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Self-Assessment and the Growth Mindset of Middle School Students

Abstract

This action research study investigated the effects of self-assessment on the growth and fixed mindsets of students. Twenty-six 6th grade students in a private school in northwest Iowa participated in the study. Each student took a pre-survey at the beginning of the study to determine whether they had a strong growth mindset, moderate growth mindset, moderate fixed mindset, or strong fixed mindset. Following the pre-survey, students participated in self-assessment experiences for nine weeks and an identical post-survey was given to determine if changes in mindset had occurred. In addition, nine students were interviewed at the conclusion of the study. Quantitative data showed little to no change in the growth and fixed mindsets of students. However, qualitative data showed that most students found value in the self-assessment activities as they developed greater ability to self-regulate their learning experiences which is consistent with growth mindset theory.

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Comments

Action Research Thesis Submitted in the Partial Fulfillment Of the Requirements for the Degree of Master of Education

Self-Assessment and the Growth Mindset of Middle School Students

by

Julie Gross

B.A. Dordt College, 2004

Action Research Thesis
Submitted in the Partial Fulfillment
Of the Requirements for the
Degree of Master of Education

Department of Education
Dordt College
Sioux Center, Iowa
May 2019

Self-Assessment and the Growth Mindset of Middle School Students

by

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Abstract

This action research study investigated the effects of self-assessment on the growth and fixed mindsets of students. Twenty-six 6th grade students in a private school in northwest Iowa participated in the study. Each student took a pre-survey at the beginning of the study to determine whether they had a strong growth mindset, moderate growth mindset, moderate fixed mindset, or strong fixed mindset. Following the pre-survey, students participated in self-assessment experiences for nine weeks and an identical post-survey was given to determine if changes in mindset had occurred. In addition, nine students were interviewed at the conclusion of the study. Quantitative data showed little to no change in the growth and fixed mindsets of students. However, qualitative data showed that most students found value in the self-assessment activities as they developed greater ability to self-regulate their learning experiences which is consistent with growth mindset theory.

Keywords: growth mindset, fixed mindset, self-assessment

Many of today's students are struggling to find the motivation it takes to thrive in their learning. In 2017, Gallup's Student Poll survey reported that an average of 47% of students in grades five through twelve were engaged in school; and the more time students spend in K-12 education, the more their levels of motivation decline. Whereas 74% of 5th grade students reported being engaged in school, that number dropped to 45% by eighth grade. Furthermore, Gallup reported that disengaged students are nine times more likely to say they get poor grades at school, twice as likely to say they missed a lot of school last year, and 7.2 times more likely to feel discouraged about the future than students who are engaged (Robison, 2018).

Researchers believe that student mindsets play an important role in student success and motivation. Cury, Elliott, Da Fonseca, & Moller (2006) found that "students who believe they can increase their academic ability by their own effort are more likely to work toward building competence, more likely to be self-motivating and persistent, and more likely to exhibit behaviors associated with higher academic achievement" (Farrington, et al., 2012, p. 30-31). Headden and McKay (2015) advocated that "it's not just academic ability that determines motivation, but also the capacities and character traits like resilience, self-confidence, and tenacity that help students stay the course" (p. 7). Evidence suggests that addressing student mindsets in the classroom may contribute to how well students are engaged in their learning.

Yeager and Dweck (2012) believed that what students need most are "mindsets that represent challenges as things that they can take on and overcome with time, effort, new strategies, learning, help from others, and patience" (p. 312). When classrooms emphasize that students have the potential to grow, students are better prepared to tackle and overcome challenges in their learning. Dweck, Walton, and Cohen (2014) support the idea that students are more likely to engage in learning tasks in situations where teachers present them in ways that

make success seem attainable and when they provide students with the support they need. Teachers can lead students to greater perseverance and academic behaviors by teaching them about academic mindsets and by providing opportunities for students to develop their metacognitive and self-regulatory skills. By doing so, they can help “students move from being passive recipients of academic content to active learners who can manage their workload, assess their progress and status, persist in difficult tasks, and develop a reliable set of strategies to master increasingly complex academic content” (Farrington et al., 2012, p. 5).

Self-assessment allows students to accept responsibility for their own learning and performance, making middle school the opportune time to teach students self-assessment strategies. During adolescence, children are “developing the capacity to define and establish goals, regulate their behavior, and articulate an increasingly clear sense of themselves as efficacious learners” (Farrington et al, 2012, p. 56). Furthermore, Barnes and Fives (2016) have concluded that “advances in student’s cognitive capacities, social and emotional well-being, and use of self-regulation strategies allow middle level educators to design assessments that capitalize on students’ developing capacities to engage in more autonomous and challenging tasks” (p. 31). Therefore, it is suggested that students in the middle grades will fare best in instructional environments that take these new abilities into account.

Instructional contexts that promote self-assessment provide students with opportunities to assess what they already know, determine the steps they need to take to improve their learning, and make the changes needed to find success in their learning. When students are encouraged to think about their learning, including what they know and need to learn, achievement improves (Shatri & Zabeli, 2018). Providing students with opportunities to use self-assessment in the

classroom enhances their potential to develop a positive academic mindset by increasing self-awareness and offering insight that can transform a student's education.

Purpose of the Study

The purpose of the study was to determine if self-assessment positively impacts the academic mindsets of middle school students.

Research Questions

1. Will a student with a fixed mindset adopt a growth mindset when self-assessment strategies are regularly used during instruction?
2. Will a student who already has a growth mindset develop a stronger growth mindset when self-assessment strategies are regularly used during instruction?

Definition of Terms

For the purposes of this study, the following definitions will be used. All definitions are the author's own unless otherwise indicated.

