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HOW STUDENTS WHO HAVE DIFFICULTY WITH READING UNDERSTAND
THEMSELVES AS LEARNERS FOLLOWING THEORIES OF INTELLIGENCE

INSTRUCTION:

A QUALITATIVE CASE STUDY

By

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THEORIES OF INTELLIGENCE IN STUDENTS

ABSTRACT

The purpose of this qualitative study was to examine how students who have difficulty with reading understand themselves as learners following theories of intelligence instruction through the online Brainology® Program. Typically, students' learning experiences are organized and directed by adults, with little input from the students themselves. Providing children with an opportunity to express how they feel about learning and about themselves as learners can inform the kinds of learning experiences that should be made available to them. The data for this study were collected from five elementary-aged students who have difficulty with reading from one school, all of whom participated in an after-school tutoring program that included theories of intelligence instruction. Data sources included documents (e.g., teacher comments on report cards, reading journals/notebooks, running records, and standardized test scores), field observations, and pre-intervention and post-intervention interviews with each participant. The findings from this study demonstrate three main ways that the study participants understood themselves as learners after theories of intelligence instruction via the Brainology® program: 1) Intellectually, 2) Emotionally, and 3) Physically. Taken together, these findings indicate that students understand themselves as learners from the whole-child frame of reference. The results suggest that educators should consider ways to incorporate theories of intelligence instruction into the school day for all learners.

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CHAPTER 1: INTRODUCTION

"America will not succeed in the 21st century unless we do a far better job of educating our sons and daughters... And the race starts today." (Obama, 2009)

Unlike “new literacies,” born from digital technology developments (e.g., blogging, texting, social media, podcasting and video casting, etc.), traditional literacy is understood as the ability to read the written word to gain understanding and meaning. The capacity to gain knowledge from the recorded or written word is commonly considered a testament of literacy (Jimenez & Venegas, 2004). Literacy is the backbone of social progress (Boshier, Huang, Song, & Song, 2006), and, as such, illiteracy is a key national dilemma with significant economic and social impact on our society (U.S. Department of Health and Human Services, 2000). According to the National Adult Literacy Survey, approximately 35% of the prison population achieves at the lowest literacy proficiency levels (Coley & Barton, 2006); this contrasts with the general population, of whom 22% achieve at the lowest proficiency levels. People who struggle to gain traditional literacy skills are less likely to be employed: young people between the ages of 16-21 who experience the inability to function appropriately because of illiteracy account for approximately 50% of the nation's unemployed youth, with limited possibility of obtaining employment (U.S. Department of Health and Human Services, 2000). Furthermore, illiteracy obstructs social progress and the cooperative contribution of adults in civil society (Gastil, 2004).

Illiteracy has a substantial impact on the quality of life for all citizens and, as such, has become a national issue and a major public health concern (National Institute of Child Health and Human Development, 2000). Mental health problems are exacerbated in illiterate adults, due to limited knowledge of resources about mental health services and conditions and symptoms associated with mental health problems (Bennett, Culhane, McCollum, Elo, & Mathew, 2007; Vogel, Wade, & Hackler, 2007). Some people who struggle to gain traditional literacy skills

exhibit social problems, such as increased high school dropout rates, delinquency, teenage pregnancy, and unemployment (Kaminski & Good, 1996). Illiteracy may also manifest in student behavioral issues such as aggressiveness, hyperactivity, hopelessness, and low self-esteem (Good, Simmons, & Smith, 1998).

Those who struggle to gain traditional literacy skills do not choose this path for themselves, nor is there a single cause of illiteracy. The causes are as diverse as the number of non-readers. The adult non-reader may have dropped out of school, may have an undiagnosed physical or emotional disability, may have had weak teachers, or simply may have not been ready to learn when reading instruction commenced. Parents who cannot read oftentimes continue the inter-generational cycle of illiteracy, as they are unable to help their children learn. Due to the lack of a strong literate role model and access to magazines, books, or newspapers in the home, many children grow up with literacy deficits. In spite of the dire consequences of illiteracy, and even though it is well reported that reading achievement is the most prominent factor in determining a child's educational success, large gaps in achievement persist for many children in the United States. Unless we intervene, today's students who have difficulty with reading may become tomorrow's illiterate adults.

Learning to read is a complicated process, and, for many, learning to read is a struggle. Students who have difficulty with reading do not reach the academic level of their able-reading peers. It is universally understood that not all students progress at the same pace. Consequently, some students move on to the next grade level with stronger foundational reading skills than others (Zorfass & Urbano, 2008). Students are often retained, assigned to special education classrooms, or given individualized instruction based on their level of understanding (National Reading Panel, 2000; Rashotte, Torgesen, & Wagner, 1997; Torgesen, 1998). Oftentimes,

without effective intervention, students who have difficulty with reading proceed through the grade levels and the reading gap between them and their proficient peers becomes wider (Torgesen, 2006). Research suggests that if children are not proficient readers by the end of third grade, it is unlikely that they will catch up with their peers (Dorn, French, & Jones, 1998). Students who have difficulty with reading are at an elevated risk for failure in their subject-area classes and, potentially, for dropping out of school completely (Snow & Biancarosa, 2003). Frequently, issues of low self-esteem and negative behavior accompany this lack of reading success (Sloat, Beswick, & Willms, 2007). As such, reading difficulty in the primary grades continues to be a major focal point for our state and federal government because, as noted earlier, teens and adults who struggle with literacy may experience a wide range of difficulties.

The January 8, 2002 signing of the No Child Left Behind (NCLB) Act by former President George W. Bush highlighted reading achievement and garnered the attention of all educators, students, parents, and stakeholders in public education. NCLB dramatically changed expectations for student achievement in public schools, requiring all students to meet state-established standards in reading and mathematics during their 12 years of school. Moreover, all states are required to articulate and classify academic standards and to develop a state testing system to measure achievement. States, school districts, and individual schools are held accountable for all students' academic success, which is a critical component of NCLB (No Child Left Behind Act, 2001). The Act's accountability provisions require states to declare how they will close the achievement gap and to make sure that all students, even underprivileged students, realize academic proficiency. The Every Student Succeeds Act (ESSA) is new legislation that was passed in December 2015 to replace the NCLB Act. Like NCLB, the main focus of ESSA is to ensure that every student is prepared to succeed in a 21st century economy.

Statement of the Problem

Despite the implementation of numerous local and federal literacy initiatives, current methods have been insufficient for meeting the needs of all readers. At present, educators are meeting the needs of approximately 70-80% of students in the general education classroom, leaving roughly 20-30% of students in need of additional instruction or intervention (Richards, Pavri, Golez, Canges, & Murphy, 2007). From this reality, this study was crafted to examine students' understanding of themselves as learners following theories of intelligence instruction.

If we do not address students' reading difficulties in the elementary grades, the academic distance between those who read well and those who do not will grow more pronounced as they progress through the grade levels (Learning First Alliance, 1998; National Reading Panel, 2000; Rashotte et al., 1997; Torgesen, 1998). The number of students with reading difficulties can be diminished if students are supported through early intervention programs (Goldenberg, 1994; Hiebert & Taylor, 1994; Reynolds, 1991), and the sooner educators provide support to students who have difficulty with reading, the higher the probability of reading success will be (Flippo, 2001; Ziolkowska, 2007). As concern intensifies over the elevated numbers of elementary school children who struggle with reading (National Reading Panel, 2000; Torgesen, 2006), the search continues for new and highly effective interventions and teaching strategies (Quatroche, 2000).

While traditional approaches can increase literacy, there is evidence that noncognitive influences on learning, such as the beliefs a person holds about intelligence and the ability to learn, are also important (Elliot & Dweck, 2005). The Nobel Prize-winning economist, James Heckman, coined the term *noncognitive* (Heckman & Rubinstein, 2001). Heckman contends, and others agree (Blackwell, Trzesniewski, & Dweck, 2007), that beyond academic knowledge and skills, noncognitive factors like motivation, time management, and self-regulation are essential

for literacy learning and later life outcomes. In turn, interest in noncognitive factors has been driven into the educational spotlight in recent years, in part by compelling results from a number of psychological studies. This body of work has shown that some short-term interventions that target students' psychosocial beliefs have considerable effects on school performance that are continued over time (e.g., Blackwell et al., 2007; Good, Aronson, & Inzlicht, 2003; Oyserman, Terry, & Bybee, 2002; Walton & Cohen, 2007).

In addition to implementing initiatives that focus on improving instruction and the learning context, implementing initiatives that take a noncognitive approach may have a direct positive relationship on students' school performance and future outcomes (Duckworth & Seligman, 2005; Heckman & Rubinstein, 2001). One noncognitive approach to improvement focuses on teachers' use of language because teachers' language can impact how students think about themselves as learners (Johnston, 2012). Another noncognitive factor affecting academic performance is students' self-control or self-discipline, which is far more predictive of positive academic outcomes than are measures of IQ (Duckworth & Seligman, 2005). Furthermore, a meta-analysis of research on academic mindsets indicates that "educational interventions and initiatives that target these psychological factors can have transformative effects on students' experience and achievement in school, improving core academic outcomes such as GPA and test scores months and even years later" (Dweck, Walton, & Cohen, 2011, p. 3). Despite evidence of its importance, direct, systematic instruction regarding noncognitive skills has been mostly absent in education. Consequently, there are currently few strategies to develop these noncognitive skills within the school context.

Examining students' beliefs about themselves as learners could be beneficial to their growth by helping educators understand multiple variables that influence learning. Furthermore,

teachers would benefit from a greater understanding of the role that beliefs play in students' learning to read (Lynott & Woolfolk, 1994). In the classroom, repeated failures produce high levels of student frustration, which can reduce students' levels of engagement and impede the learning process (Coon & Mitterer, 2012). Consequently, teachers often view students as not caring enough or simply not trying to learn the concepts (Oakes, Wells, Jones, & Datnow, 1997; Pretzlik, Olsson, Nabuco, & Cruz, 2003; Watanabe, 2006). Oftentimes, teachers assume that poor performance is a result of some learner deficiency or that students should just *work harder* or *care a little more* (Georgiou, 2008; Leroy, Bressoux, Sarrazin, & Trouilloud, 2007; Southerland & Gess-Newsome, 1999). Since current literacy initiatives are not meeting the needs of all readers, this study examined students' understanding of themselves as learners following theories of intelligence instruction to learn how to best support them.

As the principal of Bowne-Munro Elementary School in East Brunswick, NJ, I have observed a core group of elementary school-aged students who have difficulty with reading and are not catching up to their peers despite daily basic skills support. Seeing this revolving door of students in the remedial reading program and hearing students' concerns about learning to read provides the impetus for this study. Students have made statements such as "Why did you put me in this stupid class?" and "I've never been good at reading. I hate it!" I have also observed nervousness, feelings of hopelessness, outbursts, behavioral defiance, tears, and in an extreme case, repeated physical illness in the remedial reading classroom. Such negative experiences do not create a positive learning environment for our children. Something must be done to transform this situation.

Entity vs. Incremental Theories of Intelligence

One useful framework for understanding how noncognitive factors and beliefs can shape overall achievement is Carol Dweck's theories of intelligence (Dweck & Sorich, 1999). The theory stems from prominent motivation theories in educational psychology including Bandura's (1977, 1989, 2006) self-efficacy theory, and Wigfield and Eccles' (2000) expectancy-value theory. Over the past two decades, Dweck (2006, 2007a) has researched noncognitive variables that promote student achievement and motivation.

Dweck's research focused on how beliefs about intelligence affect behavior and performance. She identified two different mindsets regarding intelligence: entity theory of intelligence and incremental theory of intelligence. Dweck and her colleagues uncovered a relationship between developing an incremental mindset (understanding that abilities are malleable and not fixed) and demonstrating learning-oriented behavior (Dweck, 2006, 2007a, 2012; Dweck & Sorich, 1999). Students who hold an entity mindset (e.g., they believe their intelligence is predetermined or that they possess a finite amount) are terrified to look dumb, which restricts their learning. Conversely, students who hold an incremental mindset understand that intelligence can be grown. Since they are not fretting about how smart they are, they are free to work hard, make mistakes, and learn. Dweck's studies provide robust data that an entity or incremental theory of intelligence foretells countless behaviors essential to learning, achievement, and success. Beliefs about intelligence influence how much effort one expends to learn, how much challenge one pursues, how much determination one demonstrates, how resilient one is when facing failure, and how much validation one may seek (Dweck, 2012). Holding an incremental theory of intelligence portends the growth of ability over time (e.g., Blackwell et al., 2007). Researchers continue to examine the consequences of this framework for

student outcomes across a range of subject areas (Hong, Chiu, Dweck, Lin, & Wan, 1999; Robins & Pals, 2002; Stipek & Gralinski, 1996). Figure 1 depicts the incremental and entity theories of intelligence (Dweck, 2007a).

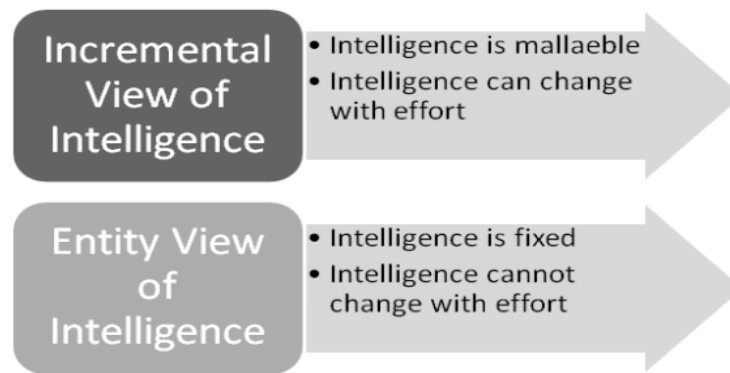


Figure 1. Dweck's theories of intelligence.

Without intervention, students' theories of intelligence are likely to remain static over time (Robins & Pals, 2002); however, they can be transformed (Aronson, Fried, & Good, 2002). Research has sought to study how students' theories of intelligence change after participating in sessions that teach an incremental theory. Subsequent to these interventions, students demonstrate increased motivation to learn, improved grades, and improved achievement test scores (Aronson, Fried, et al., 2002; Blackwell et al., 2007; Good et al., 2003). Given the evidence that noncognitive factors are malleable and critical to academic performance, it is incumbent upon educators to intentionally develop these factors alongside content knowledge and academic skills.

Brainology®

Dweck and colleagues' initial work was piloted as an instructor-delivered intervention for elementary school-aged students (Blackwell et al., 2007). Inspired by positive findings, but limited by the number of instructors available, they started to think about how they could make an incremental mindset workshop more widely available. To do this, they developed a computer-

based program called Brainology®. In the Brainology® Program, students proceed through six computer modules, learning about their brain and how to make it work better. The modules follow two teenage characters and demonstrate how they deal with schoolwork problems and craft study plans. The program takes students into a virtual brain lab to conduct experiments to discover how their brain changes with learning (e.g., makes new connections every time something new is learned). Students are taught how to transfer this learning into their own schoolwork by putting their study skills to work (see Figure 2, adapted from the Brainology® Program).

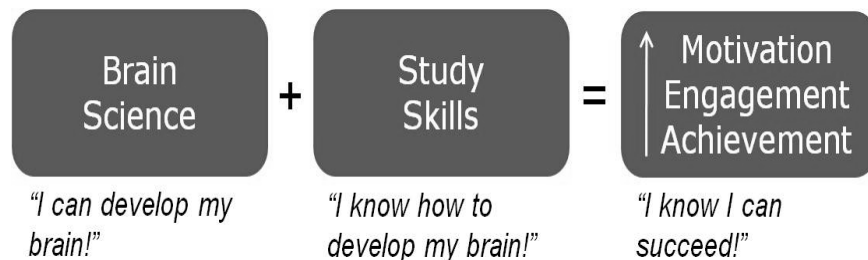


Figure 2. Brainology® program.

Based on Dweck's (2006) research, The Brainology® Program shows students how their brain works, learns, and physically changes when they exercise it. Brainology® explains to students that they are in control of their brain and provides them with real-world skills and strategies to apply these lessons to their schoolwork (Dweck, 2006). The Brainology® program includes about two and a half hours of online instruction separated into an introduction and four instructional units.

Pilot Study

In the spring of 2014, I conducted a pilot study with two 4th grade students who were experiencing difficulty with reading and were participating in an after-school reading tutoring program. The students received theories of intelligence instruction through the Brainology®

program. The objective of the pilot study was to analyze the general perceptions of these elementary school-aged students' regarding their experience with the Brainology® program. These students participated in one semi-structured interview following theories of intelligence instruction via the Brainology® program. My objective was to learn about their experiences and determine the appropriateness of the interview protocol for answering the research question.

The findings from the pilot study indicated that students had positive perceptions of theories of intelligence instruction, although there were variations between the two participants' experiences. Five themes emerged from my data analysis: (a) *All People Are Not Good (Smart) At Everything*, (b) *How Your Brain Works*, (c) *Perseverance*, (d) *Self Reflection*, and (e) *Making Your Brain Work Better and Calming Yourself*. I used the preliminary findings of the pilot study to think further about additional research that could be conducted on this topic. I was intrigued by the students' responses and I wondered how other elementary school-aged students might experience the Brainology® program. This fascination compelled me to complete the current research study.

Purpose of the Study

The major objective of this current research study was to examine and describe the personal experiences of five elementary school-aged students who have difficulty with reading in order to appreciate how they understand themselves as learners following theories of intelligence instruction. Typically, students' learning experiences are organized and directed by adults with little input from students (see Appendix A). Providing children with an opportunity to express how they feel about learning and about themselves as learners can inform the kinds of learning experiences that should be made available to them. As such, the findings from this study may be used to support further development of students who have difficulty with reading.

The study design uses qualitative case study methodology (Yin, 1993) because I wanted to capture both the students' voices as well as their school context. For the purposes of this study, students received 720 minutes of tutoring (570 minutes of direct reading instruction and 150 minutes of Brainology® Program implementation) divided into 12 hour-long tutoring sessions. Each session started with the students engaging with the Brainology® Program, followed by direct reading instruction.

If simply possessing an incremental mindset leads to higher academic achievement, and if changing the mindsets of students can be accomplished by utilizing Brainology®, which can feasibly be implemented in any school, then educators could possess a powerful approach to narrowing the achievement gap and decreasing illiteracy. The following research question guided the study design: *How do elementary school-aged students who have difficulty with reading understand themselves as learners following theories of intelligence instruction?*

The pre-intervention interviews were conducted to obtain general information about how the elementary school-aged students understood themselves as learners in regards to theories of intelligence and to establish a positive interaction between the investigator and the respondents. In-depth, semi-structured post-intervention interviews were designed to obtain an inclusive understanding of the identified participants' perceptions about themselves as learners, as well as their experiences with learning about theories of intelligence via the Brainology® Program. To get a full representation of participants' perspectives related to their experiences, I conducted individual interviews, each lasting less than 1 hour. An interview protocol was utilized during the interviews. The students shared their experiences, impressions, and feelings regarding their experience participating in these sessions. I also conducted field observations and analyzed formal and informal documents related to each participant's academic performance, including:

teacher comments on report cards, reading journals/notebooks, running records, and standardized test scores.

The data analysis procedures involved immersing myself in the complete data set, including the documents, transcripts, field notes, and personal journal entries. Results from the study revealed three main ways that the study participants understood themselves as learners after theories of intelligence instruction via the Brainology® program: Intellectually: I can develop my intelligence, Emotionally: I can control my emotional responses, and Physically: I can strengthen my brain. Overall, these findings indicate that students understand themselves as learners from the whole-child frame of reference. The results suggest that educators should consider ways to integrate theories of intelligence instruction into the school day for all students.

Sadly, there is a huge disconnect between how educators understand students as learners (and thus plan to support them) and how the students understand themselves as learners. Therefore, the ways in which educators are creating learning constructs for students who have difficulty with reading are not aligned to the students' realities.

Conceptual and Operational Definitions

The following definitions were used during the course of this dissertation research study: “*Literacy*” refers to “an individual’s ability to use printed information to function in society, to achieve one’s goals, and to develop one’s knowledge and potential” (Kirsch, Jungeblut, Jenkins, & Kolstad, 1993); “*intervention*” denotes “integrated, strategic, meaningful, and, if necessary, intensive curriculum and instruction to powerfully enrich and expand children’s reading lives” (Greenleaf & Roller, 2002); “*students who have difficulty with reading*” are those not reaching the academic level of their able-reading peers; “*reading level*” is defined as a metric used for

matching text to a reader; “*noncognitive factors*” are those factors that are beyond academic knowledge and technical skills (e.g., motivation, time management, and self-regulation).

CHAPTER 2: LITERATURE REVIEW

This literature review is divided into three sections. In the first section, I further discuss the risks associated with illiteracy. In the second section, I explore a limited sample of common approaches to literacy improvement that schools have adopted throughout the country. I focus on popular reforms that aim to improve the conditions for literacy learning: differentiated instruction, Response to Intervention (RtI), teacher professional development, and adoption of the Common Core State Standards (CCSS). Finally, in the third section, I present research on how noncognitive factors – e.g., motivation, expectancy-value theory, self-efficacy, classroom context, and theories of intelligence – can influence learning and literacy improvement.

Risks Associated with Illiteracy

Due to dropping achievement test scores, concern lingers about the United States losing its competitive edge globally (Jackson, 2012; López, 2007). Unfortunately, illiteracy is a national quandary that is not going away. The U.S. Department of Education's National Institute of Literacy (2013) reported that 14% of the population, or 32 million adults, in the United States cannot read. Of those who can read, 21% read below a 5th grade level.

Educators must take action to intervene on behalf of students who have difficulty with reading at an early age by offering a plan for change. A society that cannot effectively reach its students who have difficulty with reading is a society destined to become an increasingly illiterate population. Some readers continue to struggle despite the many efforts put forth by school districts to support them. This study examines one potential noncognitive factor, theories of intelligence, which has shown promise in positively influencing students.

Reading is the most consequential skill taught in school and learned by schoolchildren because reading provides access to all other knowledge (Kay, 1996). Any teacher or parent

knows what Armbruster, Lehr, and Osborn (2001) confirm: students who have difficulty with reading face dire long-term consequences. Weak reading skills have a lasting effect on self-confidence and motivation to learn. Poor literacy skills in elementary school are one reason for the gap that grows as students move from one grade level to the next, reaching its largest discrepancy at the middle school or high school level. Research indicates that students reading below grade level when they finish third grade are unlikely to ever catch up with their same-age peers (Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996; Juel, 1998). Adolescent literacy attainment across the United States is in crisis as more than 8 million students in grades 4 to 12 are recognized as students who have difficulty with reading (Sternberg, Kaplan, & Borck, 2007). The U.S. Department of Health and Human Services (2000) revealed that youth between the ages of 16 and 21 who experience the inability to function appropriately because of illiteracy account for approximately 50% of the nation's unemployed youth, with limited potential to obtain employment. Catastrophe looms for an illiterate adult who seeks employment in a 21st century society that relies heavily on written information (NCES, 2011).

Even the Department of Justice states, "The link between academic failure and delinquency, violence, and crime is welded to reading failure," and the data back up this claim: 85% of all minors involved with the juvenile court system demonstrate functional illiteracy, and over 70% of inmates in America's prisons are reading at a fourth grade level (U.S. Department of Education, 2003a). Three-fifths of all American prisoners cannot read. Some states even use the current performance of elementary school students on reading tests as part of their projection to determine how many prison beds will be needed in future years (Gillis, 2006). Approximately 50% of Americans read so poorly that they are unable to perform simple tasks such as reading prescription drug labels (National Institute for Literacy, 1998).

The United States literacy rate has been a concern for years (Grigg, Daane, Jin, & Campbell, 2003; National Institute for Literacy, 1998; Obama, 2007; Organization for Economic Cooperation and Development, 2013; U.S. Department of Education, 2002; White House, n.d.). In addition to their concern about the literacy rate, Americans are also interested in how their nation fares compared to its international neighbors (Obama, 2007). An acute awareness of these facts motivated the authorization and signing into law of the No Child Left Behind (NCLB) Act of 2001, put into motion by President George W. Bush. The requirements of NCLB established goals, incrementally increasing each year, with the mandate that all schoolchildren would be proficient readers by 2014 (No Child Left Behind Act, 2001). Subsequently, as of February 2012, 34 states and Washington, D.C. have been granted waivers. These waivers remained active until the end of the 2013-14 school year, at which time states were granted the opportunity to extend their waivers for another two years. The NCLB Act was replaced in 2015 with the Every Student Succeeds Act (ESSA), touting the same focus on supporting students with the tools that have the greatest potential for ensuring their success in school and preparing them for college and work. School districts all over the United States continually search for the programs and interventions necessary to ensure students make “Adequate Yearly Progress” toward these goals (U.S. Department of Education, 2003b).

Despite this national attention on literacy, many students in schools all over the country are not learning how to become successful readers (National Institute for Literacy, 1998; Thompson et al., 2012; U.S. Department of Education, 2002, 2003a). An alarming number of eighth grade students lack the ability to read fluently, and approximately 70% are poor readers (Armbruster et al., 2001). The National Assessment of Educational Progress (2011) report pronounced the average fourth-grade score in reading as remaining unchanged from 2005 to

2009. Furthermore, it indicated that in eighth grade, the average score in 2011 was only one point higher than in 2009 (National Center for Education Statistics, 2011). The National Assessment of Educational Progress detailed that 26% of eighth grade students cannot read common items (e.g., road signs, newspapers, and bus schedules) necessary for daily life (Grigg et al., 2003).

Educators must act quickly because “Once children become mired in a swamp of negative expectations, lowered motivation, and lowered levels of practice, it becomes increasingly difficult for them to get back on the road to proficient reading” (Spear-Swerling & Sternberg, 1994, p. 99). In response to the distressing statistics regarding national reading performance and the evidence suggesting a connection between lack of reading abilities and illiteracy, many current educational reforms focus on literacy education. Researchers and educators are looking for ways to help students who have difficulty with reading before it is too late (Allington, 2006; Derville, 1966; Dewey, 1938, 2001; Mohr et al., 2004; National Reading Panel, 2000; Powell-Brown, 2006; Schmoker, 2006; Shanker & Ekwall, 2003). Throughout the country, school districts are implementing a variety of approaches in an effort to help students achieve a level of literacy competence with which they can be locally successful and globally competitive (Jackson, 2012).

Common Approaches to Literacy Improvement

Schools characteristically take a multi-faceted approach to improving literacy (Biancarosa & Snow, 2004). They may introduce new curriculum or textbooks, implement new instructional approaches such as guided reading or close reading, develop teachers’ literacy content knowledge, or attend to students’ physical needs, such as the posture needed for writing or eye tracking techniques for reading. The range of approaches is immense. Here, I describe

some common approaches aimed at supporting literacy development that are currently popular in my district and around the country (Morris, 2015). These include differentiated instruction, Response to Intervention, professional learning for teachers, and literacy content standards. While there are many other initiatives focused on supporting literacy development, I chose to examine big picture approaches, assuming that many pieces of other approaches would be incorporated within the larger constructs (e.g., leveled texts could be considered differentiation). The selected sample addresses the most widespread approaches, each of which focuses on factors other than the child's innate cognitive capacity or specific instructional and pedagogical approaches. While cognitive capacity and instructional and pedagogical approaches are likely equally important to consider, in an effort to better understand how educators structure the learning environment for students, I narrowed the discussion to some widespread efforts that do not focus specifically on the learner.

Differentiated Instruction

In an effort to attend to the individual needs of each student, school districts across the country are approaching instruction through the lens of "differentiation." Educators have come to realize that not all children learn in the same way. The old instructional approaches that focus on the median learner are understood as ineffective for meeting all students' needs and are no longer acceptable as they suggest that all students are the same (Tomlinson, 1999, 2001, 2003, 2005; Tomlinson & Strickland, 2005). Today's teachers are expected to tailor their instruction, assignments, and assessments to target individual student needs.

The most important advantage of differentiating instruction is the ability to identify the learning needs of each child and plan instruction to meet those needs. The approach of differentiated instruction can be explained through several actions (see Figure 3).

