Winter 11-14-2018

An Investigation Into The Learning Experiences Of Adolescents With Perceived Dual Exceptionalities Within Gifted And Special Education Middle Grades Settings

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An Investigation Into The Learning Experiences Of Adolescents With Perceived Dual

Exceptionalities Within Gifted And Special Education Middle Grades Settings

by

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A Dissertation

Presented in Partial Fulfillment of Requirements for the
Degree of
Doctor of Education
in
Special Education
in the
Bagwell College of Education
Kennesaw State University

Kennesaw, GA
30144

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Acknowledgments

First of all, I want to give thanks to my Lord and Savior Jesus Christ. Without Him, I could do nothing. I am so grateful and appreciative for His help and guidance through this journey. There were moments when I wanted to give up, but those were the times when I prayed for God to give me strength to finish this race. 2 Corinthians 12:10 (NIV) says, "That is why, for Christ's sake, I delight in weaknesses, in insults, in hardships, in persecutions, in difficulties. For when I am weak, then I am strong."

There have been so many influential people in my life who have supported me throughout the dissertation process. I want to specifically thank Dr. Harriet Bessette, my dissertation chair, for her endless support and unrelenting guidance. She has challenged me more than I could have ever challenged myself and she has taught me how to be a better educator. Dr. Bessette's leadership skills and guidance have helped me grow personally, academically, and professionally. Her attention to detail and overall professional editing abilities have influenced my written expression skills. From this point on, I will always be aware of my over usage of colloquial language, and I will do my best to use formal register in every professional written document.

I would also like to thank Dr. Joya Carter Hicks for all of her invaluable guidance during the early stage of research development. Without her unwavering support in the beginning, this document would not be possible. I would also like to thank Dr. Katie Bennett for all of her support and professional advice concerning the methodology of this study. She was willing to jump on board when I needed her, and I will always be appreciative of her enthusiastic attitude and helpful disposition. My dissertation committee: Dr. Bessette, Dr. Hicks, and Dr. Bennett have provided support and guidance throughout this process, and I am forever in their debts. I

Dedication

I would like to dedicate this document to my family. First, to my husband, who has been by my side, supporting me since we were high-school sweethearts. To my two kids, for "letting mommy work on her dissertation," and for providing my inspiration for life on a daily basis. I hope you both always know that nothing is impossible to those who believe. To my mother, who has been my #1 supporter since birth; I could not have completed this accomplishment without your help and support. To my father, who helped me brainstorm initial ideas for this document, but lost his life to lung cancer in 2014; this is for you Daddy! To my sisters, my brother, and all of my family members and friends who helped me with the kids when I was working on this manuscript; I could not have completed this without each one of you. I have been blessed with God's grace when it comes to family and friends and I am very humbled to be a part of such an amazing group of people.

Abstract

Students who possess both a disability and characteristics of giftedness are referred to as students with dual exceptionalities. This paradoxical relationship of disability and giftedness creates a challenge for teachers and students, particularly in schools that do not have a specific program for students with dual exceptionalities. Most of these students typically receive the majority of their instruction either within a special education program, or a gifted education program. Students with perceived dual exceptionalities are often able to mask their disabilities with strengths in other major areas. The students in this investigation have all demonstrated strong talent in mathematics. They each have a unique view of the world and their learning experiences are filtered through the lenses of both their disabilities and their talents. In this qualitative case study, the researcher will explore the learning experiences of students with perceived dual exceptionalities through the perspective of parents, teachers, and the students themselves. While it may be subjective to ask middle schoolers what they think, perception is reality, and however they feel about their experiences *is* their current reality. The conceptual framework that undergirds this study is the Constructivist Theory offered by Piaget (1952) and elaborated by Vygotsky's (1978) socio-cultural theory. Building upon these is the theoretical framework of the Stage-Environment Fit Theory which attempts to explain the fit between adolescent developmental needs and the educational environment. Student participants generated drawings in order to express their perceptions of their learning experiences. Other data sources included semi-structured interviews, observations, and a document review. All data was triangulated and analyzed using three analysis strategies offered by Creswell and Poth (2018), consisting of (1) data preparation and organization (i.e., transcribing data for analysis, or preparing student drawings/image data for analysis), (2) development of themes through a process of coding, and

(3) writing up the results of the study and representing the data in tables and figures. Themes that emerged from the data became larger categories of note. Findings suggest that (1) Students perceived to have dual exceptionalities who receive instruction primarily within gifted educational settings may use their giftedness to mask their disability; (2) Conversely, students perceived to have dual exceptionalities who receive instruction primarily within special educational settings may use have the tools or opportunity to leverage their giftedness to mask their disability; (3) Academic and/or Social/Emotional difficulties that begin early in the educational careers of students perceived to possess dual exceptionalities can become exacerbated by time they reach the middle-school level (Stage Environment Fit Theory); and (4) Students who are perceived to have dual exceptionalities and who suffer from feelings of isolation, may experience these feelings regardless of the setting in which they receive the majority of their instruction.

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Chapter 1

Within the field of special education, increasing attention has been given to adolescents with perceived dual exceptionalities, that is, students who simultaneously demonstrate characteristics of giftedness *and* possess a learning disability, physical handicaps, emotional disorder, and/or psychological dysfunctions (Al-Hroub, 2013; Armstrong, 2018; Mayes & Moore, 2016; Nielsen, Hammond & Higgins, 1993; Maddocks, 2018; Nielsen & Higgins, 2005; Rizza & Morrison, 2007; Silverman, 2009; Wang & Neihart, 2015). Research on dual exceptionalities has successfully merged the two lines of inquiry of gifted education and special education (Baldwin, Baum, Pereles, & Hughes, 2015a). Students with perceived dual exceptionalities exhibit higher-level cognitive abilities, puzzling patterns of behavior, exceptional comprehension of abstract concepts interwoven with poor phonemic awareness, and poor writing and reading skills (Buică-Belciu & Popovici, 2014; Lee & Olenchak, 2015). Because of challenges with identification and resources available, students with dual exceptionalities remain under-identified, under-served, and largely neglected in education and research endeavors (Foley-Nicpon, Allmon, Sieck, & Sinson, 2011; Lee & Olenchak, 2015; Leggett, Shea, & Wilson, 2010; Mayes & Moore, 2016; Missett, Azano, Callahan, & Landrum, 2016; Rizza & Morrison, 2007).

The term "dual exceptional" is used interchangeably with many terms in the literature including: twice exceptional, (often abbreviated as 2e), GLD (Gifted with a Learning Disabled), multiple exceptionalities, and learning disabled with characteristics of giftedness (Al-Hroub, 2014; Baldwin et al., 2015a; Baum & Owen, 2004; Brody & Mills, 1997; Buică-Belciu & Popovici, 2014; Dare & Nowicki, 2015; Foley-Nicpon, 2013; Kalbfleisch, 2014; Nielsen et al., 1993). The terms have been coined to label students who have gifted characteristics, but who

also have a disability (Silverman, 1989, 2009; Willard-Holt, 1999). Students with perceived dual exceptionalities may appear to be bright and capable, but when asked to produce quality work in the classroom, may not demonstrate competence on a consistent basis (Baldwin, Omdal, & Pereles, 2015b; Rizza & Morrison, 2007; Silverman, 2009). These students are at risk of academic underachieving (Robinson, 1999, Krausz, 2018), and they may experience feelings of depression, anxiety, low academic self-concept, or behavior problems (Barber & Mueller, 2011; Baum, Cooper, & Neu, 2001; Cooper, Ness, & Smith, 2004; Moon & Reis, 2004; Reis, Neu, & McGuire, 1997; Wang & Neihart, 2015). The literature is replete with studies revealing that students with dual exceptionalities struggle with certain social-emotional characteristics and unusual behavior patterns which could include: anger, fear of failure, fear of success, withdrawal, hostility, irritation, being overly sensitive, having a low self-efficacy, or other difficulties characterized by psychological vulnerability or emotional tension (Al-Hroub, 2013; Fletcher, Francis, Morris, & Lyon, 2005; Foley-Nicpon, Rickels, Assouline, & Richards, 2012; Jackson, 1998; Missett et al., 2016; Neihart, 1998, 1999; Strop & Goldman, 2002; Wang & Neihart, 2015).

The increasing awareness of dual exceptionalities within the field of special education and gifted education (Mayes & Moore, 2016) should be met with equal enthusiasm from researchers to empirically investigate the identification and support needs of these students, particularly those at the middle-grades level (Foley-Nicpon et al., 2011). Recent data available has estimated that there are approximately 360,000 students with identified dual exceptionalities in the U.S. (National Education Association, 2006). This approximation is most likely conservative due to the challenges of identifying students with dual exceptionalities. In general, these students take one of three paths in school. The first path leads a student to be identified as

gifted at an early age and instructed through gifted programming; but then a disability may emerge later in their development. The second path leads a student to be identified as having a disability, and served in the special education program, with their giftedness largely ignored. The third path leads a student to stay in general education because these students have mastered the ability to mask their disability with their giftedness and therefore never seem to possess noticeable characteristics of either (Foley-Nicpon, Assouline, & Colangelo, 2013; Foley-Nicpon, Assouline, & Fosenburg, 2015).

The most prominent characteristic of students with perceived dual exceptionalities lies in the paradoxical traits of these learners: they have problems with basic sensory processing abilities such as writing, spelling, and calculation, yet they can demonstrate high level intellectual abilities (Kalbfleisch, 2014). These students can utilize their advanced intellectual abilities when given the opportunity in the correct setting with the right resources. However, these students are not always given the opportunity to shine because many teachers/intervention programs focus on their disability and ways to remediate or compensate for the disability (Krausz, 2018).

Identifying students with dual exceptionalities is challenging since their abilities and disabilities tend to mask one another (Dare & Nowicki, 2015), and general education teachers have limited awareness of coexisting exceptionalities (Foley-Nicpon et al., 2013). To add to the complexities of identifying students with both disabilities and characteristics of giftedness, research has shown that parents often lack the resources and support to understand their child's struggles (Dare & Nowicki, 2015). Unidentified students with dual exceptionalities may often go through years of school without being recognized until they have entered the higher grades. This identification may not happen until parents seek help professionally outside of school. Since

identification is so difficult, these students are often hidden in our classrooms, being promoted grade to grade without their social, emotional, and educational needs being met (Baum & Owen, 2004). Even when students are identified as having dual exceptionalities, many schools may not offer programs to help these students; in fact, many schools only focus on academic weaknesses which usually include performing lower than their typically developing peers on high-stakes tests of achievement, specifically in mathematics (Bell, Taylor, McCallum, Coles, & Hays, 2015).

In order for educators to correctly identify students with dual exceptionalities, it is important to understand the definition of the term. In 2014, the National Association for Gifted Children presented an operational definition that synthesized a combination of articles, research, contributions from experts in the field, including a symposium and subsequent meetings at national conferences. The purpose for creating an operational definition was to allow students with dual exceptionalities to be identified more easily and accurately. For a student to be identified with dual exceptionalities, that student must meet the following criteria/operational definition:

> Students who demonstrate the potential for high achievement or creative productivity in one or more domains such as mathematics, science, technology, the social arts, the visual, spatial, or performing arts or other areas of human productivity and who manifest one of more disabilities as defined by federal or state eligibility criteria. These disabilities include specific learning disabilities; speech and language disorders; emotional/behavioral disorder; physical disabilities; Autism Spectrum Disorders (ASD); or other health impairments, such as Attention Deficit/Hyperactivity Disorder (ADHD). These disabilities and high abilities combine to produce a unique population of students who may fail to demonstrate either high academic performance or specific disabilities.

Their gifts may mask their disabilities and their disabilities may mask their gifts (Reis,

Baum, & Burke, 2014, p. 222).

Identification of Students with Dual Exceptionalities

The identification of students with dual exceptionalities includes a comprehensive

assessment of both areas in their specific disability and giftedness, since one does not preclude

the other. A professional in both special education and gifted education should evaluate the

individual. The professionals from each discipline should consider the possibility of dual

exceptionalities, keeping in mind the impact of comorbidity, since the combination of conditions

can look different than the conditions being observed individually. If identified as having dual

exceptionalities by local and state standards, students are required to have an individual

education program (IEP) or a 504-accommodation plan which must address their potential high

achievement in the gifted area, and their academic or social-emotional deficit in the special

education area. The IEP must include strategies and goals that will help students with dual

exceptionalities maximize their academic and social potential. The IEP for students with dual

exceptionalities also includes goals for talent development, in addition to strategies and skills to

compensate for their disability (Reis et al., 2014). The goal of this comprehensive IEP is to

provide a flexible plan that ultimately attempts to educate the whole child, including the

student's social-emotional health and well-being (Baldwin et al., 2015a).

Regardless of whether students with perceived dual exceptionalities are identified by

educational services, they usually experience confusion and frustration when asked to perform a

task that incorporates their weakness in the classroom. Their weakness, or disability, may

overshadow their gifted characteristics, and when this occurs, the student will usually try to mask

the effect of their disability with their giftedness. For instance, if a student has a weakness in

written language, then the student may try to avoid the assignment altogether by not doing it, or

doing the bare minimum required. Not only might they demonstrate refusal to work, they may

often engage in inappropriate behaviors such as acting out, talking out of turn, acting

disinterested, or being disorganized (Baldwin et al., 2015a).

Middle Grades and the Student with Perceived Dual Exceptionalities

Middle grades can be a time of advancing knowledge, conflicting emotions, and for those

students with perceived dual exceptionalities, increased challenges and complexities surrounding

learning. It is not unusual for them to have trouble when they get to the middle grades, when

masking a disability may seem most desirable (McEachern & Bornot, 2001). Often, a middle

school teacher may mistake a disability with poor work habits, poor disposition, or lack of

motivation (Baldwin et al., 2015b).

The literature suggests that students with dual exceptionalities frequently struggle

academically and are reported as being at risk of academic underachievement or failure (Baldwin

et al., 2015b; Bell et al., 2015; Reis et al., 2014; Robinson, 1999). Studies have indicated that the

unique characteristics of students with dual exceptionalities have been a factor in causing these

students to feel low self-efficacy, anxiety, depression, and other behavioral issues (Barber &

Mueller, 2011; Kauder, 2009). Foley-Nicpon et al. (2013) found that it was common for students

with dual exceptionalities to exhibit certain social-emotional physiognomies such as fear of

failure, anger, fear of success, and low self-esteem. Overall, studies have reported that students

with dual exceptionalities exhibit certain psychological vulnerability to emotional difficulties

(Neihart, 2002), as well as more socio-emotional impairment than that of their same-aged peers,

or typically developing, peers (Fletcher et al., 2005).

Purpose and Research Questions

The purpose of this study is to examine the learning experiences of students with dual-exceptionalities within a Title 1 middle school setting. This investigation is guided by the following research questions:

a) How do adolescent students with perceived dual exceptionalities view their learning experiences within a middle-grades mathematics setting?

b) How do they perceive their learning experiences in different educational settings?

c) How do those perceptions influence how students view themselves as learners?

d) How are students' perceptions consistent with what their parents and teachers report?

Statement of Problem

Literature has focused on the difficulties of identifying and serving students with dual exceptionalities with appropriate programming (Balwin et al., 2015; Dare & Nowicki, 2015; National Education Association, 2006). Students with perceived dual exceptionalities are among the most under-identified and marginalized population in American schools (National Education Association, 2006). Students with perceived disabilities and characteristics of giftedness present a unique dilemma of identification and service delivery for our education system. If students are never identified as having dual exceptionalities, then they cannot be served in that capacity, and therefore may possibly never achieve their full potential because of the relationship between their disability and their enhanced cognitive abilities. Furthermore, if schools do not have teachers equipped with effective teaching strategies for students with perceived dual exceptionalities, then correct identification is futile. Because of a lack of funding and/or programming, students with identified dual exceptionalities are usually asked to choose how they would like to be served- either in the gifted program, or the special education program. The

parents of students with dual exceptionalities must consent to one or the other, since the programs are usually mutually exclusive. Overall, students with perceived dual exceptionalities are both underserved and under-identified in our schools (National Education Association, 2006).

Students with both disabilities and characteristics of giftedness commonly have strong cognitive ability which they can use to compensate for their disability (Baum, Schader & Herbert, 2014; Bell et al., 2015; Buică-Belciu & Popovici, 2014). However, sometimes the disability present in students with perceived dual exceptionalities may deflate standardized test performance, making them not eligible for gifted services (Baum, 1990). In fact, many students who seem to possess average cognitive ability could be using their giftedness to mask or compensate for their disability. When they experience academic discrepancies in school, they may lash out in frustration, exposing their emotional, social, and behavioral issues (Baum, 1990).

Students with dual exceptionalities have been identified in every cultural, ethnic, socioeconomic, and racial population in the world. However, there is a lack of prevalent empirical data since no federal organization or agency collects statistics on students with perceived dual exceptionalities beyond the purview of the literature review done for this study (National Education Association, 2006).

Beyond the issue of not knowing the statistics, there is a much more important reason why school personnel should know about students with perceived dual exceptionalities. These students represent a valuable resource for our nation (as do all students), and their future potential societal contributions are mostly contingent upon the level of appropriate programming they are receiving in school. Without teachers maximizing the potential of students with both disabilities and characteristics of giftedness and meeting their academic needs, it could cost our

society to miss out on the gifts of these students. They could be potential leaders, inventors, musicians, politicians, innovators, and much more.

In addition to the problem statements listed above, *awareness* of dual exceptionalities is one of the largest challenges (Foley-Nicpon et al., 2013). Because of limited awareness, many school systems do not provide funding or services for students with dual exceptionalities. Because of the lack of public awareness, schools do not know how to respond to the needs of our students with dual exceptionalities. The two most significant obstacles that could have a negative impact on how students with dual exceptionalities are served in a school are: insufficient identification techniques and inadequate access to educational experiences appropriate for a student with identified dual exceptionalities (Baldwin et al., 2015b; Foley-Nicpon et al., 2015; Mayes & Moore, 2016; National Education Association, 2006).

Students with formal identification of dual exceptionalities require a range of services, just as special education students require an Individual Education Plan, or gifted students require an Eligibility Continuum Plan. The plan should be a special combination of special education services and the gifted curriculum. Schools should provide specific services that address both the disability and the giftedness, and in doing so, they will teach to the whole child. This is part of the researcher's rationale for trying to understand the students' perceptions of their learning experiences as individuals perceived as twice exceptional. What do the students' think? What is their perception of their own learning experiences?

Significance of Study

This study finds its significance in the need for educators, parents, administrators, and students themselves to understand and comprehend the challenges that those with perceived dual exceptionalities face in the middle-grades classroom. Most existing research involving students

with dual exceptionalities focuses on demographics, academic achievement, identification, programming, and/or social justice issues involving these students. The existing literature has uncovered the increasing challenges surrounding students with identified dual exceptionalities, especially with intervention and identification programs (Foley-Nicpon et al., 2011, Mayes & Moore, 2016). Research has explored differences in students with dual exceptionalities, including differentiation by gender, race, and disability. These studies are conducted by research experts, educators, or parents. There is a dearth of literature that focuses on the perceptions of students with perceived or identified dual exceptionalities and their personal learning experiences, which is what makes the current study particularly worthwhile and relevant.

The results of this study will hopefully offer valuable information to anyone in education who works with students with perceived dual exceptionalities, such as current or prospective teachers, coaches, counselors, psychologists, or parents. Additionally, this study hopes to provide insight into the daily challenges of students with both disabilities and characteristics of giftedness, as well as the supports and services that serve them best.

Definition of Terms

This section provides a common operational definition for each major term referenced in this study. Terms are in alphabetical order.

Adolescent. An adolescent is one who is in their adolescence. Adolescence is a dynamic ever-evolving theoretical construct that could vary according to the lenses of culture, physiological, temporal, and psychosocial aspects (Curtis, 2015). In general, adolescence begins with the onset of puberty and ends with social independence (Steinberg, 2014). In general, a young adult is considered an adolescent between the ages of 10-18; however, it is sometimes considered to span as far as the ages of 9-26 (Curtis, 2015).

Assimilation. According to Piaget, when humans encounter new information or experiences, they try to uphold a state of equilibrium by either assimilating the information with their prior cognitive structures, or by accommodation. Assimilation occurs when the information presented is consistent with our prior knowledge, so it is accepted into our mental structures without modifications (Piaget, 1952).

Autonomy. In the learning environment (such as a classroom), autonomy is defined as possessing the ability to weigh the options and make an academic choice independently, and then to act on that choice (Wehmeyer, 1997).

Cognitive Constructivism. One of the primary branches of constructivism. Based on the work of Piaget, cognitive constructivism defines learning as changes within cognitive structures (Piaget, 1952).

Dual Exceptionalities. A student with dual exceptionalities (or perceived dual exceptionalities) is an adolescent who simultaneously demonstrate characteristics of giftedness *and* possess a learning disability, physical handicaps, emotional disorder, and/or psychological dysfunctions (Al-Hroub, 2010, 2013; Mayes & Moore, 2016; Nielsen et al., 1993; Nielsen & Higgins, 2005; Rizza & Morrison, 2007; Silverman, 2009; Wang & Neihart, 2015).

Free appropriate public education (FAPE). FAPE is a term used in the elementary and secondary school context; for purposes of Section 504, it refers to the provision of regular or special education and related aids and services that are designed to meet individual educational needs of students with disabilities as adequately as the needs of students without disabilities are met and is based upon adherence to procedures that satisfy the Section 504 requirements pertaining to educational setting, evaluation and placement, and procedural safeguards (U.S. Department of Education, 2018).

Individual Education Program (IEP). An Individual Education Program, or an IEP, is a written document for each child with a disability that is developed, reviewed, and revised each year. This fluid document must include a variety of information detailing the services provided to the child, including accommodations, modifications, and/or supportive/related services (Individuals with Disabilities Education Act, 2004).