Academic mindset - beliefs, attitudes, or ways of perceiving oneself in relation to learning and intellectual work that support academic performance (Farrington et al., 2012, p. 9)

Academic tenacity – the growth mindset and skills that allow students to look beyond short-term goals to longer-term ones and withstand challenges while working toward goals (Dweck, Walton, & Cohen, 2014, p. 4)

Fixed mindset – the belief that the qualities a person possesses are carved in stone and that one's ability or situation cannot be changed (Dweck, 2006, p. 6)

Grit – perseverance and passion for long-term goals that entails working strenuously toward challenges, maintaining effort and interest over time despite failure, adversity, and plateaus in progress (Duckworth, Peterson, Matthews, & Kelly, 2007, p. 1087-1088)

Growth mindset – the belief that a person can develop his or her abilities over the course of time through effort and strategy (Dweck, 2006, p. 7)

Metacognition – higher-order thinking that enables understanding, analysis, and control of one's cognitive processes, especially when engaged in learning

Mindset – core assumptions about the malleability of one's abilities

Performance approach orientation – the determination to perform well in comparison to another person in order to gain favor or avoid judgement

Performance avoidant orientation – the determination to put forth as little effort as possible because one thinks he or she doesn't have the ability to do what it takes to succeed

Performance avoidance – the act of using self-handicapping strategies such as carelessness, withdrawal, or low effort in order to protect one's ego or self-esteem

Self-assessment – the act of using metacognitive processes to analyze and reflect upon one's own understanding

Self-regulation – the capacity to alter affective, cognitive, and behavioral responses to support the pursuit of goals (Burnette, Van Epps, O'Boyle, Pollack, & Finkel, 2013)

Social-psychological interventions – brief exercises that target students' thoughts, feelings, and beliefs in and about school (Yeager & Walton, 2011)

Literature Review

Albert Binet, the French psychologist who created the IQ test, once said “It's not always the people who start out the smartest who end up the smartest” (Dweck, 2006, p. 5). In other words, Binet believed that a person's intelligence is not limited to his or her natural ability. Dweck stated that each person has a mindset, or way of thinking about one's abilities. She referred to mindset as the view you adopt for yourself and noted that it “profoundly affects the

way you lead your life. It can determine whether you become the person you want to be and whether you accomplish the things you value” (Dweck, 2006, p. 6).

Each of us is a combination of fixed and growth mindsets. A fixed mindset is the belief that the qualities you possess are carved in stone. In the area of intelligence, having a fixed mindset means that a person believes his or her ability or situation cannot be changed. Someone either has what it takes to learn or doesn't. “In short, when people believe in fixed traits, they are always in danger of being measured by a failure. It can define them in a permanent way” (Dweck, 2006, p. 39).

A fixed mindset is detrimental to learning because it limits the level of achievement a student attains. For adolescents, a fixed mindset is like a test. Students may ask, “Am I smart or dumb? Am I a winner or a loser?” When someone with a fixed mindset experiences challenges and setbacks in his life, he can begin to think that he will be a loser forever. Students with a fixed mindset can develop a low-effort syndrome called performance avoidance, which means they learn to put forth as little effort as possible because they don't think they have what it takes to succeed (Dweck, 2006).

Performance-avoidant students measure their competence in comparison to others and will use self-handicapping strategies to protect their ego because they view themselves as lacking ability. To protect their self-worth, they will “begin to adopt failure-avoiding strategies. These strategies include weak efforts, avoiding academic risks, setting unrealistically high or low goals, claiming not to care, and procrastination” (Was, 2006, p. 534). Seligman suggested that the fear of failure may even be a factor in the increase in youth depression in recent decades (as cited in Headden & McKay, 2015).

On the other hand, a person with a growth mindset believes that her performance can improve with effort (Dweck, 2016; Farrington et al., 2012). A growth mindset can be summarized as the belief that people can develop their abilities over time. In this case, people believe their traits are malleable and changeable. The person with a growth mindset believes that there are many pathways to success and that each person must find the one that works for her. Growth-minded students are more engaged in their learning, have greater self-esteem, and are more likely to believe their performance will improve with effort (Farrington et al., 2012). However, common teaching practices, such as those that promote common standardized testing practices, are more likely to promote a fixed mindset (Dweck, 2006).

Studies show that mindsets change as students get older. Nicholls (as cited in Was, 2006) found evidence of growth mindset in four and five-year-old children who viewed intelligence as an unlimited ability that would improve with hard work. By second grade, children began to see intelligence as fixed. This mindset increasingly persists as students move along in school. Middleton, Kaplan, and Midgley (as cited in Was, 2006) found that students who had a performance-approach orientation in sixth grade developed a performance-avoidant orientation in seventh grade. Furthermore, a study by the Clark County School District in Las Vegas, Nevada confirms the idea that fewer students have a growth mindset in the older grades. In surveying 121,835 elementary, middle school, and high school students, they found that more elementary students had a growth mindset than middle school students. By high school, the prevalence of a growth mindset was even less, and performance avoidant behaviors had increased (Snipes & Tran, 2017).

There are many factors for this change in mindset. Dweck (2006) stated that “the transition to junior high is a time of great challenge for many students. The work gets much

harder, the grading policies toughen up, and the teaching becomes less personalized” (p. 57).

For many adolescents, school performance, grades, and engagement decline as well as their confidence in these abilities (Farrington et al., 2012). And all of this happens while students are learning to cope with their changing bodies, social roles, and greater independence. Students with a growth mindset will fare better than students with a fixed mindset as these changes are happening because they will keep persevering.

Academically, research has shown a correlation between student mindsets and grades. In a two-year study, Dweck (2006) measured mindset for students entering junior high. The purpose of her study was to determine if students believed their intelligence was a fixed trait or something they could develop. The results of the survey showed that only students with a fixed mindset showed a decline in grades over two years. Those with a growth mindset saw an increase in grades, whereas no difference in grades could be distinguished between those with fixed and growth mindsets prior to junior high. Students with a fixed mindset blamed others for their shortcomings, while students with growth mindsets worked hard and used the resources they had at their disposal to find success (Dweck, 2006).

