Student Mindset Compared to Performance on the Nebraska State Accountability Test

Ann E. Dvorak
University of Nebraska-Lincoln, ann@clovercove.com

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STUDENT MINDSET COMPARED TO PERFORMANCE ON THE NEBRASKA STATE ACCOUNTABILITY TEST

by

Ann E. Dvorak

A THESIS

Presented to the Faculty of

The Graduate College at the University of Nebraska

In Partial Fulfillment of Requirements

For the Degree of Master of Science

Major: Leadership Education

Under the Supervision of Professor Lloyd Bell

Lincoln, Nebraska

December, 2014
Carol Dweck’s research on fixed vs. growth mindset has led to many opportunities for educational research. According to Dweck, a person with a fixed mindset believes that his or her qualities related to a certain task are unchangeable while an individual with a growth mindset believes that his or her qualities related to a certain task can be changed and improved (Dweck, 2006). A correlative study was conducted to identify relationships that exist between student mindset and scores from the Nebraska State Accountability Test (NeSA). For this study, students in the 7th, 8th, and 11th grade classes at a Plains State school were administered Dweck’s Scale of Mindset. These scores were then correlated with their standardized test scores. A null hypothesis was formed that there is no relationship between student mindset and performance on the NeSA test. A moderate, positive, statistically significant correlation was found between 8th grade and 11th grade reading scores and intelligence mindset. Similarly, a moderate, positive, statistically significant correlation was found between female reading scores and intelligence mindset. Recommendations for further study and implications for practice were given.

*Keywords: growth mindset, fixed mindset, self-concept, cognitive development, constructive-developmental theory, standardized testing*
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Chapter 1

Introduction

Since Ronald Reagan’s administration released the document *A Nation at Risk: The Imperative for Educational Reform*, the United States’ educational system has been under close watch as to how it is meeting the needs of learners. Much of the document compares the United States to other world powers and points out the deficiencies in the system as it was in 1983 (Burdick, 2012). This document brought about some major reform in the educational system, began the focus on education, and led to the initial adoption of the “No Child Left Behind Act” in 2001 (U.S. Department of Education, 2008). The purpose of the “No Child Left Behind Act” was “to close student achievement gaps by providing all children with a fair, equal, and significant opportunity to obtain a high-quality education,” (Elementary and Secondary Education Act, 2013, para. 3).

Under this law, states are required to test students’ reading and math skills in grades 3-8 and once in high school. Since this adoption, school administrators and teachers have been mandated to meet adequate yearly progress goals. These goals compare student achievement on standardized tests from year to year. Students are expected to show improvement each year and meet or exceed state standards in reading and math by 2014. If adequate yearly progress is not achieved, school districts are given consequences that become harsher and harsher for each year that adequate yearly progress is not achieved.

While this is the reality that many schools face, there are several contributing factors that can be explored. There are many issues contributing to low test scores including student socioeconomic standing, student attendance, school conditions, parental support and even bullying. Because of this wide array of issues and factors and because of the increased
importance being placed on meeting yearly progress goals, in schools across the country, those involved in education are continually searching for answers on how to raise standardized test scores (Jorgenson, 2012).

Carol Dweck, a Lewis and Virginia Eaton Professor at Stanford University, has devoted much of her research towards exploring an individual’s perception of self and how these perceptions affect different realms of his or her life. Through her research, Dweck has demonstrated that students develop a perception of intelligence (Dweck, 1975, 1986, 2006, 2010). Some believe that intelligence is something that is malleable and can be changed while others believe that it is something that is fixed and cannot be altered. Could it be possible that how a student perceives his or her intelligence will affect his or her performance on a standardized test? This study will explore the theory of student mindsets and if an individual student’s intelligence mindset affects his or her performance on a standardized test.

According to Dweck (2006), everybody has certain beliefs about themselves that “create different psychological worlds that lead to a host of thoughts, feelings, and actions.” These beliefs are established through experiences and encounters throughout life. Failures contribute to these beliefs, as do successes. Once these beliefs are established, people begin to form perceptions on what portions of their lives can be influenced and what things are out of their control, thus solidifying either a fixed or a growth mindset. A person with a fixed mindset believes that his or her qualities related to a certain task are unchangeable while an individual with a growth mindset believes that his or her qualities related to a certain task can be changed and improved (Dweck, 2006). Interestingly enough, an individual can have a mixture of mindsets within a domain such
as intelligence or an individual can also have differing mindsets across domains such as a fixed mindset in relation to social interaction and a growth mindset in relation to intelligence (Dweck, 2006). Because of this complexity, for the purposes of this research, the focus will be on mindset as it relates to intelligence and academic performance.

Past studies have shown that mindset can affect a student’s performance in a course (Blackwell, Trzesniewski, and Dweck, 2007). Furthermore, research indicates that mindset is something that can be altered with proper intervention. In a study by Blackwell, Trzesniewski, and Dweck (2007), 7th grade math students completed Dweck’s Mindset Scale. Those that were found to have a growth mindset showed an upward trend in math grades during their two years in junior high, while those that were found to have a fixed mindset showed no change in math grades during the same time period. During this study, an eight-session intervention program was also installed. Students were put into experimental and control groups. Both groups received instruction on the physiology of the brain, proper study skills, and antistereotypic thinking. Blackwell, Trzesniewski, and Dweck (2007) further describe the study below:

In addition, through science-based reading, activities, and discussions, students in the experimental group were taught that intelligence is malleable and can be developed; students in the control group had a lesson on memory and engaged in discussions of academic issues of personal interest to them. (p. 254)

Results of this intervention highlighted that when students are taught that intelligence is something that is not fixed but instead can be developed, motivation and grades increased. Thus, if intelligence mindset is an indicator of performance on standardized tests, the thought behind the current research study is that teachers and administrators
would have the capability to detect an individual’s mindset, implement a strategy to modify a student’s perception of intelligence and ultimately impact scores on standardized tests (Blackwell, Trzesniewski, and Dweck, 2007).

In order to adequately explore the concept of mindsets, it is important that theories of self-concept and cognitive development be understood. Through literature review, self-concept will be explored as a building block for cognitive development, which gives a glimpse into how mindsets are formed, how they may affect academic performance, and how they can possibly be altered through intervention.

**Statement of the Problem and Definitions**

The purpose of this study was to investigate if the intelligence mindset of 7th, 8th and 11th graders at a Plains State school correlated to student math, science, reading and writing performance on the Nebraska State Accountability (NeSA) tests.

**Nebraska State Accountability Test:** “a system of criterion-referenced tests in reading, mathematics, science, and writing,” (Nebraska Department of Education: About NeSA, 2013).

**Mindset:** a view or belief that is adopted for one’s qualities and characteristics – where they come from and whether or not they can change. There are two types of mindsets: fixed and growth.

**Fixed Mindset:** “believing that your qualities are carved in stone,” (Dweck, 2006, p. 6).

**Entity Theory of Intelligence:** individuals that favor this theory believe that intelligence is a “fixed or uncontrollable trait,” (Dweck & Leggett, 1988, p. 262).
**Performance Goals:** the focus of performance goals is to avoid negative judgments by proving ability (Elliot & Dweck, 1988).

**Growth Mindset:** “based on the belief that your basic qualities are things you can cultivate through your efforts,” (Dweck, 2006, p. 7).

**Incremental Theory of Intelligence:** individuals that favor this theory believe that intelligence is a “malleable, increasable, controllable quality,” (Dweck & Legget, 1988, p. 262).

**Learning Goals:** the focus of learning goals is to seek to increase ability or master new tasks (Elliot & Dweck, 1988).

In order to better understand the formation of mindsets and how interventions can alter mindsets, self-concept and cognitive development are also discussed.

**Self-concept:** “a composite view of oneself,” (Bong & Skaalvick, 2003, p. 2).

**Academic Self-concept:** explanation for an individual’s beliefs of his or her abilities academically (Byrne, 1984; Shavelson and Bolus, 1982; Wigfield and Karpathian, 1991).

Self-concept is closely related to self-efficacy, which is “one’s capabilities to organize and execute the courses of action required to produce given attainments,” (Bong & Skaalvick, 2003, p. 5). The two are similar in that they help to explain and predict and individual’s thoughts, emotions and actions. However, “while self-concept represents one’s general perceptions of the self in given domains of functioning, self-efficacy represents individuals’ expectations and convictions of what they can accomplish in given situations,” (Bong & Skaalvick, 2003, p. 5). Because this study focuses on a
student’s mindset as it pertains to a certain domain – intelligence, we will use self-concept to explore the basis for mindset development.