Individuals with Disabilities Education Act (IDEA). The Individuals with Disabilities Education Act (IDEA) is a law which ensures services to children with disabilities within the U.S. (Individuals with Disabilities Education Act, 2004). IDEA governs how states and public agencies provide early intervention, special education and related services to more than 6.5 million eligible infants, toddlers, children and youth with disabilities. Infants and toddlers with disabilities (birth-2) and their families receive early intervention services under IDEA Part C. Children and youth (ages 3-21) receive special education and related services under IDEA Part B (U.S. Department of Education, 2018).

Learning Experiences. Within the bounds of this study, this term is used to describe the cumulative educational experiences of the student participants. The experiences may have occurred any time between pre-kindergarten to present day. Learning experiences could include academic, social, or developmental experiences (Krausz, 2018).

Placement. Within the context of this study, the term *placement* refers to the educational setting a student has been placed within a school according to an Individual Education Program/504 Plan/or a Gifted Educational Program. This term is used in the elementary and secondary school context and refers to regular and/or special educational program in which a student receives educational and/or related services (U.S. Department of Education, 2018).

Section 504. Section 504 of the Rehabilitation Act of 1973 (as amended, 29 U.S.C. § 794) is a federal law designed to protect the rights of individuals with disabilities in programs and

activities that receive Federal financial assistance from the U.S. Department of Education.

Section 504 states: "No otherwise qualified individual with a disability in the United States . . .

shall, solely by reason of her or his disability, be excluded from the participation in, be denied

the benefits of, or be subjected to discrimination under any program or activity receiving Federal

financial assistance" (Section 504, 1973). The Section 504 regulations require a school district to

provide a "free appropriate public education" (FAPE) to each qualified student with a disability

who is in the school district's jurisdiction, regardless of the nature or severity of the disability

(U.S. Department of Education, 2018).

  Section 504 Plan. A Section 504 Plan covers qualified students with disabilities who

attend schools receiving Federal financial assistance. To be protected under Section 504, a

student must be determined to: (1) have a physical or mental impairment that substantially limits

one or more major life activities; or (2) have a record of such an impairment; or (3) be regarded

as having such an impairment (Section 504, 1973). Section 504 requires that school districts

provide a free appropriate public education (FAPE) to qualified students in their jurisdictions

who have a physical or mental impairment that substantially limits one or more major life

activities (U.S. Department of Education, 2018). Determining whether a child is a qualified

disabled student under Section 504 begins with the evaluation process. A multi-disciplinary

committee from the recipient school will meet to determine the amount of information required

for the evaluation process. Once a student is identified as being eligible for regular or special

education and related aids or services, a decision must be made regarding the type of services the

student needs (U.S. Department of Education, 2018). Public elementary and secondary schools

must employ procedural safeguards regarding the identification, evaluation, or educational

placement of persons who, because of disability, need or are believed to need special instruction

or related services (Section 504, 1973). Under a Section 504 Plan, school districts are required to provide each student with a disability any special education and/or related aids and services necessary to ensure the student is receiving a free appropriate public education (FAPE). Examples of aids and services provided could include physical therapy or speech language therapy. In addition, school districts may need to modify a regular education program in order to provide FAPE to students with a Section 504 Plan. Examples of such modifications include: additional time (or extended time) to take tests, or a modification to policies regarding the permitted number of absences in a school year if/when a student's absences are due to a disability (Section 504, 1973; U.S. Department of Education, 2018).

Stage Environment Fit Theory. The stage-environment theory is relevant to the current study because it is crucial that students with dual exceptionalities are served in an appropriate environment that will fit the adolescent developmental needs, and where opportunities are provided by their social environments (Eccles & Midgley, 1989). This theory helped to frame the research questions, the methodology, and the literature review because they have laid the theoretical foundation to the current study.

Social Constructivism. A primary branch of constructivism based on the work of Vygotsky. This framework defines learning as social in terms of social interaction, culture, and language. While some scholars believe that social constructivism is at odds with cognitive constructivism, more recent studies have highlighted ways that the two can complement each other (Prouix, 2006).

Twice Exceptional (2e). Twice Exceptional is a term that is used interchangeably with Dual Exceptional within the education research field (Silverman, 1989).

Zone of Proximal Development. One of the main ideas of Vygotsky's social constructivism theory. The zone of proximal development is the 'space' in which children are challenged to extend their current knowledge when working with adults (Vygotsky, 1978).

Chapter 2: Review of the Literature

The purpose of the literature review is to explore the existing literature on the research topic and provide evidence that either instantiates or refutes the study's findings. The following review of related literature will begin with the reiteration of the research questions for the current study. Next, the researcher will provide the names of primary and secondary sources that were used in this review. Secondary sources will include search terms used in various search engines and will be identified along with their utility in providing information related to the topic. Next is a discussion of the empirical literature that is intended to help the reader understand the topic in greater detail followed by a description of the conceptual and theoretical frameworks. Finally, the methodological framework is presented followed by the conclusion which will summarize each of these elements.

Research Questions

This investigation is guided by the following research questions:

a) How do adolescent students with perceived dual exceptionalities view their learning experiences within a middle-grades mathematics setting?

b) How do they perceive their learning experiences in different educational settings?

c) How do those perceptions influence how students view themselves as learners?

d) How are students' perceptions consistent with what their parents and teachers report?

The researcher seeks to understand how adolescent students with perceived dual exceptionalities view their learning experience in gifted education settings differently from adolescent students with perceived dual exceptionalities who experience learning in special education settings.

Primary and Secondary Sources

The primary sources used for this research include original works by various theorists and scholars (Al-Hroub, 2014; Baum 1990; Buică-Belciu & Popovici, 2014; Creswell, 1998, 2009, 2012; Creswell & Poth, 2018; Eccles, Midgley, Wigfield, Buchanan, Reuman, Flanagan, & Mac Iver, 1993; Foley-Nicpon, 2013; Marshall & Rossman, 2016; Merriam & Merriam, 2009; Piaget, 1952; Reis et al., 2014; Schiro, 2012; Silverman, 2000; Stake, 2005; Vygotsky, 1978; Wolcott, 1994; Yin, 2014) who elucidate topics, theories, frameworks, and other pertinent information consistent with the research topic. Secondary sources (Association of Middle Level Education, 2015; Woolfolk, 2015; Brookover, 1979; Campbell, 2014; Daniels & Perry, 2003; Edwards, 2015; Edwards, Kemp, & Page, 2014; Flavell, 1963; Fostnot, 1996; Fraser & Fisher, 1982; Hertherington & Parke, 1975; Higgins & Parsons, 1983; Krausz, 2018; Moos, 1979; Nesin, 2012; National Middle School Association, 2010; Prouix, 2006; Schifter, 1996; Simatwa, 2010) were utilized in conjunction with several open-ended search databases such as EbscoHost, ProQuest, JSTOR Journals, and ERIC. Some databases provided articles that others did not. In some instances, i.e. when PDF versions of the full-text article were needed, Google Scholar was utilized.

Search Procedures

The following conditions were met when choosing research articles for this investigation. First, the articles chosen had to relate to *students with dual exceptionalities* in some respect. After beginning the research, it became apparent that the term *dual exceptionalities* could be used interchangeably with many different terms such as: *twice exceptional, 2e,* and *GLD (Gifted/Learner Disabled) students*. Other related terms or phrases searched included: *operational definition of dual exceptionalities, challenges of students with dual exceptionalities,*

dual exceptionalities and academic achievement, identification of students with dual exceptionalities, characteristics of students with dual exceptionalities, strategies for students with dual exceptionalities. The articles chosen must have directly or indirectly referred to one of the following search terms (including synonyms of these terms): *middle school, students with disabilities, gifted curriculum, mathematics, perceptions of students with dual exceptionalities, cognitive development, learner-centered mathematics*. For example, an article about students with dual exceptionalities in elementary school, or an article about students with dual exceptionalities and academic achievement in a college English class, would be omitted for not meeting the second criterion even though the first was met. Only professional, peer-reviewed journal articles and reliable reports were included in the current study. For the most part, these articles and reports were from the fields of education or psychology.

The following terms (and many different combination of terms), were searched as key words (located anywhere in the article), and subject indicators toto provide an exhaustive search. The term *students with dual exceptionalities* was searched and returned 2,643 results on EBSCOhost, 2,053 on ProQuest, 9 on ERIC, and 2 on JSTOR Journals. To narrow down the relevant literature, the following terms were also searched: *twice exceptional, 2e, middle school, students with disabilities, gifted curriculum, special education, mathematics, constructivism, curriculum ideologies, learner-centered, active learning, cognitive development, sociocultural theory, zone of proximal development, stage-environment fit theory, self-determination theory, learner-centered mathematics, culturally responsive classrooms, case study*.

For the setting of the study, the researcher searched terms such as *middle school* and *secondary education*. Using the term *middle school* limited the search to the degree that useful items could not be found. The researcher broadened the search to include the term *adolescents*

(which includes the age of students in middle school), thus expanding the number of useful articles. When the following terms (*students with dual exceptionalities*, *middle school*, *adolescents*, and *mathematics*), were searched together with the Boolean operator "and" in between each word, only four results from EBSCOhost and one result from JSOTR Journals were found. This suggests that there is a dearth of literature on this topic, supporting the need for further research.

Empirical Literature

The literature covers the topic of dual exceptionalities by classifying what the term means, how students are identified, what challenges they and their families face, and effective strategies for teachers working with students with dual exceptionalities. While the literature is replete with definitions and descriptions of students with dual exceptionalities, few empirical studies investigate how students with perceived dual exceptionalities actually fare in middle-grades settings.

Dual Exceptionalities- Definition

The concept of "dual exceptionalities" is a remotely new idea in the educational body of literature. The term *twice exceptional* was coined by Gallagher (2004), who desired to create a new eligibility category describing intellectually gifted students who also possess a disability (Buică-Belciu & Popovici, 2014).

The literature is saturated with definitions of what it means to have dual exceptionalities. Each definition varies slightly, which makes it easy to see why there is confusion among teachers, administration, and educational researchers, when it comes to identifying students with dual exceptionalities. To understand what it means to have dual exceptionalities, it is crucial to explore the definitions provided in the literature.

The Javits Program (U.S. Department of Education, 2005) issued in 2005, called for a supreme priority of scientifically-based research concentrated strictly on the needs of the gifted and talented so that school systems (K-12) could meet the needs of diverse students. Coincidentally, the Individuals with Disabilities Education Act (Individuals with Disabilities Education Act, 2004) was reauthorized nearly simultaneously with the Javits Program. For the first time in the 30-year history of Individuals with Disabilities Education Act, the need to recognize and accept that students who are identified as gifted may also possess disabilities was acknowledged. These two national educational priorities, intertwined with an increased awareness in research involving students with dual exceptionalities, provided the impetus for national attention on this group of students. The Individuals with Disabilities Educational Act (Individuals with Disabilities Education Act, 2004) defines students with dual exceptionalities as having "one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which may manifest itself in an imperfect ability to listen, speak, read, write, spell, or to do mathematical calculations" (p.1)

In 2014, the National Association for Gifted Children presented an operational definition that synthesized a combination of articles, research, contributions from experts in the field, including a symposium and subsequent meetings at national conferences (Reis et al., 2014). The purpose for creating an operational definition was to allow students with dual exceptionalities to be identified more easily and accurately. For a student to be identified with dual exceptionalities, that student must fit into the following operational definition:

> Students who demonstrate the potential for high achievement or creative productivity in one or more domains such as mathematics, science, technology, the social arts, the visual, spatial, or performing arts or other areas of human productivity AND who manifest one

of more disabilities as defined by federal or state eligibility criteria. These disabilities

include specific learning disabilities; speech and language disorders;

emotional/behavioral disorder; physical disabilities; Autism Spectrum Disorders (ASD);

or other health impairments, such as Attention Deficit/Hyperactivity Disorder (ADHD).

These disabilities and high abilities combine to produce a unique population of students

who may fail to demonstrate either high academic performance or specific disabilities.

Their gifts may mask their disabilities and their disabilities may mask their gifts (Reis et

al., 2014, p. 22)

According to Baldwin et al. (2015b), The National Twice-Exceptional Community of

Practice defined those as having dual exceptionalities (Twice exceptional) as,

individuals who evidence exceptional ability and disability, which results in a unique set

of circumstances. Their exceptional ability may dominate, hiding their disability; their

disability may dominate, hiding their exceptional ability; each may mask the other so that

neither is recognized or addressed (p. 218).

Brody and Mills (1997), defined students with dual exceptionalities as students who met

the following criteria: (1) Evidence of an outstanding talent or ability, (2) Evidence of a

discrepancy between expected and actual achievement, and (3) Evidence of a processing deficit.

Over a decade before Brody and Mills (1997) identified these qualities, experts from the gifted

education field and the special education field were brought together to attend an academic

conference organized by John Hopkins University (Fox & Brody, 1983). This conference began

educational discourse related to identifying and serving this unique group of learners in earnest.

Empirical studies related to students with dual exceptionalities have traditionally resulted

in a paucity of research. Contributing to the lack of research on students with dual

exceptionalities are three main multi-layered issues: (1) varied definitions of the terms "high ability" or "giftedness" (Worrell, 2009); (2) vagueness regarding the definition of "dual exceptional," often leading to a confusion understanding of disability and diagnoses (Foley-Nicpon, 2013); (3) There is a lack of emphasis on best practice that is research-driven to meet the immediate needs of students with disabilities (Foley-Nicpon, 2013).

Identification of Students with Dual Exceptionalities

Often, gifted students are not identified as having dual exceptionalities because their special education needs may be unrecognized or ignored (Brody & Mills, 1997). The authors describe three subcategories of students who possess unrecognized special education needs. These subcategories include: (a) gifted students who are labeled as underachievers (their learning difficulties are often attributed to character development and personality problems, and academic challenges enhance these difficulties); (b) students who are gifted but diagnosed as having learning disabilities and served in special education services, therefore their giftedness is often ignored; and (c) students who are both gifted and have learning disabilities, with both attributes overshadowing each other. This leads to mediocre academic performance. Students who are not identified as being gifted or as having a disability perform on an academically average level when served in a general education classroom (Brody & Mills, 1997).

Some of the most prominent indicators of dual exceptionality consist of gifted characteristics such as higher-level intellectual abilities, excellent comprehension of abstract ideas and concepts, advanced vocabulary compared to same-age peers, ingenious sense of humor, vivid imagination, multiple and complex interests, and an expansive form of general observation. These characteristics may be in combination with the characteristics of exceptionality, such as reading difficulties, very poor handwriting, difficulty with spelling, and

inadequate phonemic awareness (Coleman, Harradine, & King, 2005; Kalbfleish & Gillmarten, 2013). According to McCoach, Kehle, Bray and Siegle (2001), students with dual exceptionalities are, "students of superior intellectual ability who exhibit a significant discrepancy in their level of performance in an academic area such as reading, mathematics, spelling, or written expression" (p. 405). Overall, these students have academic performance that is clearly below their potential, even when ruling out other factors such as lack of motivation, emotional and social difficulties, or learned helplessness.

Students who are perceived to have dual exceptionalities are often hard to identify since there is not a psychological evaluation test exclusively designed to identify a student with perceived dual exceptionalities. Another reason that students who are perceived to have dual exceptionalities are hard to identify is because it can be difficult to recognize the difference between a student who is genuinely uninterested in a class (and being lethargic on purpose), and a student who has Attention Deficit Hyperactivity Disorder (ADHD), accompanied by a learning disorder. Silverman (2000) claimed that the "two-edged sword of compensation," which is characterized by a student who does only enough to get by academically, results in underachievement. Because these students are not technically failing their academic classes and tests, they are often overlooked when screening for special education services (Baum, Owen, & Dixon, 1991).

Silverman (2000) also claimed that standard psychological tests are biased toward students with dual exceptionalities due to the masking effect. In other words, they are clever enough to mask their academic weaknesses by overcompensating with their academic strengths.

While one standardized test cannot formally identify a child with dual exceptionalities, the literature has cited previous investigations involving the analysis of their perceptual and

cognitive characteristics. In general, the literature reveals that students with dual exceptionalities tend to have a higher Verbal IQ than Performance IQ (Al-Hroub, 2011; Kaufman, 1994). In an empirical study conducted by Al-Hroub (2014), a multidisciplinary team developed and implemented a multidimensional model of evaluation to identify students with dual exceptionalities. In this extensive research, using a mixed methods approach, a multidimensional model was developed to identify students with dual exceptionalities. This model, or evaluation process, included eight criteria: school document analysis, teacher nomination, structured and semi-structured interviews with teachers, structured and semi-structured interviews with parents, the Wechsler Intelligence Scale for Children (WISC-III-Jordan, 1996), the Diagnostic Arabic Literacy Language Skills Test (Waqfi, 1997a), the Group of Perceptual Skills Tests (Waqfi & Kilani, 1998), and a dynamic assessment which included a mathematics achievement test. A combination of evaluation tools was used - some for identifying giftedness, and others for identifying learning disabilities. In the process of selecting participants for the study, 52 students ages 10-11 were nominated by their mathematics teacher as potential candidates for exhibiting 'mathematical giftedness' as well as 'learning difficulties.' After the initial assessment, 22 students were eliminated because they were not mathematically gifted and possessing a learning difficulty (Al-Hroub, 2014). The remaining 30 students in the study consisted of 14 boys and 16 girls. Each participant was informally and formally evaluated 7-9 times for a total of approximately 12-15 hours. The participants came from three public schools and 15 teachers participated in the original nominations. Most of these teachers had extensive experience in education. Since 22 students were immediately disqualified from the study after the first assessment, this indicates that 42.4% were inaccurate nominations. This fact alone tells us so much about the difficulty associated with the identification of students with dual exceptionalities.

Experienced teachers were incorrect nearly half of the time, based on their daily interactions with these students. The 15 teachers had also been to a special training before the nominations where they received specific details about characteristics and identification of students with dual exceptionalities.

        The research by Al-Hroub (2014) exposed some critical details about students with dual exceptionalities. The outcomes of the parent interviews provided essential information about the student's physical, familial, psychological, and educational history. The parent interviews were also helpful in identifying unusual behavior patterns in about three-quarters of the students investigated such as, anger, withdrawal, being overly sensitive or overly affectionate, and being hostile. Parents also reported that more than one-third of the participants showed emotional tension, irritation, fear, or lack of confidence. Based on the parent interviews, students were grouped into five subgroups. The first subgroup identified as exclusively gifted in mathematics without a learning disability recognized. About half the students (14) were in the first subgroup. The second subgroup was comprised of those students who were not identified as gifted in mathematics but were identified with learning difficulties. Only 2 students were in the second subgroup. The third subgroup consisted of approximately one-third (10 students) of the participants, and these students were neither recognized as gifted in mathematics nor as learning disabled as reported by their parents. The fourth subgroup consisted of students who we would consider truly dual exceptional (recognized as gifted in mathematics *and* having a learning disability), and only two students were recognized in this group. The fifth subgroup was made up of two students whose parents reported that they believe their child had been misdiagnosed in the past (Al-Hroub, 2014).

When digging deep into the data, there are some apparent differences that emerge between students who are Mathematically Gifted with a Learning Difficulty (MG/LDs), and those of average ability. Figure 1 is a table of the means and standard deviations of the subtest scaled scores for these two groups.

Figure 1: Means and Standard Deviations of Subtest Scaled Scores of WISC-III-Jordan for MG/LDs Sample and the Average IQ/LDs Group

WISC-III-Jordan	MG/LDs (n = 30)		Average-IQ/LDs (n = 22)		Independent sample t-tests
Subtests	Mean	SD	Mean	SD	df = 50
Comprehension	15.23	1.76	12.22	2.25	5.42 **
Arithmetic	14.87	1.87	11.73	1.83	6.03 **
Vocabulary	14.67	2.17	11.59	2.68	4.57 **
Picture Completion	13.97	2.06	10.81	3.03	4.46 **
Information	13.37	1.47	10.59	1.79	6.13 **
Similarities	13.27	1.70	9.68	2.19	6.65 **
Block Design	12.40	2.13	9.90	2.33	4.01 **
Picture Arrangement	12.20	2.16	9.00	2.11	5.33 **
Object Assembly	11.40	2.04	10.22	2.54	1.84
Coding	10.07	1.46	9.31	1.67	1.72

* Significant at level $p < .05$ ** Significant at level $p < .01$

Figure X. The independent sample *t*-tests indicate a significant group difference ($p<.01$) between composite IQ scores amongst the groups. The mean scale scores for MG/LD students were higher in each subtest of the WISC-III-Jordan including: Comprehension, Arithmetic, Vocabulary, Picture Completion, Information, Similarities, Block Design, Picture Arrangement, Object Assembly, and Coding. Adapted from Al-Hroub, A. (2014). Identification of dual-exceptional learners. *Procedia-Social and Behavioral Sciences*, *116*, 59.

When these two groups are compared (the students with dual exceptionalities and the students without), the independent sample *t* tests denoted significant differences ($p<.01$) in the subtests of Comprehension, Arithmetic, Vocabulary, Picture Completion, Information, Similarities, Block Design, and Picture Arrangement. There were no significant differences for Object Assembly or Coding. These results indicate that the average mean of mathematically gifted students with learning disabilities is higher than that of their peers with average IQs for the majority of subtests performed on the WISC-III-Jordan.

Figure 2 illustrates the means and standard deviations for the students with dual

exceptionalities and the average-IQ group of the Full-Scale IQ indices scores in the areas of

Verbal and Performance IQ scores.

Figure 2: Means and Standard Deviations of WISC-III-Jordan Scaled Indices Scores for
         MG/LDs Sample and Average-IQ/LD Group

WISC-III-Jordan	Dual-Exceptional Group ($n = 30$)		Average-IQ Group ($n = 22$)		Independent sample t-tests
IQ Indices	Mean	SD	Mean	SD	$df = 50$
Verbal-Scale IQ	126.77	5.91	107.60	9.22	9.14 **
Performance-Scale IQ	114.03	6.56	99.64	8.76	6.78 **
Full-Scale IQ	122.57	3.17	104.32	8.29	11.04 **

* Significant at level $p < .05$ ** Significant at level $p < .01$

Figure X. The independent sample t-tests indicate a significant group difference ($p<.01$) between
composite IQ scores amongst the groups. In general, Figure 2 shows that students with dual
exceptionalities had higher composite IQ scores, in Verbal-Scale IQ, Performance-Scale IQ, and
Full-Scale IQ. Adapted from Al-Hroub, A. (2014). Identification of dual-exceptional learners.
Procedia-Social and Behavioral Sciences, *116*, 59.