Individuals with a growth mindset use self-regulation to help reach future goals (Mangels, Butterfield, Lamb, Good & Dweck, 2006). In 1972, Mischel and a group of researchers at Stanford University offered ninety-two nursery school children a marshmallow and told them that if they didn't eat it until the examiner came back, they could have more treats. Mischel and his team of researchers followed the same group of children for twenty years and found that those who had waited the longest for their treat had an average SAT score that was 210 points higher than the children who didn't delay gratification. Mischel said that as adults, those with a childhood growth mindset showed greater self-control, achieved higher levels of

education, and even had lower body-mass indexes (Headden & McKay, 2015). Interestingly, the children who kept themselves from eating the marshmallow avoided temptation with a variety of strategies including singing songs, making faces, playing with their toes, and even trying to go to sleep. “All this suggested that self-control can be taught by equipping children with specific strategies” (Headden & McKay, 2015, p. 13).

Research also shows that we have come a long way in what we understand about motivation and self-esteem since the 1990s. At that time, it was believed that students were motivated by feeling good about themselves, their abilities, and the likelihood of their success in the classroom (Dweck, Walton, & Cohen, 2014). Unfortunately, this “feel good” approach was not successful in motivating students. In 2001, psychologists Twenge and Campbell uncovered that the median male college student in 1995 reported higher self-esteem than 86% of male college students did in 1968. Yet self-esteem initiatives had not solved the problems they were designed to. Rather than improving academic achievement, several studies showed that the movement had actually lowered self-esteem (Headden & McKay, 2015).

More recent research by Dweck (2006) shows that well intended practices, such as praising intelligence actually harms students by encouraging fixed mindset. In one study students who were praised for their effort, rather than for their ability, accepted a new challenging task when given the opportunity. Those who were praised for their ability rejected the new challenging task because they didn't want their shortcomings to be seen. Students who were praised for effort saw more success and learned more, but the performance of ability-praised students plummeted even when easier problems were given (Dweck, 2006). Praising student ability harms both their motivation and their intelligence, while praising effort can increase it.

Historically, educational reforms have focused on curriculum and pedagogy. Several researchers agree that interventions can positively impact student beliefs about intelligence by connecting performance to future goals (Blackwell, Trzesniewski, & Dweck, 2007). Yeager & Walton (2011) suggest that social-psychological interventions targeting student feelings, thoughts, and beliefs about school can lead to large gains in student achievement that last for years. Social-psychological interventions can successfully promote growth mindset because they target the student's perspective of their school experience.

Interventions do not need to be time consuming in order to be effective (Farrington et al., 2012; Snipes, Fancsali, & Stoker, 2012). One study conducted in a New York City public middle school taught students, who had declining grades in math, that intelligence is malleable and compared the brain to a muscle that can grow and change with use. Students in the experimental group learned about mindsets in a series of eight sessions of twenty-five minutes each, while a randomized control group learned only about study skills in the same number of sessions. Students who participated in the control group continued to experience the decline in grades that typically happens in middle school. However, students who learned about growth mindset saw improved grades resulting in a difference between the groups of 0.30 grade points by the end of the year (Blackwell et al., 2007).

Interventions that are indirect can be most effective because they are stealthy enough that students do not recognize them, and therefore they do not stigmatize students and cause them to lose effectiveness (Sherman et al., 2009). However, explicitly teaching growth mindset may be especially helpful for students as they transition to middle school and become more autonomous with the challenging tasks they face (Bailey, Giles, & Rogers, 2015).

Barnes and Fives (2016) recommend four strategies for supporting students in their development of a growth-centered mindset in the classroom:

1. Modeling risk and allowing mistakes during learning exercises
2. Emphasizing effort over outcomes (Blackwell et al., 2007)
3. Establishing and holding high expectations for all students (Dweck, 2006)
4. Offering feedback that is both timely and focused on process to help students reach their learning goals (Mueller & Dweck, 1998)

The way that feedback is given will impact a student's performance. Withholding feedback that is difficult to hear doesn't help a student's confidence—it builds false optimism and will prevent him or her from learning. Dweck (2006) stated “Research is showing that when teachers care about deeper understanding and work with students to achieve it, then students are more likely to believe that their abilities can be developed” (p. 219).

In the classroom setting, mindsets not only influence the academic performance of students but their goal orientations as well (Yeager & Dweck, 2012). Additionally, students with growth mindsets are able to be resilient when experiencing challenges and can face their challenges in positive ways (Blackwell et al., 2007). Resilience can also be referred to as academic tenacity, which is the growth mindset and skills that allow students to look beyond short-term goals to longer-term ones and withstand challenges while working toward goals. Dweck, Walton, & Cohen (2014) define the academically tenacious student as one that believes he belongs in school, is engaged in learning, can forego immediate pleasures for the sake of learning, is not derailed by difficulty, knows how to remain engaged over the long haul, and can employ new strategies to move forward effectively (Dweck et al., 2014).

Duckworth and her colleagues (2007) defined *grit* as “working strenuously toward challenges and maintaining effort and interest over years despite failure, adversity, and plateaus in progress” (p. 1087-1088). They say that a gritty person is someone who approaches achievement as a marathon and can stay the course (Duckworth et al., 2007). Knowing how to stay the course with learning is what growth mindset in the classroom is all about.

While middle school students are just learning to become more independent, developmentally adolescents have the capacity to become effective in monitoring and evaluating their own learning. The middle school student is “becoming increasingly self-aware, more able to reflect on themselves, and conscious of their strengths and weaknesses” (Heritage, 2009, p. 28). In other words, student abilities to metacognitively think about their own thinking increase during the middle school years as students gain the capacity to learn how to learn using strategies that promote sense-making, self-assessment, and reflection.

Metacognition can also be referred to as self-regulation, a process that “refers to the capacity to alter affective, cognitive, and behavioral responses to support the pursuit of goals” (Burnette et al., 2013). Students who have a growth mindset may report greater levels of self-regulation because they engage in it on a regular basis. However, research shows that individuals can strengthen their ability to self-regulate through regular practice (Baumeister & Tierney, 2011).