**Cognitive Development:** the process of gaining intelligence and problem-solving ability from infancy to adulthood.

### Chapter 2

**Review of Related Literature**

**Self-Concept**

At the base of the mindset theory is that everyone has certain beliefs about themselves (Dweck 2006). These beliefs about oneself are defined as an individual’s self-concept. In broad terms, a person’s self-concept is that person’s perception of himself or herself (Shavelson & Bolus, 1982). These perceptions are formed through a number of avenues including one’s interpretation of environment, one’s experience, reinforcement, evaluations from others, and one’s explanation for one’s behavior (Shavelson & Bolus, 1982). Self-concept is especially influenced by reinforcements or evaluations from one’s self or from a significant other. A simple example would be a small child who is first trying to hit a baseball. If the child swings and misses and her father reinforces by saying, “That pitch was too fast,” the girl might form a self-concept that she cannot hit fast pitches. Thus, when faced with another situation where she is given a fast pitch, she may question her ability to hit the ball. Although an example, this scenario only touches the surface of self-concept formation as it can be much more complex than a simple comment from a parent. It can take many experiences, differing situations, varying environments, or even a catastrophic event before the self-concept solidifies. Figure 1 depicts how general self-concept is formed from many subareas of self-concept. These
subareas are formed through an individual’s evaluation of his or her behavior in certain situations. According to Shavelson & Bolus (1982) self-concept has seven critical features: (a) It is organized or structured because people categorize information that they have about themselves and work to compare these categories to one another; (b) It is multifaceted covering all aspects of an individual’s life; (c) It is hierarchical and moves from perceptions of behavior to thoughts about self in subareas, which leads to inferences about self in academic and nonacademic realms, finally forming a general self-concept; (d) General self-concept is stable but self-concept becomes less stable and more situation specific as one travels down the hierarchy; (e) As an individual develops into adulthood, self-concept becomes more and more multifaceted; (f) Individuals can either describe themselves or evaluate themselves when forming self-concept; (g) It can be differentiated from other constructs such as academic achievement.

Figure 1. Shavelson’s model of self-concept. Reprinted from Shavelson & Bolus (1982).
Over time the term “academic self-concept” has been adopted as an explanation for an individual’s beliefs of his or her abilities academically (Byrne, 1984; Shavelson and Bolus, 1982; Wigfield and Karpathian, 1991). “Research in education indicates that academic achievement is more correlated with academic self-concept than global self-concept, and achievement in specific domains should be correlated with the corresponding specific domains of self-concept,” (McInerney, Cheng, Mok, & Lam, 2012, p. 250). Therefore, when exploring an individual’s beliefs on their academic performance, it is imperative to explore their academic self-concept. How do they view themselves in the academic realm? Furthermore, this exploration must be even more specific to academic domains such as science, reading, or math. In the academic self-concept research realm there is also debate on whether a high self-concept forms into academic achievement or academic achievement forms into a high self-concept. Despite this debate, previous researchers have indicated that there is a positive correlation between academic self-concept and academic achievement (Wenglinsky, 1996).

Furthermore, Purkey (1988), outlined three qualities of self-concept relevant when exploring how self-concept relates to mindset. These three qualities are: (a) that self-concept is learned; (b) it is organized; and (c) it is dynamic.

Researchers have not proven that humans are born with self-concept; rather it is something that emerges throughout life. Because it is something that is created, it has the “potential for development and actualization,” (Purkey, 1988, “Some Basic Assumptions Regarding Self-Concept,” para. 3). Although there is this potential for molding and development of self-concept, it can also be difficult to change once it has been learned. Any experience that is inconsistent with an individual’s self-concept can be seen as a
threat and it is because of this threat that an individual may not feel comfortable with a change in self-concept (Purkey, 1988).

Self-concept is generally stable and provides consistency for an individual’s personality. Imagine a spider web, organized, stable because of its structure, but also fragile. This spider web can be compared to self-concept because even though there are different areas of self-concept, they are all intermingled and attached. This allows an individual to experience failure in one area thus lowering their self-concept in other areas. It also allows an individual to experience success in one area, which enhances self-concept in other areas (Purkey, 1988). It is this organization and stability that also causes self-concept to be slow to change.

Finally, self-concept is dynamic, acting as an individual’s compass for living. “This guidance system not only shapes the ways a person views oneself, others, and the world, but it also serves to direct action and enables each person to take a consistent ‘stance’ in life,” (Purkey, 1988, “Some Basic Assumptions Regarding Self-Concept,” para. 14). This means that an individual’s world is not simply perceived but instead that perception is altered in relation to one’s self-concept. Also, individuals will automatically behave in accordance with their self-concept. They will do so if it helps or even if it hinders their performance or their relationships with others (Purkey, 1988). Being able to understand these qualities of self-concept will help to better understand how it is related to cognitive development and mindsets. It will also provide a clearer picture of how mindsets evolve and can be modified.
Cognitive Development

As an individual’s self-concept is forming, he or she is also developing cognitively. Cognition is influenced by self-concept and is also a precursor to a developed mindset. In 1980, Kegan developed a constructive-developmental theory in which individuals progress through stages of cognitive development by mastering the subject/object relationship. In his theory, he outlines that objects are things that can be “held.” These are “aspects of experience, which we can perceive, take responsibility for and problem-solve around,” (Pruyn, 2010, para. 5). Subjects, on the other hand, are portions of an experience of which an individual is not aware, cannot take responsibility for, and cannot problem solve around (Pruyn, 2010). In simpler terms, objects are perceptions that we have while subjects are perceptions that have us. In the instance of a toddler, he holds many things as an object – the feeling of his clothes, the taste of an apple, the color of his blanket. These are all things of which he is aware and can perceive. He cannot, however, perceive how to control his anger. This concept is subject to him. When he is angry, he shows that anger. An adult on the other hand can become angry but usually is able to suppress that anger and handle a situation in an appropriate manner. The anger has become an object.

Objects are closely related to Dweck’s growth mindset in which individuals welcome challenge because it is something that they see can help them achieve their goals of learning and developing. Similarly, subjects are related to Dweck’s fixed mindset where individuals have a difficult time with a challenge because they are focused on performance goals and the challenge might hinder their success. As Dweck’s theory of
mindset is later explained, it will become clearer how objects are closely related to a growth mindset while subjects are related to a fixed mindset.

Kegan’s theory outlines five stages of development of the mind (Figure 2) (Pruyn, 2010). An individual moves from one stage of development to the next by taking something that was once subject to them and making it object. Figure 2 illustrates how an individual can advance cognitively by making certain aspects of life object rather than subject by taking control, perceiving, and problem solving. For the purpose of this literature review, a focus on stages three and four is beneficial.

In the 3rd order of the socialized mind, one’s own needs, interests, and desires are object while social environment is subject. A person in this order is subject to the opinion of others and is strongly influenced by what others think. In comparing this to self-concept development, one would make the connection that a person in this order would still be evaluating their behavior and taking cues from others in various settings at the bottom of Shavelson’s hierarchy.

The 4th order of the self-authoring mind highlights an individual who is able to hold his or her environment as object. This individual is no longer subject to the opinion of others and has made object relationships and mutuality. Able to form independent opinions and judgments, this person then becomes subject to his or her own ideology. It is at this stage that a person begins to problem solve to meet personal goals rather than worrying about what the social system perceives. Again, as we compare to Shavelson’s model of self-concept, an individual in this 4th order would be rising to the top of the hierarchy and forming general self-concept.
Individuals can regress or move back and forth between stages and it can take years to advance to a higher stage (Pruyn, 2010). Interestingly enough, approximately 58% of the adult population is below the level of self-authoring, with only 35% at this level of development. Further, only 1% of the population ever reaches the 5th level (Pruyn, 2010).