According to Figure 3, the results of the study also revealed that 40% of the participants

(MG/LD Sample) had Poor Auditory Perceptual Skills accompanied by Good Visual Perceptual

Skills. 25% had both Poor Visual and Auditory Perceptual Skills and 18.8% had both Good

Visual and Auditory Perceptual Skills. Perhaps the most notable result of all though, is that 0%

of the students with dual exceptionalities in this study had Poor Visual Perceptual Skills coupled

with Good Auditory Perceptual Skills. This finding could be helpful to teachers and those who

work with students with dual exceptionalities, because it may help explain how each individual

student learns best.

Figure 3: Perceptual Skills Numbers and Percentages from the MG/LD Sample

Categories		MG/LD Sample (n = 30)	
		No.	%
Perceptual Skills	Poor Auditory & Good Visual Perceptual Skills	9	56.3
	Poor Visual & Good Auditory Perceptual Skills	0	0
	Poor Visual & Auditory Perceptual Skills	4	25
	Good Visual & Auditory Perceptual Skills	3	18.8
Short-Term Memory	Poor Auditory ST-M & Good Visual ST-M	8	26.7
	Poor Visual ST-M & Good Auditory ST-M	1	3.3
	Poor Visual & Auditory ST-M	19	63.3
	Good Visual & Auditory ST-M	2	6.7

Figure X. Outcomes showed that 63.3% of participants had Poor Visual and Auditory Short-Term Memory. Only 6.7% of the MD/LD Sample had Good Visual and Auditory Short-Term Memory. 26.7% were poor in Auditory Short-Term Memory, but good in Visual Short-Term Memory. Only 3.3% of students were poor in Visual Short-Term Memory and good in Auditory Short-Term Memory. Adapted from Al-Hroub, A. (2014). Identification of dual-exceptional learners. *Procedia-Social and Behavioral Sciences*, *116*, p.61.

One theme that emerged from this data was the relative weakness in Short-Term Memory for Visual and Auditory for students with dual exceptionalities. Another noticeable, albeit relative, weakness is noted in the difference between students' overall Auditory functioning versus Visual functioning. This difference is shown in the bar graph in Figure 4.

Figure 4: Bar Graph illustrating the mean scores in auditory and visual perceptual skills and auditory and visual short-term memory for the MG/LD sample (Al-Hroub, 2014, p. 61).
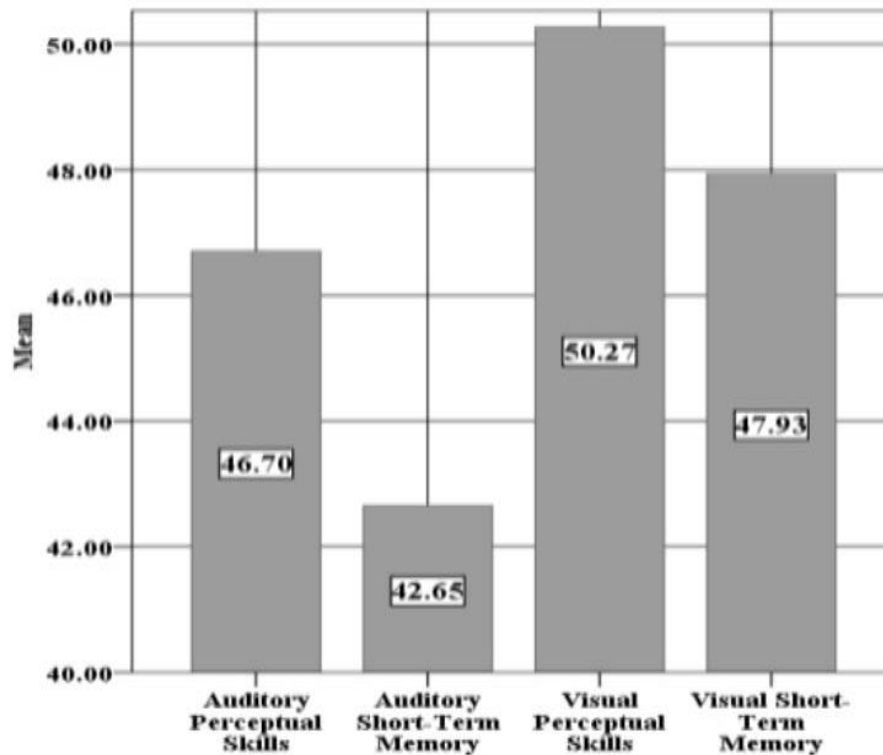
After the multidimensional data was analyzed, the results were noteworthy.

Unsurprisingly, the results of the study revealed that in order to understand a student's gifted

cognitive abilities as well as their learning difficulties, it is most effective to use *multiple criteria*

of assessment instruments to get a complete picture of the child's abilities. Students with dual

exceptionalities cannot be identified using a single source; instead multiple sources should be

used to complement each other, which adds validity. For instance, teacher nominations should be

supported by school documentation, psychological reports, and other assessments. The

assessment profiles and historical backgrounds of familial, medical, educational, and

psychological information help to provide the bigger picture. Also, the psycho-educational

assessments along with the dynamic assessment in this case, added validity to the results (Al-Hroub, 2014).

Instructional Challenges

Because of the difficulties of identifying students with dual exceptionalities, it follows that instruction may also prove to be a challenge. Students are typically taught either within the gifted education setting, or the special education setting. According to Buică-Belciu & Popovici (2014), programs that focus on students with dual exceptionalities have been initiated in a few schools so far and they have been proven to be successful across the US. Once students are identified as having dual exceptionalities, or as this school refers to them, Gifted/Learning Disabled (GLD), they enter the program where they receive gifted and special education services. The program is unique because the focus is to simultaneously focus on the specific giftedness of each student while considering the disability. As part of the GLD program, the students have an IEP written by a team of teachers using CPS (Collaborative Problem Solving) and EMT (Educational Management Team) guidelines. As a related service, GLD students also receive mentoring services. These students also receive support from qualified individuals through an enrichment program in their specialized area of interest. They are encouraged to participate in extracurricular activities that interest them.

Another documented challenge relates to the lack of collaboration between schools and parents of students with dual exceptionalities (Besnoy, Swoszowski, Newman, Floyd, Jones, & Byrne, 2015). The literature eludes to an overall deficit of knowledge and resources that parents need to advocate for their child (Besnoy et al., 2015). Parents who are knowledgeable about their child's perceived dual exceptionality, including strengths and interests, could enhance their child's learning outcomes (Krausz, 2018).

Baum and Owen (1988) piloted one of the first studies conducted concerning the challenges of students with dual exceptionalities. Their study investigated 112 students, who were either gifted, had disabilities, or both. The students ranged from fourth to sixth grade. The findings of their study suggested that the significant characteristic which distinguished students with dual exceptionalities from their peers, was their amplified sense of inefficacy about school. The students with dual exceptionalities displayed high levels of potential creativity, but high levels of disruptive behavior as well; their academic achievement was lower than their peers as well. These findings are significant because they illustrate how these characteristics may lower a student's chance of being considered for various advanced or gifted programs. These characteristics may also lower a student's overall confidence and academic success in school as well (Colangelo, Assouline, & Gross, 2004). Students with dual exceptionalities may develop feelings of inadequacy and depression because of their contradictory characteristics, resulting in disruptive behaviors meant to hide their true feelings of academic inefficacy and diminished self-esteem/self-efficacy (Baum et al., 2001).

In a study conducted by Reis et al. (1997), researchers identified the many challenges and characteristics of students with dual exceptionalities. The study put the characteristics of these students into three categories: (1) characteristics that hamper identification as gifted, (2) characteristics that enhance identification as gifted, and (3) social and emotional characteristics of students with dual exceptionalities. These characteristics are listed in Figure 5.

Figure 5: Characteristics of Gifted Students with Learning Disabilities (Reis et al., 1997).

CHARACTERISTICS OF GIFTED STUDENTS WITH LEARNING DISABILITIES

Characteristics That Hamper Identification as Gifted
- Frustration with inability to master certain academic skill
- Learned helplessness
- General lack of motivation
- Disruptive classroom behavior
- Perfectionism
- Supersensitivity
- Failure to complete assignments
- Lack of organizational skills
- Demonstration of poor listening and concentration skills
- Deficiency in tasks emphasizing memory and perceptual abilities
- Low self-esteem
- Unrealistic self-expectations
- Absence of social skills with some peers

Characteristics That Enhance Identification as Gifted
- Advanced vocabulary use
- Exceptional analytic abilities
- High levels of creativity
- Advanced problem-solving skills
- Ability to think of divergent ideas and solutions
- Specific aptitude (artistic, musical, or mechanical)
- Wide variety of interests
- Good memory
- Task commitment
- Spatial abilities

Social and Emotional Characteristics of GT/LD Students:
- Exhibit feelings of inferiority
- Show an inability to persevere in the accomplishment of goals
- Demonstrate a general lack of self-confidence
- Exhibit confusion as they struggle to understand why they can know an answer but are not able to say it or write it correctly
- Have their abilities mask their disabilities
- Have their disabilities mask their giftedness
- Demonstrate a strong, personal need for excellence in performance and in outcomes that nears and often embodies unhealthy perfectionism
- Exhibit an intensity of emotions
- Have unrealistic expectations of self
- Also have a tendency to experience intense frustration with difficult tasks that often produces a general lack of motivation
- Experience feelings of learned helplessness
- Exhibit low self-esteem

Findings from studies conducted within the past three decades remain consistent across more recent studies (Armstrong, 2018; Maddocks, 2018; Wang & Neihart, 2015).

Effective Approaches

Recent research on the topic of providing students with dual exceptionalities appropriate instructional strategies calls for a strengths-based, multi-dimensional approach (Krausz, 2018). This approach engages students in a positive and rewarding school experience, which appears to

benefit the student academically (Baum et al., 2014; Reis et al., 2014). Despite this, many

schools in the US remain tethered to a deficit instructional and assessment approach to learning

(Laija-Rodriguez, Grites, Bouman, Pohlman, & Goldman, 2013).

In an empirical study conducted by Olenchak (1995), 108 students identified with dual

exceptionalities in fourth through sixth grade participated in a highly structured, year-long

program that was personally tailored to fit the strengths of the students. While most studies focus

on the disability of students, this study focused on students' personal strengths. The purpose of

this study was to investigate the effects of an enrichment program that targeted the self-concepts,

attitudes, and creative productivity of these students. The results indicated that the program had a

significantly positive impact on the self-concept of the students involved. Also, the program had

a significantly positive impact on students' creativity production and attitude about school

(Olenchak, 1995).

More recent research has supported the original works of Olenchak (1995). Maddocks

(2018) states that:

Many but not all students identified as potentially GLD had relative weaknesses in lower

order processing abilities and achievement, as hypothesized for this population. Students also

exhibited academic strengths, which suggests dual differentiation would be appropriate.

Commonly used intraindividual discrepancy criteria identified most potentially gifted

students as potentially learning disabled; therefore, these are not valid stand-alone criteria to

identify learning disabilities in gifted youth. Results suggest it may be best to combine

alternative gifted criteria, an intraindividual LD criterion, and examination of absolute

deficits in processing and achievement (p. 175).

Figure 6 illustrates a list of academic strategies to help students with dual exceptionalities academically. This table is comprised of a combination of existing literature including compensation and self-regulation strategies.

Figure 6: Strategies to increase academic challenge for GT/LD students (Reis et al., 1997).

STRATEGIES TO INCREASE ACADEMIC CHALLENGE FOR GT/LD STUDENTS

Strategies	References
Academic Strategies	
Develop a clear understanding of specific student learning disabilities	(Brinckerhoff, McGuire, & Shaw, 2002; Cowen, 1993; Field & Hoffman, 1996)
Learn about one's legal rights • learn about changes in legal rights under Section 504; ADA; and IDEA • learn about accommodations provided by law	(Brinckerhoff, Shaw, & McGuire, 1993; Heyward, 1998; Latham & Latham, 1998; Vogel, 1997; Vogel & Reder, 1998)
Select courses to prepare for academically challenging college and future career choices • encourage college preparatory courses; consider quality and advanced content • avoid modified or simplified courses • attempt completion of a wide array of courses and avoid course waivers if possible • use a multi-year educational plan • involve parents and students as part of the educational team	(Barr, Hartman, & Spillance, 1998; Cowen, 1993; Koehler & Kravets, 1998; McGuire, Hall, & Litt, 1991; Reis, et al., 1995; Whitmore, 1980)
Explore career & postsecondary options • explore ways to incorporate strengths & weaknesses into a career plan • participate in a career exploration program • explore careers through extracurricular activities, hobbies & work experiences • explore colleges that do not require the SAT or ACT if scores are lower due to LD • use college resource guides / directories / Web sites, including specialized LD sources • explore college options with comprehensive LD programs versus LD services	(Brinckerhoff, et al., 2002; Cowen, 1993; DuChossois & Stein, 1992; Patton & Dunn, 1998)
Self-Regulation and Compensation Strategies	
Focus on development and internalization of a wide array of personalized compensation strategies of high practical utility • self-evaluation; organizing material; transforming material (e.g., use flashcards); goal-setting and planning; seeking information; keeping records & monitoring; structuring environment; using self-consequating (i.e., self-rewards); rehearsing & memorizing; reviewing records • help a student begin to learn and employ generalizable study skills • help a student begin to develop a personalized set of compensation strategies to promote academic success • avoid traditional remediation resource room models • explore the benefits of assistive technology	(Bryant, Bryant, & Rieth, 2002; Bursuck & Jayanthi, 1993; Butler, 1998; Crux, 1991; Deshler, Ellis, & Lenz, 1996; Pintrich, 1995; Reis, McGuire, & Neu, 2000; Shaw, Brinckerhoff, Kistler, & McGuire, 1991)
• seek environmental & social support and study skills: learn how to get around campus; where to go for the services; when it is appropriate to ask for assistance; ask teachers for lecture notes; ask teaching assistants for help; use office hours to clarify assignments; ask others which professors are more understanding of LDs & more accommodating • learn study strategies: learn library skills; develop personalized strategies for taking exams; learn ways to manage course materials (e.g., use color-coded binders) • use and practice cognitive, memory & study strategies: time management; chunking material & time; monitoring assignments; using weekly & monthly organizers; using mnemonics; rehearsal; flashcards • use note taking and written expression strategies: note taking; condensing notes; clustering material for exams; using graphical organizers in notes and with the help of computer programs; highlighting in notes; color-coding notes & flashcards	(Baum, 1984; Bursuck & Jayanthi, 1993; Crux, 1991; Deshler, et al., 1996; Hodge & Preston-Sabin, 1997; McGuire, et al., 1991; Schumaker & Deshler, 1984; Reis, et al., 2000; Shaw, et al., 1991; Vogel & Adelman, 1993)

STRATEGIES TO INCREASE ACADEMIC CHALLENGE FOR GT/LD STUDENTS

Strategies and Goals	References
Self-Regulation and Compensation Strategies (continued) • learn performance strategies for written expression, reading, comprehension, and mathematical processing: concept maps to organize material & see connections among concepts; SQ3R method (survey, question, read, recite, review); repeated readings if necessary; write one's own essays to ensure deep understanding of material; teach material to peers • explore the nature of one's own LD • through an individualized assessment, understand one's own profile of strengths and weaknesses • understand connection between one's own LD and academic performance (teachers)	(Baum, 1984; Bursuck & Jayanthi, 1993; Crux, 1991; Deshler, et al., 1996; Hodge & Preston-Sabin, 1997; McGuire, et al., 1991; Schumaker & Deshler, 1984; Reis, et al., 2000; Shaw, et al., 1991; Vogel & Adelman, 1993)
Foster self-determination • help develop self-advocacy skills • help set goals and then implement the plan • teach assertive communication, understanding oneself as a learner • encourage appropriately challenging classes	(Brinckerhoff, et al., 2002; Eaton, 1996; Price, 1988; Tessler, 1997; Wilson, 1994)
Develop independence • consider taking a summer job to establish work ethic • refine academic skills and career options • help understand the psycho-educational report • become aware of accommodations available for taking standardized tests	(Anderson, 1993; Aune & Ness, 1991; Cowen, 1993; Eaton & Coull, 1998; Vogel & Reder, 1998)
Social-Emotional Strategies	
Develop a variety of support systems for healthy social and emotional growth • develop emotional support systems and encouragement if negative interaction with teachers or peers occurs (parents; counselors; professionals) • provide parent advocacy in the school settings (parents) • learn the importance of education and raise an adolescent's aspirations (parents) • seek support outside of school (parents) • obtain help with schoolwork if needed • help avoid associating compensation strategies with negative stigma • involve both parents in academic and non-academic activities • nurture talents and interests • foster healthy self-concept and self-esteem	(Baldwin, 1999; Baum & Olenchak, 2002; Baum, et al., 1991; Hebert & Olenchak, 2000; Reis, et al., 2000; Tannenbaum & Baldwin, 1983; Whitmore, 1980)
Talent Development and Enrichment Strategies	
Participate in opportunities for advanced content, enrichment, and talent development • take appropriately challenging AP, Honors classes or other opportunities for accelerated learning if appropriate • participate in extracurricular activities to broaden horizons • participate in summer mentorship and accelerated programs • encourage development of advanced independent projects • encourage involvement in extracurricular clubs, team sports, theatrical performances • evaluate career interests through extracurricular activities, hobbies & work experiences • explore interests through interest & career inventories • create and maintain Personal Talent Portfolio • participate in an advanced enrichment program based on student's strengths and interests	(Baldwin, 1999; Baum & Olenchak, 2002; Baum & Owen, 1988; Baum, et al., 1991; Purcell & Renzulli, 1998; Reis, et al., 1995; Reis, et al., 2000; Renzulli & Reis, 1997; Silverman, 1989; Vogel & Reder, 1998)

Reis et al. (1997) and Olenchak (1995), laid the foundation for the educational body of research for students with dual exceptionalities. Many have built upon this research, resulting in a continuous need for extending knowledge and educating individuals about how to serve

students with dual exceptionalities. As Al-Hroub (2014) argued, "….providing in-service training for teachers, the school community, and parents would raise their awareness of the definitions, identification, and characteristics of dual-exceptional students" (p. 66).

One of the primary goals in the middle school classroom should be to actively and intellectually engage students with the content (Edwards, 2015; Edwards et al., 2014). Students should work towards being cognitively active, as opposed to passively receiving content from an authority figure. Leaders of the middle school movement, as well as the National Middle School Association (2010), have long supported instructional methodologies that encourage active learning through questioning, problem-solving, and inquiry. Middle school students have an intense curiosity about everything around them and they are continuously trying to make sense of their experiences (Edwards, 2015). Instructional methodologies that build upon that curiosity and make young adolescents actively connect their world to the content are ideal strategies for middle school students (Association of Middle Level Education, 2015; Edwards et al., 2014). In fact, the most effective instruction for a middle school classroom occurs when a teacher uses the students' natural curiosity to build upon their existing knowledge to create meaning (Nesin, 2012). Knowing that typically developing students' knowledge is largely dependent on active learning, would have educators looking at these same features for increasing learning among students with dual exceptionalities (Schiro, 2012).

In addition to students being intellectually engaged, young adolescents also need to be socially engaged to be aligned with the middle school concept of active learning. Young adolescents between the ages of 10-15, are developmentally-sensitive and they desire to be social with their peers. This applies to students with dual exceptionalities as well. According to the Association for Middle Level Education, one sign of a successful middle school is that teachers

allow students to work collaboratively in pairs or groups to provide opportunities for students to improve social development (Association of Middle Level Education, 2015). Opportunities for social development could range from having students work together in a group project, to having them discuss content covered in class with a partner. Young adolescents are very engaged when allowed to work small groups as they learn new content (Nesin, 2012). Whole group and small group discussions can also encourage active learning socially and give middle school students the opportunity to be social (Edwards, 2014). It is easy to see why students with dual exceptionalities would benefit from the same instruction as their typically-developing peers.

To have the highest level of active learning, it is not enough to only engage students on an intellectual and social level (Schiro, 2012). The third and final requirement in the active learning framework is the concept of physical engagement (Campbell, 2014). Middle school students are typically full of energy and very active, therefore it is important to have some physical movement within the classroom (Edwards, 2014, 2015). Some examples of active learning including physical engagement could include using manipulatives, experiential learning, hands-on projects, or building models (Daniels & Perry, 2003). These strategies all require physical movement, and are engaging for all middle school students, including those with perceived dual exceptionalities (Nesin, 2012).

The overall goal for active learning is to use intellectual, social, and physical engagement to empower students to use their problem-solving skills and critical thinking skills to learn new information (Edwards et al., 2014). Figure 7 illustrates the Active Learning Framework as offered by Edwards (2015) and shows the three parts of active learning. The diagram shows how active learning can happen only using each piece individually, or it can include two approaches at the same time. However, the most effective approach is represented by the middle of the

diagram when all three approaches overlap to create the highest level of active learning. At this

level, students discover the tools they need to learn and apply new concepts on their own, and

they become empowered lifelong learners who know how to apply and synthesize information

(Edwards, 2015).