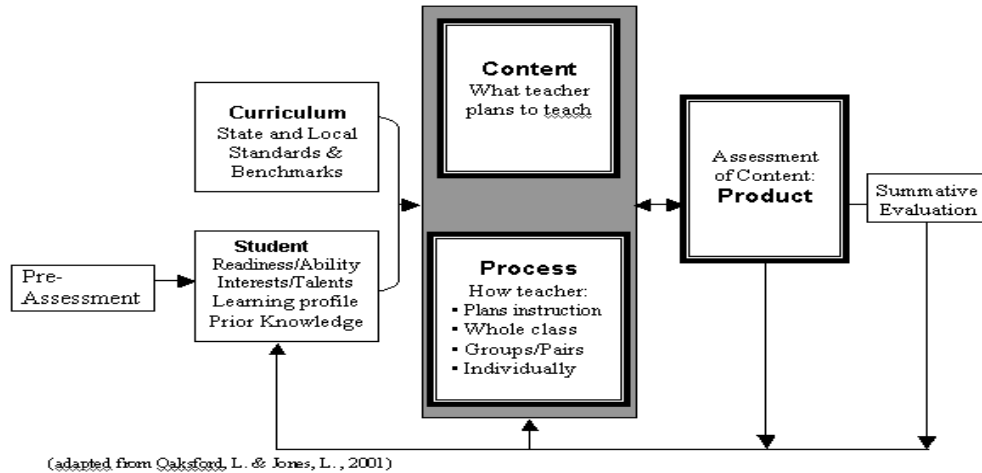


Figure 3. Differentiated instruction plan.

First, flexibility in content, process, and product presented and received by teacher and student provides students with choice. Further, student assessment, which includes pre-assessment, formative assessment, and summative assessment, helps inform teachers in making appropriate instructional decisions. Formative assessment provides students and teachers with information about student academic progress in formal and informal ways (Yorke, 2005) and helps inform curriculum and lesson planning (Chapman & King, 2005). In addition, flexibly grouping students based on ability levels, learning styles, and interests allows for alternative grouping of students for maximum engagement and growth. When grouping is flexible, and changes take place from one assignment to the next, student interest remains high (Ernst & Ernst, 2005). Additionally, planning tiered lessons through grouping, content, product, and process engages students. Finally, a focus beyond minimum standards as a means to help students achieve standards, exceed standards, and achieve individual potential toward the standards lends opportunity for varied curriculum approaches (George, 2005; Heacox, 2002; King-Shaver, 2008; Lawrence-Brown, 2004; Levy, 2008; Lewis & Batts, 2005; Wormeli, 2005).

Although the concept of differentiation is worthy, fidelity of implementation of differentiated instructional strategies and teacher aptitude are two variables that can impact effectiveness. For differentiation to be effective as theorized, teachers must frequently formatively assess students and use assessment results to guide classroom instruction (Irving, 2007). Examples of formative assessment tools teachers may use to measure progress in the classroom include exit cards, interactive technology remotes, and simple whiteboards (Crumrine & Demers, 2007). Ensuring that all teachers in a school district know how to assess formatively and to effectively use that data to drive instruction is a challenge. Successful assessment requires teachers to create classroom conditions of peer respect and contribution, instruct students in peer and self-assessment methods, interpret evidence of assessment, and adjust instruction to fill the gaps (Heritage, 2007). Furthermore, grouping by ability requires teachers to be familiar with each student's readiness and to flexibly place students in groups below, at, and above grade level as their abilities change over time (Adams & Pierce, 2003). Mastering all aspects of differentiation in instruction requires extensive time and training (Schmoker, 2010). The aforementioned challenges may help explain why this approach has not been successful in supporting all readers.

Response to Intervention

The Individuals with Disabilities Education Improvement Act (IDEIA), reauthorized in 2004, addressed the achievement of all at-risk students in the general education population by mandating that schools "monitor and measure a student's response to an individualized intervention in the general education classroom" (McCook, 2006, p. 3). This means that schools must keep track of what intervention is provided to a student identified as at-risk and how the child responds to the implemented intervention (e.g., was there an educational impact from the

intervention). This Response to Intervention (RtI) approach is grounded in collective responsibility and accountability for ensuring the success of all students, including restructuring teaching and leadership practices (Buffum, Mattos, & Weber, 2009). RtI mandates the use of scientifically based reading instruction, the evaluation of students' responses to the intervention, and the use of data based decision-making (Brown-Chidsey & Steege, 2005). In an effort to support students who have difficulty with reading and promote their reading achievement, teachers and reading specialists throughout the country are supposed to be utilizing evidence-based strategies to implement RtI methods and structures at both the classroom and/or school level.

RtI is different from other specific reform efforts in that it fundamentally changes the way educators view teaching and learning. In contrast to other reforms, RtI promotes examination of various factors that enable or hinder student learning. This framework promotes moving away from a focus on student deficits and instead promotes a thorough examination of instruction, curriculum, and the environment in order to best meet diverse student needs (Prasse, 2009). The spirit of RtI also focuses on the whole child by analyzing the correlation between an academic and/or behavioral intervention and how the student responds to the intervention; furthermore, RtI is a method to identify, define, and resolve students' challenges (Brown-Chidsey & Steege, 2005). Although there is no universal framework for RtI, researchers have suggested the use of a three-tiered model (see Figure 4; Fuchs, Mock, Morgan, & Young, 2003). Tier 1 includes a primary intervention for all students in the general education classroom. Tier 2 consists of a secondary level of intervention for students who need additional support, whereas Tier 3 is a tertiary level of intervention for students needing even more intensive support. Purposeful assessment is a key component of the three-tiered model (Fuchs & Fuchs, 2006;

Fuchs & Fuchs, 2007). Through assessment, teachers identify students for possible interventions, implement those individualized interventions accordingly, and then evaluate students for responsiveness to the prescribed interventions.

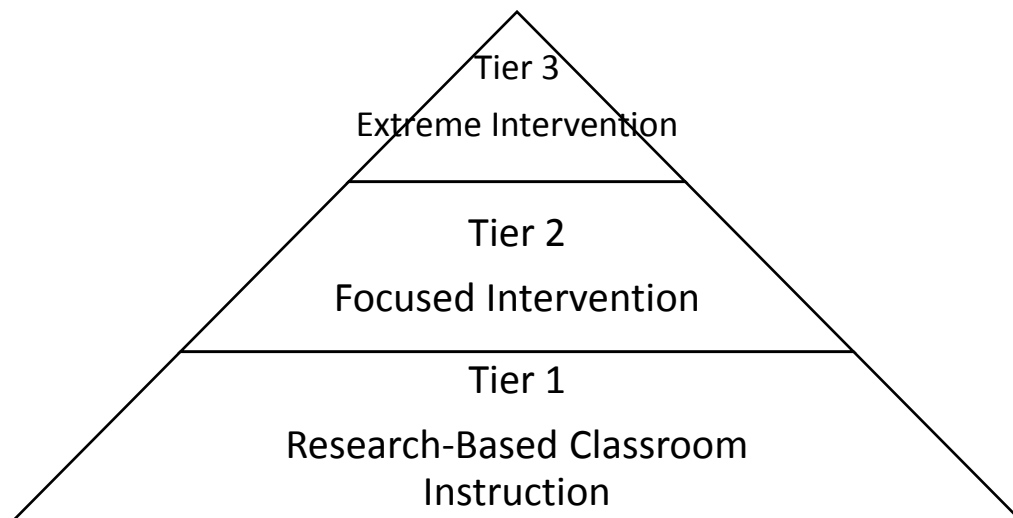


Figure 4. RtI instructional framework.

Researchers have described two approaches to RtI that are frequently implemented in schools: the problem-solving approach and the standard-protocol approach (Fuchs & Fuchs, 2007; Fuchs et al., 2003; Hollenbeck, 2007; O'Connor, Harty, & Fulmer, 2005; Tilly, 2003; Vaughn, Linan-Thompson, & Hickman, 2003). The majority of districts using the RtI framework use the problem-solving model (Fuchs & Fuchs, 2006), which is a three-tiered approach based on assessing a student's difficulty (Fuchs et al., 2003; Tilly, 2003). This problem-solving approach includes identifying a problem, analyzing the problem, devising and implementing a plan of action, and evaluating the problem (Batsche et al., 2005; Fuchs et al., 2003). It emphasizes team collaboration (Hollenbeck, 2007), in that teams evaluate individual students and develop an individual intervention plan for each student based on particular student needs (Bender & Shores, 2007; Mellard & Johnson, 2008). As a result, the problem-solving approach develops a greater variety of research-based interventions, as the selection of interventions is based on individual

student needs rather than a standard set of interventions. A potential weakness of the problem-solving approach is its reliance first on the knowledge and skills of the practitioner who administers the assessments and then on the interventions to target and meet an individual student's needs (Fuchs & Fuchs, 2006). Due to a lack of controlled instruction, the problem-solving approach has not been documented as an effective approach to intervention (Fuchs et al., 2003).

The standard-protocol approach, in contrast, provides all at-risk students with the same intensive instruction (Fuchs et al., 2003; Hollenbeck, 2007; Vaughn et al., 2003). The standard-protocol model involves using a predetermined set of standard interventions to assist students who qualify for those interventions using a set of criteria (Bender & Shores, 2007; Buffum et al., 2009). Based on initial assessment results and expected results on benchmarks, students are identified and grouped. In an attempt to ensure the reliability and fidelity of instruction, standardized approaches use scripted protocols (Vaughn et al., 2003). Like the problem-solving approach, the standard-protocol approach also provides three-tiered and targeted prevention and remediation (Fuchs et al., 2003), which researchers prefer as a method to document the results and effectiveness of the intervention (Fuchs & Fuchs, 2006). Students struggling in a specific content area or with a particular skill all receive the same kind of intervention. Using this approach, a specialist trained in the appropriate area provides a standard intervention, simplifying supervision and attempting to ensure the fidelity of interventions (Vaughn & Denton, 2008); however, these protocols may not meet all students' individual needs.

RtI has many benefits, including the potential to reduce the number of special education referrals and placements (Bollman, Silberglitt, & Gibbons, 2007; Farmer, Vernon-Feagans, & Hannum, 2004; Mellard & Johnson, 2008). Described as a "safety net" (Brown-Chidsey &

Steege, 2005), RtI has been identified as an effective approach to prevent or significantly reduce reading difficulties for the majority of students (Vaughn et al., 2003). Effective instruction, appropriate interventions, and sound instructional decisions constitute the overarching framework of the three-tiered model of RtI (Vaughn et al., 2003). For example, students who require extra time to master skills receive additional instructional time in the general education setting to reinforce what is being taught (Foorman & Torgesen, 2001; O'Connor, 2007), whereas students who need more direct instruction receive small-group instruction focused directly on particular skills (Denton, Vaughn, & Fletcher, 2003; Foorman & Torgesen, 2001; O'Connor et al., 2005). Students who still experience difficulty may receive instruction that differs entirely in content or method from the rest of the students (O'Connor et al., 2005). However, given that each school district defines and implements RtI distinctly, many variables impact RtI results.

Researchers list two major components that impact RtI effectiveness: implementing interventions and monitoring student progress (Brown-Chidsey & Steege, 2005; Deno, 2005), both of which require close oversight to be effective (Deno, 2005; Shinn, 2005). Ensuring the reliability of interventions is an integral part of ensuring students' responses to intervention are informative, which is critical as students' responses to various interventions are used to evaluate special education services. Furthermore, because Tiers 2 and 3 involve instruction that is "more explicit and comprehensive, more intensive, and more supportive" than general education instruction (Foorman & Torgesen, 2001, p. 206), districts must ensure that teachers are capable and trained to provide this instruction. Principal leadership, teacher commitment, availability of resources, use of research-based interventions, and collaboration between general education and special education teachers are additional factors that can contribute to the potential for success of RtI (Kimmel, 2008).

Professional Development

Research demonstrates a correlation between teacher effectiveness and student achievement (Darling-Hammond, Wei, Andree, Richardson, & Orphanos, 2009; Marzano, Pickering, & Pollock, 2001; Sanders & Rivers, 1996; Schmoker, 1999). Therefore, in an effort to meet the needs of students who have difficulty with reading, many school districts focus on professional development for teachers. Professional development to improve teaching practices and build content knowledge is a logical expectation for all teachers (Sawchuk, 2010). To ensure that teachers are knowledgeable about content areas and effective instructional strategies, they must participate in professional development throughout their careers (Elmore, 2002). In the state where this study took place, each teacher must complete at least 20 hours of professional development each school year, replacing the previous requirement of 100 hours over 5 years. This annual hourly requirement ensures that professional development plans (PDPs) are revisited each year and are aligned with the teachers' evaluation results, as well as any school, team, or district priorities (State of New Jersey Department of Education, 2015). Individual school districts may have additional requirements as well.

The effectiveness of professional development for improving classroom instruction and increasing student achievement is dependent upon the quality of the professional development (Ball & Cohen, 1999; Cohen & Hill, 2000; Corcoran, Shields, & Zucker, 1998; Darling-Hammond & McLaughlin, 1995; Elmore, 1997; Little, 1993; National Commission on Teaching and America's Future, 1996). Too frequently, professional development is no better than a "patchwork of opportunities—formal and informal, mandatory and voluntary, serendipitous and planned" (Wilson & Berne, 1999, p. 174). The typical delivery approach of most professional development providers has been questionable in the past (Sawchuk, 2010). To create high-

quality teaching, professional development needs to become site-based and job-embedded (Zepeda, 2011).

Professional development is only as worthwhile as it is effective. Researchers found that even though 90% of teachers engaged in professional development, the majority reported that it was a waste of time (Darling-Hammond et al., 2009). One-time workshops for professional development are the most common, even though they do not positively influence teacher practice and student achievement (Yoon, Duncan, Lee, Scarloss, & Shapley, 2007). Research is beginning to focus on how to effectively evaluate professional-development programs in order to determine whether the training changes educator knowledge, attitudes, skills, aspirations, and behaviors, and how the learning is applied in classrooms to produce gains in student learning (Desimone, 2009). Until professional development opportunities engage teachers in developing a deeper understanding of teaching and learning, improvement will remain elusive.

To provide experiences that engage teachers and facilitate change, administrators are introducing forms of professional development called *professional learning* (Borko, 2004; Fullan, 2007; Little, 1993, 2002; Wei, Andree, & Darling-Hammond, 2009). Professional learning is influential because it emerges from the world of teaching and learning, is focused on what will assist young people to learn, connects those involved in helping students learn, and has a positive outcome on the classrooms where students and their teachers learn (Easton, 2008, p. 2).

Although necessary and important, professional development is not a panacea for reform (Guskey, 2003). Currently, many districts do not invest the time required for quality professional development (Elmore, 2002). School districts must be prepared to commit extended time and money, as changing professional practice does not happen overnight. Adapting new content or

new pedagogy to unique classroom contexts takes time, thus providing follow-up (such as digital resources, mentoring, or additional workshops) after the main professional-development activity is crucial to sustained improvement (Guskey & Yoon, 2009). Studies do not show that a set amount of time spent in professional development is required for improvements in student outcomes; however, the initiatives that showed the most positive effects included 20 or more contact hours and were spread over a semester (Desimone, 2009).

The Common Core State Standards

Alarming, and for the first time in U.S. history, current retirees have higher educational achievement than the young adults coming into the workforce (Organization for Economic Cooperation and Development, 2013). Education policies to increase academic demands have been legislated with the expectation of reversing this trend and are now being implemented across the country. More recently, the Common Core State Standards (CCSS) are being established in states across the country, with the hope that a pronounced framework of content knowledge in language arts and core academic skills will lead to higher student achievement.

The Common Core State Standards represent a relatively new initiative, and many districts are still in the process of fully implementing the standards. Unlike other literacy initiatives, the CCSS are a state-led initiative directed by the National Governors Association Center for Best Practices and Council of Chief State School Officers (2010). Standards-based educational reform is grounded in the belief that curriculum reflecting rigorous standards and aligned instructional techniques will have the greatest impact on teaching and learning (Swanson & Stevenson, 2002). At present, the CCSS are informing instructional decision making in 46 states across the United States, being touted by some as one of the most influential reforms teachers have experienced (Calkins, Ehrenworth, & Lehman, 2012).

The CCSS bring higher expectations and increased rigor. The reading standards focus on comprehension of complex texts, including informational and literary texts, close reading, and purposeful use of textual evidence. This focus on comprehension is based on research confirming that it is probable that students who understand complex texts will be successful after high school (American College Testing [ACT], 2006). Many students currently lack the ability to comprehend complex texts. The reading complexity of workplace materials and college textbooks has remained stable or increased over the past 50 years (Council of Chief State School Officers & National Governors Association Center on Best Practices, 2010); however, the level of text complexity in high schools has waned (Chall, Conard, & Harris, 1977; Hayes, Wolfer, & Wolfe, 1996). Many high school teachers attempt to make comprehension simpler for students by presenting material via PowerPoint or reading aloud without even requiring students to read or comprehend these texts.

Current policy efforts rest on the assumption that a more rigorous curriculum will improve student performance (Loveless, 2012). Yet there is little to no evidence that solely increasing standards will lead to higher levels of literacy attainment. The CCSS propose flexibility, but also require a great level of teacher proficiency (Ewing, 2010). Since the CCSS are still relatively new, how and to what degree they will truly impact learning remains to be seen.

Noncognitive Factors

Beyond content knowledge and academic skills, there are other factors that have an impact on student performance and are crucial for success in school and in life, such as work habits, study skills, metacognitive strategies, time management, attendance, help-seeking behaviors, and social and academic problem-solving skills (Conley, 2007; Farkas, 2003; Paris &

Winograd, 1990). Other critical factors for success include relationships with adults and peers, views on intelligence, levels of self-control and persistence, and attitudes about learning (Ames & Archer, 1988; Bandura, 1997; Bandura & Schunk, 1981; Keith et al., 1993; Pintrich, 2000; Schunk & Hanson, 1985; Wentzel, 1991; Zimmerman, 1990). Since these factors are not largely measured by cognitive tests (e.g., IQ tests or academic examinations), they are often referred to as “noncognitive.” Studies reveal that these noncognitive qualities have a direct positive relationship to students’ current school performance and future outcomes (Farrington et al., 2012). Heckman (2008), economist and Nobel laureate, maintains that noncognitive factors (e.g., time management, motivation, or self-regulation, etc...) are critical for success in school and life, including in the labor market. Research has suggested that the development of these noncognitive factors would yield high payoffs in improved educational outcomes (Blackwell et al., 2007).

When considering how to support students who have difficulty with reading, educators seldom consider how noncognitive factors such as students’ beliefs about their learning may actually influence their learning (Duckworth & Seligman, 2005; Duckworth, Quinn, and Tsukayama, 2012; Farrington et al., 2012; Olson, 2012). We as educators must examine all factors that serve as possible obstacles to effective learning. Considering noncognitive factors may shed light on why some students continue to struggle regardless of the great efforts put forth by school districts and individual educators to support them. Here, I present research on five overarching noncognitive factors (drawn from Figure 2, presented in Chapter 1): motivation, expectancy-value theory, self-efficacy, classroom context, and theories of intelligence.

Motivation to Read

Terrell Bell, former U.S. Secretary of Education, aptly stated, “There are three things to remember about education. The first one is motivation; the second one is motivation; the third one is motivation” (as cited in Ames, 1993, p. 409). Although the National Reading Panel (2000) did not include motivation as one of the major components of reading instruction (Williams, Hedrick, & Tuschinski, 2008), many educators and researchers have found that motivation is key to effective instruction (Schunk, Pintrich, & Meece, 2008; Sullo, 2007; Williams et al., 2008), successful reading achievement (Gambrell, Palmer, Codling, & Mazzoni, 1996; Quirk, Schwanenflugel, & Webb, 2009), and improved comprehension of text (Guthrie & Wigfield, 1999).

Motivation is the “why of behavior” (Covington, 1998, p. 11). Why is it that some students appear to want to learn, but others do not? Why do some students read late into the night? Why do others carry around a thick book with no intention or ability to read it? Motivation also speaks to what guides a student to attain certain goals (Sansone & Harackiewicz, 2000) and makes him/her avoid other situations (Derville, 1966; Onatsu-Arvilommi & Nurmi, 2000), and it explains how he/she feels about him/herself (Bandura, 1977; Renninger, 2000) or why he/she chooses to read or not to read (Butkowsky & Willows, 1980; Clifford & Chou, 1991; Gambrell et al., 1996). White (1959) pointed out that the motivation theories of his time did not consider that humans learn to do things that they certainly did not know how to do at birth; motivation research has evolved markedly since then (Covington, 1998; Schunk et al., 2008) and now helps to provide better answers to the above questions about motivation (or the lack thereof). Other theorists (Bandura, 1977; Derville, 1966) describe what they believe happens when students pay attention and observe their surroundings. Bandura (1977) described

motivation in terms of what is learned in a social setting. In this approach, identified as social-learning theory (Petri, 1991), humans are able to learn through observation and are more likely to engage in the observed behavior if they believe they are able to complete the task (Bandura, 1977, 1986, 1993; Bandura & Schunk, 1981). Bandura (1977) believed that some people have a strong sense of self-efficacy whereas others have a weaker one. Derville (1966), with a slightly different approach, explained what motivates students to learn in terms of difficulties and discoveries. Derville explained that one way to understand what motivates students to learn is the observation that “difficulties lead to discoveries” (p. 85). Children can either watch someone else have difficulties or experience difficulty themselves; either way, discoveries or learning will happen, as these discoveries are tied to human emotions. If one discovers that he wants to do something and then finds that he cannot, he becomes frustrated. If one finds that he lacks the expertise other people have and that he feels he should have, he will feel inferior. When learners choose to avoid such situations, they are preventing themselves from gaining the opportunity to improve, which is necessary to remove feelings of inferiority (Derville, 1966).

Becoming a successful reader undeniably falls under the category of tasks humans are not born to do (Rasinski, 2003). Learning to read is not an innate talent (Lyon, 2000), and it is likely that there are “multiple motivation pathways” (Taboada, Tonks, Wigfield, & Guthrie, 2009, p. 86) that guide student behavior. As Baker and Wigfield (1999) observed, “because reading is an effortful activity that children often choose to do or not to do, it also requires motivation” (p. 452). There is a clear link between intrinsic motivation and frequency of reading (Wigfield & Guthrie, 1995, 1997). Nevertheless, it is often extrinsic motivation, such as that experienced as a result of interactions with school adults, that influences future learning and impacts a student’s motivation (Deci & Ryan, 1985; Marzano, 2003; Sweet, Guthrie, & Ng, 1998).

Expectancy-Value Theory

More than a few theories offer an explanation as to why people show persistence in the activities they do (Schunk et al., 2008). One such theory, expectancy-value theory, suggests that two factors commonly determine students' achievement and achievement related choices: expectancies for success and subjective task values (see Figure 5 from Pintrich & Schunk, 1996). How confident one feels in his/her ability to succeed in a task is called "expectancies for success," while how important, useful, or enjoyable the individual perceives the task to be is called "subjective task values."

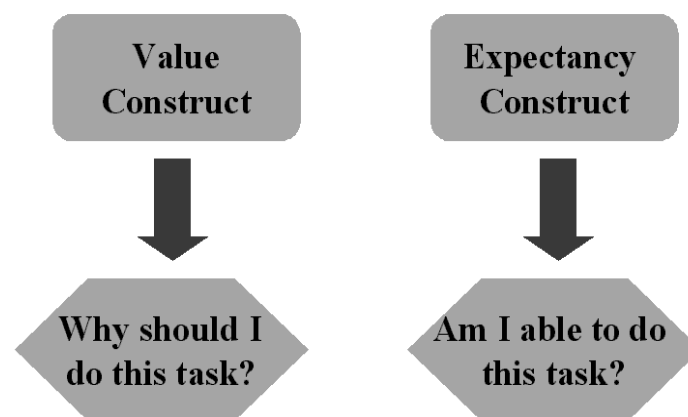


Figure 5. Expectancy-value model.

Self-concept and task value (Gambrell et al., 1996) are the two central dimensions of the expectancy-value theory of achievement motivation (Wigfield & Eccles, 2000). These two facets have a strong impact on performance, persistence, and choice of achievement task in students and have been empirically identified in children as young as 6 years old (Wigfield, 2004). Even though self-concept and task value are present in students as early as first grade (Wigfield & Eccles, 2000), they change as children get older (Wigfield & Guthrie, 1997). Expectancy-value theory claims that the amount of effort expended by an individual is directly correlated to the

amount of interest taken in the task, the perceived likelihood of success, and the meaning associated with its completion (Wigfield & Eccles, 2000).

The expectancy-value model of achievement was originally conceived as an attempt to understand the different kinds of achievement behaviors in males and females (Wigfield, 2004). Even though the performance of each population was similar (Bembenutty, 2008), a longitudinal study determined that there were not only domain/subject area differences for the dimensions of motivation, but gender differences as well. These differences arise most distinctly in the middle school years (Wigfield & Guthrie, 1997). Eccles (2007) applied his expectancy-value model of achievement initially to instruction in mathematics. An expectation regarding success in school combines with a student's views about the value of school tasks and determines the amount of motivation the student feels to engage in school. The premise of this theory is comparable to the constructs of Bandura's (1977) theory, which distinguished between efficacy expectations—that is, the belief that one can accomplish a task, such as “I can do this!”—and outcome expectancies—that is, the belief that specific effort will produce a given result, such as “If I study, I can pass this test.”

Self-Efficacy Theory

Individuals have self-efficacy beliefs that allow them to exercise control over their thoughts, feelings, and actions. Few opinions about oneself are more essential than self-efficacy beliefs, or the confidence that one can achieve success in a certain area. Self-efficacy prompts willingness to engage in an academic task and persist even when the task becomes challenging (Bandura, 1997). Self-efficacy beliefs influence affective, cognitive, motivational, and decisional processes and determine whether individuals view themselves as capable or incapable, are motivated to persist when confronted with challenges, have a sense of emotional well-being, and

can make certain choices in critical instances (Bandura, 1997; Bandura & Locke, 2003). For most students, past performance is the most reliable guide for gauging self-efficacy (Schunk & Meece, 2006). When a deficiency in self-efficacy exists, people are likely to underachieve, even with the knowledge of what they need to do to succeed (Bandura, 1986, 1993). Self-efficacy beliefs can be context-specific or linked to a domain. Constructs such as self-concept or competence beliefs, while similar, are more general and are based on social comparisons instead of normative criteria (Klassen, 2002; Zimmerman, 1995).

The literature clearly demonstrates the connection between self-efficacy and academic performance in the areas of mathematics (Schunk, 2003), reading (Paris & Oka, 1986; Shell, Colvin, & Bruning, 1995; Shell, Murphy, & Bruning, 1989), and writing (Pajares & Johnson, 1996; Pajares & Valiante, 1999; Schunk & Swartz, 1993; Shell et al., 1989, 1995; Zimmerman & Bandura, 1994). As students get older, their self-efficacy beliefs appear to be even more predictive of their achievement in reading and writing (Shell et al., 1995).

Furthermore, researchers have concluded that self-efficacy is a very reliable indicator of behavioral outcomes (Graham & Weiner, 1996; Pajares, 2003; Shell et al., 1989, 1995). Results show that writing task and writing skill self-efficacy scales are an accurate predictor of writing performance at all grade levels (Bruning, Dempsey, Kauffman, McKim, & Zumbrunn, 2013). Researchers emphasized the importance of fostering domain-specific literacy skills and attitudes that support readers in developing confidence. Moreover, studies have found that self-efficacy beliefs are more closely related to actual engagement and learning, and are also more predictive of performance, than measures of general self-concept (Graham & Weiner, 1996; Linnenbrink & Pintrich, 2003; Pajares, 2003; Pajares & Miller, 1994; Shell et al., 1989, 1995).

Studies show that self-efficacy, and therefore achievement, can be improved through instruction in modeled strategy use, goal-setting, constructive feedback, and self-evaluation of progress. Students can effectively and efficiently improve their reading or writing performance through these practices (Linnenbrink & Pintrich, 2003; Schunk, 2003; Walker, 2003).

Interventions must target not only cognitive skills, reflecting the ability to read, but also those attitudes and beliefs that readers and writers possess concerning their abilities, as these self-beliefs equally influence their progress (Pajares & Miller, 1994).

Classroom Context

Any way in which classroom context impacts any of the cognitive or noncognitive factors discussed above would also impact academic behavior (Deakin Crick, Barr, & Green, 2013; Gu & Johansson, 2013). For example, classrooms may influence students' attitudes by creating excitement about an upcoming project. If that excitement translates to more active engagement in and completion of the project, then the classroom context will have influenced behavior.

Likewise, if classroom instructional practice helps students develop learning strategies that allow them to derive more tangible benefits from the time they spend studying, then they may be more likely to study. If teachers present material in a way that makes it more accessible and students feel as if they understand what is going on, then students are more likely to engage in classroom discussions. Thus, classroom context shapes academic behavior indirectly through noncognitive factors, as well as influencing behavior directly through behavioral expectations and strategies.