<table>
<thead>
<tr>
<th>Developmental Stage/Order of Mind (typical ages)</th>
<th>What can be seen as object (the content of one's knowing)</th>
<th>What one is subject to (the structure of one's knowing)</th>
<th>Underlying Structure of Meaning-Making</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Order: Impulsive Mind (~2-6 years-old)</td>
<td>one's reflexes</td>
<td>one's impulses, perceptions</td>
<td>Single Point</td>
</tr>
<tr>
<td>2nd Order: Instrumental Mind (~6 years-old through adolescence)</td>
<td>one's impulses, perceptions</td>
<td>one's needs, interests, desires</td>
<td>Categories</td>
</tr>
<tr>
<td>3rd Order: Socialized Mind (post-adolescence)</td>
<td>one's needs, interests, desires</td>
<td>interpersonal relationships, mutuality</td>
<td>Across Categories</td>
</tr>
<tr>
<td>4th Order: Self-Authoring Mind (variable, if achieved)</td>
<td>interpersonal relationships, mutuality</td>
<td>self-authorship, identity, ideology</td>
<td>Systemic</td>
</tr>
<tr>
<td>5th Order: Self-Transforming Mind (typically &gt; ~40, if achieved)</td>
<td>self-authorship, identity, ideology</td>
<td>the dialectic between ideologies</td>
<td>System of Systems</td>
</tr>
</tbody>
</table>


Figure 2. Kegan’s constructive development theory. Reprinted from Pruyn (2010).
An individual with a fixed mindset is constantly comparing themselves to others and making judgments about him or herself based on other’s performance (Dweck, 2006). It is at this level of cognition that achievement or success becomes more important than growth and learning. On the other hand, an individual with a growth mindset is more likely to believe that their performance is something that they can control (Dweck, 2006). It has been made object and thus the individual can value the challenge and understand that showing growth and learning is more important than achievement. This is important as we begin to look at mindset formation and its effect on student academic performance.

**Mindsets**

In the 1970’s, Carol Dweck (Diener & Dweck; 1978; Dweck, 1975; Dweck & Reppuccii, 1973) began her research stimulated by the observation that children who associate their failure with lack of ability (uncontrollable factor) experience performance setbacks when they encounter failure (helpless-oriented). Children who associate their failure with lack of effort (controllable factor) do not experience performance setbacks, but instead show improvement following their failure (mastery-oriented) (Dweck, 1975). This observation evolved into a wide array of psychological and educational research and has led to Dweck’s theory of mindsets (Figure 3) (Arsaga, 2011). In a more recent study, Dweck identified helpless-oriented individuals as having a fixed mindset while mastery-oriented individuals have a growth mindset (Dweck, 2006).
Figure 3. Dweck’s theory of mindset. Reprinted from Holmes (2011).
Mindset formation has its roots in self-concept formation and cognitive development. Much like self-concept and cognitive development, the bulk of an individual’s mindset comes from past experiences and outside reinforcement from peers, parents, teachers, and significant others. Dweck (2006) proposed that one of the driving factors behind mindset formation comes from the type of outside praise that is given. As previous literature review has revealed, self-concept is formed through reinforcement and evaluation from others and cognitive development also progresses through stages in which outside praise is of importance. Parents and teachers think that offering praise is building self-concept and cognitive development, but in fact it can be hindering it, depending on the type of praise given. “After seven experiments with hundreds of children, we had some of the clearest findings I’ve ever seen: Praising children’s intelligence harms their motivation and it harms their performance,” (Dweck, 2006, p. 175). Dweck (2006) goes on to explain that adolescents need praise, but that the praise needs to be directed not towards their talent and intelligence but instead towards accepting challenging, growth in learning, and putting forth effort. Healthy praise assists in developing a growth mindset rather than a fixed mindset and it is through mindsets that insight is gained on views of intelligence, goal setting, and coping with challenge. Figure 4 illustrates this discussion.
Is intelligence something that individuals are born with or is it something that can be developed over time? Dweck and Leggett (1988) highlight that a consistent indicator of either a growth or fixed mindset is one’s theory of intelligence. “Some children favor what we have termed an incremental theory of intelligence: They believe that intelligence is a malleable, increasable, controllable quality. Others lean toward an entity theory of intelligence: They believe that intelligence is a fixed or uncontrollable trait,” (Dweck & Leggett, 1988, p. 262). A fixed mindset is defined by an entity theory of intelligence while a growth mindset is defined by an incremental theory of intelligence. Interestingly enough, an individual’s theory on intelligence is the driving force behind goal formation (Dweck & Legget, 1988). For example, Elliot and Dweck (1988) hypothesized that helpless-oriented and mastery-oriented children pursue different types of goals. They found that individuals with a fixed mindset were more likely to pursue performance goals.
where the focus was to “maintain positive judgments of their ability and avoid negative judgments by seeking to prove, validate, or document their ability and not discredit it,” (Elliot & Dweck, 1988, p. 5). It was also shown that individuals with a growth mindset were more likely to pursue learning goals “in which individuals seek to increase their ability or master new tasks,” (Elliot & Dweck, 1988, p. 5).

For the current research proposal, individual mindsets will be determined and a challenge will be proposed. In Dweck’s research (1986) she indicates that if an individual sets performance goals and has high ability or confidence, he or she will seek out the challenge, show great persistence, and will demonstrate mastery. However, if an individual sets performance goals and has low ability or confidence, he or she will avoid the challenge, not persist, and demonstrate helplessness. Individuals that set learning goals can have either high or low ability or confidence and seek out the challenge, show great persistence, and demonstrate mastery when faced with a challenge (Dweck, 1986; Elliot & Dweck, 1988).

Individuals with a fixed mindset will shy away from challenges, even if the challenge is important to their future, as they do not want to risk performing poorly or showing their deficiencies. If forced to face a challenge, often times they will fail because if the task is not easy for them or requires effort, they become immediately discouraged and defensive. Individuals with a growth mindset view challenge as an opportunity to grow and learn, welcome challenge and are actually motivated by challenge. When faced with a setback or something that they don’t understand, they do not give up but instead persist in trying to find a solution (Dweck, 2010).
Summary

By studying self-concept and its assumptions of being learned, organized, and dynamic (Purkey, 1988), a correlation is made that mindsets possess these same qualities. It is because of these similarities that self-concept can be used as a basis for mindset and a better understanding of mindset formation can be recognized. The task then lies in identifying individual mindsets and altering or changing those mindsets if needed. In Dweck’s book entitled, *Mindset the New Psychology of Success*, she devotes an entire chapter to the process of altering mindset. She admits that this alteration is not always an easy one, especially in individuals who have been living with a certain mindset for years, but that it can be done. Simply educating individuals about the concept of mindsets can drastically change the way they think about themselves and their lives. The complexity of self-concept and its many areas and subareas also brings about the importance of a focused study on academic or intelligence based mindset as it relates to standardized testing.

Much like self-concept, mindsets are very complex and can cross several areas. Most individuals do not possess a 100% fixed mindset or a 100% growth mindset. Mindset can be altered throughout different domains. For example, an individual might have a fixed mindset about his or her reading skills but a growth mindset about his or her math skills (Blazer, 2011). Therefore, when studying mindset as it relates to standardized testing, it is important that the mindset survey be focused toward academic success and intelligence.

Kegan’s constructive-developmental theory (Kegan, 1980; Pruyn, 2010) helps establish connections concerning mindset development and how it relates to the cognitive
developmental stages that an individual progresses through during life. An individual’s current mindset may simply be related to the level of development that he or she is facing cognitively. This model is an indicator that an individual’s mindset can be altered if needed by equipping individuals with the knowledge of how to make subjects into objects and move to higher levels of cognition.

As an individual develops in the areas of self-concept and cognition, they are very cognizant of their environments and those around them. Both models of self-concept and cognition are also indicators of how type of praise can lead to the development of a certain mindset. Once this mindset is developed, it can cause an individual to form theories of intelligence, set certain types of goals and behave in certain manners towards challenges.

Dweck and her cohorts (Diener & Dweck, 1978; Dweck, 1975; Dweck, 1986; Dweck, 2006; Dweck, 2010; Dweck & Legget, 1988; Dweck, & Reppucci, 1973; Elliott & Dweck, 1988) indicate convincing evidence that individuals with a fixed mindset possess an entity theory of intelligence therefore setting performance goals for themselves. By adopting performance goals, individuals with a fixed mindset face challenges with a fear of failure. Individuals with a growth mindset possess an incremental theory of intelligence therefore setting learning goals for themselves. These goals allow them to face challenges with a mindset of opportunity and growth (Elliot & Dweck, 1988).