Figure 7: Active Learning Framework (Edwards, 2015).
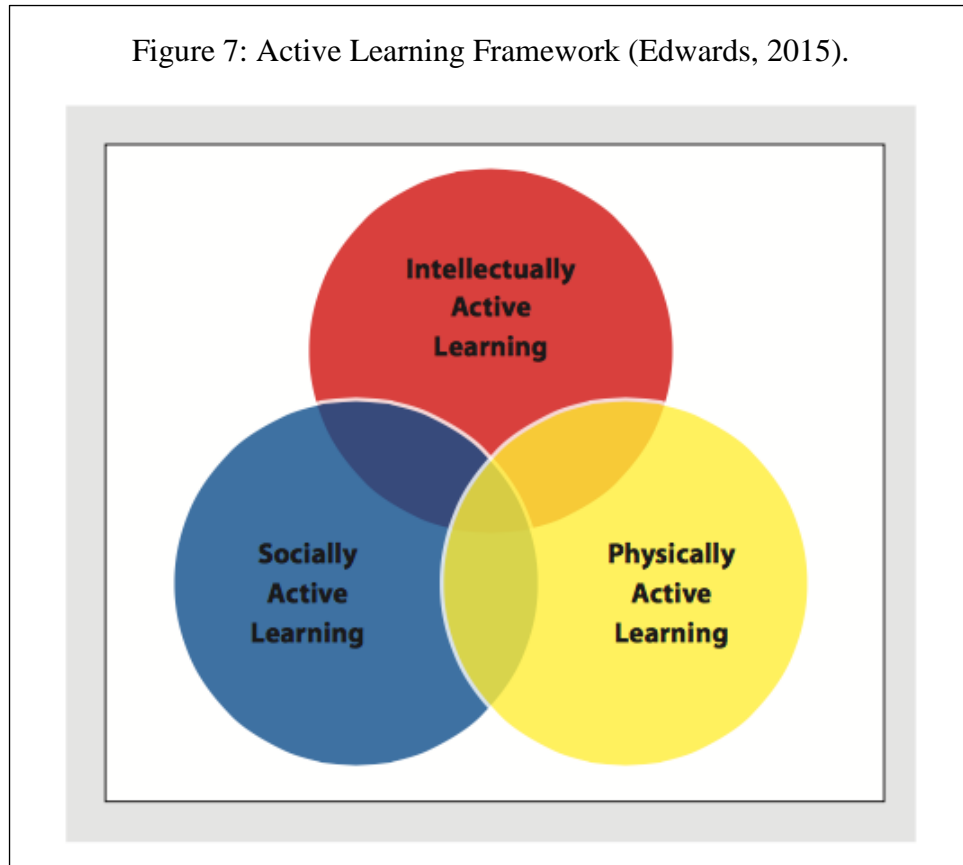
Students with both disabilities and characteristics of giftedness thrive when they utilize all

three components of the active learning framework. Middle school students desire to be involved

in active learning that applies to their real-life (Edwards, 2014). Although they can sometimes be

coined as pre-teens and teenagers with raging hormones and disrespectful attitudes, they are

mostly looking for acceptance and belonging. Young adolescents at this age are trying to make

sense of the world around intellectually, socially, and physically (Association of Middle Level

Education, 2015). According to the National Middle School Association (2010), middle school

students

respond positively to opportunities to connect what they are learning to participation in real-life situations such as community service projects; and…are generally idealistic, desiring to make the world a better place and to make a meaningful contribution to a cause or issue larger than themselves (p. 57-58).

Learner-Centered Mathematics Setting

As Schiro (2012) asserts, an educator's job is to create the environments, contexts, and units of work which will maximize growth in their students as they use their innate talents and ability to construct meaning for themselves. One of the researcher's major assumptions within the current study is that in order for students to learn mathematics effectively, they must construct knowledge for themselves. This construction includes exploring mathematical concepts, representing mathematics in multiple ways, justifying their answers, discussing the concepts with peers using mathematical vocabulary, using prior knowledge, describing patterns and mathematical reasoning, investigating, and predicting; and being active in the world around them (Boaler, 2002, 2016; Countryman, 1992, Schiro, 2012).

There is support in the literature for learner-centered instruction and the positive results that it brings (Daniels & Perry, 2003). Within the last decade, there has been a substantial push for learner-centered mathematics curricula taught in a constructivist environment (Rao, Slovin, Zenigami, & Black, 2017). This is a paradigm shift for the field of mathematics (National Council of Teachers of Mathematics, 2014). In the traditional mathematics classroom, it would be commonplace to see rows of students silently listening to the teacher for the first half of class, and then practicing a skill repeatedly from the mathematics textbook. Mathematics educators are encouraged to use constructivist approaches that are "discovery" based and require group work in an environment that focuses heavily upon mathematical vocabulary (Woodward, 2004). This

approach to teaching mathematics requires students to *discover* concepts on their own without any help from direct instruction from a teacher (Kozioff, LaNunziata, Cowardin, & Bessellieu, 2001). The expectation of this approach is that all students will ask questions, be engaged in discussion, and express their opinions and ideas about the mathematical concepts addressed during the lesson. Learning-Centered mathematics curricula focused on conceptual understanding versus rote memory is essential for students to become successful in the middle-grades mathematics classroom (Rao et al., 2017, Schiro, 2012).

Research suggests that diverse students may struggle with mathematics in middle-grades settings because of the open-endedness of the curriculum which depends on students being ready and willing to share their answers, be inquisitive with group members, and justify their work (Rao et al., 2017). In an empirical study conducted by Parks (2010), open-ended mathematical questioning appeared to privilege some children while marginalizing others. The literature provides evidence that some students with disabilities struggle with a constructivist approach to learning mathematics because they become cognitively overloaded (Woodward, 2004). This is contrary to the belief that a constructivist approach assists in the learning of mathematics. When students with disabilities are provided with scaffolding and accommodations and/or modifications in an inclusive setting, however, they can be successful (Woodward, 2004).

There is literature to support that *all* students benefit from a collaborative, interactive, and active learning environment (Boaler, 2002; Edwards, 2015; Parks, 2010; Rao et al., 2017; Schiro, 2012; Woodward, 2004).

Active engagement is a significant part of a constructivist mathematics classroom (Schiro, 2012). Students who are gifted as well as those with disabilities need practice to learn how to become actively engaged and functioning within a student-centered classroom. They

need practice to learn how to communicate effectively with others, how to ask questions and be inquisitive, how to explain their mathematical thinking, and how to dispute answers without being degrading. When students are practicing these skills, they are participating in active learning, which means they are contributing to mathematical class discussions by answering implicit and explicit questions posed by their teacher and peers. Students who are gifted as well as those with learning disabilities are able to make sense of the ideas and concepts they are learning, and they are able to become metacognitively aware of own individual educational needs and learning abilities (Rao et al., 2017, Schiro, 2012).

Culturally Responsive Gifted Classrooms

With each year, our nation and our schools are becoming more and more culturally diverse or culturally different (Ford, 2010). This is important to add to the discussion of students with perceived dual exceptionalities, because a student from a diverse background who also has both disabilities and characteristics of giftedness will have a more complex experience in school. Each individual and group have a culture, and therefore they cannot be chunked in large general groups when we discuss culture. Unfortunately, often the students who are culturally different, usually have the least amount of success in school (Ford, 2010). Since students who are culturally diverse struggle in school, it is important that teachers affirm, recognize, and respond to their needs and differences. Ford (2010), suggests that teachers become more culturally responsive, which means we should respond empathetically to efforts, appeals, and influences. Culturally responsive teaching means that teachers are student-centered, eliminating barriers to achievement and learning, which unlocks true potential for all students. Teachers who are culturally responsive assertively and proactively work to respect, understand, and meet the needs of all students, even those who have a different cultural background than their own.

Figure 8: Components of culturally responsive classrooms: student-centered and culture-centered (Ford & Whiting, 2007).
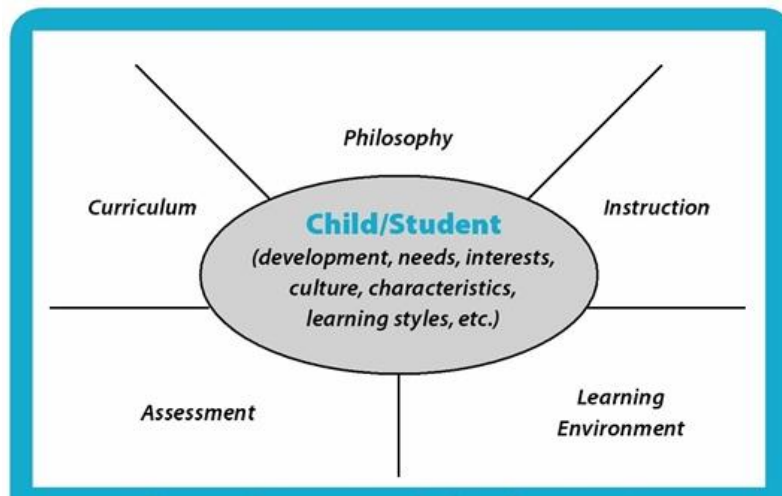
Conceptual Framework

This study connects Piaget's notion of Cognitive Development and Vygotsky's (1978) Zone of Proximal Development and Sociocultural Theory, both of which contribute to the epistemology known as Constructivism. Constructivism stresses the importance of allowing children to develop their own understanding of the world around them (Crotty, 1998). The philosophical foundations of this framework have been studied for thousands of years (Fostnot, 1996). At the center of Constructivism is the epistemological question, "Where does knowledge come from?" This is ultimately the study of the nature of knowledge. It strives to answer what we know as individuals and how we acquired that knowledge (Crotty, 1998; Fostnot, 1996).

Constructivism is a theory of learning, sometimes known as a theory of knowing, and it provides a basic framework for the ways in which teachers can work with students. A constructivist teacher will allow students to construct their own meaning of a concept within boundaries. For example, instead of instructing a class exactly how to complete a task, a constructivist teacher will present the information in the form of a problem which needs to be resolved by the class. Students will then be given the chance to create their own meanings. Students build their knowledge based upon the educational experiences they are exposed to and where they construct these experiences. Social interaction is another function of the learning process and plays a role in how and what students learn (Schifter, 1996). Piaget (1952) and Vygotsky (1978) provide guidance on the social nature of learning as elaborated below.

Piaget's Theory of Cognitive Development

The theory of intellectual development by Piaget (1952) is considered to be a foundational theory of cognitive development (Flavell, 1963). Piaget (1952) posited that the ability to think lies in the physiological foundation of a child. He asserted that all intelligence among living

creatures originates within the two natural attributes of: adaptation and organization. Adaptation is the instinctive characteristic of a child that allows them to interact or respond to their environment. The interaction between a child and his or her surroundings will nurture the growth of a continuous complex psychological organization (Piaget, 1952). Adaptation consists of two procedures of accommodation and assimilation (Simatwa, 2010). Children try to assimilate their experiences into their current intellectual structure. When a child experiences a new event that does not fit into his or her current structure, the child will create a modified way of thinking, or an accommodation, within his or her intellectual development (Flavell, 1963).

Organization consists of the biological component that allows every living creature to combine processes into intelligible systems (Simatwa, 2010). For example, an infant is initially only able to either look at an object or grasp an object, but as the infant amalgamates the two process structures, he or she can look at an object and then reach out to grasp that object (Simatwa, 2010). Piaget (1952) emphasized that as a child cognitively develops, he or she will pass through four main stages in a consecutive order (Hertherington & Parke, 1975). These stages are: Sensory motor (age 0-2), Intuitive or Preoperational (age 2-7), Concrete Operations (age 7-11), and Formal Operations (age 11-15). Each stage has numerous sub-stages and involve chance variation. These stages bring a child through a series of changes starting with basic reflex responses, to full maturity of formal deductive reasoning (Hertherington & Parke, 1975). Every stage is quantitatively different and involves a system of thinking that is a structure transformation from the preceding stage. According to Piaget, each child must go through these stages sequentially regardless of age. A child cannot skip over a stage, nor speed through them at a faster pace (Hertherington & Parke, 1975). Each child needs to not only have adequate experience within each stage, he or she also needs to have sufficient time to then internalize

those experiences and make sense of them before advancing to the next stage (Flavell, 1963; Piaget, 1952; Simatwa, 2010).

This framework informs the current study within the boundaries of middle school and the Formal Operations Stage (age 11-15), as it relates to the age of the students in the current study. The formal operations stage usually happens between the ages of 11-15 among adolescents. During this stage, students are shifting from concrete operations into the final stage of cognitive development to formal operations (Hertherington & Parke, 1975). In this new stage, students are capable of being considerate of other students' ideas as well as being able to effectively communicate their own ideas. At this stage, students should be in the socialized speech phase of their language development (Hertherington & Parke, 1975). Students should be developing their cognitive ability including logical, abstract, and rational thinking (Flavell, 1963; Piaget, 1952). As Simatwa (2010) posits, "to concretize, pupils develop the ability to reason by hypotheses based on logic of all possible combinations" (p. 369). At this stage, students will be able to use deductive reasoning with logical thinking to draw rational conclusions, even if they have never experienced the subject. The student at this stage has mastered decentration and reversibility. He or she can investigate similarities and differences of a subject and think abstractly about the content (Hertherington & Parke, 1975). Students should be able to perform operational combinations, understand proportions and permutations, grasp aggregations, and achieve a state of equilibrium. Students at this stage should be encouraged to think for themselves and discover answers on their own, instead of waiting for the teacher to give the answers to them. Students at this stage should be assigned school work that challenges their imagination and encourages conceptual thinking (Flavell, 1963; Piaget, 1952; Woolfolk, 2015).

According to Piaget (1952), the motivation of all learning begins with a desire to stay in a constant state of equilibrium (Prouix, 2006). When students are presented with new information that is contradictory to their current knowledge structure, they become determined to adapt or modify their prior knowledge in an attempt to stay at equilibrium. This adaptation to cognitive conflicts is vital in the process of learning. Prouix (2006) reminds us that, "it is often through struggling to resolve the disequilibria caused by perturbations that one comes to a resolution that deepens and revises one's world-view" (p. 5). A student's mind tends to try to assimilate new experiences into his or her prior knowledge; however, for true learning to occur, students must make accommodations (or modify) their existing cognitive structures (Prouix, 2006).

Constructivists believe that the classroom should be learner-centered (Daniels & Perry, 2003), instead of teacher centered. This is clear and evident in the similarities of the research between learner-centered, active learning, and Piaget's (1936 and 1952) theories. Ultimately, Piaget (1952) emphasizes the importance of social interaction in the cognitive development stages. His research indicates that children must be involved in their learning process, and therefore all learning should be learner-centered (Simatwa, 2010). This theory applies to the current study in that student-centered learning is one of the most effective teaching strategies for teaching students with dual exceptionalities (Daniels & Perry, 2003; Mann, 2006).

Vygotsky's Sociocultural Theory

The current study is additionally supported by Sociocultural Theory (Vygotsky, 1978). Conceptual parallels can be drawn between Vygotsky's (1978) theory and Constructivism. Although most of Vygotsky's (1978) work is analogous to Piaget's (1952) and other constructivists', Vygotsky's (1978) theories focused on social interaction within the construction of knowledge. He believed that learning was developmental but noted the difference between

spontaneous and scientific constructs (Fosnot, 1996). Vygotsky (1978) believed that spontaneous concepts were developed during a child's everyday life, within the course of their everyday routine. He referred to these concepts are as pseudo-concepts (Fosnot, 1996). Vygotsky (1978) suggested that scientific concepts develop while in a classroom, or a formal setting, and these concepts are culturally-based. Students, he reasoned, would most likely never learn scientific concepts without the help of an adult or a more knowledgeable peer. The 'space' where a more knowledgeable other provides assistance to a learner for the purpose of extending knowledge, is known as the ZPD, or Zone of Proximal Development (Vygotsky, 1978). The ZPD is typically actualized within the middle-grades mathematics classroom. Adolescents rely often on more knowledgeable others particularly in settings where cooperative learning, collaborative teaching, and peer-learning and assistance is common.

Theoretical Framework

Stage-environment fit theory (Eccles et al., 1993) provides the theoretical framework for the current study, suggesting that engagement, motivation, and a sense of belonging may be enhanced when a young adolescent's developmental needs are met within a positive, responsive learning environment (Kiefer, Alley, & Ellerbrock, 2015). Stage-environment fit theory attempts to explain how teachers and peers can foster a learning environment that is responsive to students' developmental needs (Midgley, Feldlaufer, & Eccles, 1989). These developmental needs include peer acceptance, high-quality friendships, close relationships with non-familial adults, and dynamic cognitive, personal, social, and emotional needs (Eccles & Roeser, 2011). The researcher chose this theory because the student participants of this study are middle-school students between the ages of 11-14, who could potentially struggle with transition. At this age, students have more development needs such as peer acceptance, and other academic, social,

emotional, and physical changes (Barber & Mueller, 2011; Curtis, 2015; Eccles, Barber, Stone & Hunt, 2003; Eccles & Midgley, 1989, 1990; Eccles & Wigfield, 2002).

The beginning of stage-environment fit theory was the result of a research study by Eccles et al. in the 1980s and 1990s. These researchers noticed that over the past few decades, there had been a large increase of attention paid to the developmental stage of adolescence. Although a few adolescents did not experience the "storm and stress" of the adolescent years, most were experiencing difficulty and rarely made it through the adolescent years unscathed (Eccles et al., 2003; Eccles et al., 1993). Eccles and her team of researchers set out to find out why this was happening. Why were adolescents susceptible to all the difficulty they were experiencing? Was there something different about this developmental period that was putting these adolescents at risk?

Eccles et al. (1993) examined the general environmental influences of various school settings and suggested that there may be certain systemic differences within middle schools which could possibly account for some of the students' motivational changes. Higgins and Parsons (1983) suggested this change of schools, or transition into middle school, may be the cause of motivational problems rather than developmental characteristics. Based on this assertion, Eccles et al. (1993) developed the stage-environment theory. The stage-environment theory builds on the idea that some of the negative motivational factors from middle school students are present because they are not in an environment that fits well with their needs (Higgins & Parsons, 1983). This may have important implications for students with perceived dual exceptionalities who receive instruction in either a gifted educational setting or a special education setting, based on their particular exceptionality.

Stage-environment theory ultimately suggests that the fit between adolescent developmental needs and the educational environment is very important (Eccles et al., 1993; Eccles & Roeser, 2011). The environment offered to the adolescent should be responsive to the changing needs of the student and offer the stimulation and engagement that will propel positive continued growth (Higgins & Parsons, 1983). This transition to middle school (and later to high school), should be developmentally appropriate and should have a positive impact on the adolescent's self-perception as well his or her educational environment. If the two trajectories (development and environment) are not aligned in synchrony, there will inevitably be negative motivational consequences. There are a number of empirical studies that support the idea that the quality of student-teacher relationships and classroom climate is directly associated with students' academic attitudes and motivation in school (Fraser & Fisher, 1982; Moos, 1979).

Eccles et al. (1989) concluded that to achieve optimal development, there needs to be a good stage-environment fit among the adolescent developmental need, and the opportunities provided by their learning and social environments. The findings also suggest that an increase in ability grouping, whole-class task, and comparative/public evaluation during a period of development when an adolescent has a heightened concern of status in comparison with their peers and have a detrimental effect on efficacy. Ultimately, at the heart of the stage-environment theory, providing the appropriate environment at the right time and place is critical. The stage-environment theory provides the theoretical foundation for the current study as it is crucial that students with dual exceptionalities are served in an appropriate environment that will fit their developmental needs (Eccles et al., 1989, 1993).

Methodological Framework

For the purposes of this study, the researcher will utilize the qualitative paradigm and an explanatory case study approach (Creswell & Poth, 2018). Qualitative research refutes the positivist assertion that there is only one objective truth to be discovered through the process of research (Cohen, Manion, & Morrison, 2013). The goal of data analysis in qualitative studies is not to prove or disprove the original research questions; instead, the purpose is to accurately capture the perceptions of the participant's experience (Bogdan & Biklen, 2007).

Qualitative research is characterized by in-depth interviews which include open-ended questions and flexibility of those questions based on participant response (Bogdan & Biklen, 2007). Merriam & Tisdell (2015), describe qualitative inquiry as focusing

on meaning in context, requires a data collection instrument that is sensitive to underlying meaning when gathering and interpreting data. Humans are best suited for this task, especially because interviewing, observing, and analyzing are activities central to qualitative research (p. 2).

The research of Glaser and Strauss (1967) set the foundation for qualitative research (Merriam & Tisdell, 2015) making the case for "inductively analyzing a social phenomenon" rather than testing the theory. Traditionally, there were two ways to analyze qualitative research. One way was to obtain results through coding the qualitative data to support or refute a proposition (Yin, 2014). The second way to analyze qualitative research was to analyze the data for new theoretical ideas, or categories. This allows the researcher to look for new theoretical categories, and while writing memos on these properties (Glaser, 2008). According to Glaser & Strauss (1967), there is a third way which is utilized in this study, known as the constant comparative method of qualitative analysis. This approach provides participants with a voice to

illustrate their experiences more vividly and to share their personal stories (Fitzpatrick, Moore &

Lang, 2008). In-depth interviews are usually recorded and then transcribed using a qualitative

data analysis program such as Atlas.ti. The data analysis program will develop a coding system

and then determine common themes through rich descriptions and deep analysis. The words used

in a qualitative analysis paint a picture of the experience (Bogdan & Biklen, 2007). As Stake

(2005) contends,

> Case study issues reflect complex, situated, problematic relationships. They pull attention
>
> both to ordinary experience and also to the disciplines of knowledge (e.g., sociology,
>
> economics, ethics, literary criticism) …qualitative case researchers focus on relationships
>
> connecting ordinary practice in natural habitats to a few factors and concerns of the
>
> academic disciplines (p.10-11).

A case study is a type of qualitative approach, namely, a bounded study that provides a

comprehensive examination of one subject or a single setting. A case study approach looks in

depth into a topic using interviews, surveys, and questionnaires (Creswell & Poth, 2018). The

process of developing a case study can be viewed metaphorically as a funnel, starting with a

broad idea or topic, and then narrowing the boundaries of the study by determining specific

phenomenon to investigate (Bogdan & Biklen, 2007). Case studies encompass the study of a

certain case within a real-life scenario, which is bounded by place and time through an in-depth

process of data collection involving numerous sources of information (Creswell, 2012, Stake,

2006). The case study approach is used in a substantial number of theses and dissertations,

specifically in social science research (Yin, 2014). In the current study, the researcher uses

multiple sources of data, including observations, teacher interviews, parent interviews, student

interviews, student-created drawings, and review of documents.