Self-assessment can help students become aware of their mindsets and the strategies they can use to further their learning and overcome challenges. Learning strategies which target metacognition, self-regulation, time management, and goal setting “constitute a group of learner-directed strategies, processes, and ‘study skills’ that contribute to academic performance” (Farrington et al., 2012). Achievement also improves when students are required to think about

what they understand and what they need to do to improve. Self-assessment activities such as the use of rubrics, graphic organizers, and written reflections encourage students to metacognitively reflect upon their strengths and weaknesses, promoting self-regulation theory (Shatri & Zabeli, 2018). To be most effective, self-assessment activities should be interwoven into the curriculum (Brown & Harris, 2014). When this is the case, self-assessment encourages students to accept responsibility for their own learning and performance while promoting the development of a growth mindset.

Methods

Participants

The participants in the study were twenty-sixth 6th grade students in a small private Christian school in northwest Iowa. Fifteen of the students who participated in the study were males (57.7%) and eleven were females (42.3%). Students in the study were split into two sections for history class with the same content being covered in both sections (14 students in one section and 12 in the other). Students were combined into one section for Bible class with the same teacher. Students were eleven or twelve years old at the time of the study. All but one of the 6th graders in the study was Caucasian. Three of the students in the study were on 504 plans. One student has autism and attention deficit disorder, another student has F43.22 adjustment order with anxiety, and the third student has a processing speed disorder.

Materials

At the beginning of third quarter each 6th grader was given an academic mindset survey using *Google Forms* to assess whether they had a growth mindset or a fixed mindset toward learning. The first four survey items were developed by the Consortium on Chicago School Research as part of the *Becoming Effective Learners Survey* and were previously field tested

(Farrington et al., 2014). These survey items were also used in a study of the mindset, performance, and academic behaviors of K-12 students attending school in the Clark County School district in Las Vegas, Nevada (Snipes & Tran, 2017). Survey items five through fourteen were developed from Dweck's (2006) descriptions of the growth and fixed mindsets in *Mindset the New Psychology of Success*. An equal number of growth mindset and fixed mindset-related questions were used in this portion of the survey. All survey questions were piloted by a group of eighteen middle school students who did not participate in the study. The feedback that was gathered from these students was used to revise the questions prior to administering the survey to the sixth graders (see Appendix A).

Additional materials included teacher-selected forms of self-assessment such as exit tickets, graphic organizers, rubrics, checklists, and written reflections. The form of self-assessment that was used each day depended on the content that was covered in class. In addition, a list of interview questions was generated to gather qualitative data from students at the conclusion of the study (see Appendix B).

Research Design

A combination of quantitative and qualitative methods were utilized to determine if there was a difference in academic mindset following the use of self-assessment strategies during instruction. At the beginning of the third quarter, each 6th grader was given an academic mindset survey to assess whether he or she came into the study with a growth mindset or a fixed mindset toward learning. An identical survey was given to the same group of students at the end of third quarter to determine if any changes in mindset had occurred following the use of self-assessment strategies in the classroom. Students were not notified as to whether they had a fixed or growth mindset.

In addition, a series of interviews was conducted at the conclusion of the study to gather student feedback about academic mindsets and their experiences with using self-assessment. A semi-structured interview format was used, and nine students were interviewed. Students were randomly selected for the interview using a random generator. A list of interview questions from these interviews can be found in Appendix B.

Procedures

The study used a mix of quantitative and qualitative data to examine the effects of self-assessment on the academic mindsets of students. At the beginning of the study students were given a 14-item pre-assessment survey to determine whether they had a fixed or growth mindset. An identical survey was given to students nine weeks later to determine if any changes had occurred in the academic mindsets of the students who participated in the study. Further insights into student academic mindsets and their relation to self-assessment strategies were gathered through a series of interviews. A total of nine students (34.6% of the class) participated in the interview process with interviews being conducted in a one-on-one setting (see Appendix B).

The focus of the study was to examine the relationship between self-assessment and the academic mindsets of the students who experienced them in the study. The independent variable in the study was the students who experienced the self-assessment strategies. Prior to the study, students had not experienced self-assessment on a regular basis in their 6th grade classroom. The dependent variable in the study was the academic mindset scores of the students which were measured using a pre- and post- survey to determine each student's level of growth or fixed mindset. Confounding variables included the fact that students were not randomly selected for the study, since course sections had been in place from the beginning of the year, and the prior

experiences of students that could potentially impact academic mindsets and dispositions toward learning.

The study examined whether the implementation of self-assessment strategies influenced the fixed and growth mindsets of the students who exhibited them. Self-assessment methods incorporated a variety of strategies including exit tickets, graphic organizers, rubrics, checklists, and written reflections into regular instruction and were used on an almost daily basis. The method of self-assessment that was used each day was determined by the teacher who conducted the study and was based on the content that was covered in class that day. Forms of self-assessment that were unfamiliar to students were demonstrated prior to students using the method on their own. These self-assessment measures were carefully examined by the teacher who conducted the study and feedback was given to students as appropriate to help them adjust their learning strategies.

Data on student academic mindsets was collected using a survey on a five-point Likert scale at the beginning of the study. For each of the fourteen survey questions, students were asked to reflect upon their beliefs about learning and whether they felt each question was *not true at all, a little true, somewhat true, mostly true, or completely true*. Survey items were weighted for scoring and reverse-coded as needed to categorize students into one of the following categories: strong growth mindset, moderate growth mindset, moderate fixed mindset, or strong fixed mindset. A score of 14 represented the strongest growth mindset possible, while a score of 70 represented the strongest fixed mindset possible. The score range for each category can be seen in Table 1. An identical survey was taken nine weeks later, at the conclusion of the study, to determine if a change in mindset had occurred. Then the data was analyzed and graphed using

the Wilcoxon Signed Rank Test, a nonparametric test designed to evaluate the difference between two treatments or conditions where the samples are correlated.

Table 1

Academic Mindset Categories by Scoring Range

	Survey Score
Strong Growth Mindset	14-27
Moderate Growth Mindset	28-41
Moderate Fixed Mindset	42-55
Strong Fixed Mindset	56-70

Nine students participated in semi-structured interviews at the conclusion of the study, which were recorded and transcribed by the researcher. These transcribed documents were thoroughly examined for common themes or trends in the answers that were given to each survey question. Important words and themes from each interview were highlighted and coded before being grouped together by shared characteristics in order to determine patterns.