Statement of the Hypothesis

This study attempted to answer the question: Does an individual’s intelligence and academic mindset affect their performance on the Nebraska State Accountability
Test? Over 30 years of research has shown the differences that fixed mindset vs. growth mindset individuals possess (Dweck, 2006). Of particular interest is their reaction to the introduction of a challenge such as a standardized test. Based on Dweck’s research related to theories of intelligence and performance vs. mastery goals, one would expect that individuals with a fixed mindset concerning intelligence and academic success would experience lower NeSA test scores than individuals with a growth mindset concerning intelligence and academic success. The following null hypothesis was utilized for this study: There is no relationship between student mindset and performance on the NeSA test.

Chapter 3

Method

The proposal for a correlational research study was submitted to the University of Nebraska at Lincoln’s Institutional Review Board outlining the research objectives, description of participants, and procedures for consent and confidentiality. Once approval was accepted (Appendix A), the superintendent at the subject school was approached with information pertaining to the study. Following administrative consent, a cover letter (Appendix B) and consent form (Appendix C) were sent to every parent whose student was in the proposed participation group. Parents were asked to return their consent within 10 days. If a form was left unreturned, that parent was individually contacted for further clarification (Appendix D).

The Nebraska State Accountability Test (NeSA) was administered to students in grades 3-11 at the subject school. For this study, it was determined to only use NeSA test results from students at the junior high level and above. Mindsets at this age are well
established in regards to intelligence as well as academics (Dweck, 2006). The population studied was 7th, 8th, and 11th grade classes. The 7th grade class consisted of eight students – four boys and four girls. The 8th grade class consisted of eighteen total students – seven boys and eleven girls. The 11th grade class consisted of eleven total students – seven boys and four girls. This allowed for a total accessible population of 37 students – 18 boys and 19 girls. The students in these classes were primarily Caucasian and came from similar educational and economic backgrounds.

Upon receiving parental consent, students were visited during their study halls. The research was explained, and they were asked to read and sign the student assent form (Appendix E). To prevent coercion, the process of parental consent and student assent was carried out by a third party. The guidance counselor at the institution assisted with the collection of forms from parents and students. This individual also created a coding system in which each student was assigned a code. This code was used as identification on the mindset survey as well as used when the guidance counselor transferred NeSA scores to the researcher.

In March 2014, an online survey identical to Dweck’s Intelligence Mindset Survey was created using Qualtrics. Qualtrics was chosen as the survey instrument because results are sent to the researcher in a secure manner and it can be utilized with an online system. With the school’s one-to-one initiative every student had access to an iPad to complete the survey (Appendix F). The survey consisted of eight questions with six choices on a six-point Likert type scale. Individual student totals were tabulated with a high score of 48 indicating an individual with maximum growth mindset and a low score of 0 indicating an individual with a maximum fixed mindset.
The survey was completed during regular school hours in student study halls. Students were asked to identify themselves on the survey by using a four-digit code that was emailed (Appendix F) to them by the school’s counselor. For confidentiality purposes, this code was randomly assigned to the student and the guidance counselor was the only individual with access to the correlation of the code to a specific student.

Per state policy, various classroom instructors administered the NeSA tests from January-May, 2014. For example, the 11th grade math instructor administered the 11th grade NeSA math test while the 8th grade science instructor administered the 8th grade NeSA science test. All tests were administrated through a state approved online system and administrators were asked to follow a protocol for testing to ensure consistency.

The Nebraska State Accountability Assessment is designed to test individual achievement within the four key academic core areas of math, reading, writing and science. The reading and math standards are assessed at grades 3-8 and 11, while the science standards are assessed at grades 5, 8 and 11 and the writing standards are assessed at grades 4, 8 and 11. “The standards are assessed at grade-level with the exception of grade 12. The grade 12 standards are assessed on the NeSA tests at grade 11,” (Nebraska State Accountability (NeSA) Technical Report, 2012, p. 3). Participants in this study completed the following NeSA tests: 7th grade – Reading ($\alpha = 0.91$) and Math ($\alpha = 0.94$); 8th grade – Reading ($\alpha = 0.90$), Math ($\alpha = 0.93$), Science ($\alpha = 0.91$), and Writing; and 11th grade – Reading ($\alpha = 0.91$), Math ($\alpha = 0.95$), Science ($\alpha = 0.92$), and Writing. “Each assessment was based on and was directly aligned to the Nebraska statewide content standards to ensure content validity,” (Nebraska State Accountability Technical Report, 2012, p. 71).
The reading test consisted of passages with questions pertaining to the passages to be answered by participants. Depending on the grade level, the test consisted of 45-50 questions. The math and science portions contained anywhere from 50-60 operational test questions for students to complete. Scores from the reading, math and science tests were scaled by the Nebraska Department of Education to fit in a range of 0-200. A score of 0 was reserved for students who were not tested and a score of 1 was given to any student who attempted the test even if no correct answers were given. The following performance levels were assigned: 135-200 exceeded standards, 85-134 met standards, and 1-84 below the standards (Nebraska State Accountability (NeSA) Technical Report, 2012).

For the writing portion of the test, students were given a writing prompt developed by the Nebraska Department of Education. Specific modes were assigned to grade levels with 8th graders writing descriptively and 11th graders writing persuasively. Upon submission, a trained panel of Nebraska teachers graded the essays. The rater-assigned scores were converted by the Nebraska Department of Education into a scale score metric, which ranged from 0 to 70. Performance levels were then assigned. In the 8th grade, a score of 55-70 exceeded the standards, 40-54 met the standards, and 39 and below were below the standards. In the 11th grade, a score of 53-70 exceeded the standards, 40-52 met the standards, and 39 and below were below the standards (NeSA Writing Reports Interpretive Guide, 2013).

Compiled NeSA scores for each participant were made available to school administration, students, and their parents. These compiled results were requested by the researcher for the study and used to correlate with the participant’s mindset score. Using a coding system, the guidance counselor removed individual names from test results and
replaced with the four-digit code. In order to maintain confidentiality these scores were not shared and were destroyed upon completion of data analysis.

In order to determine student mindset pertaining to intelligence, participants completed the intelligence portion of Dweck’s Scale of Mindset (Appendix G). This scale asked students to indicate the extent to which they agreed or disagreed with statements pertaining to intelligence. A Likert Scale (1=strongly agree, 6=strongly disagree) was used to quantify data. The possible responses were: strongly agree (SA), agree (A), mostly agree (MA), mostly disagree (MD), disagree (D), and strongly disagree (SD). For positive statements such as “No matter who you are, you can significantly change your intelligence level,” an individual would receive the following points: SA = 5, A = 4, MA = 3, MD = 2, D = 1, and SD = 0. For negative statements such as “Your intelligence is something about you that you cannot change very much,” an individual would receive the following points: SA = 0, A = 1, MA = 2, MD = 3, D = 4, and SD = 5.

The statements related to growth mindset are strongly correlated (-0.69 and -0.86) with the fixed mindset statements, showing that a disagreement with the fixed mindset statements indicates agreement with the growth mindset statements (Dweck, 2000). High internal consistency (0.94 to 0.98) using Cronbach’s Alpha values also exists (Dweck, 2000).

Correlational measure was used to determine if there was a relationship between intelligence mindset (independent variable) and standardized test scores (dependent variable). For this study, scores for the two variables were collected for each member in the sample. These scores were then analyzed for correlation using the product-moment correlation coefficient or Pearson r. This measure of correlation was chosen because both
variables in the study can be expressed as continuous data. The Pearson r is also able to show a positive correlation (when an increase in one variable complements an increase in the other variable) and a negative correlation (when an increase in one variable complements a decrease in the other variable), thus giving information about the relationship between the variables. For each participant in the study, a Pearson r correlation was computed using results from Dweck’s Intelligence Mindset Theory and scaled scores from each individual NeSA test. A Pearson r correlation was also computed focusing on gender. Male and female scores in each area of the NeSA assessments were correlated with respective mindset scores. It is important to remember that a high correlation from the study does not indicate that one variable causes the other but instead shows only that a relationship exists.