As one of the features of the case study, complex conditions related to the "case" play an integral role to the comprehension of the results of the study (Stake, 2008). In other words, the case study does not focus on the single "case" for data, but also looks at all the data around that single "case." The case study methodology conducts an in-depth focus on the individual case, but in addition, it broadens the scope and studies the wide range of factors/people affecting the individual (Stake, 2005). As a result, case study data are more reliable since they come from multiple sources instead of one singular source.

Other historical definitions of a case study design include Merriam (1988), who claimed, "A qualitative case study is an intensive, holistic description and analysis of a single instance, phenomenon or social unit" (p. 21). Wolcott (1992) stated that he saw qualitative case studies as, "an end-product of field-oriented research" (p. 36). Smith (1978) came up with the notion that the case study should be viewed as a *bounded system*, while Stake (1995) elaborated that a bounded system was also "an integrated system" (p. 2). Creswell (1998) summed up the definition of a case study when he said that a case study is "an exploration of a bounded system or a case (or multiple cases) over time through detailed, in-depth data collection involving multiple sources of information rich in context" (p. 61).

Case studies may focus on a small group of participants or a large organization, but the fundamental piece of this methodology is that the study must define a case that can be restricted to explicit parameters (Creswell & Poth, 2018). In general, case studies usually happen in real time so that the data collected is timely and accurate. When conducting a case study, it is important to know the intent of the study, because the intent will reveal the heart of the matter; which is the focal point of the case that will be examined. One example of the intent of a case study could be to understand a specific concern or issue. A case study with this intent is called an

instrumental case study. Regardless of intent, case studies provide an in-depth understanding of the phenomenon being examined using multiple sources of data. The analysis of a case study should be a well-developed, thorough description of the case (Creswell, 2012; Creswell & Clark, 2007, Stake, 1995).

Summary

Dividing the review of related literature into four sections allows the reader to see a better overall picture of the way in which the topic of dual exceptionalities is treated. These four sections included definitions of *dual exceptionality*; the identification process for students with perceived dual exceptionalities; challenges for students with both disabilities and characteristics of giftedness; and effective approaches and strategies for working with students who are perceived as having dual exceptionalities. Across all four sections of the literature, there is ambiguity. For instance, there are multiple operational definitions of the term, *dual exceptionality.*

In addition to the issue of ambiguity, there is a dearth of literature which addresses the learning experiences of students with perceived or identified dual exceptionalities, specifically within a middle-grades mathematics classroom setting. The literature is rich in conceptual articles and reports that describe instructional programs for students with dual exceptionalities. There are few empirical articles, however, that recount actual experiments or studies conducted on the learning experiences on students perceived to have dual exceptionalities. Further, there is an absence of articles that describe the learning experiences of students who are perceived to have dual exceptionalities from the student's point of view. The current study seeks to address this gap in the literature.

The next chapter, entitled Methodology, details the methods that were used to complete the current study.

Chapter 3: Methods

This chapter details the methods that were used to complete the current study. It begins

with a reiteration of the research questions, followed by the research design. The research design

provides details related to the participants, eligibility criteria, the setting and the context. Each of

the data sources utilized in this study along with the literature that supports their utility will be

presented next, followed by procedures for collecting and analyzing the data. Next, issues of

confidentiality and bias are followed by triangulation methods, the researcher's positionality, and

a summary. A brief introduction to the cases around which this investigation is built will also be

provided.

This qualitative study employed case study methods to learn how adolescent students

with perceived dual exceptionalities depict their learning experience within a middle-grades

mathematics setting. This case study includes four student participants, three teacher participants,

four parent participants, and two drawing-rater participants. The study incorporates observations,

in the form of field notes written by the researcher, in-depth semi-structured interviews, student

drawings, and a review of pertinent documents. Participants in this study include four students

total; two students with perceived dual exceptionalities served primarily in the Special Education

setting, both of whom have an active Individual Education Program (IEP) and two students with

perceived dual exceptionalities who receive instruction primarily in the Gifted Education setting,

both of whom have an active 504 Plan.

Research Questions

The purpose of this study is to examine the learning experiences of students with perceived

dual-exceptionalities within a Title 1 middle school mathematics classroom setting. This

investigation is guided by the following research questions:

a) How do adolescent students with perceived dual exceptionalities view their learning experiences within a middle-grades mathematics setting?

b) How do they perceive their learning experiences in different educational settings?

c) How do those perceptions influence how students view themselves as learners?

d) How are students' perceptions consistent with what their parents and teachers report?

Research Design

This qualitative inquiry utilized the multiple-case study design (Creswell & Poth, 2018; Marshall & Rossman, 2016; Miles, Huberman, & Saldana, 2014). This design was chosen because the researcher is studying a variety of variables, which can be hard to quantify. A case study approach looks in depth into a topic using interviews (Creswell & Poth, 2018; Stake, 2006, 2008; Yin, 2014). The process of developing a case study can be viewed metaphorically as a funnel, starting with a broad idea or topic, and then narrowing the boundaries of the study by determining specific phenomenon to investigate (Bogdan & Biklen, 2007). Case studies encompass the study of a certain case within a real-life scenario, which is bounded by place and time through an in-depth process of data collection involving numerous sources of information (Creswell, 2012). The purpose of conducting multiple case studies is to compare and investigate the cases holistically in their totality. Yin (2009) claims that each single case represents a whole study where the totality of evidence is pursued concerning the data and summaries for the case. The case's summaries, or conclusions become the part that needs to be replicated by other cases in the study. Replication throughout the individual cases validates, substantiates, and upholds the findings (or the results) of the research study.

In the current study, the researcher used multiple sources of data, including observations, teacher interviews, parent interviews, student interviews, creative student drawings, and review

of documents throughout the process. Because this study focuses on a bounded system of multiple cases with in-depth data collection involving multiple data sources, the case study design was the best fit. This method was also chosen because it focuses on the way people - in this case, adolescents - make sense of the world around them and interpret the meaning they have constructed (Merriam, 1998). This aligns with Crotty's (1998) assertion that students build their knowledge based upon the educational experiences they are exposed to and where they construct these experiences.

Context

Students who have been identified as having characteristics of giftedness, have at some point during their educational career been evaluated to meet the requirements set by the Department of Education. If a teacher suspects that a child may be gifted, (usually happens in elementary school, although it could happen any time), he/she must recommend the child for evaluation. The parent must then sign the consent for evaluation if they wish to have their child evaluated. The evaluation for the gifted program is conducted by the local gifted teacher. In order to qualify for gifted services, a child must meet the state mandated criteria in three out of four different areas: Mental Ability, Achievement, Creativity, and Motivation (Department of Education, 2017).

The Mental Ability and the Achievement categories consist of national normed-referenced tests. Students take the test with other students in the nation at the same time, and who are the same age. They are then given a percentile ranking according to how well they did among the same age peer group. The score received is not a "grade" out of 100, but it determines how they compare to the other students taking the test at the same time. In order to meet the criteria for the Mental Ability category, students must score in the 96th percentile or

higher on the Cognitive Abilities Test (CogAT). The CogAT Mental Ability (IQ) test is comprised of three sections which include: Verbal (picture analogies), Quantitative (number manipulation), and Nonverbal (picture manipulation). In order to meet the criteria for the Achievement category, students must score in the 90th percentile or higher on the Reading section or the Mathematics section of the Iowa Test of Basic Skills (ITBS).

The Creativity category consists of a portfolio of a variety of activities. This portfolio is evaluated by three other teachers in the county. Using a rubric, the student must receive a score of 90% or higher in order to meet the criteria. The Motivation category consists of a rating scale completed by the classroom teacher. In order for a child to qualify for this category, a score of at least 95% must be met.

If a student meets at least three out of four of these categories, the student will qualify for gifted services in the program. Once a child is identified and labeled as gifted, he/she is put on a gifted track with an accelerated curriculum. Gifted children are evaluated annually by their classroom teacher to make sure they are still performing at a high level in order to stay in the program. If they are not performing satisfactorily, they can be put on probation or removed from the program.

How does a student qualify for Special Education services?

Special Education in America is a field in flux with current trends constantly changing (Scull, Winkler, & Fordham, 2011). For decades the population of students with disabilities in the US has steadily increased. In the school year of 2004-05, the number of special education students peaked with 6.72 million students being served, which encompassed 13.8 percent of the nation's total student population (Scull et al., 2011). Since this peak, numbers have slowly declined and as of 2009-10, students enrolled in special education totaled 6.48 million, or 13.1

percent nationwide (Scull et al., 2011). Over the past decade, there have been some remarkable

differences within the special education population. These trends include a considerable decrease

in students identified as "specific learning disabled", "mental retardation", and "emotional

disturbances". However, other disorders such as Autism and "other health impaired" populations

have increased significantly (Scull et al., 2011).

According to the Department of Education website (for the state involved in this

investigation),

> The Divisions for Special Education Services and Supports include programs and
>
> services that support local school districts in their efforts to provide special education and
>
> related services to students with disabilities (Department of Education, 2010).

Some services provided by Special Education in the state include accessible instructional

materials, assistive technology, curriculum access/alignment, dropout prevention, family

engagement, least restrictive environment, positive behavior supports, transition, ensuring

compliance with federal and state regulations, along with collecting and analyzing data

(Department of Education, 2010). As of 2009-10, our state had a total of 177,070 students being

served in Special Education (Scull et al., 2011). This is a 10 percent decrease within four years,

the state had over 197,000 students enrolled in the program in 2005-06.

Within the Special Education placement, there are 13 classifications of disorders

according to federal regulations. They are: Autism, deaf-blindness, developmental delay,

emotional disturbance, hearing impairment, mental retardation, multiple disabilities, orthopedic

impairment, other health impairment, specific learning disability, speech or language

impairment, traumatic brain injury, and visual impairment (Scull et al., 2011). Some of these

categories have sub-categories which can cover a wide variety of diverse disorders. Nationally, in 2009-10, the "specific learning disability" eligibility had the highest population with 37.5% of special education students. Speech or Language impairment is the second largest with 21.8% of the total special education population. Disorders consisting of 10% or less of the total special education population included Autism, developmental delay, emotional disturbance, and mental retardation (Scull et al., 2011).

There are different paths for a child to be eligible for Special Education services. For some, a medical doctor's report is enough to qualify a student, however, other students are sent through a long, arduous, tiered process. When a teacher suspects that a student may have a learning disability, he or she must begin the RTI or SST process. Work samples must be collected, and proper protocol followed, including parental consent. If the student does not respond to interventions put into place, the committee of teachers working with the child must decide to take the next step and request testing (although a parent could also request testing at any time).

Once testing is requested, and parental consent to evaluate is signed, the school psychologist then begins a series of formal evaluations. These evaluations usually include IQ tests, norm-referenced tests, behavioral rating scales, and social rating scales. The psychologist will decide which tests to use according to the data provided. After testing, an eligibility meeting will be held where the test results will be explained, and the committee decides if the student is eligible for special education services, and for which disability criteria the student meets. Once eligible, the committee will write the student's initial IEP (Individual Education Program), which is updated annually.

The most notable outcome of special education students is scholastic underachievement (Volpe, DuPaul, DiPerna, Jitendra, Lutz, Tresco, & Junod, 2006) including grade retentions and school drop outs (Lucangeli & Cabrele, 2006). Some research has shown that academic underachievement is most strongly related to behavioral problems associated with a disorder, which cannot be explained (Scime & Norvilitis, 2006). It has been documented that up to 80% of children with special needs have poor academic achievement (Cantwell & Baker, 1991). Further studies have documented that such variables as social skills, engagement, and standardized test scores have also had an effect on student's academic achievement and attitudes (Volpe et al., 2006). Impairments in social functioning, academic engagement, and study skills have been well documented in children with special needs (Volpe et al., 2006).

Studies have shown that educational opportunities are depressed for students who attend high poverty schools, and that economic segregation in public schools may be more harmful than racial segregation (Kirwan Institute, 2005). Literature on this subject suggests that the "socioeconomic composition of a school's student population is an even stronger predictor [of achievement] than an individual's home background" (Fullan, 2003, p.13). Studies suggest that residential arrangements within a school district can be a key element in school segregation (Kirwan Institute, 2005). If measures are not taken to implement the offset of neighborhood segregation in school districts, then racially and economically segregated residential arrangements, have historically lead to segregated schools (Kirwan Institute, 2005). "As overt racism was gradually eliminated in the United States through the courts, it became inscribed in the land; the more the legal arrangements which upheld racial segregation were disturbed, the more they became socially and geographically enforced" (Kirwan Institute, 2005, p. 11). Despite these inequities of economic segregation, the county middle school involved in this study has a

higher CCRPI score than the neighboring city middle school (Department of Education, 2017).

There are several factors that can protect against the negative outcomes often associated with low-income schooling, one of which is a positive and supportive relationship with an adult, most often a teacher (Murray & Malmgren, 2005). Low-income students who have strong teacher-student relationships have higher academic achievement and have more positive social-emotional adjustment than their peers who do not have a positive relationship with a teacher (Murray & Malmgren, 2005).

Participants

In order to obtain participants for this study, the researcher used purposeful, nonprobability sampling as described by Merriam & Tisdell (2015). The most common form of non-probabilistic sampling is purposeful, or purposive sampling (Creswell & Poth, 2018; Patton, 2015; Merriam & Tisdell, 2015). Purposeful sampling is based upon the idea that the researcher wants to understand, discover, or gain important insight about a specific phenomenon, and therefore must choose the best sample to acquire this information (Creswell & Poth, 2018; Huberman & Miles, 1994; Merriam & Tisdell, 2015). Purposeful sampling, "will intentionally sample a group of people that can best inform the researcher about the research problem under examination" (Creswell & Poth, 2018, p.148).

The researcher collaborated with other teachers in the school to gain knowledge about students with perceived dual exceptionalities. Due to the researcher's access of records, she was able to confirm or deny teachers claims of students with both disabilities and characteristics of giftedness, and sought participants that meet the requirements. For the purposes of this study, a student with perceived dual exceptionalities met one of the requirements of the many combinations of giftedness and disabilities (Baldwin et al., 2015b; Baum et al., 2001; Reis et al.,

2014). For instance, some dual exceptional combinations might have included: Gifted and

ADHD, Gifted and Other Health Impaired (i.e. cerebral palsy, traumatic brain injury, etc.),

Gifted and Autistic, Gifted and Blind/Deaf/or Hard of Hearing, Gifted and Learning Disabled (in

any area including mathematics, written expression, reading, etc.), Gifted and Emotional

Behavior Disorder, Gifted and Mild Intellectual Ability, or a Special Education student (with any

of the aforementioned disabilities) served in the Gifted Curriculum.

There are exactly 13 participants in the current study. The participants of this study

include four student participants in middle grades, four parent participants, three teacher

participants, and two raters for student drawings. All participants within this qualitative

investigation are delineated below:

Student participants. The student participants of this study are middle school students (grades 6-

8, ages of approximately 11-14) from one middle school. Patton (2015) recommends that a

minimum sample size should be "based on expected reasonable coverage of the phenomenon

given the purpose of the study" (p. 314). Three students are male, and one is female. Two

students are in sixth grade, one is in seventh, and one is in eighth. These students reside within a

rural town and attend a public Title I middle school. Two students have an IEP and receive

specially designed instruction in the special education program. The other two students receive

instruction in the gifted education program. All four students also have an exceptionality. At this

particular middle school, as well as other schools in this area, students are identified and

educated in either the special education program or the gifted program exclusively. A specific

program dedicated to students with dual exceptionalities currently does not exist.

Student participants were chosen by cross reference between the list of gifted students

and the list of special education students (including 504 and SST students) at the researcher's

school. The researcher obtained a list of names from the principal of all students served in gifted for mathematics, and then another list from the Special Education Lead Teacher at the school of all the students with special education services (with an active IEP). The researcher then obtained a list of all students at the school with a 504 plan, or an SST file from the 504/SST Coordinator. These three lists were then cross-referenced by the researcher who was then able to identify several students who were perceived to have dual exceptionalities. The researcher then chose two boys and two girls across grade levels. There were only approximately 10 students in the school (grades 6-8) who met the qualifications for having perceived dual exceptionalities (possessing a disability and a gifted exceptionality). Four students were selected and the researcher gained parental consent. Parental consent was gained from three out of the four students chosen (two males and one female). One of the female student participant's parents declined the study due to extraneous external factors. The researcher was unable to find another willing female participant; therefore, another male participant took the place of the fourth student participant. Although it was the intent of the researcher to represent males and females equally, the parameters of the bounded case would not allow any other female options.

Teacher Participants. The teacher participants involved in this study are the mathematics instructors for each student participant. Since the school involved in this study has year-long classes and each student is required to take mathematics, it will be certain that each student participant has a mathematics teacher. A total of three mathematics teachers are involved in the study: one sixth grade teacher for the two sixth grade student participants, one seventh grade teacher, and one eighth grade teacher.

Parent Participants. The parent participants involved in this study are the parents/legal guardians of the student participants. The researcher received parental consent for each participant. Parents

were informed that their child's participation was voluntary and that he or she may withdraw

their consent at any time without penalty. After parental consent was gained, student assent was

secured. The researcher explained the study to each student and then allowed them to choose

whether they would like to participate or not. They were informed that they may withdraw their

assent at any time without penalty.

Rater Participants. The researcher chose two of her colleagues to complete the rating scales for

the student drawings. These two adult participants were not involved in the study in any other

manner other than rating the student drawings.

Setting

The current study took place within a Title One middle school located in a rural town, in

the southeastern part of the United States. This middle school is comprised of grades 6-8 and

according to the last Full-Time Equivalent (FTE) data from October 3, 2017, there were 940

students; 46% girls and 54% boys (Department of Education, 2017). The school has 63% of

students who qualify for Free or Reduced Lunch. The school has been in this facility for over 20

years. The demographic make-up of the students is as follows: 62% Caucasian, 14% Black, 18%

Hispanic, 5% Multi-racial, and 1% Asian. Approximately 13% of students are served in Special

Education, 16% of students receive gifted services, and 4% are served in the English Language

Learner (ELL) program (Department of Education, 2017).

The staff at this school consists of one principal, two assistant principals, two counselors,

one school nurse, 35 grade level content area teachers, 11 connections (non-content elective)

teachers, 11 special education teachers, one media specialist, and 24 additional staff members

including paraprofessionals, secretaries, custodians, and cafeteria staff. There is little turnover in

administration. The school's leader has been there for 13 years, which offers the school stability and security.

Why the Mathematics Classroom?

The researcher chose the mathematics classroom for the current study for multiple reasons. First, the researcher's background is in mathematics: she has a Master's Degree in Teaching Secondary Mathematics and has experience in teaching mathematics in almost each grade level 6-12. Second, the middle school years of mathematics consist of very important foundational mathematics curriculum that students must build on in high school mathematics, and college mathematics (Charles & Carmel, 2005).

Mathematics was also chosen as the content area to observe because research has shown that performance in mathematics and science courses taken in middle school and high school are a key predictor for future success of students (Anderton, Hine, and Joyce, 2017). With an increase in technology and digitalization, there have been some shifts in what it means to be mathematically proficient in today's society both in pedagogy and content (Gravemeijer, Stephan, Julie, Lin, & Ohtani, 2017). With STEM education on the forefront of the mathematics field, skills such as problem solving, critical thinking, collaborating, and communication are now on the agenda of mathematics educators (Boaler, 2016; Sumarna & Herman, 2017). The focus has shifted from calculations to critical thinking; and from individual work to collaboration (Anderton et al., 2017; Gravemeijer et al., 2017).

Data Sources

The following data sources were collected throughout this study and are summarized below: Observations, Student Drawings, Teacher Interviews, Parent Interviews, Student Interviews, and a review of Documents. Each data source was analyzed for each case, and then a

cross-case analysis will be conducted (Stake, 2005). Multi-case research with cross-case analysis is recommended as an effective type of dissertation research (Stake, 2005, 2006). Justification for the data sources used in the current study is provided below.

Data Source 1: Observations

In social and behavioral sciences, observation has been referred to as, "the fundamental base of all research methods" (Adler & Adler, 1994, p. 257). Qualitative researchers not only observe human interactions, they also observe the physical setting surrounding those interactions (Angrosino & Rosenberg, 2011). Observation can be a key tool in data collection for qualitative research (Creswell & Poth, 2018). Observation is the act of using the observer's five senses to observe a phenomenon in the field setting, frequently using a note-taking instrument (Angrosino, 2007). The observations conducted in a study, should be based on the study's research questions and purpose (Creswell & Poth, 2018). During an observation, the observer watches every detail of the observed. He or she may look around at the physical setting in the background of the participant and observe what the participant is wearing, saying, or doing. He or she may monitor the activities around the phenomenon, or study the interactions and conversations between the participants and others. It is crucial that the observer is aware of his or her own behaviors throughout the observation, and should take note of how that is perceived to change the outcomes (Angrosino, 2007; Creswell & Poth, 2018; Marshall & Rossman, 2016, Stake, 2006).

Observations within qualitative research typically take place in a natural setting for the activity being observed (Angrosino, 2007). Naturalistic observations attempt to be as unobtrusive as possible in order to maintain objectivity throughout the observation (Angrosino, 2007). Postmodernists in various disciplines have contested the objectivity of observations in qualitative research, emphasizing that observations cannot be purely objective because each individual

observer views the observed people through a filter of their own gender, ethnicity, social class, etc. (Angrosino, 2007; Creswell & Poth, 2018). However, using this filter as part of the study to further understand the phenomenon at hand will enrich the interpretations of the results of the research study (Angrosino, 2007). The traditional creed of observational research was coined by Gold (1997), when he claimed that researchers believed that developing standardized procedures was both desirable and possible in the field of qualitative research in order to

> maximize observational efficacy, minimize investigator bias, and allow for replication and/or verification to check out the degree to which these procedures have enabled the investigator to produce valid, reliable data that, when incorporated into his or her published reports, will be regarded by peers as objective findings (p.397).