Results

Survey Responses

Figure 1 shows the number of students who scored in each of the mindset categories at the beginning and end of the experiment. In all, a total of 26 students participated in the study. At the conclusion of the study the number of students in the strong fixed mindset category remained the same, but the number of students in the moderate fixed mindset category increased by three. The moderate growth mindset category saw a decrease of four students, while the strong growth mindset category saw an overall increase of one student.

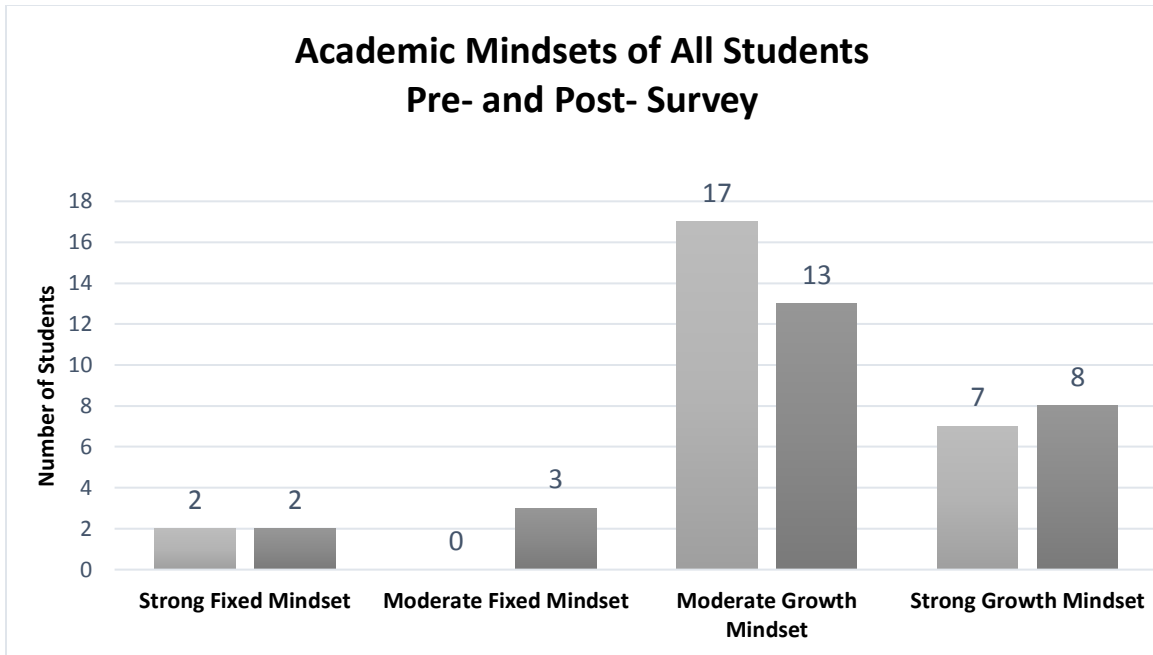


Figure 1. Distribution of student fixed and growth mindsets pre- and post- study

Research Question 1

The first research question examined if a student with a fixed mindset would develop a growth mindset when self-assessment strategies were regularly used during instruction. No students had a moderate fixed mindset at the time of the initial mindset survey. Survey results further indicated that only two students, Student 5 and Student 7, had a strong fixed mindset at the beginning of the study. Post-survey results showed little to no change with both students remaining in the strong fixed mindset category at the conclusion of the study. Table 2 shows the pre- and post-survey results of these two students.

Table 2

Scores of Students with Strong Fixed Mindset

	Pre-Survey Score	Post-Survey Score	Difference in Score
Student 5	57	59	2
Student 7	49	49	0

Research Question 2

Research question two addressed whether a student who had a growth mindset at the beginning of the study would develop a stronger growth mindset when self-assessment strategies were regularly used in the classroom. Twenty-four students (92.3%) in the research sample had either a moderate growth mindset or a strong growth mindset at the beginning of the study. Of these twenty-four students, seven had a strong growth mindset at the time the pre-survey was given and seventeen had a moderate growth mindset. Each of these groups must be examined separately in order to answer the research question.

Students who ranked in the strong growth mindset category at the time of the pre-survey are listed in Table 3. Results show that, of the seven students with strong growth mindsets, five (71.4%) remained in the strong growth mindset category while two (28.6%) dropped to the moderate growth mindset category due to slightly higher scores. The overall mean score difference for students in this category was -1, showing a nominal change in growth mindset.

Table 3

Scores of Students with Strong Growth Mindset

	Pre-Survey Score	Post-Survey Score	Difference in Score
Student 11	24	24	0
Student 12	27	27	0
Student 13	14	18	-4
Student 14	24	24	0
Student 20	27	25	2
Student 21	26	30	-4
Student 26	27	28	-1

Seventeen students (65.3%) in the study had a moderate growth mindset at the time of the pre-survey. The scores of these students can be seen in Table 4.

Table 4

Scores of Students with Moderate Growth Mindset

	Pre-Survey Score	Post-Survey Score	Difference in Score
Student 1	36	29	7
Student 2	28	25	3
Student 3	41	41	0
Student 4	33	29	4
Student 6	30	26	4
Student 8	32	34	-2
Student 9	40	41	-1
Student 10	29	33	-4
Student 15	33	44	-11
Student 16	29	39	-10
Student 17	30	29	1
Student 18	32	32	0
Student 19	41	49	-8
Student 22	29	24	5
Student 23	31	30	1
Student 24	32	36	-4
Student 25	34	56	-22

The students who had a moderate growth mindset at the beginning of the study showed mixed results. Of the seventeen students who had a moderate growth mindset at the beginning of the study, eleven (64.7%) remained in that category at the conclusion of the study. The remaining six students split evenly, with three students (17.65%) developing a strong growth mindset and three students (17.65%) moving into the fixed mindset range.