Typical classroom discourse is an example of how classroom context can shape academic behavior. Johnston (2012) highlights a distinction in the use of language that frames students' learning worlds and shows how "a single comment can profoundly change the academic and moral choices children make. It literally changes the world they live in" (p. 13). For example,

consider the possible change in a student's perspective if the internal dialogue included the statement, "I'm not good at this... yet."

Johnston (2012) brings attention to how educators can move away from language promoting a fixed (entity) theoretical frame in students—where performance is viewed as the result of unchanging, inherited abilities or intelligence, and where knowledge is one-dimensional, a set of correct answers on a test. As an alternative, he leads teachers to consider language that promotes dynamic (incremental) learning frames in students, so that children begin to view performance and knowledge as continually in flux, growing with learning and in new contexts.

Theoretical Framework: Theories of Intelligence

Although most students aim to succeed, there is increasing evidence that the likelihood of their success is not only influenced by their ability, but also by the beliefs they carry into the situation (Elliot & Dweck, 2005). One framework that has been informative in understanding how these beliefs affect overall performance and influence recovery after disappointment is theories of intelligence (TOI; Dweck & Sorich, 1999). Dr. Carol Dweck, a Stanford University professor of psychology, has studied self-theories of learning since the early 1980s. In this model (see Dweck, 1999; Dweck & Leggett, 1988), students may hold different “theories” about the nature of intelligence. Research has identified two distinct ways in which individuals view intelligence and learning. Individuals with a *fixed mindset* (“entity theorists”) believe that their intelligence is innate and view intelligence as an unchangeable, fixed “entity,” while others with a *growth mindset* (“incremental theorists”) believe that intelligence can be cultivated and is a malleable quality that can be developed (Blackwell et al., 2007; Dweck, 1999, 2007a).

A fixed (“entity theorists”) view of intelligence versus a growth (“incremental theorists”) view of intelligence results in dissimilar goals and responses to challenge and setbacks (Dweck, 1999; Dweck & Leggett, 1988; Dweck & Sorich, 1999; Henderson & Dweck, 1990; Hong, Chiu, & Dweck, 1997; Mueller & Dweck, 1998; Sorich-Blackwell, 2001). Behavioral studies revealed that students who believe that intelligence is a fixed quantity (“entity theorists”) are susceptible to decreased performance when confronted with the risk of failure, while students who view intelligence as acquirable (“incremental theorists”) are more effective learners (Dweck & Sorich, 1999). Research has also shown that, even when students show similar intellectual ability, their theories of intelligence influence their reactions to academic trials.

The research examining implicit theories of intelligence has usually studied the effort and performance of middle and high school students, and even undergraduate college students, as they perform basic tasks. For example, studies have had some students create three dimensional figures (Dweck & Reppucci, 1973), explain arithmetic problems (Dweck, 1975), acquire basic principles of psychology (Licht & Dweck, 1984), answer conceptual problems (Diener & Dweck, 1978), or take reasoning tests (Mueller & Dweck, 1998). The advanced students (high school and university) have participated in word recognition (Werth & Forster, 2002) and common knowledge questions (Mangels, Butterfield, Lamb, Good, & Dweck, 2006). The outcomes of these studies usually reveal that individuals who hold a fixed view of intelligence apply less effort and do not perform as well on challenging tasks as people with a growth view.

Entity theory (fixed mindset). Those with an entity mindset believe people are born with a lot or a little of this uncontrollable thing called intelligence (Dweck, 1999, 2007a). Therefore, they avoid learning opportunities where they anticipate a high risk of errors, or separate themselves from these situations when errors do occur. Even when weakness is

uncovered, they frequently avoid educational opportunities that could be helpful for future achievement (Chiu, Hong, & Dweck, 1997). Those who hold a fixed mindset, or entity theorists, are also highly vulnerable to negative feedback because they are focused on outdoing others in an effort to prove their intelligence. Furthermore, students with an entity mindset do not see value in effort because they believe that if you have talent, things ought to come naturally. They feel dumb as soon as they have to work hard. Students with an entity mindset do not cope with setbacks well; they become dejected or defensive when they do not immediately succeed at something because, to them, obstacles only serve to bring their intelligence into question. They may swiftly discontinue effort, place responsibility on others, fib about outcomes, and/or contemplate cheating (Dweck, 1999; Dweck & Leggett, 1988; Dweck & Sorich, 1999; Henderson & Dweck, 1990; Hong et al., 1997; Mueller & Dweck, 1998; Sorich-Blackwell, 2001).

Incremental theory (growth mindset). Those who hold a growth mindset, sometimes called incremental theorists, are more likely to believe in increasing ability through effort and, therefore, are inclined to participate in purposeful and challenging activities (“learning goals”). Students with an incremental mindset see worth in effort and realize that even masterminds have to work hard to cultivate their skills. The conviction that skill can be developed through effort steers students with an incremental mindset toward tackling challenging tasks that stimulate skill acquisition and toward expending effort to defeat difficulties (Dweck & Leggett, 1988). Furthermore, because they believe in the possibility of intellectual growth, they are eager to engage in remedial actions when they struggle (Dweck, 1999; Dweck & Leggett, 1988; Dweck & Sorich, 1999; Henderson & Dweck, 1990). An incremental mindset prognoses a response to initial obstacles with continuing involvement and attempting innovative strategies while

employing all available resources for learning. Those who hold an incremental mindset interpret challenging work as a prospect for learning and growth (Dweck, 1999; Dweck & Leggett, 1988; Dweck & Sorich, 1999; Henderson & Dweck, 1990; Hong et al., 1997; Mueller & Dweck, 1998; Sorich-Blackwell, 2001). Considering intelligence to be malleable means that intellectual ability can always be further developed, not that everyone has identical potential in every domain or will learn every topic with equivalent ease (Sternberg & Horvath, 1998).

Dweck's more recent work (2012) showed a statistically significant connection between students' self-theory of intelligence, or mindset, and academic achievement. In "Implicit Theories of Intelligence Predict Achievement across an Adolescent Transition: A Longitudinal Study and an Intervention," Blackwell et al. (2007) demonstrated that an incremental theory, or growth mindset, in seventh grade students predicted an upward trend in academic achievement over the course of seventh and eighth grade. This result was compelling, but it begged the question: Could mindsets be changed to create conditions that were conducive to success?

Mueller and Dweck (1998) took 128 students in 5th grade out of their classrooms one at a time and asked them to do a simple nonverbal reasoning test. When some of the students finished the test, they were told, "This is your score. It's a very good score. You must have worked hard." Researchers told the other students, "This is your score. It's a very good score. You must be smart." They were then informed that they would do more of the tests during the day but that they could choose the next one. They could choose an easy one like the first one or "one that's hard, but you might learn something from it." The researchers wondered which students would choose a challenge with the intention of learning, and which would select security even with the price of not learning. Would telling the children that they were smart boost their self-esteem and enable them to take on the challenge? Not at all. Only about one-third of the "you must be smart"

group chose to struggle and learn, whereas better than 90% of the “you must have worked hard” students opted for the challenge and learning. For some students, that solitary bit of feedback created a world where working hard gets results, and where errors and successes do not reflect on them personally; they worked hard and it paid off. Only 35% of the “you must be smart” students chose to take the challenge. They had been led into a land where people are either smart or not, where doing the puzzles is about deciding who is smart and who is not, and where this can be determined from one test score.

The students next all struggled with a difficult test. Afterwards they were questioned as to how much they enjoyed working on the problems, if they would like to take some problems home to continue to work on, and why they believed they did poorly. Those students who received the feedback that they were smart liked the problems less and were not interested in taking them home. These students described their performance in terms of fixed ability rather than in terms of effort, over which they have control.

The study continued with an easy test, similar to the first one. On this test, the “worked hard” students did better than on the initial test, while the “smart” students performed worse. Lastly, the researchers communicated to the youngsters that students in other schools would also be working on these puzzles, and requested they write a letter to tell the new students about what it is like to do the puzzles. The form used to write the letter had a space for the students to write their test score. Amazingly, 40% of the “smart” students, those in the fixed performance world, lied about their score. Because in their world their score reflected a deep and permanent trait, they inflated their score to impress people - people whom they would never even meet. Only one of the “worked hard” students did this. In other words, one remark can deeply alter the academic

and moral decisions children make. It literally changes the world they live in (Johnston, 2004, 2012).

Students with an entity mindset, who consider themselves unsuccessful, make decisions that weaken their probability of succeeding in the future. Consider a study by Ying-Yi Hong and her colleagues (Hong et al., 1999), in which they influenced some students to embrace a fixed-performance frame, or entity mindset, and others to adopt a dynamic-learning frame, or incremental mindset, before taking a nonverbal reasoning test. After the test, regardless of their score, half were told they did well and half were told their performance was poor. Then the students were presented with the option of taking a tutorial class to help them do better on the next tests. Three-quarters of the students in the dynamic-learning frame, or incremental mindset, chose to take the tutorial. It did not matter to them whether or not they believed they did well; the tutorial was a chance to learn. Fewer students in the fixed-performance frame, or entity mindset, chose to take the tutorial. Within this group, 60% of those who thought they did well elected to take the tutorial. Of those who believed they did poorly, only 13% chose to take it. In a fixed-performance frame, or entity mindset, those who could benefit the most from the tutorial elected not to take it, because that could expose to others their (fixed) incompetence. Besides, if you are permanently not good at something and you do not enjoy it, where is the benefit?

Similar to other research that focuses on student psychology as an influential factor in learning, researchers have turned their attention to theories of intelligence. Individuals with an entity mindset accept that one's intelligence is predetermined and simply an inborn trait; they have a finite amount of intelligence and no more. This mindset limits their learning because they are constantly trying to prove how intelligent they are and spend their energy focused on protecting that image at all costs (Dweck, 2006). Those with an incremental mindset, however,

believe that intelligence can be grown over time (Blackwell et al., 2007; Dweck, 1999, 2007a; Grant & Dweck, 2003). Instead of being concerned with how smart they appear to others, they are available for true learning, work hard, and actually get smarter (Dweck, 2006). Without an understanding of the importance of an incremental mindset and the variety of strategies that support its development, teachers often misinterpret poor academic behaviors as an indication that students are not interested or lack the fortitude to persevere.

A teacher's mindset can influence how a child adopts his or her own developing mindset as a learner. As educators focus on their ultimate responsibility, "growing future adults," they must consider how students' created mindset will influence learning. Developing a growth mindset amongst teachers and students will not be instantaneous; rather, it will take the combined effort of teachers and the whole school community. With the (over) emphasis on test scores as the deciding factor of a child's potential, or even a school's success, educators must be committed to emanating a growth mindset and encouraging opportunities for cooperative and flexible thinking in the classroom.

Theories of intelligence and academic achievement. These two views about intelligence, incremental and entity, are linked with two different frameworks, or "meaning systems" (Hong et al., 1999), which can have significant consequences for students. A long history of psychological research undergirds the concept of academic mindsets. This includes initial work in expectancy-value theory (Eccles et al., 1983), self-efficacy (Bandura, 1986), and social learning theory (Bandura, 1977; Rotter, 1954). Similarly, psychology research has examined how environments may damage positive academic mindsets (Seligman & Maier, 1967; Steele, 1997; Steele & Aronson, 1995).

Researchers have begun to assess the consequences of these two different frameworks in relation to student outcomes (e.g., Hong et al., 1999; Robins & Pals, 2002; Stipek & Gralinski, 1996). In a study of junior high school students, Henderson and Dweck (1990) established that students who held an incremental view had a distinctive advantage over those with an entity view, and received considerably higher grades in the first year of junior high school, controlling for prior achievement.

If noncognitive skills are both malleable and critical to academic performance (e.g., literacy development), it is crucial that educators intentionally develop noncognitive skills, traits, strategies, and attitudes alongside content knowledge and academic skills. Educators must support students as they transition from being passive receivers of academic content to active, reflective participants who are capable of managing their workload, assessing their progress and status, persisting in difficult tasks, and developing a reliable set of strategies to control progressively complex academic content as they proceed through school. It is vital that the possible outcomes of different approaches to developing student noncognitive factors are examined, that tangible strategies to address the development of these factors are created, and that tools to dependably measure deviations in these factors are constructed.

Several studies have shown that purposefully teaching students that intelligence and talent can be developed and that the brain “grows like a muscle” when it is challenged can lead to higher grades and test scores (Aronson, Fried, et al., 2002; Blackwell et al., 2007; Good et al., 2003; Paunesku, Goldman, & Dweck, 2011). If theories of intelligence can indeed, as these studies have shown, be transformed, and are directly linked to academic performance, then we as educators must learn how to best create classroom environments that foster an incremental mindset.

Studies, such as those discussed, suggest that children who possess an entity mindset understand errors, challenge, and work as indicators of their lack of intelligence, whereas children who possess an incremental mindset interpret effort as helpful and view challenges as chances to learn (Dweck, 2006; Heyman & Dweck, 1998). More importantly, holding an entity mindset predicts static or decreasing academic performance over time, while holding a growth mindset predicts academic improvement (Blackwell et al., 2007; Good et al., 2003). Blackwell et al. (2007) and Good et al. (2003) focused on two groups of low-achieving seventh graders in New York City. An 8-week intervention was undertaken with these students. The experimental group showed marked improvement in mathematics achievement and learned that their brains can get stronger, like a muscle.

It is imperative to understand all the factors that lead to student success and to give educators the understanding and tools necessary to create contexts where students will persevere to achieve their academic goals. Paying attention to students' theories of intelligence may be a useful strategy for supporting students who have difficulty with reading.

Malleability of academic behaviors. Human behavior is generally viewed as malleable. Although it may be tough to alter one's personality or one's core values, a basic tenet of psychology is that it is almost always possible to change one's behavior (Deci & Ryan, 1985; Skinner, 1953; Staats, 1963). Practically all educational reform efforts start with this basic assumption. Whether through new policies, programs, structures, supports, curricular materials, or instructional approaches, the premise underlying all efforts to advance schools is that students, teachers, and school leaders can be motivated, mandated, cajoled, or trained to act differently in the classroom (OSEP Center on Positive Behavioral Interventions, 2000). Students' academic

behaviors *can* change. The important question is *how* educators can best facilitate these changes in ways that promote student learning.

A developing body of research suggests that student mindsets, and consequently their behaviors and academic performance, can be transformed through intervention (Aronson, Fried, et al., 2002; Blackwell et al., 2007; Good et al., 2003; Kamins & Dweck, 1999; Mueller & Dweck, 1998). Gunderson, Gripshover, Romero, and Dweck (2013) established the impact of praise on mindsets, demonstrating that the nature in which parents praise their young children at home forecasts the child's mindset and willingness to engage in challenging tasks 5 years later (Gunderson et al., 2013).

Another intervention consists of direct instruction in the incremental mindset. By means of readings and discussions about the neural connections that are formed in the brain when it works hard, seventh grade students were taught that intelligence is malleable during an 8-session workshop (Blackwell et al., 2007). Prior to the intervention, there was a steady decrease in the math grades of the students (and this decline persisted for children in the control group), but following the intervention, the grades improved considerably for students in the experimental group (Blackwell et al., 2007).

The positive effect of an incremental mindset intervention on the academic achievement of college students has also been documented (Aronson, Fried, et al., 2002). Aronson, Fried, et al. (2002) taught college students about incremental theory and compared them with two control groups: one group received no treatment and the other group learned a version of the "multiple intelligences" model of ability (Gardner, 1983). Subsequently, students in the incremental theory group received higher grades than the other two groups, even when controlling for SAT scores.

Compared with a control group, students' achievement test scores rose considerably upon completion of an incremental theory intervention (Good et al., 2003).

Further studies of young adults have described comparable results. College undergraduates showed marked differences in their reaction to failure (Niiya, Crocker, & Bartmess, 2004) and improved on puzzle-solving tasks (Thompson & Musket, 2005) when they were encouraged to consider the influence of practice. Simply reading a few sentences about the growth mindset modified the way in which these students approached a high-speed attention task. Those students who were presented with a "growth" mindset demonstrated increased focus and learned more from their mistakes as compared to students who read a testimonial of the "entity" theory (Schroder & Moser, 2014).

These studies demonstrate that theories of intelligence can be utilized in real-world contexts and have a positive influence on achievement outcomes. While this growing body of research shows that student' mindsets, and subsequently their behaviors and academic performance, can be changed through intervention (Aronson, Fried, et al., 2002; Blackwell et al., 2007; Good et al., 2003; Kamins & Dweck, 1999; Mueller & Dweck, 1998), it is unable to offer student perspectives or practical strategies for elementary school students.

Games as an Educational Platform

Ninety-two percent of children ages 2 to 17 play video games for an average of 20 to 33 minutes each day (Kaiser Family Foundation, 2002). Video games are engaging and stimulate players to engage in complex, time-consuming tasks. As such, video games are a captivating dais for instruction and the idea of incorporating video games into educational settings has captured the attention of educators (Gee, 2008; Mayo, 2009; O'Neil, Wainess, & Baker, 2005). Specific

attention is being paid to the game incentive structures or systems of rewards that successful players receive (Kapp, 2012).

Educational games can be enriched by altering their incentive structures to support an incremental mindset, or the belief that intelligence is malleable (O'Rourke, Haimovitz, Ballwebber, Dweck, & Popovic, 2001). O'Rourke et al. (2001) studied the implementation of a structure that cheers the expansion of incremental mindset behaviors by openly incentivizing effort, strategy, and incremental progress. Unlike earlier mindset interventions, this incentive structure, called "Brain Points," delivered real-time feedback to children as they operated to nurture growth mindset behaviors. The study of 15,000 children revealed that the "Brain Points" system encouraged low-performing students to persevere in the educational game *Refraction* when compared to a control group who did not use the "Brain Points" system. Furthermore, use of the "Brain Points" system improved total time played, strategy use, and perseverance following a challenge.

Although empirical evidence supporting learning outcomes of educational games is mixed (Harpstead, Myers, & Aleven, 2013; Linehan, Kirman, Lawson, & Chan, 2011; Mayo, 2009), there have been clear successes that demonstrate the potential of games in instruction. Some STEM games produce a 7 to 40% positive upsurge in learning outcomes (Mayo, 2009). Games have been shown to increase time-on-task, an important indicator for academic success (Lee, Luchini, Michael, Norris, & Soloway, 2004; Linehan et al., 2011), and also increase student motivation (Ricci, Salas, & Cannon-Bowers, 1996). Researchers have noted that successful educational games are those designed around effective pedagogical practices, perhaps explaining some of the mixed learning outcomes (Mayo, 2009; O'Neil et al., 2005). These results indicate the importance of constructing educational games grounded within the foundation of

pedagogical theory. Scholars have examined how to successfully integrate learning theories into games and leverage game features to maximize student motivation, persistence, and learning (Chase, 2012; Linehan et al., 2011). Case in point, while exploring how presenting tasks in a genetics game influences student persistence and learning, Chase (2012) found that students who were told their performance is reliant on both chance and skill persevered longer in spite of failure than those who were told their performance is dependent on skill alone.

While the study presented here does not examine the gaming platform used for Brainology, nor the students' experience with the technology aspect of the program, I believe that educational videos possess qualities that make them conducive to introducing and incentivizing incremental mindset concepts. Game narratives provide a forum for directly teaching about brain growth, weaving messages that support the incremental mindset throughout the game world. Constant interactive feedback provides a medium for showing students that their effort translates into progress (Gee & Shaffer, 2010; Mayo, 2009). Essentially, game incentive structures have the ability to promote and prize incremental mindset behaviors (e.g., persistence and use of strategy). The electronic delivery system for Brainology may be an incentive for students to engage in the program.

Conclusion

Common approaches to support literacy development in our schools usually focus on how or when instruction is delivered (e.g., differentiated instruction, Response to Intervention, professional development, and adopting curriculum standards). However, evidence exists that noncognitive influences on learning, such as the beliefs a person holds about intelligence and the ability to learn, matter. In addition to implementing initiatives that focus on improving

instruction and the learning context, considering noncognitive factors when planning the curriculum can have a direct positive influence on students' school performance.

The literature on noncognitive factors tells us that they can have a direct positive influence on students' school performance. Despite proven importance, explicit instruction in noncognitive skills has been neglected in elementary school education, and there are few interventions aimed at developing students' noncognitive skills. This study investigates how elementary school-aged students who have difficulty with reading understand themselves as learners after participating in an intervention designed to teach them about theories of intelligence instruction via the online Brainology® program.

CHAPTER 3: METHODOLOGY

This chapter describes the study design, research site, pilot study, data collection, and data analysis methods used to examine the question *how do elementary school-aged students who have difficulty with reading understand themselves as learners following theories of intelligence instruction?* First, I will describe the research design and explain why a qualitative case study approach was the most appropriate for this particular study. Next, I will describe the research site along with the participant selection procedures and the online Brainology® program used in the study. I will then discuss the pilot study. Further, I will explain the data collection procedures, including data organization, storage, and my role as researcher. Finally, I will present the data analysis procedures, including methods to address validity.

Study Design

This study investigated how elementary school-aged students who have difficulty with reading understand themselves as learners following theories of intelligence instruction via the online Brainology® program. In designing this study, I considered both quantitative and qualitative research methods to determine which method(s) would be most suitable for this study.

While quantitative research helps determine relationships among variables, qualitative research is more appropriate when the variables are unknown (Creswell, 2005). According to Shank (2006), qualitative research involves the researcher in the inquiry process, reveals meaning through understanding, and encourages alternate ways to see the world. In qualitative design, the researcher seeks to uncover the unknown variables through in-depth contextualized information collected from the participants (Cheek, Onslow, & Cream, 2004). After much exploration, I determined that the best way to learn about how elementary school-aged students understand themselves as learners was to listen to the voices of the students themselves. I

intended to understand their thought process, beliefs, and ideas about learning. This focus on students' thinking required a qualitative approach.

The research strategy I employed was a case study (Yin, 1993). Case studies present an opportunity for in-depth exploration of a program, event, activity, process, or one or more individuals (Stake, 1995). Cases are confined by time and activity, and researchers gather complete data using a range of data collection procedures over a sustained period of time. Case studies allow the researcher to, "Explore a real-life, contemporary bounded system or multiple bounded systems over time, through detailed, in-depth data collection" (Creswell, 2013, p. 97).

Yin (1984) described the case study research method as, "An empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and which multiple sources of evidence are used" (p. 23). Yin (2003) describes three elements to consider when planning a research strategy: "(a) the type of research questions posed, (b) the extent of control an investigator has over actual behavioral events, and (c) the degree of focus on contemporary as opposed to historical events" (p. 5).

According to Yin (2003), "how" questions are "more explanatory and are likely to lead to the use of case studies, histories and/or experiments as the preferred research strategies" (p. 6). Yin stated, "A 'what' question is a justifiable rationale for conducting an exploratory study" (p. 6); nonetheless, any of the research strategies (experiment, survey, archival analysis, history, and case study) explained by Yin can be used. This study was driven by the research question: *How do elementary school-aged students who have difficulty reading understand themselves as learners following theories of intelligence instruction?*

When considering Yin's second condition, the extent of control over behavioral events, the researcher must decide to what extent he or she can control the behavioral events related to his or her study. If the researcher has control over or can influence behavioral events, Yin stated that the best research method would be an experimental type of study. If the researcher has little to no control over behavioral events, Yin contended that the case study or historical study is desirable. Throughout this study, this researcher had no control over how students would experience theories of intelligence instruction via the online Brainology® program, thus indicating the use of a case study methodology over other types of research methods.

The final condition Yin (2003) recognized when determining a research strategy was the focus on current as opposed to historical events (p. 7). If a study looks at present issues, then an experimental, survey, or case study design would be suggested. If the study considers issues from the past, a historical study would be recommended. This study examines the modern online Brainology® program from the student perspective to learn about how elementary school-aged students valued and experienced the program, which indicated the use of a case, experimental, or survey method of research.

Operating Yin's (2003) three conditions for determining research strategies, I determined that, based on the study purpose and problem statement, the most applicable study methodology was a case study. Once the case study research design was decided upon, I looked to Merriam's (1998) work on case study research to support my decision. Merriam stated that a case study is "selected for its uniqueness, for what it can reveal about a phenomenon, knowledge we would not otherwise have access to" (p. 33). As little research exists as to elementary school-aged students' perceptions of themselves as learners after theories of intelligence instruction via the online Brainology® program, the information acquired from this study is original and distinctive.

A case study approach was the best choice for this study because it allowed me to capture students' perceptions of themselves as learners.

I then proceeded to engage in the following five steps to design my research study: conducting a literature review, building a theoretical framework, pinpointing a research problem, shaping research questions, and choosing the sample (purposive sampling) (Merriam, 1998). As part of the case study design, I developed individual profiles for each student drawing from multiple sources of data, including observations, interviews, and formal and informal documents related to each participant's academic performance. Formal and informal documents included teacher comments on report cards, reading journals/notebooks, running records, and standardized test scores. For this study, I engaged in comparative analysis, looking across the five students to understand similarities and differences among the participants.

Research Site

The research site is a critical part of the design process (Creswell, 2003; Hatch, 2002; Nicholls, 2009). The site includes the physical setting as well as the participants and the activities in which they were involved (Hatch, 2002). In this section, I describe the research site along with the participant selection procedures and the online Brainology® program used in the study.

Reading Rocks Elementary School

This study took place in a central New Jersey elementary school in a large suburban community, where the researcher is a school-level administrator at another elementary school in the district. Reading Rocks Elementary School (pseudonym) is designated as a Title 1 school with ethnically and economically diverse students. The total school population for the 2014-2015 school year was 447 students, and the student body was comprised of 41.6 % White, 3.6% Black,

8.7% Hispanic, 43.6% Asian, 0.7% American Indian, 0.7% Pacific Islander, and 1.1% two or more races (New Jersey Department of Education, 2009). The school is known for its high transience rate.

Reading Rocks Elementary School supports students who have difficulty with reading in numerous ways. All classroom teachers employ the Readers Workshop model. Texts are leveled for differentiation. Classroom teachers confer with different students daily during the reading period to meet their individual needs. In addition, basic skills support is provided by the school reading specialist for those who meet the district criteria.

In addition, students who receive basic skills support are eligible to participate in a free after-school reading tutoring program (see Appendix B) pending parental permission (see Appendix C). The after-school reading tutoring program offers each struggling reader 12 sessions of small group instruction with the reading specialist. Sessions are generally conducted twice a week for six weeks (depending on weather and other school closings). The sessions start with a brief snack and move into guided reading instruction, with other individualized literacy activities interspersed based on student need (e.g., phonics, retelling, etc...). The program starts at 3:30 and ends at 4:30. Parents must pick their child up, as the school district does not provide transportation home. Upon agreeing to participate in this study, the school also agreed to implement the Brainology® program on a trial basis, as it was not already in place at the school.

Participant Selection Procedures

Unlike quantitative research with random samples and large numbers of participants, a qualitative case study purposely selects individuals who understand the occurrence being studied. Choosing participants who are able to communicate their personal experiences related to the experience is essential in the success of the study (DeRivera, 1984; Sandelowski, 1995). In

achieving these requirements, I used purposeful and convenience sampling to select participants (Patton, 1990). The sample was purposeful because the researcher chose potential participants who met the specific criteria: (a) identified as at-risk for reading failure, (b) willing to be observed and interviewed, and (c) willing to participate in after-school reading tutoring. Convenience sampling was justified in this study as I used fourth grade and fifth grade students enrolled in my school district (but not in my school) during the 2014-2015 school year. In regards to sample size, although I planned to recruit nine total participants, three participants did not receive parental consent to participate. I began the study with six participants, but one participant moved away during the study.

After obtaining IRB approval, I met with the reading specialist at Reading Rocks Elementary School to discuss the after-school reading tutoring program she conducts and its participants. To recruit study participants, I met with the parents of the students eligible for the after-school tutoring program to explain the purpose of my study and distribute consent forms. Initially, only three parents gave consent. After several emails and phone calls to further explain the study, I was able to successfully recruit three more participants. The study took place between January 2015 and March 2015. One participant moved away in the middle of January 2015. Table 1 provides a demographic look at each of the five participants, including a pseudonym, gender, and ethnicity.