Chapter 4

Findings

Through the process of parental consent and student assent, a total of 25 students agreed to participate in the study, yielding a 67.6% participation rate. Ten male students (40%) agreed to the study while 15 female students (60%) chose to participate. In the 7th grade, 6 of the 8 students gave consent, which was 24% of the total population. Twelve of the 18 8th graders also gave consent, making up 48% of the population. Finally, in the 11th grade, 7 of the 11 students gave consent, which was 28% of the total population (Table 1).
Table 1

*Description of participants (n=25)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>$n$</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>Female</td>
<td>15</td>
<td>60</td>
</tr>
<tr>
<td>Grade</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7th</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>8th</td>
<td>12</td>
<td>48</td>
</tr>
<tr>
<td>11th</td>
<td>7</td>
<td>28</td>
</tr>
</tbody>
</table>

*Initial Results*

The Likert scale used within the mindset survey provided a score of 6 for growth mindset response and a score of 1 for fixed mindset response for each question. Students were asked a total of 8 questions related to intelligence mindset for a possible score of 48 if all questions answered indicated a growth mindset response. The average score for students in the 7th grade was 39 with a minimum of 31 and a maximum of 47. The 8th grade students scored an average of 34.42 on the mindset survey. The 8th grade class also presented the overall minimum and maximum with an 18 and 48, respectively. A 35.43 was the average for the 11th grade class with a minimum score of 28 and a maximum score of 40. The average total population score on Dweck’s survey was 35.8. The minimum was 18 and the maximum was 48. Of interest is that at least two students (one in the 7th grade and one in the 8th grade) had high scores of 47 and 48 respectively on the mindset survey. These scores were 7 and 8 points higher than the 11th grade high. A difference of 30 points also existed between the 8th grade high score and the 8th grade low score. Students surveyed had an overall average mindset score of 35.8, which is above the median score of 24. They also had higher than median average scores in each grade.
and as males and females. By being higher than the median, it is indicated that overall, the students surveyed tend to have more of a growth mindset than a fixed mindset. Table 2 further presents this data.

Table 2

*Mindset Scores for Intelligence by Grade Level*

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th Grade</td>
<td>6</td>
<td>39.00</td>
<td>5.33</td>
<td>31</td>
<td>47</td>
</tr>
<tr>
<td>8th Grade</td>
<td>12</td>
<td>34.42</td>
<td>8.18</td>
<td>18</td>
<td>48</td>
</tr>
<tr>
<td>11th Grade</td>
<td>7</td>
<td>35.43</td>
<td>4.69</td>
<td>28</td>
<td>40</td>
</tr>
<tr>
<td>Total Score</td>
<td>25</td>
<td>35.80</td>
<td>6.76</td>
<td>18</td>
<td>48</td>
</tr>
</tbody>
</table>

Data was also collected based upon gender with males averaging 37.4 on the mindset survey. Males had a minimum score of 30 and a maximum score of 47. Females averaged 34.73 and encompassed the overall of minimum score of 18 and the overall maximum score of 48 (Table 3).

Table 3

*Mindset Scores for Intelligence by Gender*

<table>
<thead>
<tr>
<th>Gender</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>10</td>
<td>37.40</td>
<td>5.08</td>
<td>30</td>
<td>47</td>
</tr>
<tr>
<td>Female</td>
<td>15</td>
<td>34.73</td>
<td>7.66</td>
<td>18</td>
<td>48</td>
</tr>
</tbody>
</table>

The highest score possible on the NeSA science assessment was a 60. The science assessment was only administered in the 8th and 11th grades per Nebraska statute. Eighth grade students averaged 38.92 on the science assessment with a minimum score of 24 and a maximum score of 54. The 11th grade students averaged 47.29 with a minimum score of 42 and a maximum score of 50. These results are shared in Table 4.
Table 4

*NeSA Science Assessment Results by Grade Level*

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>8&lt;sup&gt;th&lt;/sup&gt; Grade</td>
<td>12</td>
<td>38.92</td>
<td>7.28</td>
<td>24</td>
<td>54</td>
</tr>
<tr>
<td>11&lt;sup&gt;th&lt;/sup&gt; Grade</td>
<td>7</td>
<td>47.29</td>
<td>2.93</td>
<td>42</td>
<td>50</td>
</tr>
</tbody>
</table>

Table 5 presents NeSA Science Assessment data by gender. The male students averaged 43.86 with a minimum of 36 and a maximum of 50 while the females averaged 40.92 with a minimum of 24 and a maximum of 54.

Table 5

*NeSA Science Assessment Results by Gender*

<table>
<thead>
<tr>
<th>Gender</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>7</td>
<td>43.86</td>
<td>5.40</td>
<td>36</td>
<td>50</td>
</tr>
<tr>
<td>Female</td>
<td>12</td>
<td>40.92</td>
<td>8.15</td>
<td>24</td>
<td>54</td>
</tr>
</tbody>
</table>

Students in the 7<sup>th</sup>, 8<sup>th</sup> and 11<sup>th</sup> grades were all administered the NeSA math assessment with a possible high score of 60 for 8<sup>th</sup> and 11<sup>th</sup> grade and a high score of 58 for 7<sup>th</sup> grade. For individual grade data, the raw 7<sup>th</sup> grade scores were used, but because of this discrepancy and for manipulation of data for gender and totals, the researcher refigured 7<sup>th</sup> grade scores to correspond to a high score of 60. With 58 being the highest possible score, the 7<sup>th</sup> graders averaged 48.17 with a minimum of 40 and a maximum of 54. With 60 being the highest possible score, the 8<sup>th</sup> graders averaged 40.33 with a minimum of 31 and a maximum of 57, while the 11<sup>th</sup> grade students averaged 49.43 with a minimum of 39 and a maximum of 58. These results are presented in Table 6.
Table 6

*NeSA Math Assessment Results by Grade Level*

<table>
<thead>
<tr>
<th>Grade</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th</td>
<td>6</td>
<td>48.17</td>
<td>5.15</td>
<td>40</td>
<td>54</td>
</tr>
<tr>
<td>8th</td>
<td>12</td>
<td>40.33</td>
<td>6.93</td>
<td>31</td>
<td>57</td>
</tr>
<tr>
<td>11th</td>
<td>7</td>
<td>49.43</td>
<td>7.25</td>
<td>39</td>
<td>58</td>
</tr>
</tbody>
</table>

On the NeSA math assessment, the males averaged 45.4 with a minimum of 36 and a maximum of 54, and the females averaged 45 with a minimum of 34 and a maximum of 58 (Table 7).

Table 7

*NeSA Math Assessment Results by Gender*

<table>
<thead>
<tr>
<th>Gender</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>10</td>
<td>45.40</td>
<td>6.21</td>
<td>36</td>
<td>54</td>
</tr>
<tr>
<td>Female</td>
<td>15</td>
<td>45.00</td>
<td>9.17</td>
<td>31</td>
<td>58</td>
</tr>
</tbody>
</table>

Students in the 7th, 8th and 11th grades were all administered the NeSA reading assessment with a possible high score of 50 for 8th and 11th grade and a high score of 48 for 7th grade. For grade level data, raw scores were used, but because of this discrepancy and for manipulation of data for gender and totals, 7th grade scores were refigured to correspond to a high score of 50. With a high score being 48, the 7th grade students averaged 38.5 with a minimum of 33 and a maximum of 42. With a high score of 50, the 8th grade students averaged 32.92 with a minimum of 24 and a maximum of 46, and the 11th graders averaged 39.14 with a minimum of 34 and a maximum of 44. Table 8 presents this data.
Table 8

**NeSA Reading Assessment Results by Grade Level**

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th Grade</td>
<td>6</td>
<td>38.50</td>
<td>3.62</td>
<td>33</td>
<td>42</td>
</tr>
<tr>
<td>8th Grade</td>
<td>12</td>
<td>32.92</td>
<td>6.82</td>
<td>24</td>
<td>46</td>
</tr>
<tr>
<td>11th Grade</td>
<td>7</td>
<td>39.14</td>
<td>3.98</td>
<td>34</td>
<td>44</td>
</tr>
</tbody>
</table>

The males averaged 37.29 with a minimum of 28 and a maximum of 44, and the females averaged 35.78 with a minimum of 24 and a maximum of 46 (Table 9).

Table 9

**NeSA Reading Assessment Results by Gender**

<table>
<thead>
<tr>
<th>Gender</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>10</td>
<td>37.29</td>
<td>4.95</td>
<td>28</td>
<td>44</td>
</tr>
<tr>
<td>Female</td>
<td>15</td>
<td>35.78</td>
<td>7.19</td>
<td>24</td>
<td>46</td>
</tr>
</tbody>
</table>

**Correlative Results**

The Pearson r correlation was used to determine if there was a statistically significant relationship between mindset and scores on the NeSA assessments. The null hypothesis of this study was that there is no relationship between student mindset and performance on the NeSA test. Due to the nature of this hypothesis a two-tailed test was performed with the level of significance set at p<0.05 (Appendix H). Correlations were calculated for each class as well as for gender.