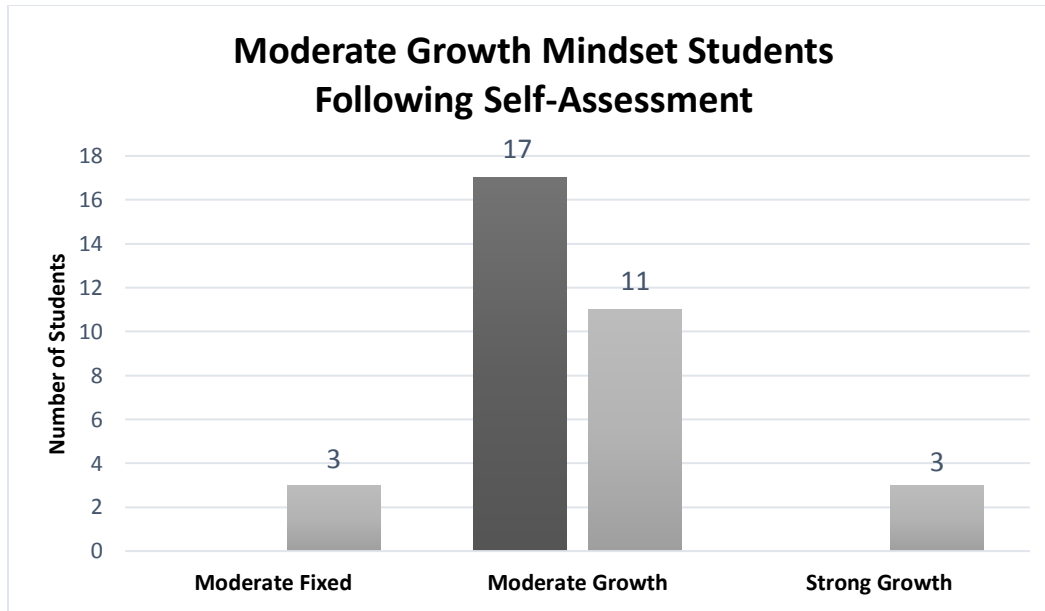


Figure 2. Distribution of students with moderate growth mindsets post-survey

Student 2, Student 6, and Student 22 developed a stronger growth mindset after using self-assessment in the classroom. Their academic mindset score improved by a mean of four points. However, the academic mindset scores of Student 15, Student 19, and Student 25 decreased by a mean score of 13.7 points. These mixed results show that further study should be done on the effects of self-assessment for students who have a moderate growth mindset.

Since the data gathered showed a non-normal distribution, the Wilcoxon Signed-Rank Test was used to evaluate the quantitative data that was collected from the twenty-six students who participated in this study. The data was analyzed to consider a .05 level of significance.

The results from this analysis show a p-value of 0.11702 which supports the idea that there was little to no change in the overall academic mindsets of students due to self-assessment.

Interview Responses

Nine (34.6%) of the twenty-six students who participated in the study were randomly chosen to participate in an interview with the researcher at the conclusion of the study. Students 2, 8, 9, 11, 13, 16, 17, 20, and 26 participated in the interview process. The purpose of these interviews was to look for themes in student ideas about academic mindset and their personal experiences with self-assessment.

Theme 1: Students believe that intelligence is malleable. Interviews showed that the overwhelming majority of students felt that they have the ability to change their intelligence. Eight of the nine students who were interviewed believed that a person has the capacity to change his or her intelligence. Only one student, Student 16, said that a person cannot change their ability to learn, but that they can use their ability more. He said that a person's "capacity to learn can't improve but they can fill up that capacity more" (Student 16 Interview, March 28, 2019). All nine students believed that their intelligence could be improved at least to a certain degree. This idea characterizes a growth mindset.

Theme 2: Students believe that effort and attentiveness can improve intelligence. Seven of the students noted the importance of being willing to put in the work that is required to succeed in order to do well in school. Student 2 said that intelligence could be improved "from doing all the extra that they can including extra assignments; or whenever there's a fix paper, you fix it" (Student 2 Interview, April 2, 2019). Student 17 said that a person can "practice things that they aren't as good at to help them get better. If you aren't good at math you can

study flashcards, or you can read books about things you are learning in class” (Student 17 Interview, April 2, 2019).

Three students noted the importance of listening and paying attention in class. Student 11 said that “if you’re not really paying attention, you don’t learn much and you don’t know much. But if you actually do pay attention more, you could gain more knowledge and you learn more and get smarter” (Student 11 Interview, April 3, 2019). Other students mentioned the importance of trying, studying, and challenging themselves in order to improve their intelligence. Again, the ideas presented here reflect a growth mindset which is consistent with the academic mindsets of the students who were interviewed.

Theme 3: Students had a positive view of themselves as learners either all or some of the time. Student interviews showed that students have an awareness of their work habits and themselves as learners. When students were asked if they considered themselves to be good learners, four students (44.4%) said yes and five students (55.6%) indicated that they were good learners sometimes. Students who believed they were good learners reflected on their work habits and level of effort. Student 11 said “I actually listen in class and I don’t mess around” (Student 11 Interview, April 3, 2019). Student 17 expressed a similar thought and said that “I listen in class and try not to get distracted” (Student 17 Interview, April 2, 2019). Another student said that he liked learning and enjoyed challenging himself.

The students who considered themselves to sometimes be good learners said that it depended on the situation or the amount of effort they put in. Student 8 said, “It depends because I’m better at some things than others” (Student 8 Interview, April 2, 2019). Student 9 reflected a similar idea and said that “It depends on the situation and how well I listen” (Student 9 Interview March 28, 2019). Another student mentioned the importance of taking the time to

understand and said, “I can learn things but sometimes I also rush through things” (Student 16 Interview, March 28, 2019).

Theme 4: All students found some value in the self-assessment activities that were used in the study. When asked whether they liked the self-assessment activities that they had done in class over the course of the study, five of the nine students interviewed said that they liked the self-assessment activities. Student 2 said “The ones that prepare me for tests were pretty good because then I could know what I needed to study for. And I liked the other ones where it helped you check over your work and made sure you were doing everything you needed to” (Student 2 Interview, April 2, 2019).