Table 1

Participants' Demographic Information

Pseudonym	Gender	Grade	Ethnicity
Ali	Male	4	Arab Asian American
Vanya	Female	4	Indian Asian American
Bradley	Male	4	African American
Ken	Male	5	Caucasian American
Mei	Female	4	Japanese Asian American

Table 2 provides academic information on each participant, including grade, independent reading level, standardized test scores, and Cognitive Skills Index (CSI). An independent reading level is the level (A-Z) at which a child can read a text on his/her own with ease. A student's independent reading level corresponds to a text that he or she can read with an accuracy rate of over 94%. The child makes few errors when reading the text and has strong comprehension of the story. This is a text the student can read alone without teacher support. The benchmarks for the end of the 4th and 5th grades are levels R and U, respectively. Classroom teachers periodically administer a running record to determine a student's independent reading level.

Table 2

Participants' Academic Information

Pseudonym	Grade	Independent Reading Level	NJASK Scores	Cognitive Skills Index (CSI)
Ali	4	N	3ELA 200 3Math 225	104
Vanya	4	N	3ELA 200 3Math 182	99
Bradley	4	L	3ELA 191 3Math 200	102
Ken	5	N	4ELA 192 4Math 210	98
Mei	4	L	3ELA 198 3Math 251	100

The New Jersey Assessment of Skills and Knowledge (NJASK) is a standardized test (administered by the New Jersey Department of Education) that was given to all New Jersey public elementary school students in grades 3-5 prior to 2015. The test was designed to assess student achievement in language arts (ELA), math, and science. The NJASK 3–8 provides raw and scale scores. A raw score is the overall number of points a student receives on a test. A scale score is just a conversion of that raw score, using a preset mathematical algorithm, to ensure authentic and meaningful comparisons over time and across grades and content areas. The total scores in English Language Arts (ELA), Mathematics, and Science are reported as scale scores

with a range of 100 to 300. The proficiency level score ranges are Advanced Proficient 250–300, Proficient 200–249, and Partially Proficient 100–199. Partially Proficient is below the state minimum level of proficiency. Students at this skill level may receive supplementary instructional support, which could be provided in the form of individual or programmatic intervention.

The Cognitive Skills Index (CSI) is an age-based score that defines an individual's performance on the In View test. The cognitive-abilities assessment, In View, comprises five tests that measure skills and abilities important for academic success, including Verbal Reasoning – Words, Verbal Reasoning – Context, Sequences, Analogies, and Quantitative Reasoning. The score shows a student's overall cognitive ability in relation to students of comparable age without regard to grade placement. An average Cognitive Skills Index score for In View is 100.

The Brainology® Program

The interactive online Brainology® Program demonstrates how the brain works, learns, and is improved in a physical way when exercised (see Figures 6 and 7). Brainology® explains to students that they are in control of their brains and how to apply this control to their schoolwork. It also offers them a practical set of skills and strategies for tackling academic challenges (Dweck, 2006).

The Brainology® blended learning program included about two and a half hours of online instruction separated into an introduction and four instructional units. The online component of the Brainology curriculum is composed of an introduction of about 10 minutes and four instructional units that each take approximately 30–45 minutes to complete. It is recommended that the online units be scheduled at least one week apart to allow time for

students to apply and integrate what they learn in each unit. Although not implemented in this study, in addition to the online units, the curriculum guide does include classroom-based activities to reinforce and apply what students learn. A minimum of one additional class period (or the equivalent, adding up to 45 minutes to 1 hour) should be spent on these activities for each online unit; two periods are recommended to get the full benefit for all students.

For the purposes of this study, over the course of 12 tutoring sessions (1 hour each), students received 720 minutes of tutoring, consisting of 570 minutes of direct reading instruction and 150 minutes of Brainology® Program implementation. There were 2 sessions per week, and each session began with the students engaged with the Brainology® Program, followed by direct instruction in reading.

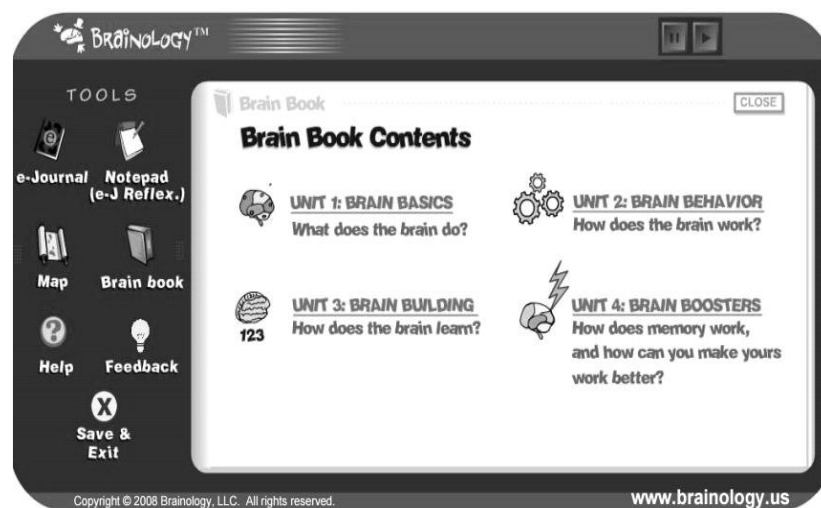


Figure 6. Screenshot of Brainology® program showing various tools and sample activities.



Figure 7. Screenshot of Brainology® program showing how you can work out your brain to make it stronger.

Data Collection

In qualitative research, data are gathered from "a variety of sources, and preferably, in a variety of ways" (Erlandson, Harris, Skipper, & Allen, 1993, p. 81). Marshall and Rossman (1989) recommend that data collection methods in qualitative research be cataloged into four types: (a) participation in the setting, (b) direct observation, (c) in-depth interviews, and (d) document analysis. Data collection for this study utilized three of these methods: (a) interviews with the identified students, (b) participant observation, and (c) document review. This research employed in-depth, individual interviews as the main method of qualitative data collection. Table 3 summarizes the data collection methods and procedures used in this study. These methods allowed me as the researcher to understand the intervention through the lens of the student.

Table 3

Data Collection Methods and Procedures

Method	Data Sources	Data Collection Period
Document Review	Brainology® Program documents, teacher comments on report cards, student e-Journals and reading notebooks, teachers' running records, and standardized test scores (NJASK and In View)	Pre and post intervention
Semi-Structured Interviews	Pre-intervention protocol, post-intervention protocol	Pre and post intervention
Field Observations	Reflexive journal, observation notes	Throughout, ongoing
Brainology® Program	Website	Throughout, ongoing

Document Review

Document review was used to clarify or substantiate participants' statements (Glaser & Strauss, 1967) and to provide thick description (Esterberg, 2002; Merriam, 2002). Like other analytical methods in qualitative research, document analysis involves examining and interpreting data to draw out meaning, acquire understanding, and advance empirical knowledge (Corbin & Strauss, 2008). Documents contain text and images that have been recorded without the intervention of the researcher. I collected and analyzed documents related to each participant's academic performance, including teacher comments on report cards, reading

journals/notebooks, running records, and standardized test scores. These documents provided insights into each participant as an overall student.

The teachers' comments on report cards provided evidence of how each student is regarded as a classmate and a student. Most comments included references to either personal attributes, behavior, work habits, social skills, or communication skills, in addition to academic performance. Most teachers provided at least one specific goal on which they wanted the student to work for the following quarter.

The e-Journal is one of the Brainology® tools for students to document their reflections and challenges (see Appendix D). Educators can review a student's entries to better understand the students' struggles and how to support them. I checked the students' e-Journals weekly and noted their reflections in an effort to understand how they were thinking about their reading. I also regularly examined the students' classroom Reader's Notebooks (see Appendix E). The 4th and 5th grade language arts teachers required the readers to maintain Reader's Notebooks in which they responded to literature and documented their thinking. The Reader's Notebooks were a one-inch binder with a personalized cover and a spine labeled with each student's name. Each binder had six sections separated by labeled tabs: Reading Log, Genres, Goals and Progress, Mini-Lesson Handouts, Reading Partnerships, and Reading Response. Students regularly used their Reader's Notebook to record the books they had read, reflect on their reading, track their reading progress, and establish individual reading goals. Reviewing their notebooks provided insights into their thinking as readers and learners.

A running record is an instrument that helps teachers assess a student's reading behaviors. By identifying patterns in a student's reading behaviors, a teacher can understand the strategies a student uses or does not use to make meaning of texts. Running records, when

combined with comprehension evaluation, can be used to pinpoint the instructional reading level for each student. Although running records are a diagnostic tool, they should also be used to drive instruction and increase a reader's use of strategies for working with text. Analysis of each student's running record helped me appreciate what he/she knows and understands about the reading process. Running records analysis captured each student's thinking and provided me with evidence of the student's skill level, readiness to learn, and literacy learning.

A running record requires not just documenting of a right and wrong word, but discerning all behaviors to help uncover the "thinking process" a student is using as he/she reads the text. Therefore, I requested that the reading specialist, who was providing the tutoring, record all student behaviors presented during the reading conferences she held with the students. As such, the running record documents the whole oral language reading conference, including the smallest particulars on the reader's attitude, behavior, accuracy, and understanding. This information provided insights into the students' behaviors, responses, competencies, initiatives taken, and instructional needs.

In addition to examining students' standardized test scores on the NJASK (described above), I also reviewed their scores on the In View test, which determines the student's cognitive skills and intelligence index. This test is constructed to measure skills and abilities directly related to academic success, such as verbal reasoning, sequences, analogies, and quantitative reasoning. The test results in a CSI (Cognitive Skills Index) score (an Intelligence Index). The norm is 100 and most students score between 84 and 116. Collectively, all of these sources of data helped to create a rich overall academic profile of each student.

Semi-Structured Interviews

Qualitative interviewing is used to study “people’s understanding of the meaning in their lived world” (Kvale, 1996, p. 105). Interviews can uncover what is on somebody’s mind. “We interview people to find out from them those things we can’t observe” (Patton, 1987, p. 196). Interviews help researchers produce thick descriptions of the subject being studied, which enables readers to make decisions about the generalizability of study results (Merriam, 2002). In addition, interviews can be used to triangulate information obtained from other sources and, thus, advance the credibility of study findings (Emerson, Fretz, & Shaw, 1995; Merriam, 2002; Stake, 1995).

When conducting interviews, the researcher must establish a rapport with those being interviewed. Since the participants of this study were relatively young children, I wanted to make myself a part of their environment in order to establish a rapport and earn the students’ trust. Therefore, prior to the start of the after-school tutoring program, the reading specialist introduced me to each student. I also visited the school two more times informally to greet each student in the hallway or in the before-school care program. I spent the first after-school tutoring session observing the students, increasing my involvement gradually as the hour proceeded. I then started individual pre-intervention interviews with the students during the second session. I was unable to complete all five interviews during this session and needed to return the following morning during the before-care program.

In planning and conducting interviews, I kept in mind what Patton (1990) emphasized: “The purpose of open-ended interviewing is not to put things in someone’s mind... but to assess the perspective of the person being interviewed” (p. 278). The five participants were each interviewed twice for this research. Interviewing students permitted me to acquire knowledge

from those who Patton (2002) calls, “key informants.” Key informants are those who are well informed about the topic and forthcoming about their knowledge, and whose perceptions can be useful in supporting an observer in understanding events that have happened and the reasons for those events. This study’s participants took part in the pre-intervention and post-intervention interviews between January 8, 2015, and March 16, 2015. For convenience, all of the interviews were held in the reading specialist’s office. To get a full representation of the participants’ perspectives, I conducted individual, face-to-face interviews, which lasted from 35 to 45 minutes. An interview protocol was utilized during the pre- and post-intervention interviews (see Appendices F and G).

As a first step in the interview process, I reminded participants of the purpose of the study, research procedures, expected benefits, their right to withdraw from the study at any time, and protection of confidentiality. I also asked participants if they had any questions about the research study or research procedures. Since my goal was to make the interviews conversational, I shared information about myself with the participants to form the trust needed for this conversation (Patton, 1980). Guiding the interviews in this way helped me to put respondents at ease and promoted an ideal interviewing environment.

In-depth, semi-structured post-intervention interviews (see Appendix G) were designed to obtain an inclusive understanding of the participants’ perceptions, as well as their educational experiences. Post-intervention interviews took place after completion of the Brainology® program. I was unable to conduct all post-intervention interviews during the after-school tutoring program and needed to visit the school on three additional occasions during the before-school care program to complete the interviews. During the post-intervention interviews, I specifically explored how each elementary school-aged student understood him/herself as a learner and how

he/she experienced theories of intelligence instruction via the Brainology® program. I asked questions to ascertain their reading interests and competencies, after which we discussed the Brainology® program to understand their perceptions concerning theories of intelligence instruction.

Esterberg (2002) described a pattern for general and specific questions, called “open-ended” questions, and cautioned against dichotomous or leading questions, which could lead to a closed style of questioning. I designed the questions to be specific, age-appropriate, and to encourage the elementary school-aged students’ voices and perspectives. Open-ended questions were used throughout the interviews to encourage participants to respond freely and openly to queries (Bogdan & Biklen, 2003; Esterberg, 2002; Kvale, 1996). Probing and/or follow-up questions were used, when necessary, to encourage participants to elaborate on or clarify a response (Denzin & Lincoln, 1994). Appendices F and G show the pre-intervention and the post-intervention semi-structured interview questions that I utilized in this study. The pre-intervention interview included topics such as (a) reading competency profiles of the student participants, (b) feelings concerning task completion and learning, and (c) perceptions of intelligence. The post-intervention interview questions recapitulated (a) descriptions of students’ competency in reading, (b) reading habits in school and at home, (c) descriptions and perceptions of theories of intelligence and the Brainology® program, and (d) observed influences of the Brainology® program. I crafted these specific interview questions because, in the pilot study, I found that the generic questions yielded generic responses. In an attempt to gain deeper and richer descriptive information, the individual interviews were structured to gather both personal and programmatic information. The five participants were asked to share their own stories, including their views on learning and themselves as learners. Additionally, participants were asked specific questions

related to their experience with the Brainology® program. Interview questions were intended to not only answer the research question but also gather recommendations that students have for the inclusion of theories of intelligence instruction in school settings, such as whether the Brainology® program could be helpful for younger students in the school.

With advanced parental consent, all interviews were audio recorded and then transcribed verbatim by a professional transcribing company for data analysis. The transcription process began after the first interview on January 8, 2015 and was completed by March 23, 2015. To ensure transcript accuracy, I reviewed each transcript while listening to the audiotapes. Additionally, I met with each interview participant and further reviewed the transcripts to ensure accuracy. I also took handwritten notes during each interview, which enabled me to track key points to return to later in the interview or to highlight ideas of particular interest or importance.

Field Observations

Observational fieldwork offers many advantages, including understanding the context of the group, seeing aspects that may otherwise be overlooked, learning about topics that the students may not discuss otherwise, and accessing the setting via firsthand experience (Patton, 1987). Observations enabled me, as the researcher, to develop systematic descriptions of “events, behaviors and artifacts in the social setting chosen for study” (Marshall & Rossman, 1989, p. 79).

Although pure objectivity was my intention, in reality I was cognizant that all of my readings, experiences, and positionality could shape my stance. As such, I attempted to maintain self-reflexivity to allow myself to recognize the way my reality might influence the research and the data I collected. Therefore, I used a reflexive journal (see Appendix H), recording information about “*self*” in regard to what is happening in the study and “*method*” in regard to

methodological decisions and reasons (Lincoln & Guba, 1985, p. 327). This technique was essential in describing facts that might not necessarily be conveyed or reflected by the participants. Data collection through non-participatory observations allowed me to maintain a detached, neutral, and unobtrusive position as a means of focusing on participant interaction.

Since I wanted to remain open-minded and be sure not to miss anything, I chose to use an open-ended protocol during my observations. Although I did have some specific items that I wanted to focus on during my observations, I did not want to be so focused on those items that I missed noticing other things that were going on. Although I used an open-ended protocol, I tried to remain objective by documenting behaviors without my opinion and documenting what I saw, not what I supposed.

I maintained a notebook during my observations (see Appendix I). To capture factual and value-free notes, I documented behaviors without judgments and what I saw, not what I thought. I documented the task and how each student responded to the task. I also noted what the reading specialist was doing and saying and kept field notes (anecdotal notes) for each student. My observational field notes focused on recording information regarding setting, participants, interactions, and routines. I also focused on the strategies students used when they got stuck on a word, distractibility, and frustration levels, among other behaviors. Altogether, the twelve session observations allowed me to get a sense of the study participants as students and as readers.

Data Analysis

Qualitative analysis has been referred to as a process of organizing and attributing meaning to the data (Marshall & Rossman, 1989). Coffey and Atkinson (1996) recommend that data collection and analysis be performed concurrently in qualitative research to allow for

flexibility. In this study, data collection and analysis ensued in a cyclical process until the concepts and themes became exhaustive and redundant, and new information failed to emerge (Miles & Huberman, 1994; Strauss & Corbin, 1998). As I chose a thematic analysis method for my research study, I approached my data analysis by constructing themes. Since the themes were not constructed beforehand, the data analysis actually started before the data collection was over. Data collection and data analysis took place in unison, with the initial analysis being used to decide which areas should be further considered, resulting in the construction of themes. As I was interested in using my complete dataset to recognize underlying themes presented through the data, I considered a constant comparison analysis to be the most suitable. I used constant comparison analysis as my data analysis method because it is most useful when the researcher wants to answer broad, or all encompassing, questions of the data (Merriam, 1998). As explained by Merriam, "...the right way to analyze data in a qualitative study is to do it simultaneously with data collection...Data that have been analyzed while being collected are both parsimonious and illuminating" (Merriam, 1998).

Before the start of the after-school tutoring program, I gathered and reviewed the documents. My analysis of the documents began with reading through all of the documents and taking notes to create a mental image of each student. I then made a chart (see Table 2) to organize the information that I read. I copied the student report cards, cut out the sections with the added teacher report card comments, and taped these into my journal. I referred back to the chart and the teacher comments often and thought deeply about each student throughout the study period to get a full sense of each child as a person.

Preliminary analysis of the observation field notes began when I was collecting data. I used a "split page" format with one column for descriptive and one column for reflective notes

(see Appendix H). The former provided space for information such as times, teacher actions, student responses, order of events, description of classroom and materials, and parts of the lesson. The latter allowed room for items such as my perceptions of overall student engagement, questions about curriculum or instruction, "I wonder" statements, possible reasons for observed behaviors, and possible talking points to include in the interview. In addition, I wrote overall impressions, summaries, and methodological notes in my researcher's journal after each observation (see Appendix I). After each session, I reviewed the field notes, filled in any notes that I abbreviated due to time constraints, and wrote detailed, concrete field notes illustrating the events of each session. I configured the field notes in such a way as to assist with later data analysis by using the following headings to organize the field notes: physical layout, lesson activities (timeline of events focusing on teacher talk, teacher actions, student talk, and student actions), people involved, objects, sequence notes, emotions, what was accomplished, writing, and specific notes on the participant being observed.

My analysis of the interview transcripts began by reading through all of the transcripts to obtain an overall sense of the information collected. Next, I wrote memos about potential themes (see Appendix J). I closely examined the collected data, looking for general ideas, persistent patterns, and themes, as well as disconfirming evidence. The process of coding the interview transcripts allowed me to further reduce the data into themes or categories. After examining each set of data individually, I then looked across sources for further recurrent patterns to determine whether more than one participant identified similar experiences in relation to participation in the Brainology® program.

Once I had read and re-read through the entire set of data, including the documents, transcripts, field notes, and personal journal entries, I began a more detailed analysis that

included three distinct phases. Initially, I sorted the organized data as it fit with my research question, and I labeled everything by student and by the context from which I gathered the information. I was able to group the data into important sections, labeling each section with a descriptive title or a “code.” I first arranged all of the data on a table. I then created a color-coding system using a different color for each theme and used markers to color-code each data piece. Any data item that referred to learning being scary was colored-coded red, any piece that referred to patience when learning was color-coded blue, any piece that referred to learning making you intelligent was color-coded green, any data item that referred to enjoying learning was colored-coded yellow, and any piece that referred to intelligence being able to grow was color-coded orange.

Initially, this process yielded five themes: Learning is Frightening, Stimulating, and Worth Trying; Patience to Learn is Essential in Learning; Learning Enhances Intelligence; Positive Attitudes on Learning Predisposes Intelligence; and Basic Intelligence Either Regresses or Progresses.

During my second pass at the data, I generated broader assertions about the study in relation to my research question. I noted several codes throughout my data sources about “practice” and “effort” of the students to reach goals. I examined these codes to create a representation of this after-school tutoring program, including Brainology®, the interactions that took place, and the meanings the students identified and questioned. I read and re-read all of the data organized within each category to inductively recognize patterns, using “the ability to see patterns in seemingly random information” (Patton, 2002, p. 452). For example, I read and re-read interview transcripts whilst probing for similarities and differences. I also used deductive analysis, comparing the data I collected to the existing literature and my theoretical framework

(see Appendix K). For example, I examined the theoretical postulations of incremental theorists based on the codes (see Table 4) emerging from the datasets (Dweck, 1999; Dweck & Leggett, 1988; Dweck & Sorich, 1999; Henderson & Dweck, 1990). I was then able to reduce my initial five themes down to three: Effort, Perseverance, and Risk-Taking (see Appendix L). After this process, I had a coding scheme for each of the data sets organized under my main research question. Next, I made a form with these three headings and typed or copied the data into the corresponding section it represented (see Appendix M).

Table 4

Data Coding Displays

Deductive codes	Inductive codes
Expectation, learning responses, effort, efficacy, fixed mindset, incremental, growth, perseverance, malleability, games, efficacy, risk, motivation, response	Fear, stimulation, anxiety, effort, attitude, efficacy, increases, detrimental, responsive to teaching, practice, trying, difficulty, interest

After a coding scheme was developed, I used both convergence, figuring out what codes fit together, and divergence, the careful examination of what did not seem to fit. I examined my coded data and considered the codes in relation to one another. After all the data had been coded, the codes were grouped by similarity, and a theme was identified and documented based on each grouping.

My final pass at the data included further analysis, which involved an iterative process in which I looked over the students' conversations, identifying the way students talked about themselves as learners and the theories of intelligence instruction. I then compared the emerging

themes and categories and related these findings to the following research question: *How do elementary school-aged students who have difficulty with reading understand themselves as learners following theories of intelligence instruction?* Ultimately, the findings, as presented in Chapter 4, demonstrate three main ways that the study participants understood themselves as learners after theories of intelligence instruction via the Brainology® program: 1) Intellectually: I can develop my intelligence, 2) Emotionally: I can control my emotional responses, and 3) Physically: I can strengthen my brain.

Trustworthiness

The concepts of validity and reliability are rather disconnected to the field of qualitative research. Instead, qualitative research focuses on trustworthiness as the fundamental standard for measuring the worth of a research study. Trustworthiness is established by demonstrating "its true value, providing the basis for applying it, and allowing for external judgments to be made about consistency of its procedures and the neutrality of its findings or decisions" (Erlandson et al., 1993, p. 29). Based on the qualitative paradigm, Lincoln and Guba (1985) proposed four constructs to reflect the trustworthiness of qualitative research: credibility, transferability, dependability, and confirmability.

The techniques I used to establish credibility were extended engagement, focused observations, data triangulation, and member checking. Triangulation is the practice of using several points of reference to elucidate meaning, confirming the repeatability of an observation or interpretation (Denzin & Lincoln, 1994). I was able to triangulate my data sources by collecting evidence from different types of data sources, such as interviews, documents (e.g., running records), public records (e.g., report cards), and observations made at different times and in different places. Having multiple sources of information gives more insight into the topic. In

addition, inadequacies found in one-source data are reduced when many sources endorse the same data (O'Donoghue & Punch, 2003).

To increase the transferability of my research, I provided a highly detailed description of the situation, the methods, and the participants' school settings. This enables "observers of other contexts to make tentative judgments about applicability of certain observations for their contexts and to form working hypotheses to guide empirical inquiry in those contexts" (Erlandson et al., 1993, p. 33). I enhanced dependability of the findings by reporting each research process in detail. Other techniques such as reflexive journaling and value-free note taking further increased the reliability (Erlandson et al., 1993; Lincoln & Guba, 1985). Finally, to enhance the confirmability of the initial conclusions and to show how each decision was made, I established an audit trail during the course of the study.

Role of the Researcher

The probing and interpretive nature of qualitative research demands attention to ethical procedures throughout the research process (Creswell, 2003, 2007). In qualitative studies, the researcher is the instrument that gathers data and needs to be described, particularly with regard to biases, assumptions, and relevant history. In this research study, I was not an outside researcher, as I currently serve as an elementary principal in a different school in the central New Jersey school district where this research took place. I have been employed in an administrative capacity in this district for 9 years. Although I do not have any direct impact on the school site where the research was conducted, I do have an after-school reading tutoring program in my school with the same profile of elementary school-aged students who have difficulty with reading as the program under study. In my particular role as principal, it is incumbent upon me to

identify and implement interventions for elementary school-aged students who are at risk in my school.

While I did not have a relationship with any of the research participants, my professional role in the district may have influenced the study, both in my role as the researcher and in the participants' willingness to share information with me about their experience with the Brainology® program. I attempted to alleviate this challenge by reassuring all participants that their experiences would remain confidential and that there was no risk for encountering consequences for sharing their perceptions. I also connected with the students by disclosing my professional role working with elementary school-aged students who have difficulty with reading in my school, to reassure them of my genuine interest in the subject matter.

My understanding of the research site, the typical elementary school-aged struggling reader, and the characteristics of an individual in the remedial reading program enhanced my knowledge of and sensitivity to the challenges faced by someone learning about theories of intelligence within a remedial reading program. However, my perceptions of this phenomenon are shaped, in part, by my personal experiences. As one who generally possesses an incremental mindset, bracketing my beliefs was important to guarantee objectivity, so that any preconceived notions that I may have had in regards to this topic did not influence data collection or analysis. To this end, using detailed descriptions and elucidating my preconceived notions helped to validate the study. Out of a desire to help those within my school environment, this research took place within my school district or "backyard" (Creswell, 2003; Hatch, 2002). Although collecting data in one's workplace can compromise the integrity of the research, I used research strategies that increased the validity of the study and decreased the bias that might have been present because of my role as elementary principal. These strategies included the use of

triangulation of data sources; rich, thick descriptions; peer debriefing; and disclosing any information that seemed to be discrepant from expected findings.

Limitations of the Study

There are limitations to this study. Foremost, because the scope of this study was limited to a small sample size at only one school, the findings are not generalizable to other contexts. An additional limitation to the study proved to be the data collection process. Since information obtained during the interview was largely dependent on the interviewee and what he or she was willing to share, the nature of the information was limited to the interviewee's own perspective and lived experiences. Patton (2002) stated that perceptual data are in the eye of the beholder. However, the triangulation of data in this study helped to verify the results and to support the accuracy of the themes mined out of the interview transcripts. Furthermore, my role as the researcher and as a principal in another school in the same school district may have influenced the study. Students may not have wanted to disclose negative experiences or perspectives of the program due to my affiliation with the school district, even though I emphasized the fact that their participation in this study would not impact their relationships with their teachers or their grades. The general classroom context may not always support the students' new thinking. An additional limitation of this study may involve the absence of investigation into whether the changes in children's thinking were sustained or applied in the general classroom context.

The study design focused on how Brainology® influenced students' perceptions of themselves as learners; other potentially influential factors may have been at play but were not measured. These include the motivation of those involved with facilitating the after-school tutoring program, participants' individual personality differences, the levels of experience held

by the reading specialist as well as classroom teachers, and the intellectual capacity of the students participating in the program.

The study presented here does not examine the gaming platform used for Brainology® or the students' experience with the technology aspect of the program. However, educational video games provide a set of properties that make them particularly conducive to introducing and incentivizing incremental mindset concepts and, therefore, may have affected the students' participation or retention of content in ways that a non-electronic delivery format might not have. For the purpose of this study, an examination of the delivery format was outside the scope of investigation.

CHAPTER 4: FINDINGS

As a result of this study, I gained a better understanding of how students who have difficulty with reading experience learning about the concepts presented in theories of intelligence instruction (the noncognitive factors) and how exposure to those concepts influences their self-perception of themselves as learners and their approach to learning. As such, the findings from this study may be used to inform educational practice and support further development of students who have difficulty with reading.