When mindset scores were correlated with NeSA science performance, both positive and negative correlations surfaced. In the 8th grade, \( r = 0.3577 \), which shows a weak, positive, non-statistically significant relationship. For 11th grade students, \( r = -0.2899 \), which is a weak, negative, non-statistically significant relationship. These correlations along with the degrees of freedom (df) used, are presented in Table 10.
Table 10

*Correlation (r) Between Mindset and NeSA Science Assessment Performance by Grade*

<table>
<thead>
<tr>
<th>Level</th>
<th>df</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>8th Grade</td>
<td>10</td>
<td>0.3577</td>
</tr>
<tr>
<td>11th Grade</td>
<td>5</td>
<td>-0.2899</td>
</tr>
</tbody>
</table>

*p<0.05 significant

When mindset scores were correlated to science scores according to gender, males results showed r = -0.3775 which is a weak, negative, non-statistically significant relationship. Finally, for females, r = 0.3464 which is a weak, positive, non-statistically significant relationship (Table 11).

Table 11

*Correlation (r) Between Mindset and NeSA Science Assessment Performance by Gender*

<table>
<thead>
<tr>
<th>Gender</th>
<th>df</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>5</td>
<td>-0.3775</td>
</tr>
<tr>
<td>Female</td>
<td>10</td>
<td>0.3464</td>
</tr>
</tbody>
</table>

*p<0.05 significant

When mindset scores were correlated with results of the NeSA math assessment, the 7th graders had a weak, negative, non-statistically significant correlation r=-0.167. The 8th graders has a moderate, positive, non-statistically significant correlation of r=0.4876 and in the 11th grade, r=0.1261 which is a correlation which is weak, positive, and non-statistically significant. Table 12 presents these findings.
Table 12

*Correlation (r) Between Mindset and NeSA Math Assessment Performance by Grade*

<table>
<thead>
<tr>
<th>Level</th>
<th>df</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th Grade</td>
<td>4</td>
<td>-0.1670</td>
</tr>
<tr>
<td>8th Grade</td>
<td>10</td>
<td>0.4876</td>
</tr>
<tr>
<td>11th Grade</td>
<td>5</td>
<td>0.1261</td>
</tr>
</tbody>
</table>

*p<0.05 significant

When the scores were correlated according to gender, males had a correlation of r=0.1774 and females had a correlation of r=0.4154. This information is documented in Table 13.

Table 13

*Correlation (r) Between Mindset and NeSA Math Assessment Performance by Gender*

<table>
<thead>
<tr>
<th>Gender</th>
<th>df</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>8</td>
<td>0.1774</td>
</tr>
<tr>
<td>Female</td>
<td>13</td>
<td>0.4154</td>
</tr>
</tbody>
</table>

*p<0.05 significant

In the area of reading, statistically significant correlation results were found. Table 14 presents these results. Although the 7th grade correlation of r=0.6014 is a moderate, positive correlation, it is non-statistically significant due to the low degrees of freedom. Because of the low sample number, this correlation was not found to be statistically significant. However, in the 8th grade r=0.5809 which is a moderate, positive correlation that is statistically significant. Interestingly, the 11th grade results in the area of reading produced a weak, negative, non-statistically significant correlation of r=-0.0575.
Table 14

*Correlation (r) Between Mindset and NeSA Reading Assessment Performance by Grade*

<table>
<thead>
<tr>
<th>Level</th>
<th>df</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th Grade</td>
<td>4</td>
<td>0.6014</td>
</tr>
<tr>
<td>8th Grade</td>
<td>10</td>
<td>0.5809*</td>
</tr>
<tr>
<td>11th Grade</td>
<td>5</td>
<td>-0.0575</td>
</tr>
</tbody>
</table>

*p<0.05 significant

Furthermore, male results were r=0.0681 which is a weak, positive, non-statistically significant correlation while females had a moderate, positive, statistically significant correlation of r=0.6394 (Table 15).

Table 15

*Correlation (r) Between Mindset and NeSA Reading Assessment Performance by Gender*

<table>
<thead>
<tr>
<th>Gender</th>
<th>df</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>8</td>
<td>0.0681</td>
</tr>
<tr>
<td>Female</td>
<td>13</td>
<td>0.6394*</td>
</tr>
</tbody>
</table>

*p<0.05 significant

Statistical significance was detected with the correlation of 8th grade reading NeSA performance and 8th grade intelligence mindset scores. Additionally, statistical significance was also detected with the correlation of female reading NeSA performance and female intelligence mindset scores. For these two areas, the null hypothesis is rejected; suggesting that a relationship may exist. For all remaining correlations, statistical significance was not detected, thus the null hypothesis is accepted for these particular areas, suggesting that no relationship existed.
Chapter 5
Conclusion

The current research was limited in that it was conducted in a small school system that averages around 60-70 students in grades 7-12. Because of this low enrollment number, the beginning population and extracted sample group was small. The initial population was 37 students, but only 25 of these students and parents consented to the study, yielding a 68% participation rate. A more accurate indication of mindset in relation to NeSA test scores would have been obtained with higher participation numbers. Because of the low sample numbers, the study could have been skewed or influenced by outliers. Also, statistical significance was difficult to obtain due to the low degrees of freedom.

Another limitation was the exclusion of the writing portion of the NeSA test. Results for the writing assessment were not made available because of an error in the testing system. This fault caused inaccuracy in the scores of students throughout the state. Therefore, the Department of Education made the decision to not publically release the test scores.

Statistically significant evidence was found that 8th grade students and female students enrolled in this small Plains States School demonstrated a moderate, positive correlation between intelligence mindset and scores on the reading portion of the NeSA test. These results propose discussion in three areas: Why was statistical significance detected in the reading subject area? Why was this statistical significance detected at the
8th grade level, and why did the female population also demonstrate statistical significance in the area of reading?

The discussion will begin with why significant results were detected in the subject of reading and not in the other subjects of math and science. Past research has indicated that reading achievement is positively correlated with reading self-concept (Colmar & Rider, 2005). Reading is a subject that often times requires performance in front of others, thus reading self-concept is highly subject to the views of others. Furthermore, the current literature review uncovered that self-concept possess three qualities: (a) it is learned, (b) it is organized, and (c) it is dynamic (Purkey, 1988). These aspects of self-concept are very similar to that of reading. Reading is something that is learned in an organized manner. In the beginning stages of reading development, much time is spent on letter identification and phonics. Words are soon recognized and fluency is developed. Reading is also a subject that is very dynamic, and acts as a guidance system for how students perform in other subject areas. From the literature review, we also know that mindset is highly affected by self-concept and the views of others (Dweck, 2006). It may be possible that because both reading and mindset have such strong ties to self-concept, significant results surfaced in the reading realm.

The discussion then leads to why significance was detected at the 8th grade level. The current study suggests that 8th grade students at the subject school who have a tendency towards a fixed intelligence mindset would experience lower test scores on the NeSA reading exam. Furthermore, 8th grade students at the subject school who have a tendency towards a growth intelligence mindset would experience higher test scores on the NeSA reading exam. Moderate correlations also existed at the 7th grade level but were
not statistically significant due to low sample numbers. The question these results pose is why is this data appearing at the middle school level? There are several responses to this question and further research would need to be conducted to confirm possible answers.