While challenges of bias and subjectivity could possibly exist, observation still remains one of the most powerful and positive tools to collect data in qualitative research (Adler & Adler, 1994; Angrosino & Rosenberg, 2011, Gold, 1994). There are four types of observation engagement recognized by Creswell & Poth (2018). The first type is a "Complete Participant." This type of observer is fully engaged with the individuals involved in the observation, which could help develop rapport with the observed people (Angrosino, 2007). The second type is "Participant as Observer." In this case, the researcher is a participant at the site of the observation. The role of participant is more salient than the role of researcher (Creswell & Poth, 2018). While this type may allow the researcher to obtain insider views of the activity, it may be difficult to accurately record data of the overall picture if he or she subjectively only sees their view (Bogdewic, 1999). The third type of observer is the "Nonparticipant or Observer as Participant." This type of researcher stays at a distance and takes field notes of a group under study. The researcher is an outsider who records data without any direct involvement with people

or the activity (Bernard, 2011). The fourth type of observer is the "Complete Observer." In this case, the researcher is not noticed, or seen by the people being observed (Creswell & Poth, 2018). A skilled qualitative observer can seamlessly transform roles during an observation if needed. For instance, in an ethnographic study, the process of a researcher's role from an outsider to an insider is well-documented in field research (Bernard, 2011; Jorgensen, 1989).

Conducting an observation is a special skill and it requires the researcher to address sensitive issues such as the possibilities of deception from participants, impression management, as well as the potential for the researcher to become marginalized in an unfamiliar setting (Atkinson, 2015). Observing requires a series of procedural steps to prepare and conduct an observation. These procedures include: (a) selecting a site and gaining access, (b) identify who or what to observe, (c) determine which type of observation engagement based on role of observer, (d) design an observational protocol to use during observation, I record different aspects of the observation, including interpretations and descriptions, (f) introduce yourself to the people in your study in order to build rapport, (g) after the observation, withdraw slowly, and use effective observational procedures, (h) prepare notes that are timely, rich, and thick in narrative description (Angrosino, 2007; Bogdan & Biklen, 1992; Creswell & Poth, 2018). Figure 9 illustrates a visual representation of the aforementioned procedures.

Figure 9: Procedures for Preparing and Conducting Observations (Creswell & Poth, 2018, p.169).

Select a site to be observed and gain access.

Identify who or what to observe with help from gatekeeper.

Distinguish type of observation based on observer role.

Design and use an observational protocol to guide notes.

Record aspects including descriptions and interpretations of the observations.

Be introduced to build initial rapport.

After observing, slowly withdraw, using good observational procedures.

Prepare timely notes that are thick and rich in narrative description.

During an observation, it is important to record information using a predesigned observational protocol in order to accurately record timely data (Wolcott, 1994). The protocol should include open-ended questions and space to write the data. Most protocols include a header to document important information, along with the purpose of the study. The protocol should have adequate space for taking notes of their observations, and the researcher should be prepared to record data in different sections. For the purposes of the current study, see Appendix B for the Observational Protocols for the current research (Creswell & Poth, 2018; Marshall & Rossman, 2016).

Observations with descriptive field notes. Two student observations were conducted for each student participant with perceived dual exceptionalities, for a total of eight student observations. Observations took place during the first 20 to 30 minutes of mathematics class. Throughout these

four observations, data was collected using field notes. An example of the template used for the

observational field notes has been included in Appendix B (Marshall & Rossman, 2016). This

template includes space for informational data, such as date and time of day. It also has two

columns separating Descriptive Notes and Observer Comments. In the Descriptive Notes

column, the observer wrote detailed field notes. These notes include the layout of the classroom,

the number of students in the classroom, what the teacher is doing, what the students are doing,

and any other observable data. The Observer Comments column depicts the thoughts and extra

comments that came to mind during the anecdotal observation.

Data Source 2: Student Drawings as Research Tools

According to Golomb (1992) and Goodenough (1926/1975), student drawings have

historically been regarded as a reliable barometer of a child's emotional and cognitive

development. Though possibly underutilized as a tool of data collection, it has obtained more

support since the initial literature on the subject (Bessette, 2008; Cronin-Jones, 2005; Everett,

2017; Haney, Russell, Gulek, & Fierros, 1998; McHatton, Shaunessy-Dedrick, Farmer, Ray, &

Bessette, 2014; Sack, 1997; Tovey, 1996; Wheelock, Bebell, & Haney, 2000; Zumbrunn,

Ekholm, Stringer, McKnight, & DeBusk-Lane, 2017).

Haney et al. (2003) describe student drawings as a powerful tool to create discourse

around the learning experiences of adolescents. Student drawings have also stimulated

conversations among teachers about the differences of how they think they are teaching, and

what the student perceives (Bessette, 2008; Haney et al., 2003; Lifford, Byron, Eckblad, and

Zieman, 2000). The literature suggests that student drawings have a very strong effect on teacher

reflection and can be known to be a powerful impetus of change in the classroom and/or school

(Everett, 2017; Haney et al., 2003; Lifford, Byron, Eckblad, and Zieman, 2000; Sack, 1997). For

instance, in a study by Haney et al. (2003), after teachers analyzed their students' drawings, the researchers were surprised at the level of engagement of the teachers and their level of reflection. The student drawings led to conversations about how the teachers could spend more time with students doing collaborative activities, instead of in front of the classroom. Haney et al., (2003) remarked, "In short, the drawings proved an effective way to focus teachers' attention on how they were teaching, how students were engaged in the classroom, and how the reform efforts were affecting their classroom teaching" (p. 264). Sack (1997) demonstrated the power of student drawings to be a catalyst in reframing and clarifying novice teachers' perceptions of pedagogy and instructional inquiry.

A study conducted by Bessette (2008), utilized student drawings of middle schoolers to elicit perceptions of coteaching among general and special educators. The results of the study indicated that middle school students were five times more likely to illustrate themselves experiencing academic problems when compared to elementary school students. The findings of the study also suggest that adolescents in middle school displayed a 75% decrease of positive teacher dispositions and motivation, compared to elementary students (Bessette, 2008).

There are many benefits to constructing learner-generated drawings (Renkl & Nuckles, 2006; Van Meter & Garner, 2005). Student drawings can illustrate their self-perceived growth and development, as well as determine their academic capabilities and developmental level (Brittain & Lowenfeld, 1987). "It is through their drawings that children express the views and interpretations of their experiences" (Farokhi & Hashemi, 2011, p. 2219). Pictures drawn by children, or students, tell of the drawer's thoughts, existence, and inner self (Farokhi & Hashemi, 2011). Most people enjoy drawing because drawing stimulates the internal desire to express oneself. Drawings release the deepest feelings and emotions from one's heart (Farokhi &

Hashemi, 2011). Creative drawings are one of the easiest and most accurate ways to gather social information from children (King, 1995). "It is widely recognized that the content of children's drawings may provide insight into their feelings and thoughts about the world" (Crook, 1985, p. 3). Student's drawings can provide researchers a 'window' into their feelings and thoughts because they reflect their perceived images of his or her own minds (Thomas & Silk, 1990). There have been a number of studies supporting close relations between students' drawing accuracy and their problem solving performance in mathematics (De Bock, Verschaffel, & Janssens, 1998; Rellensmann, Schukajlow, & Leopold, 2017; Uesaka, Manalo, & Ichikawa, 2010).

In this study, each student was given a choice of paper, pencil, and colors. Research has found that children do not choose their tools by chance. The choice they make in paper and colors reveals information about their personality and mood. For instance, determined children are more likely to choose pencils with wide, fat points, while pencils with fine points are favored by children who have difficulty expressing or asserting themselves. The size of the paper they choose is a good indicator of the overall place a child wants to occupy in life. The bigger the sheet of paper is, the more the student wants to show themselves off, while the smaller the sheet of paper is, the less the child wants to show off; and it also indicates that the child has good concentration (Farokhi & Hashemi, 2011). The authors state, "When children draw they feel free to express themselves, to transmit strong messages, positive and negative, and also things of no great importance. So don't make hasty conclusions! Analysis of drawings is done through repetition of elements like color, shapes, and recurring details which point to meanings" (p. 2221).

General Interpretations of Children's Drawings. While there can be many different ways to analyze student drawings, there are some general guidelines that help to interpret drawings. These generalizations will be listed below in no particular order. These are taken from the research of Farokhi and Hashemi (2011).

- Drawing a very big person: Typically, very large drawings are an indicator of aggression and overactive behavior. Students who draw exaggerated human figures tend to not adept well.

- Drawing a very tiny person: Students who draw small human figures usually have feelings of fear, shame, incompetence, and/or depression.

- Head: If a student exaggerates his or her own head, this is an indication of an inflated ego. Children with a normal-sized ego, draw an appropriately sized head.

- Mouth: Children who talk a lot draw a very large mouth, and very large teeth if they are always willing to cut others down. However, children who draw an appropriate size mouth for the body are considered to think of themselves as more normal.

- Eyes: Children who draw large eyes tend to view the world skeptically. They are often disturbed children who feel they are being controlled or watched by others. For those who draw the eyes in very small circles, they are more likely to feel the shallowness and dependence of emotion. For those children who omit the eyes of a human figure altogether, is an indicator of an unwillingness to mix with others.

- Nose: Enlarging and emphasizing the nose holes is typically an indicator of aggression in children, while an appropriately sized nose is a sign of children who are self-harmonious supporters.

- Neck: Children who draw the human figure with an elongated neck are psychologically illustrating the difficulties they have in achieving his or her wishes or dreams. Children who draw no necks on their human figures are indicating that they are facing troubles in life.

- Hands: Hands that are stretched out indicate a desire to connect to other people or a willingness to help others and interact socially. In some cases, large hands have indicated a person who steals from others, and small hands indicate emotions associated with helplessness and insecurity. The absence of hands is sometimes observed in drawings from disabled children and/or abused children.

- Shading: When drawing human figures, shading the whole body is usually a sign of anxiety, but if only a particular region of the body is shaded, that usually indicates anxiety associated with that part of the body. The pen (or pencil) pressure reflects the muscle tension, and the weight of the degree lines indicates the level of energy of the child, which reflects if they rush or not.

- Faint lines: If faint lines are in the drawing, that typically represents low levels of energy (physical and mental) along with possible signs of shame and depression. Varying pen pressure demonstrate compatibility and flexibility.

Farokhi and Hashemi (2011) go on to emphasize that "analyzing children's drawings has always been (viewed) as a systematic measure to evaluate children's perceptions and attitudes towards their environment" (p. 2223). Student drawings represent an emotional indicator for environmental problems, and they psychologically indicate their attitudes towards certain situations (Brown et al., 1987).

Our perception is our reality, and everything we perceive has at some point been influenced by the perception of someone else (Mays, 1985). When children draw, they illustrate their visual perception of the world around them (Farokhi & Hashemi, 2011). These elements are crucial for mental representations and the development of higher thinking processes. Traditional theoretical approaches have suggested that student's drawings predominantly reflect their stage of intellectual and conceptual development. Students often know even more than what their drawings reveal (Grieve & Hughes, 1990).

While student drawings can be a powerful tool of data collection, it is important to note the limitations of student drawings as well. A student's interpretation of the events in a classroom are highly subjective, and the drawings are illustrations of the student's perceptions filtered through their unique psyche which could change over time (Bebell, 2001). Although there are limitations to each method, educational research can be richer when methods are mixed and multiple data sources are provided (Creswell & Poth, 2018). In the current study, student drawings were used in combination with multiple other sources to get a full picture of each participant's learning experience. Analysis of student drawings is provided within the Analysis section.

Students completed three drawings in total when given three separate prompts (provided in Appendix C). The students were pulled out of their first connection (or first non-academic elective class), and brought into another classroom to complete the activity. Art supplies were provided, including sketch paper, pencils, eraser, and a variety of colored pencils and markers. Student participants were first asked to "Draw a picture of what your learning experience in mathematics looks like." The second prompt as for them to "Draw a picture of how you learn best in school." The third prompt was "Draw a picture of how you *feel* when you are sitting in

your mathematics classroom." Twenty minutes were allowed per drawing in order to keep the task structured. As each student turned in his/her drawing, a pseudo-name which was pre-assigned to each student, was applied. The researcher asked each participant to interpret his/her drawing and the interpretation was attached to the back of the corresponding drawing.

Interviews

Interviewing is a qualitative data collection tool that has been described as a social interaction based on a conversation (Rubin & Rubin, 2012; Warren & Xavia Karner, 2015). Qualitative researchers depend upon interviews as a data source quite extensively (Marshall & Rossman, 2016). An interview is where "knowledge is constructed in the interaction between the interviewer and the interviewee" (Brinkmann & Kvale, 2015, p. 4). Interviews are so important to qualitative research, that in some qualitative studies, they are the only data source used (Marshall & Rossman, 2016). Interviews are ubiquitous in our multimedia world today (Marshall & Rossman, 2016), but it is important to know the difference between a talk-show interview edited for the audience's pleasure, and an in-depth qualitative research interview measured against standards of quality for researchers (Wengraf, 2001). Further, according to Brinkmann and Kvale (2015), the research interview is an attempt to, "understand the world from the subjects' point of view, to unfold the meaning of their experience, to uncover their lived world" (p. 3). The subjects and interview questions are chosen strategically, based upon the research questions and the purpose of the study (Brinkmann & Kvale, 2015; Marshall & Rossman, 2016; Rubin & Rubin, 2012).

There are a variety of different types of interviews via technology or face-to-face (Creswell & Poth, 2018). From one-on-one interviews to large focus groups, the type of interview chosen for the study should align with the goals of the study and it should be the most

advantageous for the given situation (Creswell & Poth, 2018). For instance, one-on-one

interviews should be chosen when the interviewer would like to get the best information out of

an individual, without that individual being influenced by the opinions of others (Krueger &

Casey, 2014). This type of interviewing could be via any form of technology or face-to-face

interactions. It should be noted that one-on-one interaction also includes audio-visual

multimedia, as well as written interactions using text messaging or a chat function online

(Creswell & Poth, 2018). A focus group would be most advantageous when individuals are shy

about sharing their answers in a one-on-one setting, or when the interviewees are cooperative

and similar to one another, or when time is limited (Krueger & Casey, 2014; Morgan, 1997).

These focus groups could also include interviews face-to-face, or via technology such as online

chat groups, or Internet bulletin board groups (Krueger & Casey, 2014). The less computer

literate or articulate interviewees may present a challenge to the interviewer because he or she

may not feel comfortable sharing their true feelings and therefore may provide data that is less

than adequate (James & Busher, 2009). As Creswell & Poth (2018) so graciously stated,

"Regardless of interview mode, care must be taken to create an environment as comfortable as

possible and, in group settings, to encourage all participants to talk and to monitor individuals

who may dominate the conversation" (p. 164). It is crucial that the interviewer makes the

interviewee(s) feel useful and valuable (Marshall & Rossman, 2016), because the generativity of

the interview (regardless of type or method), will depend upon the mutual willingness of each

person to engage in deep discussion about the questions (Kvale & Brinkmann, 2009; Marshall &

Rossman, 2016). As Kvale and Brinkmann (2009) state, "an interview is literally an *inter view*,

an interchange of views between two persons" (p. 2).

According to Brinkmann and Kvale (2015), the interview protocol should guide your interview process. These authors recommend having five to seven questions that are open-ended in nature and will get the most specific and helpful answers from the interviewees. They suggest for the researcher to have this protocol with them during the interview and to leave plenty of room in between each question. During the interview, the interviewer jots down notes in addition to the audio recording. The questions will be refined by using pilot testing. Yin (2014) suggests doing a pilot test to develop relevant questions and refine the data collection plans.

Interviewing is often considered a procedure with a series of steps essential for conducting qualitative interviews (Brinkmann & Kvale, 2015; Creswell & Poth, 2018; Rubin & Rubin, 2012). Brinkmann and Kvale (2015) and Rubin & Rubin (2012) both developed seven steps in conducting qualitative interviews. The seven stages of qualitative interview inquiry by Brinkmann and Kvale (2015) include: thematizing the inquiry, designing the study, interviewing, transcribing the interviews, analyzing the data, verifying the validity, reliability, and generalizability of the findings, as well as reporting the study. Rubin and Rubin's (2012) seven stages were very similar, but their model is not fixed; in other words, it allows for the researcher to change the direction of the interview at any time. With this model, the researcher can change the questions asked, the sites visited, or the topics to study.

Creswell and Poth (2018) built on the ideology of Brinkmann and Kvale (2015) and Rubin and Rubin (2012), and developed 10 procedures for preparing and conducting interviews in qualitative inquiry. These procedures include the following: (1) deciding which research question(s) based on the central phenomenon will be answered by the qualitative interviews; (2) using purposeful sampling, identify the best interviewees to answer the aforementioned research questions; (3) determine which type of interview would be the most advantageous for the study,

and which interactions will produce the most useful data to answer the research questions; (4)

when conducting the interviews (one-on-one or focus groups), use adequate recording devices

and procedures in order to accurately collect the data; (5) design and utilize an interview protocol

specific to the study; (6) refine the interview protocol by piloting the questions; (7) find and

secure a quiet place to conduct the interviews; (8) obtain consent to participate from all

interviewees by completing a consent form that has been approved by the human relations board

and any other appropriate authorities; (9) follow good procedures for interviewing human

subjects; and (10) decide logistics about transcription beforehand (Creswell & Poth, 2018).

Below is a visual model of these 10 steps.

Figure 10: Procedures for Preparing and Conducting Interviews (Creswell & Poth, 2018).
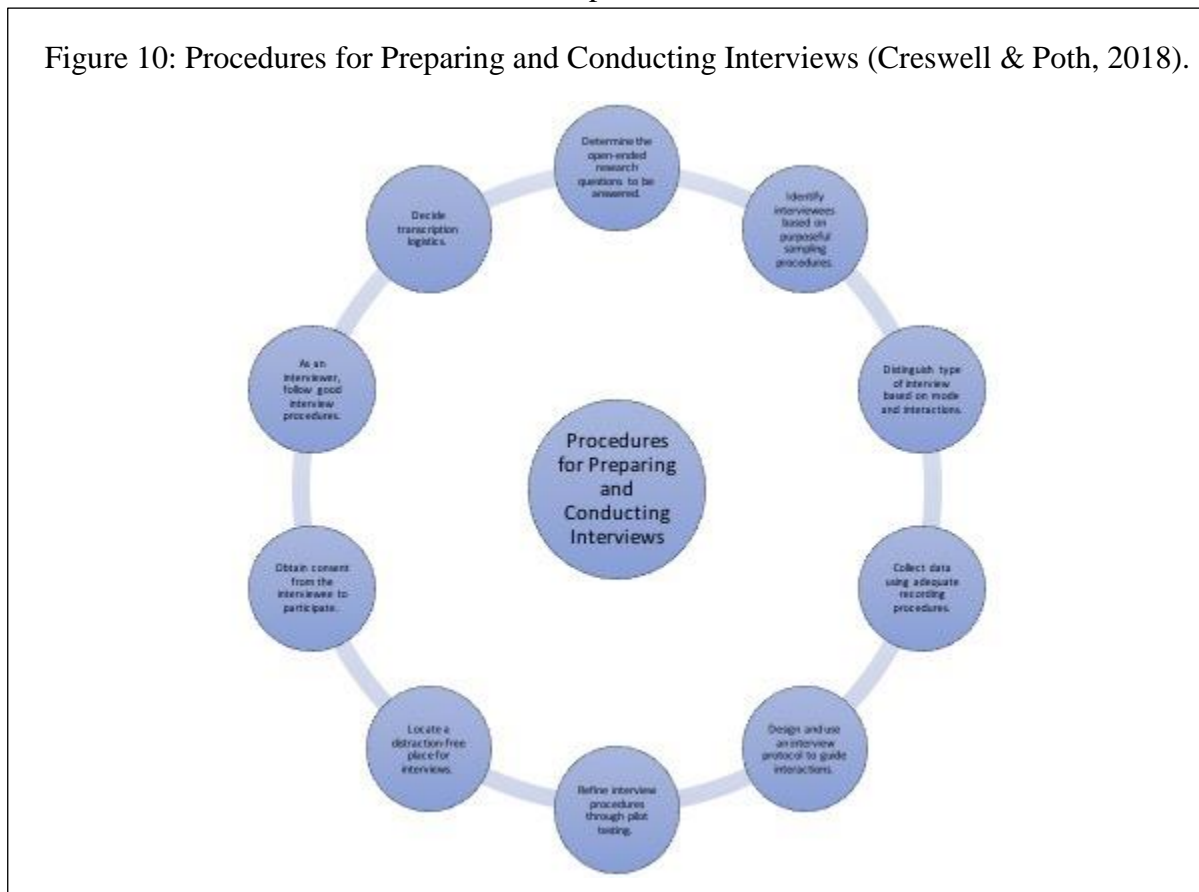
In order for an interview to be effective, it is crucial for the researcher to be prepared to

ask follow-up questions or elaboration questions. Rossman and Rallis (2012) identified three

types of follow-up questions that are crucial in order to get rich data out of an interview. These

three question types are open-ended questions, open-ended clarifications, and detailed

elaborations. While the researcher of the current study plans to do semi structured interviews,

there still needs to be flexibility, in order to be prepared for follow-up questions.

Semi-structured interviews are somewhat more scripted than other types of interviews,

and do not always yield time for follow-up questions (Marshall & Rossman, 2016). Semi

structured interviews allow for an iterative and systematic gathering of information where an

interview protocol is arranged in an order that will draw out the richest data, but also focuses on

data analysis that is most efficient (Galletta, 2013). The current study uses a semi structured

interview protocol because of the fact that the research is in the education field and it is time

sensitive. This research needs to be time efficient in order to finish before the students get out for

summer.

Interviewing is a very beneficial data collection tool for qualitative inquiry (Creswell &

Poth, 2018; Marshall & Rossman, 2016). An interview has the power to generate data quickly on

the spot. If something is ambiguous to the researcher, he or she can follow-up immediately with

their data source (the interviewee), and clarification is available without delay. Another benefit

to interviewing is the depth of information that is available. Each interviewee has their own

background and filter to the topic at hand, so they will be able to provide a unique perception

that could not be replicated. Another benefit of interviewing is that the interview allows the

interviewer to understand the deeper meaning that everyday activities may hold for that

individual (Marshall & Rossman, 2016).