This study was conducted to answer the following research question: *How do elementary school-aged students who have difficulty with reading understand themselves as learners following theories of intelligence instruction?* This chapter presents the findings collected through semi-structured interviews with the participants, field observations of the after-school tutoring program, my reflexive journal, field notes, and document review. The chapter is divided into two sections. Section 1 contains a profile of each participant as a student, drawing from observation data and documents. Section 2 presents findings organized to convey the three main ways that elementary school-aged students understood themselves as learners following theories of intelligence instruction via the Brainology® program: 1) Intellectually: I can develop my intelligence, 2) Emotionally: I can control my emotional responses, and 3) Physically: I can strengthen my brain.

Participant Profiles

In this section, I present profiles of the participants to help the reader understand each student as an individual, drawing from numerous data sources, including observations, field notes, and documents related to each participant's academic performance, such as teacher comments on report cards, reading journals/notebooks, running records, and standardized test

scores. Table 1 shows the gender and ethnicity of the study participants. Among the five participants, only two (Vanya and Mei) attended pre-school.

Ali

Ali was a male Arab-Asian grade four student diagnosed with dyslexia (AL-Assessment). Ali was considered the brightest among his after-school tutoring peers, as identified by standardized measurements. This was evident in his 104 cognitive skill index (slightly above average) and the proficiency scores he had on the 3rd grade NJASK (ELA of 200 and Math of 225, with 200 being Proficient) (AL-Assessment). However, at the time of this study, Ali did not read, write, or spell at grade level.

While Ali had a proficient vocabulary, using words like “designated,” this competency was demonstrated only in his oral communication. While he could easily pass oral testing, I witnessed Ali make excuses for his frustration with school reading tasks. On one occasion, he said, "The teacher is dumb," when asked why he was not engaged in the assigned task. When the teacher or a classmate challenged Ali, I observed him regularly act baby-like or very silly. From this observer’s perspective, Ali demonstrated little interest in school and did not participate unless prompted. I commonly witnessed Ali with his head down (AL-Field).

Although, Ali was quite capable in physical tasks and game activities, on one occasion he became easily frustrated when he lost his turn in a board game and said, "I don't want to play that game anyway" (AL-Field). Ali appeared to have a difficult time listening to others and taking turns speaking. I often observed Ali demonstrating undesirable social behaviors such as calling out in class or making cat noises under his breath when he was supposed to be reading (AL-Field). At one session, Ali dropped his book and “accidentally” stepped on it (AL-Field). When a student brought it to his attention, he said, “Oh well” (AL-Field). These behaviors had become

his social labels, particularly to many of his classmates who said to him, “You are always fooling around.”

Ali claimed to love sports and particularly knew a tremendous amount of information about baseball. He even told me which teams played in each of the last ten World Series games and who won. He lifted his head up and participated in the dialogue when exposed to areas of interest. During the observation period, Ali was observed to be an active listener and was attentive to details in subjects of interest, such as when the teacher presented material within a sports context (AL-Field).

During classroom activities, I quite often observed Ali complain of feeling or seeing non-existent movement while reading, writing, or copying (AL-Field). Ali had difficulty in seeing (and occasionally hearing) similarities and differences in letters and words (AL-Assessment). He also exhibited difficulty with vision, though the eye examinations did not reveal any problems. Ali had trouble with writing and copying and often mixed up or left out words and letters. I observed Ali become easily overwhelmed by writing assignments and put his head down. With an unusual pencil grip, Ali wrote slowly and painstakingly and his handwriting was practically illegible (AL-Field).

Vanya

Vanya was a female Indian-Asian American grade four student who had a reading level competency of a 3rd grader when she began the after-school tutoring (VA-Assessment). Vanya’s bodily movements were uncoordinated and awkward. I observed her to have poor fine and gross motor skills (VA-Field). Vanya spoke in a soft tone of voice and appeared to be somewhat inhibited when engaging with peers. It appeared to this observer that her peers perceived her to

be unfriendly and disinterested. During my observations, Vanya often preferred to stand back and watch an activity. I often observed Vanya to be physically withdrawn from the group.

During my observations, fear and anxiety were emotions that any observer could see in Vanya as demonstrated by her lack of confidence when called to participate in class or when presented with new situations (VA-Field). She hid these anxieties by not talking in the classroom and avoiding eye contact. During my observations, Vanya responded well to discrete instruction that did not show others her difficulties (VA-Field) and she appeared embarrassed when the teacher provided instruction/correction publicly (VA-Field). The researcher observed that, although Vanya seemed to sometimes have the answers to the teacher's questions, she never raised her hand in class to answer these questions (VA-Field). This behavior was observable in all of Vanya's subjects, as referenced by her teacher's report card comments. The researcher viewed these qualities as limiting her efforts to meet the expected grade level reading competency. This was evident in her 99 cognitive skill index (almost average) and the proficiency scores she had on the 3rd grade NJASK (ELA of 200 and Math of 182, with 200 being Proficient) (VA-Assessment), yet she was reading a year below grade level.

Vanya acknowledged that she was picky in terms of the type of reading materials with which she would engage and that she preferred pop culture magazines. On one occasion, Vanya chose to read *Us Weekly* magazine and *OK* magazine from her book bag when allowed free choice time. She admitted to spending hours researching and reading about her favorite pop or rap singers on the internet (VA-Field).

When the reading material did not interest her, Vanya would often stare at the clock or the door, seemingly daydreaming of events that interested her. I witnessed Vanya complain of

dizziness, headaches, or stomachaches while reading, indicating her lack of interest for the recommended reading materials.

Bradley

Bradley was a male African-American grade four student with an unspecified Encephalopathy and Attention Deficit Hyperactivity Disorder (ADHD) (BR-Assessment). His reading level competency at the time of this study was second grade (BR-Assessment). Bradley earned a 102 cognitive skill index (slightly above average) and 3rd grade NJASK proficiency scores (ELA of 191 and Math of 200, with 200 being Proficient) (BR-Assessment).

Bradley was a word-by-word reader who demonstrated difficulty decoding written word meanings (BR-Assessment). In my observations, Bradley demonstrated poor inferential and predictive skills while reading and had a difficult time identifying the main idea. One of his reading goals during this study was self-monitoring skills while reading, more specifically, learning how to stop and ask himself if material/words had been understood. The reading specialist repeatedly reminded Bradley to pause when reading and apply a fix-up strategy such as reading it again, bearing in mind the context, or requesting an explanation of the textual meaning (BR-Field).

Bradley frequently was unable to independently follow through on tasks and, without the teacher's direct assistance, would play with whatever he could find, such as a paper clip, when facing multi-step work assignments (BR-Field). Bradley seemed to learn best when tasks were segmented. This teaching strategy seemed to address his issues of frustration and distraction. On many occasions, I observed Bradley successfully following instructions with verbal repetition, focus-oriented instruction, and segmented coursework (BR-Field).

During my observations, Bradley presented with difficulties in the organization of his time (in relation to his schoolwork), his thoughts, and his belongings. I commonly observed him reporting to the teacher that he lost his school supplies – books, notebooks, pencils (BR-Field). When observed, Bradley's writing was sloppy with careless mistakes and lacked detail (BR-Field).

On several occasions, I observed Bradley quickly sidetracked by environmental distractions like insignificant noises or happenings that were typically unnoticed by others (BR-Field). Bradley was also observed to often have difficulty sustaining attention when the task at hand was boring or repetitive for him, such as the *Foundations Program* phonics/word study (BR-Field). Without proper redirection, Bradley frequently appeared to be daydreaming (BR-Field). When Bradley was engaged, he repeatedly demonstrated difficulty awaiting his turn by blurting out answers and interrupting the conversations of others.

Bradley fidgeted and squirmed often and had a bumpy cushion on his chair so that he could release his extra energy and move his body while working. He regularly got out of his seat and walked around the classroom. This was okay with the teacher. The teacher made available a yoga ball chair and other sensory objects, but Bradley did not often choose to use them (BR-Field). On one occasion, Bradley did select to use a squishy ball while working, but from my observation, it appeared to be a significant distraction.

Ken

Ken was a male American Caucasian grade five student who had a 3rd grade level of reading competency at the time of this study (KE-Assessment). Ken was a student with a 98 cognitive skills index (100 is average), 3rd grade NJASK proficiency scores (ELA of 189 and Math of 201), and 4th grade NJASK proficiency scores of (ELA of 192 and Math of 210) (KE-

Assessment), with 200 being Proficient. Ken was a Boy Scout and claimed his favorite subject was social studies. His father was a big history buff himself, and Ken conveyed that they worked on class projects together.

Ken had difficulty keeping up with classmates of the same age in a developmentally appropriate learning environment (KE-Field). Learning for Ken required instructional repetition, extra time, and additional resources from teachers (KE-Field). Ken appeared to be a passive learner and would wait for the teacher to come over to assist him instead of beginning a task independently (KE-Field). Ken appeared to lack self-motivation and curiosity as evidenced by his not actively seeking to learn new information (KE-Field). Ken appeared to have difficulty learning new or challenging concepts and often avoided new learning experiences. He was observed to be more participative in activities that he had already mastered, such as making predictions about upcoming text.

During my observations, I witnessed qualities in Ken reflective of a typically less-motivated elementary-age student. Ken often appeared bored with low energy. He yawned often throughout the observations and often ripped off the eraser from the top of his pencil and played with it until it shredded. I commonly observed Ken to be an unenthusiastic learner with his head down or resting on his arm (KE-Field). As the only 5th grader in the group, Ken appeared socially withdrawn and did not initiate interactions with the other students. Only when called on by the teacher was Ken observed to share his insights or contribute to the conversation (KE-Field).

Ken struggled with chronic absenteeism and tardiness (KE-Field). At the conclusion of this study, he had missed 10% or more of school days for various reasons (including excused and unexcused absences). The school counselor and school principal continued to work with Ken's

family to analyze the chronic absences and tardiness to determine patterns and provide possible interventions to support the family in getting Ken into the habit of attending school every day.

While going to school regularly will not by itself ensure that Ken learns, missing extended periods of school, especially when he is acquiring the basic academic skills that lead to becoming a proficient reader, certainly puts him at risk.

Mei

Mei was a female Japanese-Asian grade four student who was reading at a second grade level at the time of this study (ME-Assessment). Mei received a 100 cognitive skills index (average) and 3rd grade NJASK proficiency scores (ELA of 198 and Math of 251, with 200 being Proficient) (ME-Assessment). Her mathematical competency was above average for a 3rd grade student (ME-Assessment).

Mei had recently exited the ESL program, earning a score that just barely passed (ME Assessment). Her strongest score on the ACCESS (test to exit ESL services) was in speaking. Her reading, writing, and comprehension scores were much lower. Mei's language comprehension difficulties, however, may be associated with a lack of home environment support and stimulation that would allow her to learn some of the basic knowledge and vocabulary she needs in order to succeed in school (ME-Assessment).

Throughout my observations, Mei appeared to be inquisitive and eager to learn. This observer's perception was that Mei "looked like a student" as she was always attentive and engaged. I observed her both visually tracking the teacher and listening intently to the teacher's voice (ME-Field). Mei maintained her academic diligence by eagerly listening to the teacher, and she preferred to be seated where she could see and hear well (ME-Field).

Mei had an extroverted personality and was often observed to be laughing and socially

chatty with the other students. During my observations, she presented with full energy and good spirits (ME-Field). She demonstrated this personality with her eagerness to learn the required language competency (ME-Field).

As a student with a language difference, Mei had difficulties in understanding terms such as *compare*, *contrast*, *infer*, and *discuss* (ME-Field). In my observations, Mei appeared to have difficulties processing the words she heard and interpreting verbal instructions. She also presented with difficulty recognizing subtle differences between sounds in words.

During my observations, Mei did not ask or answer academic questions during classroom discussions without prompting. However, she did participate in whole class discussions, with support. From my observations, when she did participate, Mei spoke in short sentences. She used single words and learned phrases to communicate needs, thoughts, or opinions, such as “She was bored” (ME-Field).

I observed the reading specialist attempt to provide Mei with instructions in multiple ways. She offered visual supports for each lesson, including charts and posters. For example, during the *Foundations Program* phonics-word study lesson, she had sound cards she used with Mei and a puppet. I also observed the reading specialist working with Mei on her vocabulary development, which was aligned with her language goals (ME-Field).

Findings

In this section, I present the findings from the pre- and post-intervention interviews. My analysis revealed three main ways that the study participants understood themselves as learners after theories of intelligence instruction via the Brainology® program: 1) Intellectually: I can develop my intelligence; 2) Emotionally: I can control my emotional responses; and 3) Physically: I can strengthen my brain (see Figure 8).



Figure 8. Findings.

Major Theme 1. Intellectually: I Can Develop My Intelligence

After participating in the Brainology® program, the students in this study reported having new ways to think about themselves intellectually as learners (see Tables 5 and 6). The first set of findings is divided into three subsections. The first (intelligence levels can change) describes how the students in this study expressed their beliefs that intelligence can grow. The second (practice) shares students' views of the role that practice plays intellectually as part of learning. The third (interest level) discusses how the students felt that being interested in the topic (or intellectually engaged) was important to the learning process for them.

Table 5

Summary of the Findings on the Intellectual Effects of the Program

		Intelligence levels can change	Beliefs about Practice	Interest level
Ali	Pre-intervention	- Unsure mindset	- Can alter intelligence when learning new information	- Reads to ease boredom
	Post-intervention	- Intelligence can change when trying new things - Open to trying new things while having fun	- Practice can improve basic intelligence	- Reads to learn
Vanya	Pre-intervention	- Doubted that intelligence can change	- Can alter intelligence when learning new information	- Difficulty in reading, low interest
	Post-intervention	- More open to learning - Changing people's intelligence slowly	- Trying to read new books, trying out different page numbers	- Read new books - Ask for the series of the books
Bradley	Pre-intervention	- Fixed mindset before the intervention, did not believe that intelligence can be modified	- Can alter intelligence when learning new information	- Likes reading graphics
	Post-intervention	- Brain grows stronger when properly used; can also regress when not	- Practice by reading and researching	- New books to try, increased interest
Ken	Pre-intervention	- Intelligence can be altered	- Can alter intelligence when learning new information	- Interest in reading depends on the topic
	Post-intervention	- Practice has a great effect on an individual	- Step-by-step process of practicing or learning little by little	- Depending on who is around when practice reading
Mei	Pre-intervention	- Intelligence, innate with limitations - Students can get smarter and smarter	- Good reader is one who reads everyday	- Low interest, would rather watch TV
	Post-intervention	- One gets smarter and smarter as the program goes on	- Takes time to read	- Provides time each day to read

Post intervention, the students expressed how they understood themselves intellectually as learners in three ways: Intelligence levels can change, Practice, and Interest level.

Their shared responses found in Table 6 clearly reflect and indicate the changes that occurred since the intervention and how these students understood themselves as learners.

Table 6

Breakdown of the Intellectual Effects of the Program

	Intelligence levels can change	Practice	Interest level
Ali	Ali was open to try new things; <i>"I can change my intelligence by trying new stuff and discovering it, like having fun with it."</i>	Ali believed that practice is required to improve basic intelligence, <i>"If I learn new things I still can change my intelligence by doing them every day and like learning them [new things]."</i>	Ali reported that he no longer reads to ease his boredom but reads to learn, he is <i>"more [interested] in the book and how the main characters traits are, how their feelings are."</i>
Vanya	Vanya shared an example of the ability to change as being open to trying new food, <i>"...you can actually do that [increase intelligence] by like you can change them [people's intelligence] slowly [referring to learning]."</i>	Vanya expressed positive outcomes as a result of practicing for learning new information, <i>"I want to try different stuff, though. Like today, I found a new book that I'm reading and I kind of enjoy it [new book] just by reading some few pages."</i>	Vanya described one book she recently liked, implying that when an individual likes what she is reading, there is an interest to read the entire book and even demand for more series of the book.
Bradley	Bradley believed that intelligence can be changed - either improving or deteriorating. Bradley expressed that intelligence is directly related to learning, <i>"You can always get more smart when you read and search and research."</i>	Bradley explained the relationship between practice and improvement and how getting smarter requires enough patience to learn and practice learning; <i>"Like they [the Brainology® program] can help you get smarter, and they [the Brainology® program] would help you read more so you can achieve your life goal."</i>	Bradley stated there are days that he had more of an interest in reading, particularly when <i>"There are new books for me to try."</i>
Ken	Ken was certain that basic intelligence can be altered, but modifications are determined by how an individual practices, <i>"Because you can change things in learning but what you practice can change you."</i>	Ken recognized that he could develop mastery in reading by taking one level at a time. Ken stressed the importance of practice in learning and that a certain amount of intelligence can be improved when an individual learns, <i>"Because if you study hard for it or like practice or anything that just helps you get better, you might do it."</i>	Ken emphasized that his interest in reading depends upon the topic, and most often he likes to read with his <i>"parents and sisters."</i> Ken described the element in a mystery book that he likes saying: <i>"I just like surprises."</i>
Mei	Mei stressed that by doing her best she will learn and improve. Mei also shared that Brainology® is a helpful program for students as <i>"...they can get smarter and smarter as they go."</i>	Mei articulated the connection between practice and growth in reading. Mei reiterated that good readers read every day and students who have difficulty with reading, <i>"...only read once in a while."</i>	If Mei wants to read on a weekend, she prefers to read during nighttime. Mei shared that she loves to read books. Mei said, <i>"I like to read a lot. Every day I read, like, at least 20 minutes."</i>

Building upon the information in Table 6, I will now discuss the first subsection, which describes how the students in this study expressed their beliefs that intelligence can grow.

Minor theme 1: Intelligence levels can change. The online Brainology® program focused on improvement, not on how smart you are. In the Brainology® program, the students were taught that intelligence and abilities are qualities that can be improved. Brainology® explained to students that they are in control of their brains and how to apply this control to their schoolwork. It also offered them a practical set of skills and strategies for tackling academic challenges (Dweck, 2006).

Ali was unsure of his mindset before the intervention. This seemed to be one of the first times Ali had thought about this concept. He was uncertain whether intelligence could be modified. After the intervention, Ali started to believe that he could change his intelligence because, “I can change it [intelligence] because I can try new things.” He went on to clarify, “I can change my intelligence by trying new stuff and discovering it, like having fun with it.”

Vanya showed a fixed mindset before the intervention. When asked about her initial views on intelligence, Vanya seemed to believe that people can change, but implied that she doubted that intelligence has a malleable quality, “You can change it [intelligence] sometimes, and you cannot change it [intelligence] because it's like your opinion.” After the intervention, Vanya appeared less filled with limiting thoughts and more open to learning. She believed that intelligence could be altered just as a person changes his or her preferences. She explained, “Like if they don't like to eat this or eat that you can actually make them try it [new item], and they might actually like it [new item].”

Bradley showed a fixed mindset before the intervention. Bradley did not believe intelligence could be modified, “Maybe you can learn new things, but you don’t change your basic intelligence.” Since then, Bradley learned how his brain grows stronger when he uses it and expressed that intelligence is directly related to learning. Bradley shared an approach to modify his intelligence, “You can always get more smart when you read and search and research.” Bradley discussed the idea that intelligence may also regress, “I think probably you stop reading, you do other things besides reading so then other people are smarter than you. And you’re just going to be thinking, what are they [the other students] talking about?” He said, “You can change your intelligence but you can get more smarter, you can get more stupid.”

This seemed to be one of the first times Ken had thought about this concept, and he expressed mixed views about intelligence. Although Ken agreed with the notion that basic intelligence can be altered, he believed that modifications are determined by how an individual practices. Ken then learned to take charge of his learning and was certain that basic intelligence can be altered, “Because you can change things in learning but what you practice can change you.” Ken said that while intelligence could be improved, the level of improvement also depends on the learning capability and the effort invested to learn.

Mei showed a fixed mindset before the intervention. Mei believed that her intelligence was something innate, with limitations. She used musical awareness as an example, “I always do the same thing like singing every day.” However, Mei reported that singing was not a gift that she could improve further. She stressed that, “I try new stuff, but I can’t change my intelligence.” Mei learned about the power of her mindset and shared that she can definitely change her intelligence. Mei concluded that Brainology® is a helpful program for students as “they can get smarter and smarter as they go.”

Overall, most people think of the brain as a mystery and do not really know much about how intelligence works. The same was true for our young students. During the pre-intervention interviews, I asked the five elementary school-aged students who have difficulty with reading about their views of intelligence. This seemed to be one of the first times the students had thought about this concept, and they expressed mixed views about intelligence. For example, although Ken agreed with the notion that basic intelligence can be altered, he believed that modifications are determined by how an individual practices. On the other hand, when asked about their initial views on intelligence, three of the participants (Vanya, Bradley, and Mei) were uncertain whether intelligence could be modified (Pre2015 02 10-155716 and Pre2015-02-10-135827). Vanya, Bradley, and Mei were somewhat conditioned in the fixed mindset where intelligence is a fixed entity. In the pre-intervention interview, Vanya seemed to believe that people can change but implied that she doubted that intelligence has a malleable quality because people could not sustain her interest in learning. Vanya shared this idea by saying:

You can change it [intelligence] sometimes, and you cannot change it [intelligence] because it's like your opinion. If you want to get out of a bad habit, you can try to stop doing that [bad habit], like personally even stop doing that [bad habit] for a little while. You'll want to feel like to do it [bad habit] but you'll just try to like force yourself to not do it [bad habit]. So you can change. Like after one many [times] you'll feel like hey, I'm not doing it [bad habit] anymore (Pre2015-02-10-155716).

In this quote, Vanya explains in her own words that personal habits may change, but she likens intelligence to “opinion,” saying “you cannot change it.” Thus, for Vanya, intelligence seemed to be something that just is an immutable part of self. Bradley felt similarly. He believed that “Maybe you can learn new things, but you don’t change your basic intelligence.” However, Bradley did imply that an individual could acquire learning through his or her best effort. He added that learning outcomes depend upon the learner’s level of intelligence and motivation

(Pre2015-02-10-135827). So basically, he is saying that the amount you learn is dependent upon your effort, motivation, and intelligence.

In pre-intervention interviews, two students (Vanya and Ken) articulated a difference between intelligence and learning. When asked about intelligence, Vanya associated learning with a continuous activity of knowledge acquisition while intelligence is something that an individual possess naturally. Similarly, in the pre-intervention interview with Ken, he expressed his belief that learning and intelligence are something related but are not the same (Pre2015-02-11-081542). While these two children were not able to offer precise definitions of the terms, they reported a general conceptualization that the terms have distinct meanings. Looking across all five participants, we see that prior to the intervention; the students had mixed views about intelligence with Vanya, Bradley and Mei presenting as more closely aligned with an entity (fixed) mindset.

During the post-intervention interviews, following theories of intelligence instruction, these five elementary school-aged students who have difficulty with reading all were thinking about intelligence as something that can be cultivated. For example, Ali believed that he could change his intelligence, “I can change my intelligence by trying new stuff and discovering it, like having fun with it.” Even Vanya, Bradley, and Mei’s views of intelligence appeared to have changed. Vanya believed that intelligence could be altered just as a person changes his or her preferences. Vanya further described the development of intelligence. She said:

I kind of agree with that [the ability to increase intelligence] so I’m going to say agree because you can actually do that [increase intelligence] by like you can change them [people’s intelligence] slowly. But you can’t completely change them. Like you have to read books every single night, you have to do it for like 12 hours. You can’t change them by just doing that [the reading for 12 hours] I mean they can for like a few minutes or one hour I guess, but you can’t change them [people’s intelligence] completely. You can’t change them for what they are already” (Post2015-04-01-140606).

In the post-intervention interview, Bradley expressed that intelligence is directly related to learning. Bradley shared an approach to modify his intelligence. He said, “You can always get more smart when you read and search and research.”

Mei also shared that she can definitely change her intelligence. Mei concluded that Brainology® is a helpful program for students, as “they can get smarter and smarter as they go” (Post2015-04-01-142025). She seemed to stress that by doing her best she will learn and improve. Mei further supported that basic intelligence may change but in the course of learning new information, she acquired less information because of her attitude to focus on learning areas that she is already good at. She said, “When I do new stuff I always stick with the other stuff I'm good at.” Mei also shared that she can certainly change her intelligence because “I always do certain stuff no matter what.”

In the post-intervention interview with Ken, he was certain that basic intelligence can be altered, but modifications are determined by how an individual practices. Ken was more convinced now that intelligence and learning are two different concepts (Post2015-04-01-143222). He contested the researcher’s contention that there are “people just born smart,” arguing, “They [smart people] practice hard, but they [smart people] don’t practice too hard.” Ken did imply that learning for people with high intelligence takes less effort than those who have low intelligence. Ken said that while intelligence could be improved, the level of improvement also depends on the learning capability and the effort invested to learn (Post2015-04-01-143222).

The students seemed to have learned about the power of their mindset, how they can take charge of their learning, and how their brain grows stronger when they use it. They all seemed less filled with limiting thoughts and more open to learning.

Interestingly, while all five participants viewed intelligence as something that progresses, one student (Bradley) offered insight that intelligence may also regress. Bradley demonstrated this phenomenon by stating, “I think probably you stop reading, you do other things besides reading so then other people are smarter than you. And you’re just going to be thinking, what are they [the other students] talking about?” Bradley believed that intelligence can be changed - either improving or deteriorating. He said, “You can change your intelligence but you can get more smarter, you can get more stupid” (Post2015-04-02 113314). Bradley’s thoughts imply that when an individual stops learning, intelligence can regress. All the students expressed a new way of thinking about themselves as learners and their beliefs that intelligence levels can change - intelligence can grow, and for Bradley, it can also regress.

Minor theme 2: Practice. In the online Brainology® program, students are taught the value of effort and resilience. Students are conditioned that achievement takes several stages of improvement. The online Brainology® program guides students in exploring the concepts of effort and resilience by engaging them in interactive activities (see Figure 9).



Figure 9. Brainology® interactive online activity.

An entity (fixed) mindset theorist would argue that if you are smart, you should not need to practice, as well as conversely, not having to practice for academic tasks defines them as smart or gifted. Our students disagreed. During the pre-intervention interviews, these five elementary

school-aged students who have difficulty with reading believed that they could alter their intelligence by practicing to learn new information. For example, Ali and Bradley articulated that they approached new learning by practicing and trying hard to develop their abilities. When confronted with challenges, Ali handles his difficulties by, “Maybe I do something else that's easier and then try it again...I just keep practicing” (Pre2015-02-10-160732). During the pre-intervention interview, Ali shared that he does try new things and often finds new learning interesting. He confessed, “I sometimes feel like I'm going to fail but when I get used to it [new learning], I actually think it's kind of fun.” An entity (fixed) mindset theorist would advocate that practice is only for those who have deficits. Ali is demonstrating the opposite as he described that after learning something that was difficult; he again practices “the hard stuff and keep doing it [new learning] so I can keep practicing it [new learning]” (Pre-2015-02-10-160732). Similarly, Bradley said, “I usually just take a break then I try again.”

All five participants did express the concept of practice in the context that intelligence is something that an individual has to improve every day by practicing to learn new things. Ali, for instance, said, “I can also change my intelligence by practicing to learn new things.” Vanya reflected on how she practiced learning math when she was a little younger. She stated:

If you hate math then when you grow up you'll realize that I actually love math comparing from I was little. Now I kind of enjoy math, like the basic terms, but sometimes I just don't like it. When I was little, I didn't like it. So now I'm changing over (Pre2015-02-10-155716).

Vanya is saying that practice strengthens her ability, which leads to achievement. However, Ken believed that intelligence of an individual is something innate and that one could possibly improve but not to the highest extent. He further stressed this by saying: “Like if you can change things in learning but what you practice can change you,” (Pre2015-02-11-081542). This

statement implies that learning depends upon the effort invested in practicing to acquire new skills or information.

Two participants (Vanya and Ken) expressed the concept of taking one step at a time and the patience to practice in order to develop their abilities to perform a newer task. The students shared that practice is an important aspect of dealing with a challenging situation. For example, while Vanya's normal reaction to difficult situations is to calm herself and think of a solution, she thought she could possibly improve herself through exposure and practice. She explained: "You can change it [bad habit] sometimes... Like after one many, you'll feel like hey; I'm not doing it [bad habit] anymore" (Pre2015-02-10-155716). Vanya shared that although she may panic, she remains calm and trying "to figure it [new learning] out like slowly by slowly" (Pre2015-02-10 155716). Ken expressed how he feels when he faces a challenge: "Like everything is just like a waste of time...I feel like mad or something. Not like too mad but I just get a little upset that I just can't do it [new learning], and I just practice it [new learning]" (Pre2015-02 11-081542). Ken describes that practicing can help ease his frustration level.