One conclusion could be that this particular age group’s test scores are affected more by intelligence mindset than the older 11th grade age group because of cognitive development. In revisiting Kegan’s model, the subject/object basis of this model becomes important: that objects are perceptions that an individual has mastered and controls while subjects are perceptions that an individual is unaware of or is aware of but cannot control. Kegan proposed that an individual develops cognitively by taking subject areas and mastering them into object areas. As an individual does this, he or she moves up the hierarchy of cognitive development. The results of the current study make it relevant to question where the majority of middle school students at the subject school fall on the hierarchy. It would be suspected that they would fall somewhere between the 3rd and 4th order with the majority of them falling in the 3rd order of a socialized mind – a mind that is concerned with relationships and the opinions of others; a place where an individual is subject to interpersonal relationships and mutuality. The possibility exists that the correlation that was found at the 8th grade level may be related to this stage of development. This may also play a part into why no significance and even negative correlations were found at the 11th grade, where students have moved out of this stage of cognitive development. More students at this grade level have possibly made object interpersonal relationships and mutuality. More specific and repeated quantitative and qualitative research on 8th grade mindset, cognition, and reading scores could be conducted to explore this argument further.
Another reason that statistical significance in reading was found at the 8\textsuperscript{th} grade level might be a reflection of the nationwide phenomenon of middle school reading deficiency. The 2013 reading results for 8\textsuperscript{th} grade students in the United States showed no significant gain or loss, but of interest was that only 4\% of 8\textsuperscript{th} grade students in the United States were advanced in their reading skills, 32\% were proficient in reading, 42\% possessed basic reading skills and 22\% fell below basic in their reading skills. Therefore, the majority of United States 8\textsuperscript{th} graders possessed only basic or below basic reading skills (A First Look: 2013 Mathematics and Reading, 2013). Reading at the 8\textsuperscript{th} grade level tends to be a stagnant area of achievement throughout the United States.

The final statistic bringing forth discussion is that female student mindsets in this study demonstrated a significant, positive correlation with scores for the NeSA reading exam. Dweck & Legget (1988) proposed that individuals with a growth mindset set learning goals for themselves and when faced with a challenge, accepted the challenge and become even more motivated. This same phenomenon is occurring in research related to females and reading. In a study by McGeown, et al. (2012), gender differences in reading motivation was researched. The study found that girls had significantly higher intrinsic reading motivation than their male counterparts. Furthermore, a feminine identity was more associated with reading motivation than a masculine identity. Motivation and even more specifically intrinsic motivation is a driving force behind reading achievement (Logan, Medford & Hughes, 2011). Similarly, motivation is a key outcome of a growth mindset (Dweck & Legget, 1988). By linking a growth mindset with reading motivation, the positive correlation reported in this study between female mindset scores and their NeSA reading assessment scores may be explained. Further research in
this area would assist in achieving a better interpretation and understanding of the current study’s results.

Although this study contained limitations due to low sample numbers, it brought to the surface recommendations for further study. Some of these recommendations have been mentioned within the previous discussion of results, but two other recommendations worth exploring are focusing (a) on mindset in one subject area at a time and (b) repeated study of institutions of similar size and varying size.

Mindsets are very complex and can cross several areas. An individual might have a fixed mindset about his or her reading skills but a growth mindset about his or her math skills (Blazer, 2011). Because of this complexity, and because of the significance found only in the subject of reading, the current study could be strengthened by surveying students on their mindset in relation to the various areas on the NeSA test. For example, one could recreate the mindset survey used to specifically focus on student mindset as it relates to reading, math, science, and writing individually rather than intelligence mindset as a whole and correlate this data with the corresponding results on the NeSA test. A sample question on the survey might read: “No matter who you are, you can significantly increase your score on the reading assessment.” This would provide further evidence to be assessed on mindset and how it relates to standardized test performance. Researchers would be able to focus on the correlation between a specific subject area and mindset rather than intelligence as a whole. This would allow for teachers and school administrators to consider specific strategies to improve both student mindset as well as its potential impact on standardized testing.
When the statistics related to this research are reviewed, an interesting finding is that the total mean score for Dweck’s scale is trending towards a growth mindset. This indicates that the majority of students in this Plains State school system have a tendency towards a growth mindset in relation to their intelligence. An area of further research could be to study intelligence mindsets of students at schools with varying levels of enrollment. The school used in this research study maintains an average of 65 students in grades 7-12. Comparing mindsets between schools of similar sizes and comparing mindsets of schools of unequal sizes could yield information relating enrollment numbers and intelligence mindset.

The current research can also offer some implications for practice. It is a recommendation within this Plains State School for educators and parents who are involved with reading curriculum and strategies to focus some time toward educating students on learning strategies to promote a growth mindset attitude. As was stated in the literature review, Blackwell, Trzesniewski, and Dweck (2007) completed a study and found that by simply educating an individual on the concept of mindset, one’s mindset can be altered from a state of being fixed to a state of growth. Their interventions with students showed that when students were taught that intelligence is something that is not fixed, but instead can be developed, motivation and grades increased. Therefore, it is suggested that this Plains State School system teach students that their intelligence is something that can be changed and developed.

Another implication would be to focus on the type of praise that is given when students are being taught or asked to read, as praise is one of the major factors related to mindset development (Dweck, 2006). Praise should not be given towards a student’s
reading ability but instead should be directed towards accepting the challenge to read, becoming a better reader, and putting forth effort to read. An example of poor praise would be, “You are an excellent reader.” A better form of praise would be, “You have really improved your reading,” or “I am proud of you for trying to read this difficult passage.”

Finally, when setting goals for reading, work with students to set learning goals instead of performance goals. Rather than setting goals to avoid negative judgments or to maintain positive judgments, students should be encouraged to set goals in which they work to increase their ability or master new tasks (Elliot and Dweck, 1988). Also, when faced with a reading challenge, encourage students to view that challenge as an opportunity for growth rather than looking at it as a way of being graded or judged.

Standardized testing is a controversial issue in the United States educational system. It is important that those involved in education continually look for ways to improve student performance when faced with a challenge of any kind – be it a standardized test or another challenge in life. Perhaps a focus on developing growth-oriented mindsets in students is a legitimate option for assisting students with this life skill.


NeSA Writing Reports Interpretive Guide, (2013). Retrieved from
http://www.education.ne.gov/assessment/pdfs/2013_NeSA-
Writing_Interpretive_Reports_Guide.pdf

Nebraska Department of Education: About NeSA. (2013). Retrieved from
http://nesa.caltesting.org/about.html

Report.pdf

Pruyn, P. (2010, June 9). An overview of constructive development theory (CDT) [Web
log post]. Retrieved from http://developmentalobserver.blog.com/2010/06/09/an-
overview-of-constructive-developmental-theory-cdt/

Purkey, W. W., & ERIC Clearinghouse on Counseling and Personnel Services, A. I.

Journal of Educational Psychology, 74(1), 3-17. doi:10.1037/0022-0663.74.1.3

Sriram, R. (2010). Rethinking intelligence: The role of mindset in promoting success for
academically high-risk college students. Unpublished manuscript, Baylor
University, Waco, Texas.

A nation accountable [electronic resource]: Twenty-five years after “A Nation at Risk.”

Appendix A
IRB Approval Letter

January 10, 2014

Ann Dvorak
Agricultural Leadership, Education and Communication
617 S. State Street Bassett, NE 68714

Lloyd Bell
Agricultural Leadership, Education and Communication
300 AGH, UNL, 68583-0709

IRB Number: 20140113751 EP
Project ID: 13751
Project Title: Student Mindset Compared to Performance on the Nebraska State Accountability Test

Dear Ann:

This letter is to officially notify you of the approval of your project by the Institutional Review Board (IRB) for the Protection of Human Subjects. It is the Board's opinion that you have provided adequate safeguards for the rights and welfare of the participants in this study based on the information provided. Your proposal is in compliance with this institution’s Federal Wide Assurance 00002238 and the DHHS Regulations for the Protection of Human Subjects (45 CFR 46). Your project has been approved as Expedited Category 5 and 7.

Date of EP Review: 11/13/2013
You are authorized to implement this study as of the Date of Final Approval: 01/10/2014. This approval is Valid Until: 01/09/2015.

1. The approved informed consent forms have been uploaded to NUgrant (files with -Approved.pdf in the file name). Please use these forms to distribute to participants. If you need to make changes to the informed consent forms, please submit the revised forms to the IRB for review and approval prior to using them.
We wish to remind you that the principal investigator is responsible for reporting to this Board any of the following events within 48 hours of the event:

* Any serious event (including on-site and off-site adverse events, injuries, side effects, deaths, or other problems) which in the opinion of the local investigator was unanticipated, involved risk to subjects or others, and was possibly related to the research procedures;

* Any serious accidental or unintentional change to the IRB-approved protocol that involves risk or has the potential to recur;

* Any publication in the literature, safety monitoring report, interim result or other finding that indicates an unexpected change to the risk/benefit ratio of the research;

* Any breach in confidentiality or compromise in data privacy related to the subject or others; or

* Any complaint of a subject that indicates an unanticipated risk or that cannot be resolved by the research staff.