While there are many benefits to interviewing, there are also limitations (Marshall &

Rossman, 2016). Often, interviews can be a very intimate experience, depending upon the central

phenomenon, and building trust quickly with a stranger can be difficult. Sometimes interviewees

may feel uncomfortable sharing their feelings, or they may be unwilling to give away the desired information intentionally (Marshall & Rossman, 2016). Interviewers should try to have excellent listening skills, well-articulated, and know how to interact with others on a personal level. They should be skilled in framing their questions, while gently probing interviewees for elaboration when needed. These skills will help reduce the limitations and increase the quality of the data (Marshall & Rossman, 2016; Wengraf, 2001). It is also important for the interviewer to be sensitive to the interviewee's feelings and time constraints. The interviewer must be compassionate, empathetic, and caring in order to develop rapport and trust with the interviewee. The interviewer must also be well-prepared, well-read on the topic at hand, and well-spoken so that the interview returns the maximum volume and richest data possible (Creswell & Poth, 2018; Marshall & Rossman, 2016; Roulston, 2010; Wengraf, 2001).

Semi-Structured Open Interviews. Semi-structured interviews include conversations between the interviewer and interviewee about a specific subject, steered by a set of questions (Fylan, 2005). Although the interviewer has a set of questions to cover the topic, the conversation is free to vary, and each interview between participants will most likely change substantially (Fylan, 2005). Semi-structured open interviews are used when the researcher wants to talk to people about their experiences or what they think/feel about something of interest (Arksey & Knight, 1999). "Semi-structured interviewing allows a systematic and iterative gathering of data where questions are arranged in a protocol that evokes rich data but is also focused for efficient data analysis (Galletta, 2013; as quoted by Marshall & Rossman, 2016, p. 150). The semi-structured open interview was chosen for this study due to the flexibility of the design, and the ability to explore more complicated research questions (Fylan, 2005). The research questions guiding the current research cannot be answered by asking questions that answer, 'how many' or 'how

much'. This qualitative inquiry can best be investigated by semi-structured open interviews because it is such a versatile way to collect data, and it can be used to acquire a much deeper meaning of the research question by examining differences among participants' accounts (Fylan, 2005).

While interviews (student, teacher, and parent) are being conducted, the interviewer wrote brief notes with paper and pencil, but also recorded the interview on an iPhone using a voice-recording app called "Voice Record Pro", downloaded from the Apple Store. Voice Record Pro is a professional voice recorder app that allows you to record voice memos and on-site sounds for an unlimited length with configurable quality. This app will work for face-to-face interactions, phone conversations, or other multimedia technology communication tools such as Skype or Facetime. From this app, it is a one-step process to convert the recording to MP3 format, which can then be sent as an email attachment to easily share with others. The app also has a feature that can allow the user to trim a recording to a desired length and save it to a new file and the app allows access between iPad, iPhone, and other desktop computers. The application has a built-in protection system for M4A recording in advanced engine to recover the recording in the case of a battery failure or crash. The app is very visual, and provides a VU meter that constantly measures decibels of sound. Next, the researcher used a data analysis software program to store, organize, and retrieve the data. These organizational features helped the researcher find patterns which exist among the data and assisted the researcher in synthesizing the data to form themes.

Atlas.ti 8 software was downloaded on a personal Mac desktop. This procedure used for all interviews conducted in this study, including teacher, parent, and student interviews. For each

interview, the same protocol was followed. All interviews were transcribed and included in the analysis of the study.

Data Source 3: Teacher Semi-Structured Open Interviews

The purpose of the teacher interview was to gain insight into the teacher's perception of their student. The researcher's questions included: how do students with perceived dual exceptionalities viewed? How well do teachers understand students with perceived dual exceptionalities? How do teachers define "dual exceptionality"? Do teachers think their students are placed in the most appropriate instructional setting?

Teachers were interviewed during the first 20 minutes of their planning period. Appendix D provides a list of sample questions that the researcher asked each teacher. The teacher participants in this study signed a consent form provided by the researcher. Questions in the interview included: "Tell me a little bit about (name of student participant), and what his or her typical day looks like in your mathematics classroom." Another question for teacher interviews include, "What are the student's strengths and weaknesses? Be specific."

Data Source 4: Parent Semi-structured Open Interviews

The legal guardians of the student participants were interviewed using a semi-structured open interview protocol. Parents were interviewed and asked to discuss the challenges faced by their children during their school years (see Appendix D for Parental Protocol). All parent interviews were audio-recorded. At the beginning of each interview, I reviewed the purpose of the study, the amount of time it should take, their right to assent, and what my plans were for the results of the study. Parents provided a brief history of their child's experience of school in elementary school, and overall, how their child feels about their learning experience.

Data Source 5:Student Semi-Structured Open Interviews

Each student participant was interviewed. The purpose of interviewing the student was to gain a direct perspective of the learning experiences of students with perceived dual exceptionalities. These interviews took place immediately upon completion of their drawings. More specifically, students were asked the three interview questions listed in Appendix I. The student interviews were limited to a 20 to 30- minute time frame. The researcher expressed gratitude to the student for being involved in this study and taking time to be interviewed for the study. This was scripted and read to each interviewee. The interview took place in the researcher's classroom, one-on-one. The interview protocol is listed in Appendix E.

Data Source 6: Document Review

In order to provide a deeper understanding of how each student initially began their current placement, it was important to review their educational history. Documents included the student's IEP, 504 Plan, or gifted test results. More specifically, the students' present level of performance was analyzed as well as their progress notes, grades, and psychological evaluations. These documents provide insight into the students' disability and gifted characteristics, and allow the researcher to capture a deeper, richer view of the data collected from multiple sources.

Procedures

Data collection began with student observations. Each student was observed twice during his/her mathematics class. The observation protocol located in Appendix B was utilized while observing students. Next, parent and teacher interviews were conducted. Interviews were transcribed and stored electronically. The interview protocol for parent and teacher interviews can be found in Appendix D and E, respectively.

Next, student drawings and interviews were conducted contemporaneously. Student

interviews were transcribed and stored electronically. Students drawings were then analyzed by

two raters. These results were then converted into themes (Appendix W and Appendix X). All

data collection procedures are enumerated in the table provided in Appendix J.

Confidentiality

All data have been kept on a password-protected computer located in the researcher's office

environment. Participants' identity was not revealed in any way during the study. At no time

during the study were participants' names or personal data disclosed. Complete anonymity was

maintained. The student drawings were kept in a locked file cabinet. All audio recordings were

also kept in a locked file cabinet on an audio device. All paper data will be destroyed one year

following the end of the study via shredding. All electronic data will be destroyed one year

following the end of the study via erasure.

Data Analysis

Qualitative researchers must analyze their data in order to explicitly identify, or

categorize the reasonings behind their interpretations of the data (Creswell & Poth, 2017,

Wolcott, 2009). The process of analyzing data in a qualitative study can be complex, as the

researcher must take an ambiguous mass of data collected and bring order and structure to it

using the most effective analysis strategy (Creswell & Poth, 2017; Miles & Huberman, 1994;

Marshall & Rossman, 2016, Wolcott, 2009). The purpose of qualitative data analysis is to

explore and search out general statements about the underlying themes and relationships of the

data collected, and then to describe those relationships and build grounded theory (Strauss &

Corbin, 1997). True data analysis, within the context of qualitative inquiry, combines a rich

description of the data, a thorough analysis of the data, and a vivid interpretation of the data

(Marshall & Rossman, 2016; Wolcott, 1994, 2009). Although the data collection process is both recursive and reflexive, the analysis of the data is vital to the study (Merriam & Merriam, 2009).

The current study uses three analysis strategies offered by Creswell and Poth (2017), consisting of (1) data preparation and organization (i.e., transcribing data for analysis, or preparing student drawings/image data for analysis), (2) the development of themes through a process of coding, and (3) writing up the results of the study and representing the data in tables and figures (p.183). Data was prepared and organized by transcribing all the interviews, and creating and organizing data files based on all interviews, observation notes and protocols, and documents collected. The text was then read and reviewed while the researcher made margin notes and formed initial codes. Next, each case and its content by was classified by initial codes and transformed into themes. Categorical aggregation was used to develop and assess interpretations. Patterns were discerned for applicability for establishing themes. Lastly, an in-depth analysis of each case was conducted and cross-case synthesis (Miles & Huberman, 1994) comparing the cases and developing generalizations about what was learned from the study (Creswell & Poth, 2017, p.199), was conducted.

Analyzing Student Drawings

In order to analyze the student drawings in this study, the four coding schemes offered by Bessette (2008) were utilized. The coding schemes are as follows: Emergent Analytic Coding of student drawings, Trait Coding, Holistic Coding, and Holistic Review. The researcher and 2 raters coded the student drawings.

For Emergent Analytic Coding of student drawings, a checklist was developed with explicit traits (similar to the sample checklist in Appendix G). In this step, raters reviewed an initial set of drawings and independently create a checklist which will record specific features,

such as the presence of students, teachers, books, laptops, etc. These checklists were compared and the results were combined into one master list, referred to as the features checklist (Bessette, 2008). The purpose of the features checklist was to quantifiably interpret the data in an objective manner. The remaining student drawings and the features checklist serve as a draft-coding sheet where the presence or absence of certain features can be noted (i.e. Appendix G). The results of the coding were then compared and the features that had a high level of agreement, were fused into a formal description with an operational definition where needed. The features that had low levels of agreement were eliminated from the master list (Bessette, 2008).

Next, the *trait coding* scheme captured the student drawings at a more abstract level (Haney et al., 2003). The drawings were again reviewed and rated based on a certain trait, whether negative or positive. The coding results were compared, and new categories were added where needed (Bessette, 2008).

The *holistic coding* scheme included an overall interpretation of the drawing (Bessette, 2008). Traits with a high agreement level from the trait coding approach were transferred to an interpretive checklist (see Appendix H for sample), where overall judgements about specific situations were recorded.

The *holistic review* was the fourth and last level of coding. For this level, the researcher met with the participants' mathematics teachers, and asked them questions provided in Appendix I. Their responses were audio-recorded. These recordings were added to Atlas.ti and analyzed for emerging patterns and themes.

Previous research indicates that "Student drawings can assist researchers in understanding perceptions of classroom experiences…and the sharing of these experiences through students' original drawings provides teachers and other school personnel with valuable

insight regarding student needs and perceptions" (McHatton, Farmer, Bessette, Shaunessy-Dedrick, & Ray, 2014, p. 40). Depictions in student drawings can be representative of a range of learning experiences and serve as an excellent tool for fostering teacher reflection of instructional pedagogy and practice (Haney et al., 1998). Student success in school hinges on a variety of factors from past experiences, the individual student's characteristics, and perceptions of learning experiences in the classroom (Juvonen, 2007; Patrick et al., 2007). Recognizing and acknowledging student voice, including students of all ability levels, is one of the first steps in promoting a classroom environment where students feel supported and cared for; which are two of the most essential elements of stimulating positive student outcomes (Lumpkin, 2007).

Triangulation

A triangulated approach to data collection was utilized for this qualitative case study. Triangulation is the "act of bringing more than one source of data to bear on a single point" (Marshall & Rossman, 2016, p. 262). Validity refers to the degree of which measurements and observations are a true depiction of some reality (Creswell, 2007). Reliability refers to the ability to replicate the findings of the research (Marshall & Rossman, 2016). Validity and reliability are important measures of trustworthiness which can judge the soundness a qualitative study (Marshall & Rossman, 2016). One way to achieve validity and reliability is through triangulation of the data (Creswell & Poth, 2017; Marshall & Rossman, 2016; Miles et al., 2014).

The current study shows evidence of triangulation in its utilization of the following: (a) varied data sources, (b) multiple data sources, (c) multiple participants, (d) visual data as well as written data, (e) a review of relevant literature and (f) member-checking. The related literature will be used to support or refute the study's findings.

Increasing Validity: Member Checking

In qualitative research, member checking (Birt, Scott, Cavers, Campbell, & Walter, 2016; Harper & Cole, 2012), also known as respondent validation, is used as a way to increase internal validity, credibility, and accuracy. Member checking is quality control process used by researchers to increase the validity of their research by asking them to clarify answers from data previously collected such as a recorded interview, or other data (Barbour, 2001; Byrne, 2001; Coffey & Atkinson, 1996; Doyle, 2007; Lincoln & Guba, 1985). In the current study, member checking was utilized to increase the validity of the analyzation of student drawings. Once students finished their drawings, they were asked to interpret each drawing, and according to their answers, clarifying questions were asked.

Member checking is primarily used in qualitative inquiry methodology and is defined as a quality control process by which a researcher seeks to improve the accuracy, credibility and validity of what has been recorded during a research interview (Barbour, 2001; Byrne, 2001; Coffey & Atkinson, 1996; Doyle, 2007; Lincoln & Guba, 1985). Member checking is also known as participant verification (Rager, 2005), informant feedback, respondent validation, applicability, external validity, and fittingness (Morse, Barrett, Mayan, Olson, & Spiers, 2002).

Limitations

The limitations of a study are derived from the study's design and the conceptual framework that bind the study (Marshall & Rossman, 2016). Limitations also remind the reader that research is framed and situated within a specific context, bounded by time and scholarly traditions (Creswell & Poth, 2017; Marshall & Rossman, 2016). While limitation discussions should acknowledge the study's generalizability, it should also reinforce the strengths and unique purposes of the qualitative study (Creswell, 2013).

One limitation of the current study is that it relies on self-reported data, i.e., researcher must take what people say (or draw) at face value. If the researcher notices an outlier in the data it could potentially bias the results.

The fact that the researcher is also a teacher at the study site could also be viewed as a limitation since the participants may feel too familiar with researcher or want to please the researcher with responses they imagine the researcher would like to hear. Knowing the students as well as the researcher does could present a limitation in the researcher's ability to remain impartial. Preconceived notions about each child based upon prior experiences can have an impact on the results. Knowing students' daily work habits, temperaments, and levels of academic achievement may be viewed as a limitation as the researcher may bring preconceived ideas to the research table.

Bias

It is virtually impossible to eliminate all bias from the study's data collection and analysis sections, and it becomes necessary to explicitly acknowledge bias and account for it, instead of avoiding it or trying to remove it. In some studies, bias can be a positive feature of the study because it can narrow the focus of the study and thereby limit the bounds of the research (Marshall & Rossman, 2016). However, if uncontrolled, bias can be a negative feature of the study because it can weaken the quality of qualitative inquiry by distorting the results and/or yielding different findings.

To control bias, the researcher attempted to refrain from asking biased interview questions, and asked for clarifications when necessary. The researcher actively listened to the responses of the interviewees and was prepared to probe with follow-up questions when appropriate. The researcher watched their body language, facial expressions, voice tones, and

other nonverbal communication. In order to reduce bias in the current study, the researcher used triangulation, nonjudgmental orientation, and contextualization. Nonjudgmental orientation is similar to suspending the emotional stance when watching a movie or reading a book, where one may disbelieve some parts of the story, but he or she accepts what may obviously be illogical in order to allow the author/screenwriter to unravel a riveting story. Contextualization takes into consideration the context and setting of the study, and explicitly state that information upfront in order to reduce bias.

Delimitations

According to Wolcott (2009), the term 'delimitation' is used to describe all the things that the study is *not* about. Delimitations are the boundaries that the researcher has set for the study. The delimitations are choices which are made by the researcher which are worthy of mention because by defining what the study is *not* about, it gives the reader a clearer picture of what the study *is* about (Simon & Goes, 2013). These choices could include decisions made by the researcher about the research questions, variables of interest, the paradigm, the methodology, the conceptual and theoretical framework, as well as the selection of participants.

The delimitations for the current study were chosen carefully and strategically. This study is not about programs offered by schools in the past, or budgets associated with FTE counts within local school districts. This study is not about students from other states, counties, or schools. The study is bounded by one middle school, in one county, in one state within the US.

Trustworthiness

To ensure reliability within a qualitative case study, it is crucial to examine the trustworthiness of the study (Marshall & Rossman, 2016). In order for research findings to be as trustworthy as possible, each research study should be assessed in relation to the research

methods and procedures used to produce the findings (Creswell, 2009). The goal of

trustworthiness in a research study, specifically a qualitative inquiry, is to support the claim that

the results of the study are worthy of attention (Lincoln & Guba, 1985). Instead of an indefinite

quantitative answer a qualitative research study, each inquiry will produce a probable meaning

from a specific perspective. Trustworthiness of the study's interpretations include establishing

claims for the most probable interpretations. Within qualitative inquiry, trustworthiness will

improve if the results of the study are presented in a way that allows for alternate interpretations

by the reader. The trustworthiness of the current study is predicated on the literature and research

methods chosen to investigate the topic of dual exceptionality.

Positionality as Researcher

A fundamental part of qualitative research is understanding how the researcher accounts

for how he or she discloses that world of secrets (Anfara, Brown, & Mangione, 2002; Howe &

Eisenhart, 1990). This investigation has given me an opportunity to reflect upon my own

assumptions and practice, particularly as they apply to providing equitable instruction to students

with exceptionalities. I am currently a special education mathematics teacher at a Title 1 middle

school in the Southeast U.S. with 8 years of teaching experience. I have five years of experience

teaching students with disabilities in mathematics (four years high school, and one year in

middle school), and I have three years of experience teaching advanced students who are

mathematically gifted and talented (all three years in middle school). In my experience with

children who have a disability and also characteristics of giftedness, I have observed how these

students struggle to fit in with other students, including gifted students or students with

disabilities. They struggle with low self-efficacy and low self-confidence. It is my mission to be

an advocate for this group of students, to ensure they are provided an equitable education and have exposure to the general curriculum.

Middle-grades students with disabilities who also possess characteristics of giftedness, pose interesting dilemmas for educators in terms of curriculum, instruction, and assessment. As of now, there are no services provided to accommodate students with dual exceptionalities, specifically, however, the phenomenon of dual exceptionalities became the topic that I desired to investigate.

Introduction to cases

George. George is a 6th grade male student being served in the special education program for Autism being served in gifted math. He comes from a single-parent household and he is the youngest of four siblings. He lives with his father, two brothers, and one sister. George was nonverbal until he was four years old, and he was not potty-trained until he was six. He was significantly behind his peers in all developmental development milestones of childhood. George had a very hard time socially transitioning into elementary school for multiple reasons. Teachers have struggled with placing George in the correct placement since he entered Kindergarten. Although he struggles socially, he is brilliant; specifically gifted in mathematics.

Caleb. Caleb is a seventh-grade male student with ADHD who is served in the Gateway Gifted program for his traits of giftedness, specifically in mathematics and English Language arts. Caleb's teachers have described him as a brilliant student who must be redirected often due to his loss of focus. Caleb exhibits off-task behavior such as talking, getting out of his seat without permission, and not completing his assignments. Caleb was tested for the Gifted Gateway program in elementary school, and he was found eligible with ease. Caleb has an IQ of 122 and is incredibly intelligent.

David. David is an 8th grade male student with Cerebral Palsy, ADHD, and served in gifted mathematics. He suffered an in-utero stroke and he had a right-side hemiparesis. After this, he was diagnosed with cerebral palsy, which affects the right-side of his body. This limits David's motor function when he becomes fatigued, and it affects his awareness of space. At school, this can make it difficult for David to do simple tasks such as balancing in a chair, carrying a lunch tray, or buttoning/zipping his pants after a restroom break. Teachers describe David as a joy to have in class with a very strong work ethic.

Jane. Jane is a 6th grade female student with an active IEP, served in the Eligibility Category of Deaf/Hard of Hearing, who has gifted characteristics. Jane has a moderate to severe bilateral sensorineural hearing loss. She has missed a significant incidental learning of vocabulary and background knowledge due to her disability. She wears hearing aids with an FM system attachment to connect wirelessly to a microphone that the teachers wear around their neck; but even with the hearing aids, she cannot hear as her non-disabled peers can. Jane also has a sign-language interpreter who follows her to each class throughout the day and interprets everything the teacher says using American Sign Language. Her teachers describe her as a very sweet and shy girl who is an excellent student. She completes her classwork and homework, and she has a strength in mathematics. Jane exhibits gifted characteristics in the areas of creativity, artistic ability, and motivation. She is an incredible artist who is constantly doodling in class and during down time.

Summary

In summation, this qualitative study employed case study methods to discover how adolescent students with perceived dual exceptionalities depicted their learning experience within a middle-grades mathematics setting. Using descriptive observations with field notes, in-

depth semi-structured interviews with teachers, parents, and students, student drawings, and a

review of documents, the learning experiences of students who possess disabilities and gifted

characteristics were investigated. The researcher synthesized the data collected from multiple

sources to see how the perceptions of the participants aligned (Creswell & Poth, 2017). Student

participants (cases) were briefly introduced. Chapter 4 will present the results of each case within

the gifted educational setting.

Chapter 4

Caleb and David: Students Educated in a Gifted Education Setting

Chapter 4 presents the results of the study based upon the perceptions of Caleb and

David, two middle grade students within a gifted educational setting. Both students are perceived

to have dual exceptionalities, and both have an active 504 Plan in place. This chapter presents a

thematic interpretation of the students' perceptions of their learning experiences from the

perspective of their mathematics instructional setting as well as other academic contexts. Major

themes will be presented supported by data provided by the students themselves as well as their

teachers and their parents. For each student, a thorough review of documents will be presented,

including details about background information, summary of previous assessments along with

current progress in school, and summaries of important information from interviews and

observations. Both cases are presented below:

Case #1: Caleb

Caleb is a 13-year-old, seventh-grade male student with Attention Deficit Hyperactivity

Deficit (ADHD) who receives academic instruction in the Gifted education program, based upon

his traits of giftedness, specifically in mathematics and English/Language Arts. Caleb's ethnicity

is White, not of Hispanic origin and his primary language is English.

Caleb comes from a family where he lives with his biological mother and father, along

with a younger sister. His mother has a Master's Degree in Education and is a teacher. His father

has an Associate's Degree and is employed at a local business. According to the review of

documents, Caleb's mother reports that Caleb was the product of a normal pregnancy and was

healthy at birth. Developmental milestones were achieved within normal limits with no problems

in growth or development. He reached all developmental milestones within an average or

advanced range (such as crawling, sitting, walking, and speech). Caleb's early childhood care was at home with family (no baby-sitter, daycare, or nursery school). When Caleb began pre-K, his mother and father began to notice an increase of their child's activity level. His mother described Caleb's activity level as "average" as an infant and a toddler, but as "overly active" as a preschooler and entering Kindergarten.