When asked to describe a good reader during the pre-intervention interviews, the students linked good readers with those who read a lot and practice their reading skills. Ali described good readers as those persons who "practice reading and they study reading real hard, and they have skills for it [reading]." He associated people who do not like reading as those who perceived reading as "tiring." Vanya also described a good reader as someone who reads regularly. She further added that a good reader must understand the words and when confronted with difficulty, takes the time to learn and understand the materials she is reading (Pre2015-02 10-155716). Ken too described a good reader as a person who "practices a lot and just keeps reading constantly." Ken associated bad readers as students who "don't work hard and they just

slack around.” Ken believed that good readers are those individuals who “practice with their parents a lot and study hard” (Pre2015-02-11-081542). When asked about his views about a good reader, Bradley said a good reader is a person who “really likes reading and they read a lot,” and Mei described a good reader as an individual who reads every day (Pre2015-02-11-085650). These students understand good readers to be those who read regularly to practice their skills.

During the post-intervention interviews, following theories of intelligence instruction, these five elementary school-aged students who have difficulty with reading even more strongly expressed value in practice as it relates to learning. They learned that the more you practice, the stronger and more efficient the pathways in your brain become. For example, Ali implied that practicing is required to improve his basic intelligence. He said, “If I learn new things I still can change my intelligence by doing them every day and like learning them [new things]” (Post2015-04 01-135245). For instance, Ali believed that he could change his “intelligence by trying new stuff and discovering it [new learning], like having fun with it [new learning].” Note that he stressed the word “having fun” while learning. He is implying that working hard makes you smarter. Ken implied the notion of process over innate talent. Ken also stressed the importance of practice in learning and that a certain amount of intelligence can be improved when an individual learns. He said: “Because if you study hard for it [new learning] or like practice or anything that just helps you get better, you might do it [learn].” Bradley explained the relationship between practice and improvement and how getting smarter requires enough patience to learn and practice learning. Vanya explained, “I want to try different stuff, though. Like today, I found a new book that I’m reading and I kind of enjoy it [new book] just by reading some few pages.” Positive outcomes were expressed as a result of practicing for learning new

information. Vanya, for instance, realized that she had written several ideas despite her displeasure over engaging in writing activities.

Only three students (Ken, Mei, and Bradley) seemed to articulate the connection between practice and growth in reading. In the post-intervention interview, Ken recognized that he could develop mastery in reading by taking one level at a time. He said, “Sometimes when a level’s too hard I’ll just keep practicing a lower level. And when I master a level I will try and go up to the next level, keep reading the other books independently.” Ken believed that, “Because if you study hard for it [new learning] or like practice or anything that just helps you get better, you might do it [learn].” Through these quotes, Ken seems to be understanding that, just like musicians and athletes, you get to be a proficient (even prolific) reader by practice. In the post-intervention interview, Mei reiterated that good readers read every day and that students who have difficulty with reading “only read once in a while” (Post2015-04-01-142025). Bradley said that Brainology® gives the students the “reasons why they should read” (Post2015-04-02-113314). He further claimed, “Like they can help you get smarter, and they would help you read more so you can achieve your life goal” (Post2015-04-02-113314). These three students appear to realize the connection between practice and growth in reading. Overall, each of the students expressed thoughts about how they understand themselves in a new way as a learner and how practice intellectually influences learning and intelligence.

Minor theme 3: Increased interest level. In the online Brainology® program, students are not explicitly taught about interest in learning. When students are engaged in learning, they take responsibility for their learning and do it because they are interested in something, not because the teacher tells them they should learn it. During the pre-intervention interviews, four of these five elementary school-aged students who have difficulty with reading (Ali, Vanya, Mei,

and Ken) expressed their perceptions of the importance of interest level in reading. In other words, in order to fully engage in learning, they have to be interested. During the pre-intervention interview, Ali associated nonfiction books with animals. He likes nonfiction books because according to him, “they teach me a lot of things” (Pre2015-02-10-160732). Ali’s interests include books that convey fun experiences, are mysterious, and teach life lessons. He confessed that reading books was his mechanism for coping with boredom. He said, “When I’m bored I have to read because I feel a tired thing sometimes.” This boredom strikes whenever his parents and siblings are talking, and Ali feels alone. Reading for him at the time when he was not in the program is not purposive and usually done just to ease his boredom. When asked about the books he reads, Ali said, “I’ve read a book for like no reason.” Ali associates a good reader to someone who likes and enjoys reading books. He also stresses the interest of a good reader in writing (Pre2015-02-10-160732).

During the pre-intervention interview with Vanya, she shared that “I don’t really enjoy reading that much” (Pre2015-02-10-155716). Vanya reported that she reads when she is bored, explaining: “I like to read because that’s the only thing I have.” She said that reading books that do not interest her would be boring (Pre2015-02-10 155716). When asked of a particular moment that hinders her interest in reading, Vanya shared:

...when I’m sometimes busy and when somebody tells me to read that book and this book I’m like no, I’d like to stick with the book I’m reading but then some people just like tell me to read that book right now and then read that later, put that book away, and I’m like just really bored and I just read the book, but I have no interest (Pre2015-02-10-155716).

Vanya shared that she wants to read books that thrill her and that the plot of the story should reflect real and predictable events. Vanya was of the opinion that learning by forcing and not liking the learning would not help an individual learn.

Mei and Ken expressed the role of interest level in reading differently. During the pre-intervention interview, Mei expressed that she dislikes reading in the morning and weekends because these are the times that she likes “to watch TV” (Pre2015-02-11 085650). During the pre-intervention interview, Ken expressed that he enjoys reading mystery books and trying to “solve the mystery by using my knowledge.” He emphasized that his interest in reading depends upon the topic, and most often he likes to read with his “parents and sisters” (Pre2015-02-11-081542). Ken described the element in a mystery book that he likes saying: “I just like surprises.” When asked about a specific time that Ken likes to read, he said, “When I’m reading a fairytale story to my sister.” He further stated that he reviewed the books to see the topics and said, “If it’s [the book] good I’ll keep it [the book] and if it’s [the book] not I’ll just put it [the book] back.” These examples show that when learning is challenging and not in their comfort zone, they do not fully engage or enjoy it.

During the post-intervention interviews, following theories of intelligence instruction, three of the five students (Ali, Vanya, and Mei) expressed how their perceptions of the importance of interest level in reading have changed. For example, in the post-intervention interview, Ali reported that he no longer reads to ease his boredom but reads to learn. In fact, he articulated nonfiction books’ titles and shared the information he read. He knows that opening up to new books other than fiction books could provide him more information (Post2015-04-01-135245). He is implying that when students are interested in a topic, they learn it either because they care about it or because they need it to do something they really want to do. In the post-intervention interview, Ali felt “good as a reader.” This feeling was ascertained when he said that learning is “more in the book and how the main characters traits are, how their feelings are.” He did not cut his interest in reading nonfiction books, particularly those that discuss nature.

During the post-intervention interview with Vanya, she explained that she had developed an interest in reading nonfiction books and learning about real events. She shared that her teacher succeeds in getting her to learn, only when she makes something seem so interesting that Vanya starts to care about it. She further shared that reading should be done when there are no distractions. Vanya described one book she recently liked, implying that when an individual likes what she is reading, there is an interest to read the entire book and even demand for more series of the book. Vanya is saying that giving students a chance to exercise some freedom will increase their interest and thus investment in their learning. While in her post-intervention interview, Mei emphasized her preference for reading fairytales rather than nonfiction books (Post2015-04-01-142025). She remained consistent that she dislikes reading on a weekend. If Mei wants to read on a weekend, she prefers to read during nighttime. Mei shared that she loves to read books. Mei said, "I like to read a lot. Every day I read, like, at least 20 minutes."

During the post-intervention interview, Bradley, too, stated his thoughts on interest level in reading. He shared his interest in graphic novels. He also shared that video games distract him from reading. He said, "I want to complete [the reading], so I can see what's going to happen next and what I'm going to complete [in the video game]." However, there are days that he had an interest in reading, particularly when "There are new books for me to try." Bradley claimed that he reads for fun (Post2015-04 02-113314). Bradley likes to "read graphic novels...and book series." He shared that spending time doing fun activities could negatively impact his interest in reading. Bradley described this situation as: "Sometimes when I'm doing something really fun then I remember I have reading homework," implying that now he has to stop the fun activity. With this being said, he expressed that in general, reading is his favorite past time. He shared that he likes "reading outside under a tree."

Overall, these quotes demonstrate that the students are thinking about themselves intellectually as learners differently and are realizing that in order to be open to learning they may need to come out of their comfort zone. The students have learned that intelligence can grow, and when they practice, and are interested (intellectually engaged) in a task, they will work harder and persist longer.

Major Theme 2. Emotionally: I Can Control My Emotional Responses

After participating in the Brainology® program, the students reported having new ways to think about themselves emotionally as learners (see Tables 7 and 8). The second set of findings in the cross-case analysis is divided into two subsections. The first (anxiety) describes how the students expressed anxiety when learning. The second (controlling your emotions) shares students' views of how the Brainology® program helps students get control of their emotions and subsequent body reactions.

Table 7

Summary of the Formed Themes for the Emotional Effects of the Program

		Emotion toward Learning	Controlling of emotions
Ali	Pre-intervention	- Doing new things was difficult	- Difficulty in controlling emotions when trying new things
	Post-intervention	- Fun to learn and try new things	- Has the ability to control emotions in trying new things
Vanya	Pre-intervention	- Anxious in difficult situations	- Control emotions by focusing on decisions and actions
	Post-intervention	- Has learned to calm and figure things slowly	- Brain controls emotions
Bradley	Pre-intervention	- Positive in stressful situations	- Difficulty in controlling emotions when trying new things
	Post-intervention	- Would keep trying until he gets positive results	- An individual is more capable than one thinks
Ken	Pre-intervention	- Lack of power in difficult situations	- Was not aware that he could indeed control his emotions
	Post-intervention	- New learning helps in anxiety	- Being calm helps in controlling emotions
Mei	Pre-intervention	- Gets anxious when trying new things (e.g., reading books she does not prefer)	- Depending on the mood and attitude
	Post-intervention	- Realization that it is fun and effective	- There is a link between emotions and attitude

Table 8

Breakdown of the Emotional Effects of the Program

	Emotion	Controlling Your Emotions
Ali	Ali first thought that doing new things was difficult, but as soon as he gets used to the new task, he said, <i>"I actually think it's kind of fun."</i>	Ali implied controlling his emotions in trying new things but could not articulate and explain the reasons behind those feelings.
Vanya	Vanya felt anxious in difficult learning situations. She has learned to calm herself and <i>"figure things out slowly."</i>	Vanya reiterated her learning from the Brainology® program, particularly on how the brains control emotions. She shared, <i>"Same thing as your heart, your heart keeps you moving and alive. And like your brain does the extra hard work, it [your brain] makes you move; it [your brain] makes you talk; it [your brain] makes you like learn and do more."</i>
Bradley	Bradley felt excitement when trying something new and expressed a positive attitude of trying with his best effort to finish the task; <i>"I would keep trying."</i>	Bradley believed that an individual could lack self-belief in his or her capacity to learn; <i>"You're really smart, but you don't think you can learn anymore, but you can."</i>
Ken	Ken increased his ability to cope (with the anxiety he feels when learning) by practicing, <i>"I practice that [new learning]."</i>	Ken talked about how controlling his emotions affect learning in that he can try to calm himself, <i>"If you're studying hard for this test and you study too hard you're going to fail. But when you study calm, and you say, 'I got this,' you can pass it [test]"</i>
Mei	Mei shared an experience of overcoming her anxiety when she must deliberately force herself to read books that she dislikes. She said, <i>"So then I start reading it [a book she dislikes] and when something happens like, 'Oh my God.' And when I'm done with the book I'm like, 'Wow, this [the book she dislikes] made my imagination go off."</i>	Mei discussed the link between controlling your emotions and learning by stating, <i>"Because sometimes I want to do new stuff and other times I don't feel like it [new learning]."</i>

Minor theme 1: Anxiety. The online Brainology® program taught the students information concerning how the human brain functions. One discussion in the Brainology® program focuses on the effect of emotions, particularly anxiety, on the response of students to certain problems. The Brainology® program describes the fight-or-flight response of the human brain that causes physical signs of anxiety and interferes with thinking. It teaches students that you can lower your anxiety level by being prepared, thinking positively, and calming your breathing. Figure 10 shows how the Brainology® program helps students to identify and articulate their challenges when learning.

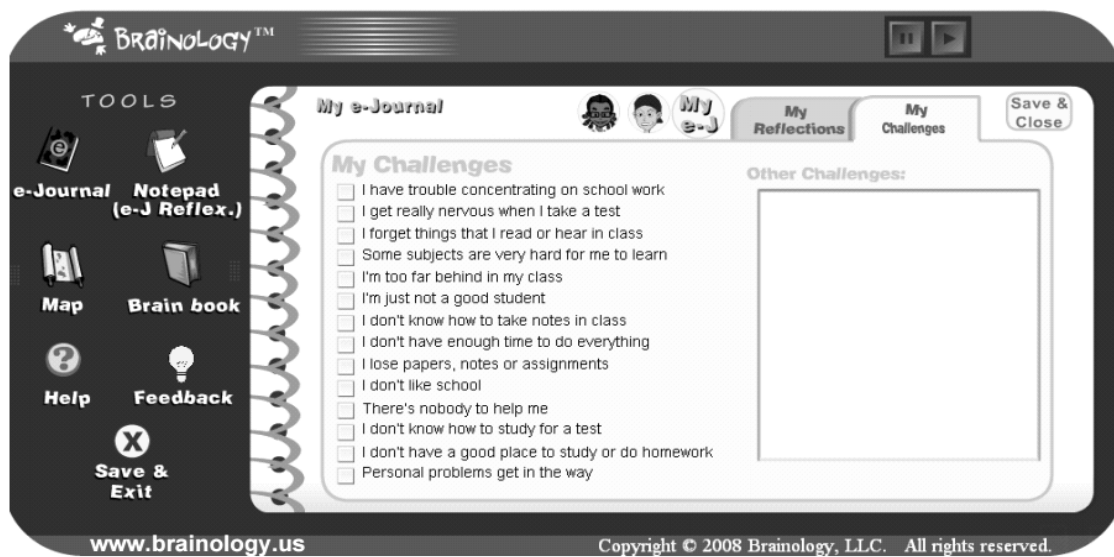


Figure 10. Student identification of learning challenges.

During the pre-intervention interviews, these five elementary school-aged students who have difficulty with reading each expressed anxiety when learning. They all seemed to lack the power to overcome these worries. Three of the participants shared their anxiety and sense of helplessness when doing something that is new to them. For example, Ali felt he is “going to fail.” Mei also shared: “I would feel nervous.” Vanya stated, “I feel like really worried.” Vanya further expressed her discomfort learning new information particularly when it is difficult to

learn (Pre2015-02-10-155716). Vanya offered an example: “Sometimes math, it [math] really struggles me, and I don't really like to [do math].” Vanya explained: “I just want to do the things I like.” She is expressing anxiety when faced with difficult academic tasks that she also is not interested in. It is hard to be sure which comes first – the task is difficult, so she is not interested in it, or is she not interested, so it is difficult. As a shy girl, Vanya hates to ask for clarifications from the teachers. Every time she is in a difficult learning situation, she feels anxious and discouraged to further her learning. When she has exhausted all possibilities, Vanya says she calms herself and figures things out slowly. Vanya shared how she dislikes learning new things and how she persistently tries to cope with this behavior. She shared:

My face gets all red and stuff. I don't like to do it [learn new things]. I really wish that there was something else for me to do but on a test if I don't know something I skip and then go to another one [question] but then sometimes I realize I go back in my memory or something, and then I realize I learned this. Then once I memorize that I go back to the answer and then write it [the answer] and then when I write it [the answer] I think of more and more. So then I write more and more ideas.

Anxiety seemed to have caused her to avoid participation in class and avoid new learning situations. Long-term avoidance of these situations could lead to further problems such as a further decrease in academic achievement.

During the pre-intervention interviews, Ali, Bradley, Mei, and Ken articulated different responses for coping with anxiety when facing a challenge or difficulty. Ali said, “Maybe I do something else that's easier and then try it [new learning] again.” Bradley mentioned, “I would keep trying” while Ken said, “I practice that [new learning].” Mei described her actions as: “My brain is like fighting.” She talks about freezing up when confronted with stressful school situations. Only Ken linked anxiety with lack of confidence as a learner in this example of spending time on something that is difficult. Ken described himself saying:

I'm a reader, like, just trying to build up my goals and skills but that part when I, like, lose confidence is when I'm doing a test and I'm trying to get to a harder level but I try my best and sometimes I make it [to a harder level] and sometimes I don't. And then to reach my goal I usually practice harder books and then go lower (Pre2015-02-11-081542).

Ken is aware that he loses confidence when he struggles and implied that you need confidence to be good at something.

During the post-intervention interviews, following theories of intelligence instruction, these five elementary school-aged students who have difficulty with reading seemed to have increased their ability to cope with the anxiety they feel when learning. Realizing that they do not know how to do something but other students do can cause anxiety. It seems that these participants learned skills to overcome the feelings of anxiety when faced with a learning challenge. They seemed to have learned that if you chose to change your focus, you would view the world in a very different light. They all expressed, despite their anxiety of not doing well the first time, positive attitudes of trying with their best effort to finish the task. For example, Ali first thought that doing new things was difficult, but as soon as he gets to use the new task, he said, "I actually think it's kind of fun." During the post-intervention interviews, these participants claimed that trying or learning new information and experiences thrilled them. Bradley and Mei even shared that they felt excitement that they get to try something new. Mei also shared an experience of overcoming her anxiety when she must deliberately force herself to read books that she dislikes. She said, "So then I start reading it [a book she dislikes] and when something happens like, 'Oh my God.' And when I'm done with the book I'm like, 'Wow, this [the book she dislikes] made my imagination go off.'" Overall, the post-intervention interviews seem to suggest that the students have a new understanding of themselves as learners and have increased their ability to cope with the anxiety they feel when learning. The shared stories and

perceptions of the participants indicate that, through the intervention, although not fully, participants have started to know themselves better and are now able to somehow control their emotions when called for. This response stands in direct opposition to a helpless response, as they seemed to have learned how to notice when these thoughts arise and then reframe them.

Minor theme 2: Controlling your emotions. The online Brainology® program does not explicitly teach the students about controlling their emotions; however, it does encourage self-reflection and self-awareness of emotions. Most students have an ongoing internal dialogue and are sensitive to judgment from themselves and others. Many factors can influence the happiness and social and emotional learning of elementary school-aged students. During the pre-intervention interviews, most of these five elementary school-aged students who have difficulty with reading did mention controlling their emotions when trying new things. However, only one student (Vanya) could articulate and explain the reasons behind those feelings. Vanya shared how she controls her emotions and manages troubling circumstances:

I feel like I want to panic and then just bump ahead to something, but instead, I don't really panic. I just stay calm, take like a deep breath or something. Then I like try to figure it [difficult question] out like slowly by slowly. If I don't know, like how did your vehicle move, if it's a question, then if I was like panicking so much I would just stay calm and think back like what I did and if that doesn't work then my only solution is to like, the question, read it really, really carefully. How did your vehicle move? And did it [your vehicle] move fast or something? Then if I just write the rubber band winded it [the vehicle], I mean I winded the rubber band, and that's not actually an answer. That's just one sentence. I like to try to come up with it [an answer] one by one.

Across all pre-interviews with the participants, only Vanya seemed to develop control over her emotions in order to focus on her decisions and actions.

During the post-intervention interviews, following theories of intelligence instruction, the students were all motivated to regulate their emotions so that they could explore new things and learn. Although aware of a body-mind connection in emotional reactivity, the students were

unclear if emotions are the cause or outcome of the way we interpret the world. Only one participant (Vanya), however, provided a verbatim articulation during the post-intervention interview that Brainology® helps students get control of their emotions and subsequent body reactions. Vanya reiterated her learning from Brainology® particularly on how the brains control emotions. She shared: “Same thing as your heart, your heart keeps you moving and alive. And like your brain does the extra hard work, it [your brain] makes you move; it [your brain] makes you talk; it [your brain] makes you like learn and do more” (Post2015-04-01-140606). Vanya’s articulation of the emotional context of Brainology® can be understood in her personality being a shy girl who most of the time dwells on her feelings before acting. This personality and attitude is reflected in the following statement of Vanya:

It depends, if it’s [new learning] like, it depends on what it [new learning] is. If it’s [new learning] like for example like ice-skating, I would be happy to try it [new learning]. And if it’s [new learning] like something I don’t like, like reading a new book I don’t like that much or something, and somebody’s like forcing me to do it [new learning], and I don’t really want to. Because it [new learning] kind of like makes me like, I don’t want to read it [new book], just reading the back I don’t want to (Post2015-04-01-140606).

The program also encourages self-reflection and self-awareness of emotions (see Figure 11).

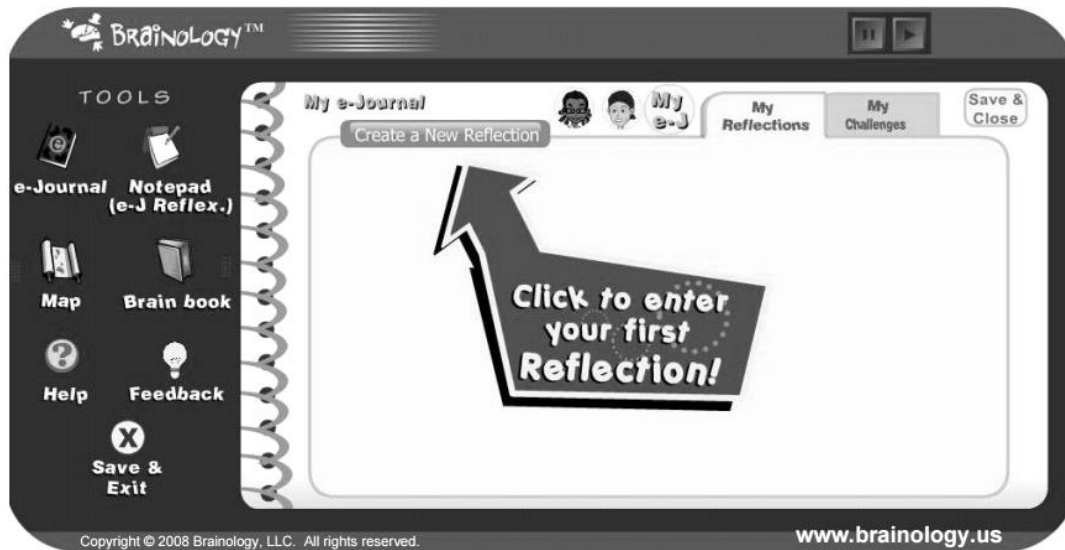


Figure 11. Student reflection on emotions.

Ali, Bradley, Ken, and Mei mentioned controlling their emotions in trying new things but could not articulate and explain the reasons behind those feelings. For instance, Mei said, “If it [new learning] was a challenge I would feel nervous” (Post2015-04-01-142025). Mei did feel frustration, but she could not articulate how these frustrations emerged after several attempts at learning. Mei’s inability to describe this feeling is also observable in the post-intervention interviews with Ali, Bradley, and Ken.

The students talked about how controlling your emotions affects learning in different ways. Ken shared that you can try to calm yourself, “If you’re studying hard for this test and you study too hard you’re going to fail. But when you study calm, and you say, ‘I got this,’ you can pass it [test]” (Post2015-04-01-143222). The key concept here is “calming yourself.” Bradley believed that an individual could lack self-belief in his or her capacity to learn and learn more. He said, “You’re really smart, but you don’t think you can learn anymore, but you can.” Ken added that the extent of altering the intelligence is dependent on how an individual manages himself. He said, “Like some people don’t know how to change, and some people do, and they

take advantage of changing in a good way, not into a bad way.” Mei demonstrated the link of controlling your emotions and learning by stating: “Because sometimes I want to do new stuff and other times I don’t feel like it [new learning].” Although most participants mentioned their emotions in trying new things only one (Vanya) could articulate and explain the reasons behind those feelings.

Major Theme 3. Physically: I Can Strengthen My Brain

The online Brainology® program taught the students physiological and cognitive functions of the human brain, how the brain works, and how to take care of their brain to learn better, as well as the role of the brain in sensory activities—how the brain is also involved with seeing, hearing, smelling, and feeling, not just thinking.

After participating in the Brainology® program, the students reported having new ways to think about themselves physically as learners (see Tables 9 and 10). The third set of findings in the cross-case analysis is not divided into subsections. Brainology® helps students understand the physiological and cognitive functions of the human brain. This section describes how the students expressed learning about how the brain works and how to take care of their brain to help them learn better.

Table 9

Summary of the Post-Intervention Results on the Physical Aspect

I can strengthen my brain	
Ali	To make one learn about the brain and how to think
Vanya	Reading multiple times results in quicker processing
Bradley	Learned about the fun facts of the brain
Ken	Learned strategies to prepare the brain before reading
Mei	Learned how the brain functions and how to control it

Table 10

Breakdown of Student Perceptions on the Physical Aspect of the Brain

Ali	Ali learned about the physiological and cognitive functions of the human brain; “It’s [the Brainology® program] I think to make me learn about my brain and how I think.”
Vanya	Vanya learned that when you review multiplication facts or re-read a tricky part of a book, the brain gets quicker at processing this information because more neurons grow and connect to other neurons, and thus get more efficient at sending each other signals. Vanya described this instance: “If you repeat a word you actually will memorize it [the word] sooner enough. Like five times five is 25, I like memorize it [multiplication fact] and then eight times three is 24, so it’s like easy to memorize it [multiplication fact].”
Bradley	Bradley learned about how his brain works and believed that “Brainology® is a program telling you how your brain works, and it [the Brainology® program] gives you fun facts about the brain. And it [the Brainology® program] could be a little silly sometimes, but it [the Brainology® program] still helps you want to learn more.”
Ken	Ken has learned strategies for priming his brain to learn more efficiently and expressed the importance of proper care for the brain; “They [learners] sleep for most of the hours, and they [learners] practice right up, and exercise their brain.”
Mei	Mei has become more knowledgeable in understanding how her brain learns; “I think the whole point of it [the Brainology® program] is to really understand your brain and to learn how to take better care of it [your brain].”

Neuroscience may seem like a difficult concept for elementary school-aged students. For the most part, lessons on how the brain works are not included in the curriculum for elementary school. As students are not formally taught much about the brain, not surprisingly then, during the pre-intervention interviews these five elementary school-aged students who have difficulty with reading did not specifically mention their brain when they talked about learning or intelligence. However, during the post-intervention interviews, following theories of intelligence instruction, it was like a light bulb went off. These five elementary school-aged students who have difficulty with reading reported having new ways to think about themselves physically as learners. The students expressed learning how their brain works and how to take care of their brain to help themselves learn better. All five participants believed that Brainology® helped them understand the physiological and cognitive functions of the human brain. For example, during the post-intervention interview, Ali said, “It’s [the Brainology® program] I think to make me learn about my brain and how I think,” implying the idea of *neuroplasticity*—or the idea that the brain will grow new connections between neurons when we learn something by experiences new learning.

He further stated that understanding how the brain works will help students achieve learning. He referenced learning about how his brain works—in particular, that the brain is plastic and can develop new capacities with effort and practice. During the post-intervention interview with Mei, she supported this notion by stating: “I think the whole point of it [the Brainology® program] is to really understand your brain and to learn how to take better care of it [your brain].” Mei expressed that as she learned more about brain function this new information positively influenced her attitude toward school, as she felt more in control of her learning.

Learning how the brain works was an essential requirement of learning how to manage your brain and its capability of learning. During the post-intervention interview, Ali demonstrated that: “It [brain] helps me feel the senses and the five senses I have and makes me learn about it [brain]...It [the Brainology® program] makes them learn about it [brain] and think about their brain... Because your brain helps you with your thinking...” One of the Brainology® neuroscience lessons was about the role of the brain in sensory activities—how the brain is also involved with seeing, hearing, smelling, and feeling, not just thinking. During the post-intervention interview, Vanya described this instance: “If you repeat a word you actually will memorize it [the word] sooner enough. Like five times five is 25, I like memorize it [multiplication fact] and then eight times three is 24, so it’s like easy to memorize it” [multiplication fact] (Post2015-04-01-140606). They have learned that when you review multiplication facts or re-read a tricky part of a book, the brain gets quicker at processing this information because more neurons grow and connect to other neurons, and thus get more efficient at sending each other signals. She further claimed the importance of Brainology® for grade one students by stating that:

I think it [the Brainology® program] would help them a lot because they didn’t know that your brain does the extra hard work for you. And you’re just like I guess standing there, and your brain is like thinking for you sometimes (Post2015-04-01-140606).