For projects which continue beyond one year from the starting date, the IRB will request continuing review and update of the research project. Your study will be due for continuing review as indicated above. The investigator must also advise the Board when this study is finished or discontinued by completing the enclosed Protocol Final Report form and returning it to the Institutional Review Board.

If you have any questions, please contact the IRB office at 472-6965.

Sincerely,

Julia Torquati, Ph.D.
Chair for the IRB
Appendix B

Consent Cover Letter

Date

To the parents/guardians of __________________:

Your son/daughter has been chosen to participate in a research study to determine how mindsets relate to scoring on the NeSA test. This research is being conducted by Ann Dvorak as a requirement for her thesis in pursuing a Masters degree in Leadership Education.

Please read through the enclosed consent form. If you are willing to allow your son/daughter to participate, please sign and date the form and return it to John Dohrman, Counselor by _____________ in the provided envelope. Your son/daughter will also be asked for his/her consent.

You may ask any questions concerning this research at any time by contacting John Dohrman at ________ or Bell, project advisor, at 402-472-8739 or lbell1@unl.edu.

Thank you.

Ann Dvorak
Appendix C

Parent/Guardian Consent Form

Student Mindset Compared to Performance on the Nebraska State Accountability Test

Invitation to Participate: Your child is invited to participate in a study of how mindset is related to standardized test scores being conducted by Ann Dvorak who is a graduate student at the University of Nebraska – Lincoln.

Basis for Participant Selection: Your child has been selected for participation in this study because he or she will be administered the Nebraska State Accountability (NeSA) tests this year.

Overall Purpose of Study: The purpose of this study is to investigate your student’s mindset and determine if it is an indicator of scoring on the Nebraska State Accountability (NeSA) tests. If mindset is an indicator, this information could be used to improve test scores in the future.

Explanation of Procedures: If you and your child decide to participate, your child will be asked to do the following things: complete a short 10-15 minute mindset survey and complete the NeSA tests as required already by the school district. The mindset survey will be completed through an online survey during student study hall at school. Results from both of these procedures will be shared in confidence with the researcher.

Potential Risks and Discomforts: There is no discomfort associated with this study. The only risk involved is that John Dohrman, school counselor will have access to your son/daughter’s test scores for the purpose of coding them and sending the scores to the researcher. The researcher will be unaware of individual student scores as they will only be identified by this code. However, you should know that ALL tests scores will be held in confidence by Mr. Dohrman.

Potential Benefits: There are no direct benefits to the student participant, however, information from this study will be beneficial to instructors and administrators when preparing other students for standardized testing.

Compensation for Participant: There is no compensation to the participant.

Assurance of Confidentiality: Individual tests scores and results from the mindset survey will be held in confidence. Overall generalized information will be shared in the research report, but no specific, individual data will be shared.
Freedom to Withdraw: Participation in this study is voluntary. You can refuse to participate or withdraw at any time without harming your relationship with the researchers, the University of Nebraska-Lincoln, or in any other way receive a penalty or loss of benefits to which you are otherwise entitled. Your child’s grades will not be affected by your decision on whether or not to participate.

Offer to Answer Questions: You may ask any questions concerning this research at any time by contacting John Dohrman at 402-472-8739 or jdohrman@unl.edu. You may also contact Dr. Lloyd Bell, project advisor, at 402-472-6965 or lbell1@unl.edu. If you would like to speak to someone else, please call the Research Compliance Services Office at 402-472-6965 or irb@unl.edu.

You are voluntarily making a decision whether or not to allow your child or legal ward to participate. Your signature indicates that, having read and understood the information provided above, you have decided to permit your child or legal ward to participate in this research. Your child will also be asked for their assent to participate.

You will be given a copy of this consent form to keep.

Name of Child:

First _____________________________________________ Last ________________________________

Signature of Parent/Guardian ____________________________________________________________

Relationship to Participant __________________________ Date ____________________________
Appendix D

Telephone Script

Hello _______________.

This is John Dohrman the guidance counselor at __________. I am calling because I had recently sent you information pertaining to a research study that is being conducted by Ann Dvorak for completion of her thesis at the University of Nebraska – Lincoln. She is working to gain consent to have your son/daughter participate in her research. Did you have any questions about the research she is conducting? (Wait for questions and answer them) Would you be willing to consent to have your son/daughter participate in the study?

YES

If so, please return the signed form to our school office within the next 2 days so that we can continue with the research process.

NO

Thank you for your consideration.
Appendix E

Student Assent Form

Student Mindset Compared to Performance on the Nebraska State Accountability Test

You are invited to participate in a study of how mindset is related to standardized test scores. Mrs. Dvorak is completing this research as part of her graduate program at the University of Nebraska at Lincoln. I am inviting you to participate because you are either a 7th, 8th or 11th grader at who will be taking the NeSA test this spring.

The first part of this research will take you about 10-15 minutes to complete a survey that will determine your mindset about intelligence. This survey will be given to you in study hall and will be administered online. The other part of the research will be completed when you take the required NeSA tests this spring.

You should know that all of your tests scores and the survey results will only be known by myself. I will be assigning you a code to use for the survey and I will remove your name from your NeSA scores and replace with the code. I am the only one that has access to this code. This information will be used to form a correlation, so your individual information will not be shared. The information from this study will be beneficial to instructors and administrators as they continue to prepare other students for the NeSA test.

Please know that your participation is voluntary. You can refuse to participate at any time and it will not affect your relationship with the school, with Mrs. Dvorak, or with myself and your grades will not be affected. I am also asking your parents for their permission to let you do this study. Please talk this over with them before you decide whether or not to participate.

If you have any questions at any time, please let me know.

Thank you,
Mr. Dohrmann

__________________________  ________________________
Signature of Participant    Date

__________________________  ________________________
Signature of Investigator   Date

300 Agricultural Hall  /  P.O. Box 830709  /  Lincoln, NE 68583-0709  /  (402) 472-2807  /  FAX (402) 472-5863
Appendix F

Student Email

(Student Name),

Thank you for agreeing to participate in Mrs. Dvorak's research on mindset and how it relates to standardized testing. For the first part of this research study, you are being asked to take a short survey about your mindset towards intelligence. Below is a link to that survey. Please click on the link, read all of the instructions and complete the survey. When asked for your identification code, please enter this four digit code: (XXXX). This code will be used for identification purposes.

(LINK TO SURVEY)

Thank you.

Mr. Dohrman
Appendix G
Dweck’s Intelligence Mindset Questionnaire

Intelligence

This questionnaire has been designed to investigate ideas about intelligence. There are no right or wrong answers. We are interested in your ideas.

Using the scale below, please indicate the extent to which you agree or disagree with each statement.

*1. You have a certain amount of intelligence, and you can’t really do much to change it.

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<tr>
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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Strongly Agree</td>
<td>Mostly Agree</td>
<td>Mostly Disagree</td>
<td>Strongly Disagree</td>
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<tr>
<td>2</td>
<td>Agree</td>
<td>Agree</td>
<td>Disagree</td>
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*2. Your intelligence is something about you that you can’t change very much.

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<tr>
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<tr>
<td>2</td>
<td>Agree</td>
<td>Agree</td>
<td>Disagree</td>
<td>Disagree</td>
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3. No matter who you are, you can significantly change your intelligence level.

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<tr>
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*4. To be honest, you can’t really change how intelligent you are.

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5. You can always substantially change how intelligent you are.

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<td>Agree</td>
<td>Agree</td>
<td>Disagree</td>
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</table>

*6. You can learn new things, but you can’t really change your basic intelligence.

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</tr>
<tr>
<td>2</td>
<td>Agree</td>
<td>Agree</td>
<td>Disagree</td>
<td>Disagree</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7. No matter how much intelligence you have, you can always change it quite a bit.

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<tr>
<td></td>
<td>Strongly Agree</td>
<td>Mostly Agree</td>
<td>Mostly Disagree</td>
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</table>

8. You can change even your basic intelligence level considerably.

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### Appendix H

#### Table of Critical Values for Pearson’s $r$

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<th>Level of Significance for a Two-Tailed Test</th>
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Adapted from Appendix 2 (Critical Values of $r$) using the square root of $[(r^2 + df)]$.

Note: Critical values for Infinite $df$ actually calculated for $df = 500$. 