Student 9, Student 16, and Student 20 all agreed that self-assessment helps you know what you are learning. Student 16 explained “They help me figure out what I need to do and what I’ve done” (Student 16 Interview, March 28, 2019). Student 20 said that were helpful because they help you better understand what you need to work on. Student 26 agreed and said “I really like the ones where you can check them off to see if you have this done, or if you should have a title and good paragraphs. Then I can read those over and see if I have good paragraphs” (Student 26 Interview, April 3, 2019).

Two of the students interviewed felt that the self-assessment activities were okay and did not express strong reasons for liking or disliking the activities. Student 8 simply said “They were fine. Some of them I liked more than the other ones. I liked the test ones and some of the rubric ones” (Student 8 Interview, March 28, 2019). Student 13 expressed that he thought the self-assessment activities helped some people but only helped him a little bit.

Student 11 and Student 16 mentioned not liking the self-assessment activities, but both students still found value in them. “Sometimes I don’t really like them, but then once you have

things written down you remember them. Sometimes you don't like writing them down, but it does help later on and then you can look back and just be like, 'Oh, I remember when we did that.'" Student 11 also said "I think the rubrics help because you can look back...it makes you try. Some of these it just looks back at what you learned—like the exit tickets—you want to try to remember things. And for the study checklists, you want to check it so like, 'yes, I do know this' or 'I short of know it,' but then when you don't know it, you try to study it" (Student 11 Interview, April 3, 2019). Student 16 said, "They help me figure out what I need to do and what I've done, but sometimes they can be annoying because I have to do them and then we don't have as much time for other things" (Student 16 Interview, March 28, 2019). When this student was asked if he would rather do self-assessment or another assignment such as comprehension questions he said, "I would rather do these things most of the time, at least."

Theme 5: The majority of students felt that self-assessment improved their ideas about what they can achieve. Two-thirds of the students interviewed felt that self-assessment had improved their ideas about what they are able to learn to at least some degree. Three students said that they helped, three students said that some of them had helped, one student was unsure, and two students did not think they had improved their ideas about what they are able to learn.

The students who said that the self-assessment activities had helped were able to express specific reasons why. Student 17 said that self-assessment "makes me know that I can do things without needing to have help and there are a lot of things that I know I need to learn or that I have already learned" (Student 17 Interview, April 2, 2019). Student 20 expressed that a self-assessment rubric had helped him improve his scores with his current events response assignment. "With the current events I realized that with some stuff I wasn't doing the exact

right thing, so I needed to change up my paragraph” (Student 20 Interview, March 28, 2019).

Student 26 said that she appreciated the self-assessment that tied learning goals to a checklist “because on the ones where you can check if you know it, or a little, or no, I like those because then you can check those off and see what I need to learn” (Student 26 Interview, April 3, 2019).

The level to which self-assessment helps students was negatively perceived by two students. Student 8 and Student 13 both said that the self-assessment activities had not really helped them learn. Student 16, who wasn’t sure if self-assessment had helped him, said “I’ve always thought that I can learn anything, and I basically have learned everything that I’ve tried to learn or everything that we’ve done in school” (Student 16 Interview, March 28, 2019).

Discussion

Overview of the Study

The purpose of the study was to determine if students would see a positive change in their academic mindset following the use of self-assessment. Self-assessment activities included exit tickets, graphic organizers, rubrics, checklists, written reflections and other experiences that allowed students to reflect upon their own work. 26 sixth grade students participated in the study during the third quarter of the 2018-19 school year. Students took a fourteen-question pre-survey at the beginning of the quarter to determine their level of fixed or growth mindset. Each student took an identical survey at the completion of the quarter to evaluate whether their mindset level had changed following the use of self-assessment. Additionally, nine students were randomly chosen for interviews at the conclusion of the study to give the researcher further insight into student ideas about learning and the self-assessment activities that were used during the study.

Summary of Findings

The analysis of the survey results showed that there is little to no evidence for a difference in student academic mindset following the use of self-assessment. Six (23.1%) students who participated in the study saw no change in academic mindset at all from pre- to post-survey. Twelve (46.2%) of the students in the study saw a decrease in their level of academic mindset and became more fixed. Students in this group saw their mindset score increase from 1 to 22 points on the academic mindset scale that was designed for the study. On this scale, scores range from 14 to 70 points with a higher score representing a stronger fixed mindset and a lower score representing a growth mindset. Eight (30.7%) of the students in the study saw an increase in their level of academic mindset and became more growth-minded. Students who experienced improved scores saw an improvement ranging from 1 to 7 points.

The first research question asked if students with a fixed mindset would adopt a growth mindset when self-assessment strategies were regularly used in the classroom. Student 5 and Student 7 were the only students who exhibited a fixed mindset at the time of the pre-survey. Little or no positive response to self-assessment was seen from an academic mindset vantagepoint for either of these students. Student 7's score did not change at all, while Student 5 showed a slight improvement of two points. Since both students were on 504 Plans at the time of the study and regularly receive modifications for their work, they did not participate in as many of the self-assessment activities as the rest of the class and it is unclear how much this impacted their results. However, Student 22 was also on a 504 Plan at the time of the study and saw an improved score of five points which was enough to bring her into the strong growth mindset range. Therefore, it is unclear how much academic mindsets are impacted by learning challenges based on the small sample size of students with 504 Plans in this study.

Research question two asked if a student with a growth mindset would develop a stronger growth mindset after using self-assessment activities. The answer to this question is also inconclusive. Twenty-four students embodied a growth mindset at the beginning of the study, with seven of these in the strong growth mindset category and seventeen in the moderate growth mindset category. Student 21 and Student 21 had a strong growth mindset during the time of the pre-survey but dropped into the fixed mindset category at the time of the post-survey. These two students showed a slight average increase of 2.5 points. However, the five students who stayed in the strong growth mindset category saw a mean change of 0.4 points, showing a slight improvement in their growth mindset.