These quotes imply that we can empower students by teaching them to control their own cognitive processing and therefore master their own learning

During the post-intervention interviews, following theories of intelligence instruction, the students also shared that they learned how to take care of their brains. For example, during the post-intervention interview, Ken expressed the importance of proper care (Post2015-04-01-143222), “They [learners] sleep for most of the hours, and they [learners] practice right up, and

exercise their brain.” They appear to have learned strategies for priming their brains to learn more efficiently. During the post-intervention interview, Bradley added that “Brainology® is a program telling you how your brain works, and it [the Brainology® program] gives you fun facts about the brain. And it [the Brainology® program] could be a little silly sometimes, but it [the Brainology® program] still helps you want to learn more.” The students seem to have become more knowledgeable in understanding how their brains learn. During the post-intervention interview, Ken believed that the purpose of the online Brainology® program is, “To help you learn better or get your brain stronger.” He demonstrated the essential components of the program. Ken said:

They're [the Brainology® program] teaching you; you have to do enough sleep to rest your brain or recharge it [brain]. And when you wake up you're feeling something good. Whatever is good in your gut you should go for it [learning challenge], and hopefully, you can pass the test or something... It helped me in my hardest subject, science, and I got the test right from taking the advice. And I practiced, I got enough sleep, and I ate healthy (Post2015-04-01-143222).

Overall, following participation in the Brainology® program the students reported having new ways to think about themselves physically as learners. From the formed themes based on the results of comparing and analyzing the pre- and post-interviews, the students began thinking about their brain in relation to themselves as learners. The students also expressed learning how the brain works and how to take care of their brain to help them learn better. Teaching students the equipment behind how the brain functions and methods they can use to work that mechanism more efficiently will empower them to create more powerful brains.

Summary

In conclusion, this chapter presented and summarized the key findings with three major themes and several other minor themes or significant perceptions on how elementary school-aged students who have difficulty with reading understand themselves as learners following

theories of intelligence instruction via the online Brainology® program. These students understood themselves as learners in three ways: (1) Intellectually: I can develop my intelligence; (2) Emotionally: I can control my emotional responses; and (3) Physically: I can strengthen my brain. The upcoming chapter will draw conclusions from these findings and provide implications for classroom teachers to improve practices that support an incremental mindset. It will also provide recommendations for school district leaders and further opportunities for research on noncognitive interventions.

CHAPTER 5: DISCUSSION AND RECOMMENDATIONS

The rising illiteracy rate in this country and the inability of public schools to support all children in becoming successful readers provided the rationale for this study. My review of the literature on illiteracy, literacy improvement efforts, and noncognitive interventions pointed to the need for further research on factors that may influence the literacy development of elementary school-aged students who have difficulty with reading. Thus, the purpose of this study was to learn how students who have difficulty with reading understand themselves as learners following theories of intelligence training via the Brainology® program, which in turn would support the profession in creating better learning situations for other students who have difficulty with reading.

This chapter contains a discussion of the study findings. To interpret the findings, I examined the study results from the perspective of existing empirical literature, drawing on five key concepts: motivation, expectancy-value, self-efficacy, classroom context, and mindset. Table 11 depicts how these concepts map onto the ways in which the students understood themselves as learners: Intellectually, Emotionally, and Physically. The first section of this chapter discusses each of the concepts from the literature and its relationship to the study findings. In the second section, I present implications for practice, offering recommendations for classroom teachers and school district leaders. The chapter concludes with a summary of the research journey.

Table 11

Students as Learners in Relation to Literature Review

	Intellectually: I can develop my intelligence	Emotionally: I can control my emotional responses	Physically: I can strengthen my brain
Motivation	X	X	
Expectancy-Value	X	X	
Self-Efficacy	X	X	X
Classroom Context		X	
Mindset	X	X	X

Concepts from Theory

Here I discuss how motivation theory, expectancy-value theory, self-efficacy theory, classroom context, and mindset were manifested in students' intellectual, emotional, and physical understanding of themselves as learners (see Table 9).

Motivation Theory

Many educators and researchers have found that motivation is key to effective instruction (Schunk, Pintrich, & Meece, 2008; Sullo, 2007; Williams et al., 2008), successful reading achievement (Gambrell, Palmer, Codling, & Mazzoni, 1996; Quirk, Schwanenflugel, & Webb, 2009), and improved comprehension of text (Guthrie & Wigfield, 1999). In addition, there is a clear link between intrinsic motivation and frequency of reading (Wigfield & Guthrie, 1995, 1997). Derville (1966) explained that what motivates students to learn is the observation that "difficulties lead to discoveries" (p. 85). Learning to read is not an innate talent (Lyon, 2000),

and it is likely that there are “multiple motivation pathways” (Taboada et al., 2009, p. 86) that guide student behavior. As Baker and Wigfield (1999) observed, “because reading is an effortful activity that children often choose to do or not to do, it also requires motivation” (p. 452).

From an intellectual standpoint, exposure to Brainology®, taught the students that motivation to practice the required competency and develop intelligence is essential in their educational journey. Bradley stated that getting smarter requires enough patience to learn and practice learning. He said that the Brainology® program gives students the “reasons why they should read” (Post2015-04-02-113314). He further claimed, “Like they can help you get smarter, and they would help you read more so you can achieve your life goal” (Post2015-04-02-113314).

The study also documented the term “fun learning” in motivating students to learn. One student claimed that learning should not be directly forced; rather, the learner must have an interest in the subject matter for him or her to develop the precursors to learning. Vanya stated, “You're really smart but you don't think you can learn anymore, but you can.” The students' excitement motivates them to develop and embrace positive attitudes towards learning the subject matter. In fact, a student shared that starting something is difficult, but as she progresses, the task becomes easier. The Brainology® program stimulated the students' confidence, motivation, and performance.

Emotionally, although the students were anxious about their abilities, they were motivated by the idea that if they were able to try, they might learn new information. Three of the participants shared their anxiety when doing something that is new to them. Ali felt he is “going to fail.” Vanya stated, “I feel like really worried.” Mei also shared, “I would feel nervous.” However, after exposure to the Brainology® program, these three participants, as well as Bradley and Ken, claimed that trying or learning new information and experiences thrilled

them. Bradley and Mei shared that they felt excitement that they get to try something new. One student, Vanya, articulated that Brainology® helps students get control of their emotions and subsequent body reactions.

Expectancy-Value Theory

Expectancy-value theory claims that the amount of effort expended by an individual is directly correlated to the amount of interest taken in the task, the perceived likelihood of success, and the meaning associated with its completion (Wigfield & Eccles, 2000). An expectation regarding success in school combines with a student's views about the value of school tasks and determines the amount of motivation the student feels to engage in school. The expectancy-value theory was reflected in how the students understood themselves intellectually and emotionally. This can help us understand why, after exposure to the Brainology® program, all five students expressed that, despite their emotional fear that they may not do well the first time, the positive feelings of trying with their best effort to finish the task stimulates their interest in learning new information.

After Brainology®, all of the participants agreed that they were motivated to learn more and that, for every successful attempt to learn new information, they become more confident, thrilled, motivated, and improved. These successes are particularly captured in the post-Brainology® experiences of Ali, Vanya, Bradley, and Ken who shared that they paused and calmed their negative emotions, and then moved on to try learning again. This learning attitude reflects the expectancy-value theory, which explains how persistence could help students improve their self-concept and task value (Gambrell et al., 1996). The students' persistence to achieve the desired goal is also a facet of achievement motivation (Wigfield & Eccles, 2000).

These students implied that they developed resilience after every difficult task that they accomplished.

Self-Efficacy

Self-efficacy beliefs influence cognitive, motivational, affective, and decisional processes and determine whether individuals view themselves as capable or incapable, are motivated to persist when confronted with challenges, have a sense of emotional well-being, and can make certain choices in critical instances (Bandura, 1997; Bandura & Locke, 2003). Self-efficacy beliefs are more closely related to actual engagement and learning, and are also more predictive of performance, than measures of general self-concept (Graham & Weiner, 1996; Linnenbrink & Pintrich, 2003; Pajares, 2003; Pajares & Miller, 1994; Shell et al., 1989, 1995). Self-efficacy promotes the willingness to engage in an academic task and to persist even when the task becomes challenging (Bandura, 1997). For most students, past performance is the most reliable guide for gauging self-efficacy (Schunk & Meece, 2006). When a deficiency in self-efficacy exists, people are likely to underachieve, even with the knowledge of what they need to do to succeed (Bandura, 1986, 1993).

From an intellectual standpoint, exposure to the Brainology® program prompted all five of the study participants to express positive views of their self-efficacy, stating that they could alter their intelligence by learning new information. However, the extent to which each child believed intelligence could be modified was dependent on each individual's attitude towards learning. For instance, Ali believed that he could change his "intelligence by trying new stuff and discovering it, like having fun with it." Self-efficacy promotes the willingness to engage in an academic task and persist even when the task becomes challenging (Bandura, 1997). While learning new information and trying new experiences are challenging for the participants, all five

agreed that learning new information and acquiring experiences were worth trying. Mei's behavior clearly reflects this, in that she persisted in learning new information, but prefers to go back to topics that she is good at. This behavior echoes Bandura's self-efficacy theory that highlights the importance of one's belief in one's own ability to complete tasks. Mei's decision to stick to topics that she is good at may be helpful in her growth in those areas, but also may hinder her development in other areas.

Expressing themselves emotionally as learners, four of the students (Ali, Bradley, Ken, and Mei) articulated that their normal response when faced with difficulty was to try something easier. As Ali said, "Maybe I do something else that's easier and then try it again." While these four students described having negative emotions when trying new things, they could not articulate and explain the reasons behind those feelings. The students inferred that if they could control their emotions, they could better attend to learning.

With regard to students as learners, physically, all five of the participants reported that the Brainology® program helped them understand the physiological and cognitive functions of the human brain. Ali reported that understanding how the brain works will help students achieve learning. Ali stated that, "It helps me feel the senses and the five senses I have and makes me learn about it... It makes them learn about it and think about their brain. Because your brain helps you with your thinking." Vanya described the importance of Brainology® for grade one students by stating that "I think it would help them a lot because they didn't know that your brain does the extra hard work for you. And you're just like I guess standing there and your brain is like thinking for you sometimes" (Post2015-04-01-140606). Mei supported this notion by stating: "I think the whole point of it is to really understand your brain and to learn how to take better care of it." Individuals have self-efficacy beliefs that allow them to exercise control over

their thoughts, feelings, and actions. For these students, learning how the brain works was an essential requirement for learning how to manage your brain and its capability of learning. For these students, learning how the brain works helped them develop the self-efficacy beliefs necessary to monitor their thoughts, feelings, and actions.

Mindset (Intellectually)

As previously discussed, numerous studies have shown that children's mindsets can be transformed through thoughtful intervention and that explicit instruction that intelligence is malleable increases classroom motivation and grades (Blackwell et al., 2007; Kamins & Dweck, 1999; Mueller & Dweck, 1998). Before the Brainology® program, all five students recognized that at some point in their difficulties, they felt discouraged, frustrated, and eventually stopped learning. These attitudes of students are consistent with the concept of a fixed mindset, where a student feels frustration when desired outcomes are not achieved the first time he or she tries (Murphy & Thomas, 2008).

The realization that intelligence and learning are abilities we can develop, has been shown over and over to have powerful ramifications on student learning and school success. The Brainology® program is an online, interactive program that teaches the scientific basis of a growth mindset. The students in this study became "incremental" theorists of intelligence, at least when asked. These students believed that intelligence could be modified by "learning new things." Vanya related this phenomenon by reflecting on her learning when she was younger. She emphasized the term "slowly" by persistently practicing to learn and establishing discipline in learning.

However, while all five of the participants viewed intelligence as something that progresses, three of them offered insight that intelligence also regresses. Bradley described

intelligence as “You can get more smarter, you can get more stupid.” Bradley articulated this phenomenon by stating, “I think probably you stop reading, you do other things besides reading so then other people are smarter than you. And you’re just going to be thinking, what are they talking about?” Other students implied that regression of intelligence happens when the learner stops practicing, maintaining a positive disposition, and focusing on developing his or her strengths. Ken agreed with the notion that basic intelligence can be altered, but that modifications are determined by how an individual practices. Ken said, “Because you can change things in learning but what you practice can change you.” He continued along this line of thinking by stating, “If you're studying hard for this test, and you study too hard you're going to fail. But when you study calm, and you say, ‘I got this,’ you can pass it.” Mei further supported that basic intelligence may change, but that in the course of learning new information, her propensity to focus on learning areas that she is already good at caused her to acquire less new information. She said, “When I do new stuff I always stick with the other stuff I'm good at...” This finding suggests that poor academic behaviors do not necessarily indicate the absence of motivation to succeed. However, an incremental theory of intelligence would view this regression as an occurrence in the student’s life that requires intervention (Blackwell et al., 2007; Dweck, 1999, 2007a; Grant & Dweck, 2003).

Mindset (Emotionally)

Those with a *growth mindset* (“incremental theorists”) believe that intelligence can be cultivated and is a malleable quality that can be developed (Blackwell et al., 2007; Dweck, 1999, 2007a). Purposefully teaching students that intelligence and talent can be developed and that the brain “grows like a muscle” when it is challenged can lead to higher grades and test scores (Aronson, Lehr, & Osborn, 2002; Blackwell et al., 2007; Good et al., 2003; Paunesku, Goldman,

& Dweck, 2011). In this study, the students understood learning to be frightening, stimulating, and worth trying. Learning and venturing into new experiences created anxiety that students may not be able to deliver what is expected in the new tasks. The word “failure” and “worried” were common terms uttered by students who initially held negative beliefs about their capacity to overcome and learn the new tasks. The students’ emotions before and after their exposure to the Brainology® program changed as they learned information concerning how the human brain behaves and functions. Children who possess an entity mindset understand errors, challenge, and work as indicators of their lack of intelligence, whereas children who possess an incremental mindset interpret effort as helpful and view challenges as chances to learn (Dweck, 2006; Heyman & Dweck, 1998).

Mindset (Physically)

Considering intelligence to be malleable means that intellectual ability can always be further developed, not that everyone has identical potential in every domain or will learn every topic with equivalent ease (Sternberg & Horvath, 1998). In addition, we know that students who have negative mindsets perform poorly in academics (Seligman & Maier, 1967; Steele, 1997; Steele & Aronson, 1995). In the Brainology® program, students proceed through six computer modules, learning about their brain and how to make it work better (Dweck, 2006). The students in this study believed that what they learned from the Brainology® program helped them understand the physiological and cognitive functions of the human brain. As mentioned earlier in this study, no amount of new information was acquired when the students were unable to “take one step at a time.” This finding supports the incremental or growth perspective of intelligence. Bradley added that “Brainology® is a program telling you how your brain works and it gives you fun facts about the brain. And it could be a little silly sometimes but it still helps you want to

learn more.” Ken believed that the purpose of Brainology® is “To help you learn better or get your brain stronger.” He explicated his understanding of the essential components of the program. Ken said,

They're teaching you, you have to do enough sleep to rest your brain or recharge it. And when you wake up you're feeling something good. Whatever is good in your gut you should go for it, and hopefully you can pass the test or something... It helped me in my hardest subject, science, and I got the test right from taking the advice. And I practiced, I got enough sleep, and I ate healthy (Post2015-04-01-143222).

To enhance academic achievement, educators must intentionally create classroom environments that foster an incremental mindset and teach students effective learning strategies (Farrington et al., 2012; Snipes, Fancsali, & Stoker, 2012) because those who hold an incremental mindset interpret challenging work as a prospect for learning and growth (Dweck, 1999; Dweck & Leggett, 1988; Dweck & Sorich, 1999; Henderson & Dweck, 1990; Hong et al., 1997; Mueller & Dweck, 1998; Sorich-Blackwell, 2001).

Classroom Context

Classroom context shapes students' academic behavior (Deakin Crick et al., 2013; Gu & Johansson, 2013); Although the participants did not explicitly state it, educators may need to consider how classroom context affects noncognitive factors, which in turn influence learning, in order to help students gain control over their studies and their capacity to improve their intelligence. Early studies have claimed that educational environments that limit a student's capacity to engage further beyond his or her competency could negatively affect the student's mindset (Kamins & Dweck, 1999; Mueller & Dweck, 1998). Frustration and anxiety were feelings that these students who have difficulty with reading had to overcome. As such, educators may need to consider helping their students to manage these negative perceptions as they engage in the task at hand. In conclusion, the findings from this study suggest ways that

schools can be organized to help support students intellectually, emotionally, and physically as learners.

Implications for Practice

Having discussed the study findings, this section will provide key recommendations for two distinct stakeholders: 1) classroom teachers and 2) school district leaders. Based on my interpretation of the findings, the first subsection below will focus on recommendations on how teachers can integrate theories of intelligence instruction into their classrooms to support elementary school-aged students who have difficulty with reading. The second subsection will focus on recommendations for school district leaders, gleaned from the research participants, on how to integrate theories of intelligence instruction into the schools and programs in their districts to support elementary school-aged students who have difficulty with reading.

A disconnect exists between what educators put in place to support elementary school aged students who have difficulty with reading and the students' own realities (See Figure 12). Educators are busy training teachers on current teaching strategies, redesigning content standards, and rethinking stages of support for those students who have difficulty with reading. The students, however, fully understand themselves as learners in noncognitive ways - intellectually, emotionally, and physically. These practical implications for purposefully integrating noncognitive factors into the instructional day will serve as a bridge to connect educators with their students' realities.

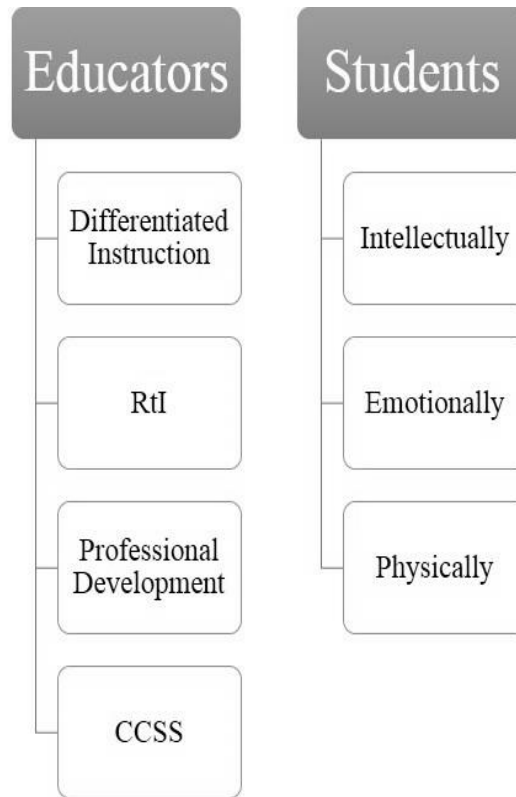


Figure 12. Focus of educator vs. students.

Educators must change the conversation about education from a focus on narrowly defined academic achievement to one that encompasses a broader definition of student success and places the child at the center. For too long, educators have committed to time structures, coursework, instructional methods, and assessments designed more than a century ago. It is time to put students first, align resources to students' multiple ways of understanding themselves as learners, and plan for a more balanced approach. We must redefine what a successful learner is and how we measure success. Twenty-first century education requires a whole child approach to learning, teaching, and community engagement. While continuing to gauge academic achievement, educators must travel past the narrow curriculum and accountability system in an effort to adequately prepare children for their futures. To the extent that we narrow the purpose

of schooling to what can be measured, we fail to engage the noncognitive sides of children that must be developed in order for them to pull learning from life.

Educators must use the influence of noncognitive factors to renovate educational practice from its existing focus on content knowledge and quantifiable academic abilities to the wider development of students as learners. Supporting noncognitive factors in students means altering classrooms into spaces buzzing with concepts that engage students' natural curiosity and longing to learn in training for college, career, and satisfying adult lives. This requires schools to construct not only students' skills and knowledge but also their belief of what is conceivable for their future, as they cultivate the strategies, behaviors, and attitudes they will need to realize their dreams.

Recommendations for Classroom Teachers

In this section, I describe some of the practices that classroom teachers can implement in their classrooms immediately based on the findings of this study. Having studied the Brainology® program, I utilized the participants' experiences to share key recommendations, which will be useful for those thinking about innovative ways to support elementary school-aged students who have difficulty with reading, and for professionals who currently oversee a literacy program.

Intellectually: I Can Develop My Intelligence

The study findings indicated that students more fully understood themselves as learners (intellectually, emotionally, and physically) following theories of intelligence instruction. This is important so that students can feel empowered and confident in learning. These findings suggest that teachers should support a culture of incremental mindset in their classrooms. One way teachers can do this is by incorporating process praise. This would include praising children's

effort, challenge seeking, strategies, or improvement rather than their product, outcome, or ability in an effort to promote an incremental mindset (Gunderson et al., 2013). These are messages that can easily be integrated into everyday classroom practices without changing the curriculum and without a lot of extra time and effort on the part of teachers.

As the five participants in this study showed us, technology is a captivating dais for instruction (Gee, 2008; Mayo, 2009; O'Neil et al., 2005). Classroom teachers can integrate educational games that develop students' interest in a particular subject matter, as well as support an incremental mindset, showing them that they too are capable of learning the knowledge that other students have acquired. Educational games can be enriched by altering their incentive structures to support an incremental mindset, or the belief that intelligence is malleable (O'Rourke et al., 2001).

Emotionally: I Can Control My Emotional Responses

In this study, students expressed elevated levels of stress and anxiety. The emotions that the children expressed--anxiety, fear, and stress--were addressed through the Brainology® program, which taught the students how to regulate their emotional responses. Based on this finding, teachers who reduce anxiety levels in their students may find that the students are more available for learning. Classroom teachers can reduce anxiety and create emotionally safe classrooms by incorporating some of the strategies taught in the Brainology® program in their classrooms. This could include relaxation and coping skills to deal with the emotional reactions students have to stressful situations.

In addition, classroom teachers can reduce student stress and anxiety by being aware of their language. Teacher language that supports an incremental mindset can have a powerful impact on students emotionally (Deakin Crick et al., 2013; Gu & Johansson, 2013). Teacher

language and our daily communication with students can help us build classrooms where students feel emotionally safe, respected, and engaged. By paying attention to our language (Johnston, 2012) and using it to open the doors of possibility for children, we can help them become successful learners. By building these emotionally safe learning environments, we will produce not only technically competent students, but also caring, secure, actively literate human beings.

Physically: I Can Strengthen My Brain

All five participants enthusiastically expressed learning about how their brain works when they are learning. For example, the brain “grows like a muscle” when it is challenged and that when they apply themselves and learn new things, their brain creates new connections (Aronson, Lehr, et al., 2002; Blackwell et al., 2007; Good et al., 2003; Paunesku et al., 2011). Most curriculums do not include lessons on brain functionality. Therefore, classroom teachers who directly teach and empower students to understand how their brains work when they learn can expect to see increased engagement. For many students, this “scientific” understanding of how they learn might motivate them. Teachers can also incorporate brainteasers or other games or puzzles that challenge the brain while teaching students about how their brains work (e.g., when the brain works hard, neural connections are made) (Blackwell et al., 2007). In the long run, our brains do better when we incorporate new activities, including brainteasers, brain games, and logic puzzles. Some of the benefits associated with brain games and logic puzzles include boosting brain activity, providing emotional satisfaction and sense of accomplishment, enhancing memory and processing speed, improving concentration, and reducing boredom.

Finally, the students in this study understood themselves intellectually, emotionally, and physically as learners. This tells us that classroom teachers must focus on the whole child by

promoting the social, emotional, physical, and academic wellbeing of each student. We know that students demonstrate improved performance in school when they are emotionally and physically healthy (e.g., they miss class less often, are less probable to get involved in dangerous or antisocial behaviors, can concentrate better, and attain higher test scores). The profits of a whole-child perspective will spread beyond the academic curriculum and into the school climate as the students feel cared for as human beings, not just learners.

Recommendations for School District Leaders

The findings from this study also have implications for school and district level leadership. Here I will offer recommendations for educational leaders who aim to increase literacy achievement for all students, especially students who have difficulty with reading.

Intellectually: I Can Develop My Intelligence

The findings from this study tell us that even young children can understand that intelligence can be increased after experiencing the Brainology® program. Therefore, school district leaders should implement the Brainology® program, or a similar program that teaches about theories of intelligence, into the school day for all students, especially those at risk, and encourage an incremental mindset culture in each school. The Brainology® program may be a useful way to help students appreciate themselves intellectually, emotionally, and physically as learners. However, in order for Brainology® or a similar program to be implemented with fidelity, the school district must provide professional learning for educators in theories of intelligence. For example, The Mindset Works® Educator Kit (Dweck, 2007b) is a collection of resources developed to educate teachers and administrators about the growth mindset and tools to assist them in encouraging their students' learning and success.

Furthermore, school district leaders must consider how teachers' theories of intelligence affect their students' achievement. Rheinberg's (1980) work has shown that students who were formerly low achievers flourish when their teachers believe they have an influence on their students' intelligence. Conversely, students who come into the class as low achievers continue to be low achievers when teachers believe they have no effect on their students' intelligence. In Rosenthal and Jacobson's (1968) research on the teacher expectancy effect, teachers were given an incremental theory of intelligence and informed that some students in their class would develop intellectually that year. The outcomes substantiated the importance of teachers having an incremental theory of their students' abilities. Butler (2000) studied the effect of teachers' theories of intelligence on their verdicts of students' intelligence. She gave teachers data about two students, one whose score improved over 10 tests and one whose score declined over 10 tests. Not surprisingly, teachers with an incremental theory believed the student with the growing performance to have greater ability than the student with declining performance; however, teachers with an entity theory assumed the opposite. Incremental teachers were concerned with progress over time as a gauge of ability, while entity teachers judged students by their first effort even if that effort was not sustained over time.

Emotionally: I Can Control My Emotional Responses

As we saw in this study, stress and anxiety are prevalent in our young students' lives. One recommendation for school district leaders is to incorporate yoga, meditation, and/or mindfulness training into the school's health, physical education, or social-emotional curricula. The participants in this study spoke of learning about being able to control their emotions through the Brainology® program. Meditation brings positive changes to the classroom, such as greater relaxation, better focus, and increased self-awareness. Studies have shown up to a 40%

reduction in psychological distress, including stress, anxiety, and depression, when implementing meditation with students (Nidich et al., 2009). If school district leaders can assist students in understanding and controlling their emotions through meditation or other self-calming techniques, these options ought to be explored.

Physically: I Can Strengthen My Brain

As we learned from this study, most students are not explicitly taught how their brains work and how they can take care of their brains so they can learn better. At the same time, we also know that positive effects are unmistakable when schools and parents work together to support learning (Eccles & Harold, 1993). Therefore, school district leaders should create a “Parent Academy” to educate parents regarding the influences of noncognitive factors on learning. The “Parent Academy” would be a free, year-round, district-wide initiative offering the training, information, and assistance necessary to help parents become full partners in their children’s education. This program would aim to provide educational excellence for all students by informing parents about the importance of noncognitive factors in their child’s learning, partnering between families and schools, and offering parents a comprehensive understanding of their rights, responsibilities, and the educational opportunities available. Monthly workshops and classes would be offered at no charge throughout the school year for both parents and children. The “Parent Academy” would connect parents to resources and information regarding noncognitive factors and ways in which they can support their child’s education.

Immediate Implications for My School District

In complete divergence from the existing overemphasis on cognitive factors, developing noncognitive skills should be an unequivocal goal of public education. As it pertains to my current school district, I plan to implement a three part set of actions: 1) increase educators’

awareness of the influence of noncognitive factors in student learning; 2) examine policies and K-12 curriculum and instructional practices to ensure alignment with supporting noncognitive factors; and 3) encourage colleagues as they develop and sustain noncognitive supportive cultures in their schools.

Devoid of the necessary mindsets, beliefs, and self-knowledge, teachers are less likely to build the kind of supportive classrooms that nurture real learning. Constructing the right atmosphere begins with centering teachers more decisively in their own noncognitive skills, traits, strategies, and attitudes. This preparation offers an opportunity for growth for all educators in my district. Therefore, my first action might be to facilitate opportunities for district staff to engage in self-reflection, allowing them to give consideration to their own beliefs and mindsets and the growth of their own noncognitive competencies. Educators feel both inexperienced with noncognitive skills and ill prepared to teach them. Frequently, they likewise need to alter their own and their students' long-held beliefs regarding their capacity to learn—such as the influences of a growth mindset and self-efficacy. Students cannot develop as effective learners unless their teachers understand, model, and believe in the skills and behaviors they seek to teach. One possible resource that the district could consider might be The Mindset Works[®] Educator Kit (Dweck, 2007b). This is a collection of resources developed to educate teachers and administrators about the growth mindset and tools to assist them in encouraging their students' learning and success.

Educators need to comprehend and be able to demonstrate the attitudes and behaviors they attempt to teach in their students. However, most educators have not been trained to make noncognitive factors paramount in their work. Therefore, my next step might be to raise

educators' awareness of noncognitive factors and how they influence student learning by sharing the literature and my research and designing professional development programs for teachers.

This suggests momentous modifications for teaching training and coaching in my district, which today largely focuses on pedagogy and classroom management. By providing this new and different kind of preparation and support, my objective is to provide teachers with knowledge of both the importance of noncognitive skills and the strategies to best promote and nurture these noncognitive skills in their students. This professional development will supplement current training intended to advance teachers' effectiveness as instructors by integrating a new module that is more focused on the child's complete growth and that helps teachers understand how to create a classroom that supports students' noncognitive factors. In addition, to deliver on-demand support for teachers, I will work to build an online site with a collection of tools and resources, consisting of reflection and observation guides and assessment rubrics, concentrated on noncognitive and academic factors.

A third effort focuses on helping my school district integrate noncognitive competencies into district-level policies and practices, extending to every classroom. Despite noncognitive skills' dominant role in education and, largely, our lives, my district's policies have neglected their significance. Consequently, there are presently scarce strategies to cultivate them within my school context or through district education policies. I will be at the forefront in declaring the need for thoughtful and concerted attention from district leaders, policymakers, and practitioners.

Next, I might work with district leaders to consider how to fully integrate these skills into the student curriculum, in order to work toward the development of students' noncognitive skills. As we seek to embed noncognitive skills into teachers' daily work with students, my recommendation will be to create a committee to study how we can effectively embed

noncognitive factors into the curriculum at all grade levels. I will recommend a program like Brainology® as we consider the best way to integrate noncognitive skills into courses and curriculum. We must design both a broader curriculum, as well as specific instructional strategies to promote those skills, as some noncognitive skills can be taught both directly and indirectly.

Last, but certainly not least, it is imperative that we create a culture that supports noncognitive factors throughout the school day from the classroom to the cafeteria and reinforces a common language for noncognitive competencies. To that end, I will work with principals in my school district to determine how to integrate noncognitive factors into their school cultures and work collaboratively with teachers individually or in groups to ascertain what is effective and how to best support noncognitive factors throughout the school day. I plan to work with our district instructional coaches on ways they can provide noncognitive support for teachers and administrators. A further recommendation I will present to my district is to assess its instructor evaluation framework, in search of associations between teacher effectiveness and their noncognitive factors competencies. Across the arenas I highlighted above, there is a common cause: to help many more students grow as effective learners. My goal is to see greater assimilation over time as countless educators learn to support their students in all the paths it takes to grow both their hearts and minds.

Limitations and Opportunities for Further Study

This study has both limitations as well as opportunities for future research. As described in Chapter 3, the qualitative study has a small sample size, as only five participants were willing and able to be interviewed; hence, the findings are not generalizable. Additionally, data collection methods utilized two in-depth interviews with each participant, as well as a review of

field notes and documents, so an opportunity for additional investigation in the future is certainly a possibility.

In terms of the methodological procedures used in this study, it is recommended that future researchers include the perspectives of teachers on the changes they observe in students who are instructed with the use of Brainology®. The inclusion of teachers' perspectives in the investigation would enrich the information provided by their students. Furthermore, as classroom context may not always support the students' new thinking, the current study did not determine the academic impact or the participants' attitudes about learning and themselves as learners in the general classroom after their experiences with the Brainology® program. Those are definitely areas worthy of future consideration.

Consequently, this study's limitations demonstrate the need for further research to inform the practice of theories of intelligence instruction aimed at supporting elementary school-aged students who have difficulty with reading. As we are only privy to the experiences of five former program participants, a larger pool of participants would contribute to the information collected and available for further analysis. In addition, with a larger pool of participants, one could potentially utilize other forms of data collection, such as focus groups, to further inform educators on how to create better learning situations for students who have difficulty with reading. Future research might also investigate whether the changes in children's thinking were sustained or applied in the general classroom context, as non-cognitive outcomes can be undermined if not supported in the general classroom setting.

As the literature review highlighted, there is still a lack of qualitative studies on theories of intelligence instruction from the perspectives of elementary school-aged students. While this study will certainly contribute to the literature, an opportunity remains to further investigate this

population and the programs aimed at impacting elementary school-aged student learners. Most important is the need to continue to learn from the students that we aim to assist: our elementary school-aged students who have difficulty with reading themselves. Hence, further research in the form of qualitative studies aimed at learning more from elementary school-aged students who have difficulty with reading about their experiences with the Brainology® program would assist in improving practice.

Conclusion

Students who have difficulty with reading do not reach the academic level of their able-reading peers. Although not all students develop at the same pace and, consequently, some students move on with more solid foundational reading skills than others (Zorfass & Urbano, 2008), educators often respond to this challenge by labeling or stereotyping the abilities of at-risk students. Students are often retained, assigned to special education classrooms, or given individualized instruction based on their level of understanding (National Reading Panel, 2000; Rashotte et al., 1997; Torgesen, 1998). This action does not support an incremental mindset, which could influence other related precursors to learning.

Claims about noncognitive factors provide limited specific direction for educational practice. Although we know that noncognitive factors matter for student learning, we must learn more about how to develop them in elementary school-aged students and the best ways they can be taught and learned in a school setting. The idea that educators would realize big results from fostering academic mindsets, self-discipline, and other noncognitive factors relies on the assumption that educators or researchers have practical knowledge of how to develop and assess these strategies. It also necessitates that educators recognize the prospective payoffs of diverse approaches to developing elementary school-aged student noncognitive factors, that they know

tangible strategies to cultivate their development, and that tools exist to consistently measure fluctuations in these factors.

As educators, we must strive to renovate educational practice from its singular emphasis on content knowledge and testable academic skills to a broader emphasis on the growth of the student as a learner in preparation for college, career, and a meaningful adult life. This work involves creating classrooms alive with ideas that engage students' natural curiosity and desire to learn. As schools cultivate students' skills and knowledge, they must also pay attention to their beliefs of what they can achieve, as they develop the strategies, behaviors, and attitudes that allow them to bring their ambitions to realization. The Brainology® Program integrates theories of intelligence instruction primarily to teach students how the brain works, learns, and physically changes when practicing. Brainology® explains to students that they are in control of their brain and shows them how to apply these lessons to their schoolwork by providing students with real-world skills and strategies (Dweck, 2006). This qualitative case study has aimed to contribute to the literature available on theories of intelligence instruction for elementary school-aged students by investigating the Brainology® program. Studies completed on theories of intelligence instruction have focused mainly on middle school or older students and use mostly quantitative means to assess increases in learning. However, there was a need for qualitative analysis aimed at learning directly from the elementary school-aged students whom the program targets. Hence, this study arose with the objective to answer the following research question: *How do elementary school-aged students who have difficulty with reading understand themselves as learners following theories of intelligence instruction?*

As I embarked on the journey to answer this question, I learned from the five wonderful participants whom I interviewed and observed, each of whom had tremendous personal stories of

their learning styles, school experiences, and reading development. This study reflects how powerful the concept of storytelling can be. Additionally, it demonstrates how instrumental it is to learn directly from the experiences and personal journeys of participants. It is my hope that I have been able to contribute to the existing literature on theories of intelligence instruction for elementary school-aged students by highlighting how the Brainology® program has influenced these elementary school-aged students who have difficulty with reading to understand themselves as learners. Most importantly, based on the research findings, this study hopes to inform educators and practitioners on how to assist elementary school-aged students who have difficulty with reading by demonstrating that Brainology® practices are valuable and effective, as confirmed by those who participated in the program. Evidence demonstrated three main findings regarding how elementary school-aged students experienced theories of intelligence instruction via the Brainology® program. The five research participants interviewed for this study were able to share their personal experiences with using the Brainology® program, which assisted in answering the research question of how elementary school-aged students who have difficulty with reading ascribe meaning to theories of intelligence instruction. The data from this study demonstrated three main ways that the study participants understood themselves as learners after theories of intelligence instruction via the Brainology® program: 1) Intellectually: I can develop my intelligence, 2) Emotionally: I can control my emotional responses, and 3) Physically: I can strengthen my brain.

This research study also makes recommendations for practice, not only for classroom teachers, but also for school district leaders who work with elementary school-aged students who have difficulty with reading. This research study utilizes the voices of elementary school-aged students who have difficulty with reading to help shape practices to better support and assist

other elementary school-aged students who have difficulty with reading in the future, with the goal of literacy for all.

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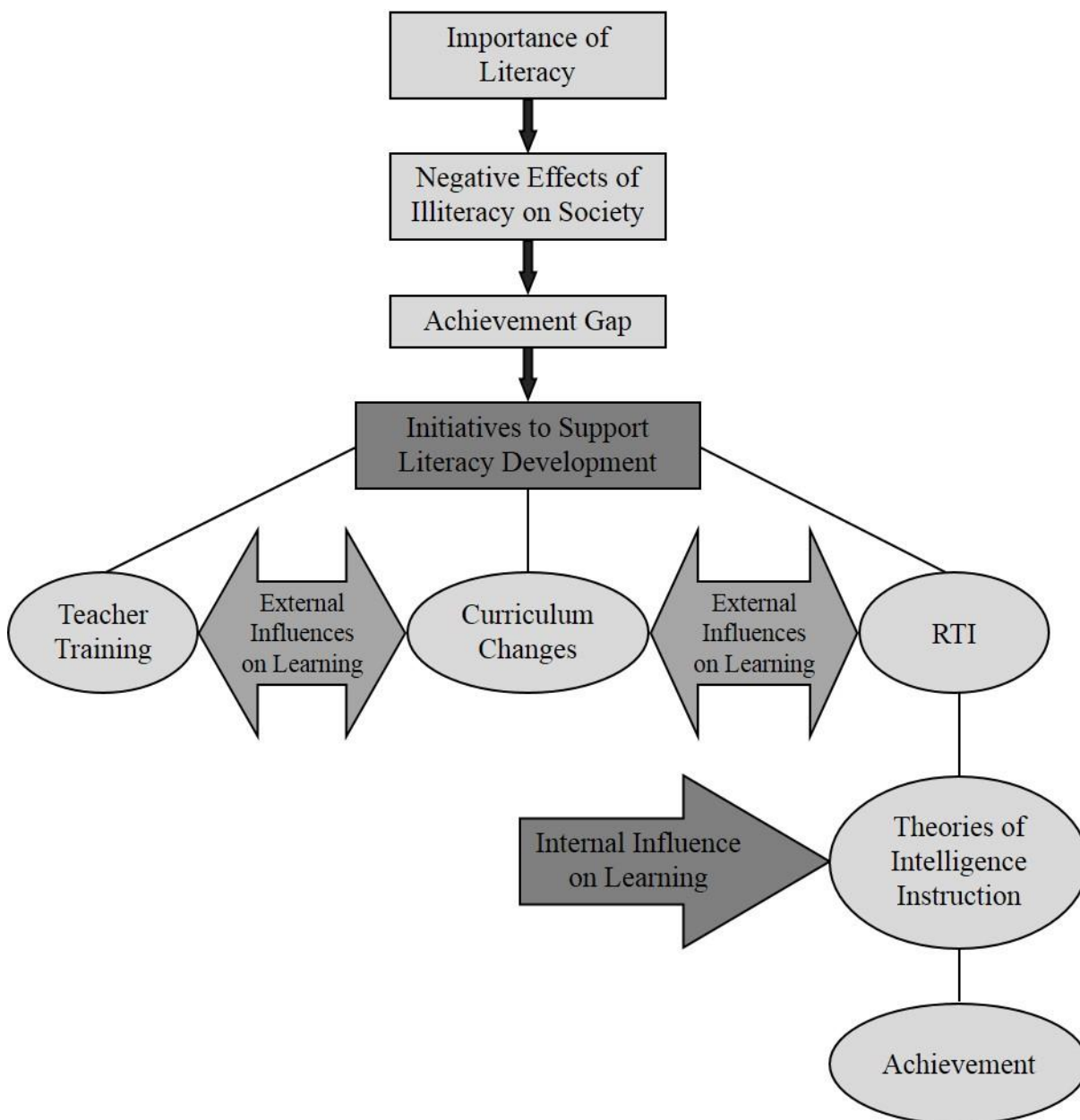
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APPENDIX A: CONCEPTUALIZATION OF METHODOLOGY

APPENDIX B: 2015-2016 INDIVIDUAL BASIC SKILLS IMPROVEMENT PLAN:**AFTER SCHOOL TUTORING**

Send completed form with signatures to Anthony Gugliotta, Jr.

School: _____ **Student Name:** _____

Date: _____ **Student #** _____ **Grade:** _____ **Male** **Female**

Current Performance:

Enter most recent report card grade or updated assessment data, if available.

READING/WRITING	Student Scores & Date	MATH	Student Scores & Date
Last Report Card Grade		Computation	
Running Record (fiction)		Place Value	
On Demand Score		Problem Solving	
Sight Words		Other:	
Other:			

PROPOSED PLAN: *Enter exact dates, learning goal and assessment. Indicate progress before sending signed, completed plan to Basic Skills Supervisor.*

After School Teacher: _____ has agreed to tutor the above student in order to meet the learning goal below, through planned activities and communication with the specialist and classroom teacher.

After School Tutoring for the following dates: *Fill in exact dates (or copy from permission slip)*

Learning Goal:

Assessment used to measure progress:

Progress made as a result of the after school tutoring intervention:

A signed permission slip is required from parents before tutoring may begin.

All educators listed below must sign before tutoring begins.

After School Teacher Signature: _____ Date: _____

Classroom Teacher's Signature: _____ Date: _____

Specialist's Signature: _____ Date: _____

Principal's Signature: _____ Date: _____

Basic Skills Supervisor Signature: _____ Date: _____

Anthony Gugliotta, Jr. Supervisor of Mathematics & Basic Skills

When completed, a copy will be returned to school for student file.

Revised October 2014

APPENDIX C: AFTER-SCHOOL TUTORING PARENT PERMISSION FORM**East Brunswick Public Schools**



Mr. Anthony Gugliotta, Jr.

Supervisor of Mathematics and Basic Skills

760 Route 18

East Brunswick, New Jersey 08816

(732) 613-6765

FAX (732) 390-9307

Email: agugliotta@ebnet.org

Date

To the Parents/Guardians of **Student Name:**

We would like to invite ***Student*** to participate in an After School Tutoring program for Reading and Writing. The After School Tutoring program is designed to provide additional support for children in basic skills beyond what they receive during the school day.

The After School Tutoring program begins at 3:35 PM and ends at 4:35 on each of the days listed below. Please send your child with a snack. At the end of the school day, your child will have the opportunity to eat his or her snack before meeting with

Name of After School Teacher, in Rm. # , who will be working with your child after school for the three weeks indicated below.

We have scheduled After School Tutoring for the following dates: *Fill in exact dates*

It is critical that you pick up your child at 4:35 promptly. The teacher will bring your child to the main entrance. If your child participates in ASK, he or she will be returned to ASK.

This plan had been carefully developed for your child by his teacher, the reading specialist, and the after school tutor. If your child is absent two times, the program will be cancelled. In addition, if your child is not picked up promptly at 4:35, the program will be cancelled.

Kindly sign and return the permission slip below tomorrow.

.....

My child will participate in the After School Tutoring Program. I understand that there is no fee for the program. I will provide a snack for my child.

Pick up arrangements (please check one):

_____ My child will return to ASK.

_____ I will pick my child up promptly at 4:35.

Parent Signature _____

Phone number _____

Note: Transportation is not provided, and walking home is not permitted. There are no crossing guards available at this time.

APPENDIX D: STUDENT E-JOURNAL REFLECTIONS

Reflection Title	Entered	While In	Reflection Body
Quick Reflection on what I learned from Dr. C. about my ability to control my own brain	1/14/2015	the Introduction to Brainology, Quick Reflection	I learned that sometimes people have to focus on their school work instead of your games and fun so you could learn.
Quick Reflection on what I learned from Dr. C. about my ability to control my own brain	1/21/2015	the Introduction to Brainology, Quick Reflection	I learned that you can still become smarter and i also learned that you sometimes might forget important things but still remeber some things
What do I think my brain has to do with my life?	1/26/2015	Level 1: Brain Basics	I think the brain makes me smarter so i could undrstand what im doing more
Quick Reflection on what I learned about what the brain does	2/4/2015	Level 1: Brain Basics, Quick Reflection	I learn that when you use senses the brain basically feels it too, and the brain is sensitive and doesn't get hurt and the brain is helpful.
Quick Reflection on what the brain looks like and how neurons send messages	2/9/2015	Level 2: Brain Behavior, Quick Reflection	I learned that brains can basically send maessages just like a person sneezing.
Quick Reflection on the tools I learned from Dr. C to better control my own brain	2/17/2015	Level 2: Brain Behavior, Quick Reflection	I learned that you can not worry to much if you be calm and take deap breathes.
How do I think the brain learns?	2/25/2015	Level 3: Brain Building	I think the brain learns by people thinking of what the answer is and then the brain know's it.
Quick Reflection on how the brain gets stronger with exercise	3/11/2015	Level 3: Brain Building, Quick Reflection	I learned that you can also get smarter by exercising too.
Ideas on how my memory works	3/16/2015	Level 4: Brain Boosters	My memory works if ik get smarter by studying or practicing.

APPENDIX E: STUDENT READING NOTEBOOK

Through the pages 1-27 in the book *No Talking* by Andrew Clements, I think Dave is determined to win the competition between boys vs girls. I think this because since Dave didn't let the girls overthrow him, and besides, he made up the challenge. But I think Lynsey is a bit more determined than Dave. I think this because Lynsey made the challenge last longer and made it harder.

Through the pages 27-54 in the book, *No Talking* by Andrew Clements, I think Dave is going a bit overboard because he is forcing other kids to do this stupid challenge. Also I think the boys are a bit too eager to win because when ~~someone~~ ^{the boy} talked that other boy jumped on him and covered his mouth.

APPENDIX F: PRE-INTERVENTION INTERVIEW GUIDE*Student perceptions of theories of intelligence instruction*

Joyce Boley, Doctoral Student, Rutgers University, Graduate School of Education

(908) 247-0039/ jkboley@verizon.net

INVESTIGATOR: PRINCIPAL

Tell me about yourself as a reader.

What do you read?

What was the last thing you read for pleasure?

How do you feel when you can't do something?

How do you feel when you try something new?

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

Agree

Sort of Agree

Disagree

Your intelligence is something about you that you can't change very much.

Agree

Sort of Agree

Disagree

You can learn new things, but you can't really change your basic intelligence.

Agree

Sort of Agree

Disagree

APPENDIX G: POST-INTERVENTION INTERVIEW GUIDE

Student perceptions of theories of intelligence instruction

Joyce Boley, Doctoral Student, Rutgers University, Graduate School of Education

(908) 247-0039/ jkboley@verizon.net

INVESTIGATOR: PRINCIPAL

Tell me about yourself as a reader.

What do you read?

What was the last thing you read for pleasure?

Tell me what you do in the after-school reading tutoring program.

What is the purpose of the Brainology® Program (theories of intelligence?)

How would you describe the Brainology® Program (theories of intelligence) to a 1st grader?

Are you thinking about your brain differently since you learned about the Brainology® Program
(theories of intelligence?)

How?

Tell me about how you use the skills and strategies from the Brainology® Program to help you tackle academic challenges.

How do you feel when you can't do something?

How do you feel when you try something new?

Tell me anything else that has happened to you in the after-school reading tutoring program.

Tell me about yourself as a reader.

Tell me what you do in the after-school tutoring program.

What is the Brainology® Program like?

Please tell me what that program is about. (Probe: What is the main idea of the Brainology® Program? Probe: What things does the Brainology® Program teach you?)

Tell me about how you use the strategies that you learn in the Brainology® Program to help you face academic challenges. Tell me how you apply the lessons from the Brainology® Program to your schoolwork?

Tell me anything else that has happened to you in the after-school reading tutoring program.

APPENDIX H: REFLEXIVE JOURNAL

3-11-15

How much teacher mindset
 shape student academic
 behavior? I will tell you about your
 reading & you can tell me about your
 message * We are all readers / readers we
 sign do they talk about this
 * 15 this culture school wide? Does that matter?

What if not
 sustained
 from room to room?

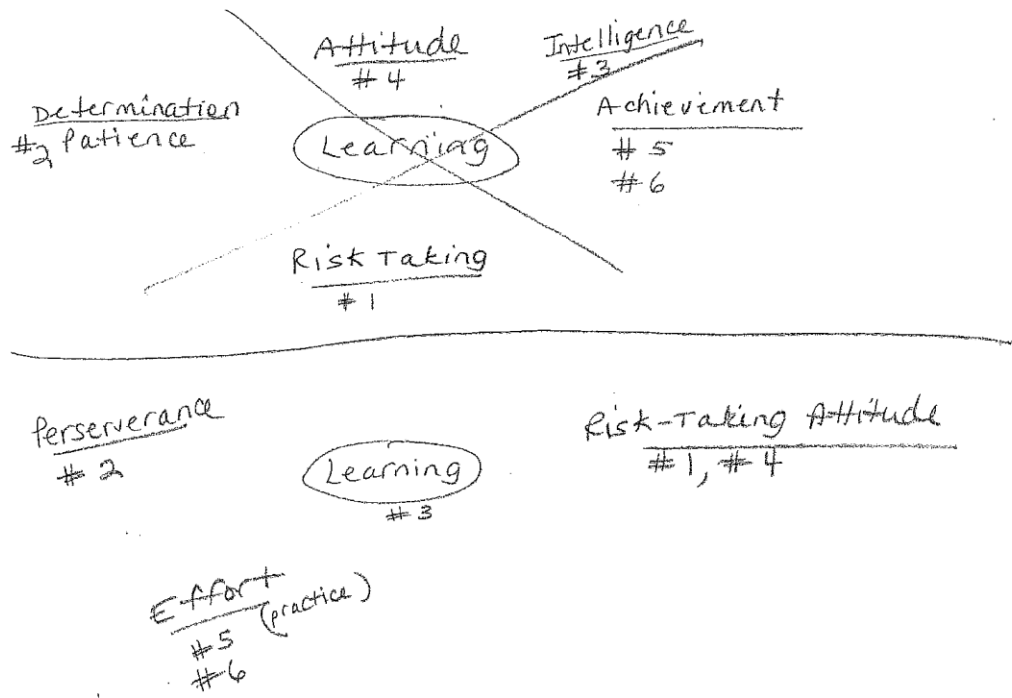
reading * We are all readers / readers we
 message * We are all readers / readers we
 sign do they talk about this
 * 15 this culture school wide? Does that matter?

APPENDIX I: OBSERVATION NOTEBOOK

<p>girl talking to teacher about going to gymnasium</p>	<p>* Does she use zing for engagement?</p>
<p>teacher sitting on bean bag chair on carpet - done w/ program looking at range on computer</p>	<p>* Tell teacher visualizing + verbalizing program for me i help her make mental images to aid comprehension</p>
<p>boy looks like a "student" tries to stick up</p>	<p>* See what he was laughing at what part?</p>
<p>teacher sitting on bean bag chair on carpet - done w/ program looking at range on computer</p>	<p>* classroom management approach</p>

APPENDIX J: THEMATIC MEMO

1. Learning is frightening, stimulating, and worth trying
2. Patience to learn is essential in learning
3. Learning enhances intelligence
4. Positive attitudes on learning predisposes intelligence
5. Basic intelligence either regresses or progresses
6. Brainology® is essential in helping students achieve difficult academic tasks



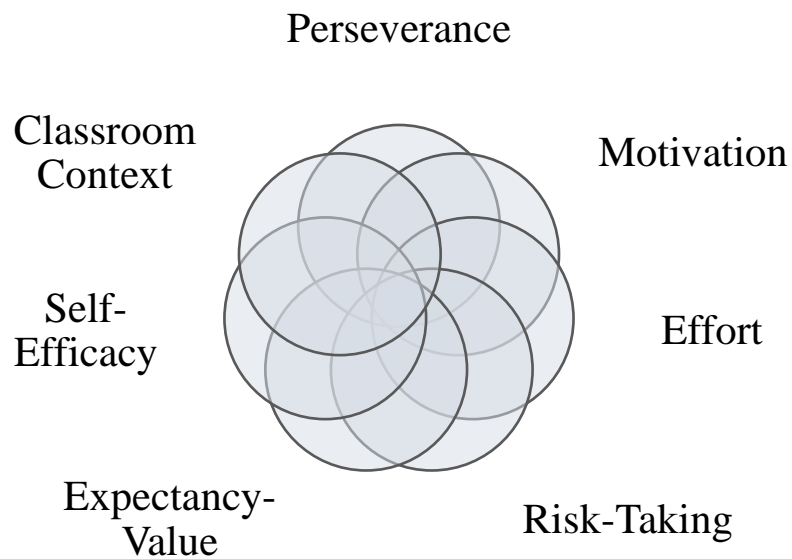
1. Motivation perseverance effort
2. Expectancy-value theory effort, risk taking
3. Self efficacy perseverance risk taking effort
4. Shaping Academic Behaviors in Classroom effort risk-taking
5. Mindset risk taking effort, perseverance

APPENDIX K: THEMATIC MEMO

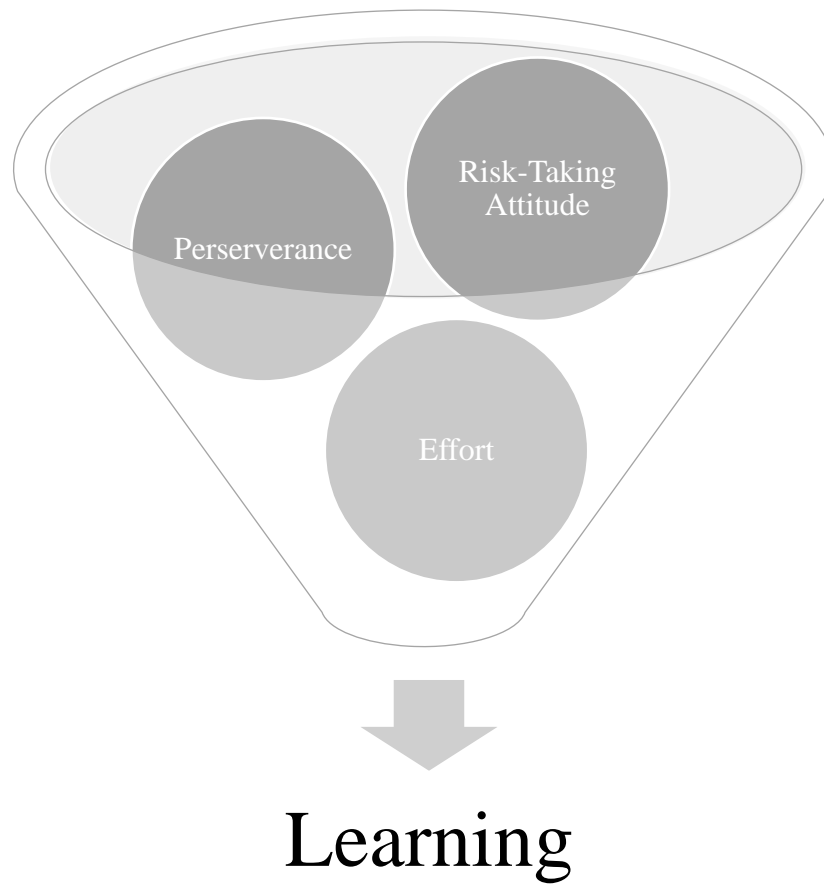
	Perseverance	Effort	Risk-Taking Attitude
Motivation	X	X	
Expectancy-Value Theory		X	X
Self-Efficacy	X	X	X
Classroom Context		X	X
Mindset	X	X	X

What kids said about non-cognitive factors

What literature says about non-cognitive factors



APPENDIX L: THEMATIC ANALYSIS



APPENDIX M: THEMATIC ANALYSIS