The students who had moderate growth mindsets at the beginning of the study showed the most interesting results. Eleven students scored in the moderate growth mindset range at the beginning of the study, remained in that category, and saw a growth mindset decrease of 0.73 points. Three students who had moderate growth mindsets developed a strong growth mindset, while three others dropped to the moderate fixed mindset category. Student 2, Student 6, and Student 22 saw an average growth mindset improvement of four points. Significant decreases in growth mindset were seen by Student 15, Student 19, and Student 25. Their academic mindset scores changed by 11, 8, and 22 points respectively moving them into the moderate fixed mindset category. The scores of these three students brought the overall class mean change 1.77 points into the fixed mindset range. If the scores of these three students were left out of the equation, then the mean change would be just 0.22 points into the fixed mindset range which is insignificant and supports the null hypothesis that student self-assessment does not improve their academic mindsets.

While the quantitative data showed no significant results, student interviews presented a more positive case for self-assessment. All students who were interviewed believed that a person can change his or her intelligence with effort, a belief that is consistent with a growth mindset. Over half of the students viewed the self-assessment activities favorably. When asked if they would continue using the self-assessment activities if given the choice, five (55.6%) of the students interviewed said yes, three (33.3%) said maybe depending on what type of self-assessment activity it was, and only one (11.1%) said no. The student who didn't prefer to use the self-assessment activities said that they were helpful, but not that helpful.

Students found the most purpose in self-assessment experiences that allowed them to check over their work to see if learning goals had been met. Checklists and rubrics were mentioned in several interviews as helping students understand the expectations for an assignment or project. Two of the students who said they would maybe want to continue using self-assessment saw the activities as an extra thing to do but also mentioned the fact that they teach you what you have learned and what you need to work toward knowing. Other students mentioned how they had helped prepare them for upcoming tests. These students felt that self-assessment had been helpful in guiding them through the changes they needed to make to their work or their study strategies in order to succeed.

Recommendations

While the quantitative data expressed no significant improvement in student growth mindset, qualitative interviews showed that self-assessment helped students make gains in developing their ability to self-regulate. For this reason, the researcher recommends the continued purposeful use of self-assessment in the middle school classroom. Since adolescents are growing in their capabilities to monitor and evaluate their own learning, self-assessment

continues to have the potential to help students understand their strengths and weaknesses and what they can do about them. Reflecting upon learning goals and the strategies that can be used to help realize them is what embodies a growth mindset.

At the same time, students need to be carefully guided and encouraged through the process. Self-regulation takes practice and will not develop overnight. Since self-assessment helps students understand what they know and don't know, it is possible that self-assessment made some students in the study more aware of their own limitations which could have decreased their level of growth mindset. Therefore, students need to be equipped with strategies that they can use when they encounter roadblocks in their learning.

Additional research should be conducted with two groups of students. Students with moderate growth mindsets would benefit from additional research because of the mixed results observed in the study. The type of self-assessment that works best for students in this group should be evaluated as well as other possible interventions that could keep these students on a growth mindset track. Secondly, students with fixed mindsets need to be further studied as the sample size of two students was much too small to fully understand the impact that self-assessment has on the academic mindsets of students within this population. Possible interventions that would promote growth mindset for the students within this population should also be investigated.

Limitations of the Study

Many factors contribute to growth and fixed mindsets including some factors which are outside of the researcher's control. Therefore, the goal of this study was to examine growth mindsets from an academic perspective. The experiences of students outside of school and

previous experiences with learning that contributed to growth or fixed mindsets were not analyzed in this study, although they could have had a reasonable impact on the results.

The relationship between the quality of student self-assessment and fixed or growth mindsets was not considered in this study but would be worthy of further study. While the teacher designed self-assessment activities that connected to learning and provided students with feedback, the self-assessment activities were conducted by students who were new to some of the self-assessment activities which means that user error a possibility.

Another significant limitation was that nine-week timeframe that this study was conducted in. Different results are possible should this study be conducted over several months or even a full school year. Larger gains are likely over time as students become more aware of themselves as learners and what they can do to gain more control over their learning. Different results are also possible if self-assessment were to be used in all subjects of study. Sixth graders who participated in the study experienced self-assessment in two of their six core academic subjects. Increasing the amount of time that students participate in self-assessment activities may provide further clarity as to the amount of self-assessment that is needed to make a significant impact on student growth mindset.

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Appendix A

Growth Mindset Survey

DIRECTIONS: Thank you for your participation in the following survey. Read each statement and carefully consider how true you believe each item to be. Then mark the answer that best fits your beliefs. Please be as honest as possible and mark only **one** answer for each statement. The answers you share here will be kept confidential.

	Not True At All 1	A Little True 2	Somewhat True 3	Mostly True 4	Completely True 5
1. My ability to learn is something that I can't change very much.					
2. Challenging myself won't make me any smarter.					
3. There are some things I am not capable of learning.					
4. If I am not naturally smart in a subject, I will never do well in it.					
5. I believe that people who are successful in school were naturally born smart.					
6. I am in charge of what I am able to learn.					
7. I find challenging tasks to be interesting.					
8. When I fail, I feel that my failures define who I am.					
9. When I do something incorrectly, I want to try it again.					
10. I try hard because I want people to think I am smart.					
11. If I do well on an assignment or test, it's usually because of good luck.					
12. I believe that people who are smart don't have to work hard.					
13. I enjoy learning new content even if I make a lot of mistakes while I'm learning it.					
14. I see failure as an opportunity to learn what I need to do better.					

Appendix B**Interview Questions**

1. What does a person need to do to be successful in school?
2. Do you think a person can change his or her intelligence? If so, how?
3. Would you consider yourself to be a good learner? Why or why not?
4. What strategies do you use to help you learn in school?
5. What kinds of thoughts come into your head when you encounter a challenging assignment or test in school?
6. How do you feel when you fail at something in school?
7. What do you think of the self-assessment strategies that we've been using over the past few weeks?
8. Has self-assessment changed your ideas about what you are able to learn? If so, how?
9. If you were given the choice, would you continue using the self-assessment strategies we've tried in class? Why or why not?