A review of Caleb's psychological profile yielded additional information related to his early educational career. By the time Caleb's parents had an outside psychological evaluation completed on Caleb at age seven, he had a lengthy history of hyperactivity, distractibility, poor concentration, difficulty with task completion, impulsivity, and disorganization. Although he was relatively well behaved at school, it was reported that he became defiant at home. There is a history of paternal ADHD. Attentional, learning, and social/emotional behaviors were also assessed. Test results showed that Caleb has a Combined IQ of 122 (Verbal-119, Non-verbal-121, Combined Memory Index-102), which is in the "Superior range of Intelligence" according to the Woodcock Johnson Tests of Achievement. It was reported that Caleb is a bright young man who is capable of superior performance in school. His notably lower score on the memory index, although still within the average range, does suggest possible attention problems. Caleb is somewhat restless and distractible, with notable strengths in mathematics calculation and applied problems. It was also noted that he is not, however, performing to his potential in either reading or written language. This may reflect a lack of appropriate attention and/or effort. Given his history, cognitive profile, behavior checklist, and continuous performance test scores, Caleb qualified for a diagnosis of Attention Deficit Hyperactivity Disorder (ADHD), Combined Type.

Caleb appears to be in good health and his mother described him as overly active and always on the move. He has vision difficulties which are corrected by glasses. He is currently on

medication for ADHD, which helps him maintain focus on extended academic tasks. Caleb's

mother reports that he feels happy with himself and he plays well with other students. He has

very close friends and he seems to relate well with adults. Caleb does not adjust readily to

change and can sometimes be fearful. He is openly affectionate to family and is friendly and

trustworthy. Caleb's mother reports that when he is not taking his medication, he displays the

following traits: difficulty controlling anger, aggressiveness, impulsive behavior, restlessness,

poor self-control, daydreaming, frustration, and irritability. His teachers notice when Caleb is not

medicated. The Child Study Team agreed that Caleb was very well-behaved, noting that when he

does not take his medicine, he *will* act differently.

Academically, Caleb has earned straight A's throughout middle school. He has excellent

scores on all standardized tests and he had a 945 Lexile score upon entering middle school. He

has satisfactory behavior and excellent attendance. Caleb's teachers have described him as a

brilliant student who sometimes struggles to focus. Caleb was tested for the Gifted program in

elementary school, and he was found eligible.

For hobbies, Caleb enjoys playing video games, playing outside, and drawing or coloring.

He also enjoys gymnastics, and he competes in gymnastics team competitions at the state level.

He spends hours at the gym every week and the program involves tedious training and intense

discipline. This activity has really improved his focus and concentration in every area of his life,

according to his mother.

Section 504 Accommodations

Caleb qualified for a 504 Plan as he has a physical or mental impairment that

substantially limits a major life activity (i.e., learning), and services are needed in order that his

Caleb's educational needs are met as adequately as those of nondisabled peers. According to his

most recent 504 Plan, Caleb struggles to maintain focus for an extended period of time and may

become frustrated with extended tasks. He may become easily distracted and exhibits hyper

tendencies without medication. For his seventh grade year, Caleb received the following

accommodations: (a) chunk or divide long term assignments when needed; (b) use graphic

organizer for written tasks; and, (c) provide extended time for testing in all classes and

standardized tests (time and a half). These classroom accommodations have worked well for

Caleb, according to his mother. He does not typically do well with timed tests or being under a

time restraint, so the extra time has been the most useful accommodation (Parent Interview

Transcript).

Demonstrated Strength in Mathematics

        Caleb's teacher reported that Caleb was a strong student and that he performed well in

mathematics. She also said that overall, he was an excellent mathematics student. She reported

that Caleb came to class everyday prepared with the correct materials (notebook, calculator, etc.)

and was attentive. He completed his homework each night, and was proactive about asking for

help if he needed it. She reported that he seemed very social, and to be well-liked by his peers.

She commented on his ability to balance sports (gymnastics and football) and academics well.

Regardless of how busy he was outside of school, he still put his academics first. He performed

well on daily classwork and on tests and quizzes. He understood new mathematics material

quickly and easily.

        Caleb's mother corroborated his teacher's description of Caleb's experience in

mathematics. She portrayed a comprehensive portrait of her son and strove to provide as much

information as possible. She reported that he has always excelled in mathematics. She said that

he has always been mathematically-minded. When he was younger, he played with Legos and he

played Minecraft, along with other hands-on activities that increase mathematical accuracy and problem-solving skills. She confirmed his creativity in the following excerpt:

> Since he was 2, he has been very innovative. He can take nothingness, like trash wrappers-or anything you can come across- and creates and builds things. Once we had some shish kebab sticks and burlap left over from a wedding, and he made a whole village of tee-pees. It's absolutely bizarre how creative he is. He loves to create…loves to make things. He's always thinking of what he can invent…always" (Parent Interview Transcript).

The literature documents prominent indicators of dual exceptionality as consisting of gifted characteristics such as higher-level intellectual abilities, excellent comprehension of abstract ideas and concepts, advanced vocabulary compared to same-age peers, ingenious sense of humor, vivid imagination, multiple and complex interests, and an expansive form of general observation (Coleman et al., 2005). While Caleb has historically excelled in mathematics, he has struggled with reading. Kalbfleish and Gillmarten (2013) found that characteristics of giftedness may be in combination with the characteristics of exceptionality, such as reading difficulties, very poor handwriting, difficulty with spelling, and inadequate phonemic awareness. Caleb has found reading challenging. Medication has had a positive effect on his skills in this area. Following a year of medication, Caleb's reading level improved from a first-grade level to a seventh-grade reading level by the 3rd grade.

Caleb had the same teacher for 3rd, 4th, and 5th grade in the Gifted education setting, and Caleb's mother said that this consistency helped him academically. She reported that his proficiency in mathematics bode well for his entry into the gifted program.

Caleb's 504 Plan (Writing) was not enacted until he was in the 5th grade. Caleb receives several accommodations, among which are opportunities to "chunk" his work, i.e., submit small parts of a whole assignment; utilize graphic organizers; and receive extended time for completing and submitting assignments, as a weakness in visual-motor integration leads to a challenge in writing. According to McCoach, Kehle, Bray and Siegle (2001), students with dual exceptionalities are, "students of superior intellectual ability who exhibit a significant discrepancy in their level of performance in an academic area such as reading, mathematics, spelling, or written expression" (p. 405). For Caleb, reading and written expression are clearly relative weaknesses.

While writing is an academic weakness for Caleb, his mother reiterated multiple times throughout the interview that mathematics is Caleb's academic strength. She also indicated that Caleb knows his strength and enjoys mathematics class. She said, "Caleb has always been very comfortable looking at a mathematics problem and talking about it, trying to figure it out. Even when he was a young kid, we would quiz him with multiplication fact games, or other mathematics exercises." (Parent interview). His mother reports that Caleb also likes History and anything involving Social Studies. Additionally, he enjoys learning about wars and the tactics with it.

When asked about social strengths, Caleb's mother reported that Caleb has a tight network of friends. He has five or six close friends that he has kept since elementary school. His mother reported, "I feel like he is friendly. He can make an acquaintance with anybody. He does fine socially. He transitions well. He can talk to adults" (Parent Interview Transcript).

The Masking Effect

Silverman (2000) claimed that standard psychological tests are biased toward students with dual exceptionalities due to the masking effect. In other words, they are clever enough to mask their academic weaknesses by overcompensating with their academic strengths. In Caleb's case, while he finds mathematics easy and fun and enjoys engaging in mathematics projects, he admitted that it could be difficult sometimes. When asked what part of mathematics is difficult, he revealed that word problems and setting up the equations for word problems were somewhat challenging, suggesting that he may be using his giftedness in mathematics to mask his less-honed skills, i.e., writing and reading comprehension.

ADHD and Giftedness

Children with ADHD and children who are gifted often engage in similar behaviors (Hartnett, Nelson, Rinn, 2004). According to Webb and Latimer (1993), both groups often possess high activity levels, have difficulty paying attention, act without much forethought, experience problems persisting on certain tasks, and have difficulty following rules. Both groups also often experience significant social difficulties and academic underachievement (Guenther, 1995; Leroux & Levitt-Perlman, 2000). It is somewhat rare to be identified as both ADHD and gifted concurrently (Harnett, Nelson, Rinn, 2004).

Gifted children are generally prone to experiencing social isolation and ostracism. When ADHD is also added to this, the gifted child experiences a deep sense of alienation stemming from the verbal or physical aggressiveness that may characterize his or her interactions with peers. In the midst of these difficulties with classmates and the ensuing negative consequences, the child's attitude toward school and academic achievement will also be affected (Mendaglio, 2005).

When asked about social weaknesses, Caleb's mother indicated that new situations can be challenging for Caleb. He tends to feel uncomfortable in new situations and he struggles with change. She also indicated that he can sometimes be a procrastinator, completing tasks very slowly. He mostly tries to make sure he is not making any mistakes. Caleb's mother indicated that he is very busy with extra-curricular activities as well. He has been involved in competitive gymnastics for the past four years, which requires a minimum of 12 hours per week of practice in the gym. Caleb's mother was knowledgeable of research-based strategies for ADHD and gymnastics. She stated that gymnastics, "has done wonders for his ADHD. There's a lot of research about gymnastics and tae kwon do really benefiting ADHD with core strength and cross-brain and things like that…it does wonders for him" (Parent Interview Transcript).

Caleb's mother revealed that her son enjoys activities that are hands-on or creative. Mathematics is absolutely his academic strength. When asked about his hobbies, Caleb's mother stated that he enjoys playing video games (although he has restrictions), and he stays active with chores around the house. She added, "We have to keep him active with his ADHD. He likes to be outside. He likes being artistic; drawing, coloring, anything like that" (Parent Interview Transcript).

An anecdotal observation of Caleb in his 7th grade mathematics class for students who exhibit giftedness, revealed that Caleb was observed as being prepared and on-task. He seemed self-motivated and serious about learning. Despite his ADHD, Caleb stayed on track. Caleb had completed his homework prior to coming to class. Caleb seemed to understand his teacher's directions and appeared to be attentive and engaged, raising his hand to volunteer an answer during questioning. He exhibited collaborative behavior, working well with others. Other students sought him out for his answers. He seemed socially aware and adept and appeared to be

mathematically confident and competent. Caleb answered nearly10 questions by the time the

researcher needed to leave. Despite his ADHD, he seemed to be exhibiting on-task behavior

consistent with a high-achieving student. He appeared to have gotten the mathematical problems

correct as well, since the in-class activity was a self-check assignment providing immediate

feedback. These data appear to support the notion that ADHD does not appear to affect student

performance for students who are perceived as having dual exceptionalities as it is possible that

his giftedness in mathematics is masking his Attention Deficit/Hyperactivity Disorder.

"Working Out All the Problems"

As this investigation is based on students' perceptions of their learning experiences

within a middle-grades mathematics setting, it seems important to include their visual self-

depictions (Bessette, 2008). Although Caleb's drawings consisted mainly of stick figures, his

message was compelling. When asked to create a drawing to the prompt, "Draw what it looks

like when you are in mathematics class," he drew himself in the front row in close proximity to

the teacher, smiling, and appearing to listen to the teacher very carefully. His teacher was

faceless but standing at the board (which is also blank), appearing to be teaching. Caleb is in the

picture, with his books and materials on his desk, appearing to be prepared for class. Behind him

is a student who is off-task, turned around fully in his seat and talking to the student behind him.

The third student in the row is facing forward but does not appear to be paying attention to the

teacher. Caleb revealed that his experience in mathematics has been a positive one. He

elaborated by saying that mathematics was "just easy for me."

Caleb's next drawing was a result of the prompt, "Draw a picture of what it looks like

when you are learning best in mathematics class." Caleb's drawing consisted of a large stick

figure in the center of the paper. His distinguishing spiky hair was present again in this picture.

He has a large smile on his face and he appears to be happy and positive. There is written text (e.g., "ready to listen," "attentive," and "eager") on his paper to appearing depict his readiness for instruction. Despite Caleb's ADHD diagnosis, he has depicted himself as attentive and eager to learn. When asked about his second picture, Caleb did not say much. He offered, "That is pretty much it. I just feel like I'm ready to learn when I go to mathematics class. I try to pay attention to everything that my teacher is teaching me."

Moving on to the third and final drawing, Caleb was instructed to, "Draw what it looks like when you are the best student you can be." In this drawing, there were no smiling faces and there was no one else in the picture. It appears that Caleb is the only one in a large, empty classroom. At the bottom left of the paper, he is sitting at his desk and it seems as if his arm is raised at an angle, as if to ask a question. On his desk is what appears to be his notebook. At the top left of the paper, the words, "Taking notes," and "Working out problems," is written. To the right of the paper, Caleb drew the white board that the teacher typically takes notes on. The board is completely empty. There appears to be a window in the wall again, but the window is blank and empty as well. There are no other distinguishing features (i.e., no teacher, no students, no smiles, no clock, no desks). The only other lines on the page are the lightly-drawn lines of the edges of the floor and the corner of the wall; three lines meeting together to form one corner of the room. The picture feels empty, void, lonely, and sad. It seems as if Caleb believes that he should be by himself working individually in order to be the best student he can be.

When asked about this drawing, Caleb offered few words. He simply said, "Yes, that's how I feel. I think to be the best student I can be, I need to just keep up with notes and work out all the problems."

Case #2: David

David is a 14-year old, eighth-grade male student with Cerebral Palsy and Attention Deficit/Hyperactivity Disorder (ADHD) who receives academic instruction in the gifted education program for mathematics. His ethnicity is White, Not of Hispanic Origin and his primary language is English. According to his most recent physician's report, he has difficulty focusing, as well as weakness on his right side. It is reported that he needs ample one-on-one time with teachers, frequent breaks, smaller classes, testing accommodations, and a chance to work in a small group setting when available. At birth, he suffered an in-utero stroke which caused a right-side hemiparesis. After this, he was diagnosed with cerebral palsy, which affects the right-side of his body. This limits David's motor function when he becomes fatigued, and it affects his spatial awareness. At school, this can make it difficult for David to do simple tasks such as balancing in a chair or carrying a lunch tray. David comes from a family, and he is the youngest of three children. He has an older sister (21) and an older brother (18). His parents have been married for 24 years, and they both have careers in education. David's mother is an elementary special education teacher and his father is a school administrator. Together they have decades of experience in education. David's older sister and brother have been very successful in their academic career (earning multiple awards and scholarships). They both have been successful athletically, competing at the state-level in their respective sports. David's parents have both been coaches for years as well, often coaching their children's teams. David's family is very athletic and competitive. David, being the youngest, has tried to follow in his brother's and sister's shoes, but his cerebral palsy does not allow him to participate in contact sports, such as football or basketball. David enjoys playing non-contact sports, such as tennis and golf. He stays active and is physically fit.

During the parent interview, David's mother reported that she had a difficult pregnancy, and that she was put on bedrest at 30 weeks to stop her labor. David's birth was quick and all natural (no epidural or medications). David's mother was an athletic trainer at the time, and she followed a strict, all-natural childbirth approach with all of her children. After birth, David seemed to be a perfectly healthy baby, and the first six months went smoothly as she stayed at home with him. At 6 months of age, David's parents noticed that he was not reaching developmental milestones as quickly as his sister and brother did. Luckily, David's parents had both worked as rehabilitation therapists in their early careers and understood the characteristics of "right neglect" and "left neglect" having worked with stroke patients. David's parents recognized that he was displaying signs of right neglect. His mother noticed that if she put an object on his right side, he would reach all the way across his body with his left hand to pick up the object. David's parents took him back to the doctor and requested an MRI. The doctors told David's parents that the MRI showed signs of brain damage, and they concluded that he suffered an in-utero stroke which caused a right-side hemiparesis. David was diagnosed with cerebral palsy and his parents were told that he may never walk or talk. David's parents would not accept this, so they sought out a second opinion. The second doctor's results yielded similar findings, with the exception that only time would tell the extent of the brain damage and how this would affect his daily life.

At nine months of age, David's parents started him in a developmental program which he remained in until he was three years of age. This a state-funded program, offered by the Department of Public Health, is based on Part C of the Individuals with Disabilities Education Act Amendments of 1997, as early intervention services must be provided to children in a natural environment, including community and home settings in which children without disabilities

participate. During his time in the program, David received Physical Therapy (PT), Occupational

Therapy (OT), and Speech services. He continued these services all through elementary school

and within an outside agency. The brain damage reported from David's early years never had an

impact on him intellectually, however he did have several physical difficulties, such as weakness

in core muscles and coordination. David's mother indicated that it was an advantage that she and

her husband were educators because they were aware of programs and supports available to

children with disabilities from which David could benefit. Being educators helped them maintain

close communication to those in David's school and outside agencies on a daily basis. She stated

that David enjoyed sharing facts relative to his physical disability with his class in elementary

school. His mother shared, however, that this may not be the case with his peers in middle

school. She reported that most of his peers in eighth grade do not realize that he has Cerebral

Palsy. Since his is a mild case, his mother stated that it looks as if he is walking with "swag"

down the hall. In reality, David has a limp as one leg is shorter than the other. Most students, she

reported, do not notice.

David's mother indicated that she and her husband were constantly worried about his

safety in elementary school. When he was young, he could not sit up straight in a chair without

falling over and hitting his head, he could not walk in a crowded hallway without running into

others, and he could not walk up or down steps without tripping. This was due to his Cerebral

Palsy and his weakness of mobility on the right side of his body. Teachers had to make special

accommodations for him (i.e., sitting on a carpet when others were in free-standing chairs), or

simply ensuring that David's schedule did not include walking up or down any stairs throughout

the day. David's mother packed his lunch everyday so that he would not have to worry about

dropping his lunch tray purchased from the lunchroom.

504 Accommodations

David's disabilities include Cerebral Palsy (CP) and ADHD. His 504 Plan states that these disabilities substantially limit a major life activity, specifically learning. It states that CP affects David's right side and limits his motor function when fatigued. ADHD compromises his ability to focus and stay on task. He has satisfactory behavior, excellent attendance, and is passing all of his classes. David's 504 Accommodation Plan includes the following accommodations: (a) frequent breaks as needed; (b) permission to move around room as needed; (c) extended time (time and a half), on tests and assignments, benchmarks, and standardized testing; and (d) check-in/check-out on Wednesdays to demonstrate work completed with his mathematics teacher. These classroom accommodations have worked well for David, and his mother indicates that the most effective accommodation has been allowing David extended time on tests. Spatial awareness is an issue for him, i.e., crowded hallways and going up and down stairs in his school. David's 504 Plan originally provided for a peer buddy; this was removed by student request.

David's 504 Plan indicates that he was not medicated for his ADHD until 6th grade. He struggled academically during his first year in middle school. His parents reported that he was spending an hour and a half on homework every night and his inability to focus was taking a toll on David and his family. Additionally, it was causing David to be physically ill. David's parents decided to take him to the doctor to explore new strategies that may help them (and David) manage his ADHD symptoms. The doctor prescribed ADHD medication, and almost immediately, his parents, teachers, coaches noticed an improvement in David.

A review of documents reveals that David is described by his teachers as very personable and enjoyable to have in the classroom. He is depicted as an excellent student with satisfactory

behavior and high grades in every class. He has had perfect attendance for seven years since

entering kindergarten. He is a hard worker with a sweet personality, who appears to be happy.

According to his teacher, David makes friends easily and is a hard worker. They recognize that

he has overcome a lot of physical limitations.

Underachievement and Giftedness

When students take the End-of-Grade Assessment in English Language Arts (ELA), they

receive a Lexile® Score. The Lexile® Framework for Reading is an educational tool which

measures a student's reading ability and text complexity on a common metric scale, known as

the Lexile® Scale. This score is based upon the reading section of the ELA test. Upon entering

middle school, David's fifth grade Lexile® score was 790L. At the end of sixth grade, his

Lexile® score was an 875L, and at the end of seventh grade, it was 876L. On average, the

Lexile® range for a fifth grader should be anywhere from 830L-1010L, for a sixth grader, it

should be between 925L-1070L, and for a seventh grader it should be between 970L-1120L.

According to David's Lexile® scale score, he has been reading below grade level throughout

middle school. According to data obtained from both the student and parent, he does not enjoy

reading or writing, both of which are documented weaknesses.

It is well documented that students with ADHD (Barry, 2002; Hinshaw, 1992a, 1992b)

and gifted students (McCoach & Siegle, 2003a, 2003b, 2003c; Reis & McCoach, 2000) have the

potential to be underachievers in their academic area of weakness. Lupart and Pyryt (1996a)

claimed that gifted students with disabilities (such as ADHD) may not receive appropriate

interventions because underachievement is either exclusively treated as a gifted program issue or

an ADHD program issue. Zentall, Moon, Hall, and Grskovic (2001) unearthed data in their case

studies that revealed that students with ADHD only, *and* students with giftedness/ADHD both

demonstrated underachievement. The teachers in their study made comments about the students not meeting their potential (Zentall et al., 2001).

When asked about David's academic strengths, his mother answered, "Academic strength is definitely math…and science, adding:

> He doesn't have a lot of common-sense smarts, but he does have book smarts, when it comes to mathematics and science. He has good memorization skills, honestly. Um…I don't know how much of that is retained…but um…especially when it's dealing with other subjects like reading…or social studies…he'll memorize that for tests, but I don't know how much of that goes into long-term retrieval. However, with mathematics it does because it's more applicable. You have to know this process to do this. And you work through it and as you do the problem, you are strengthening that (Parent Interview Transcript).

When asked to describe David's weaknesses, his mother responded, "He doesn't like reading at all!" She stated that reading and writing have always been a weakness for him, and he does not enjoy reading books. She stated, "You know, ADHD kids, and reading fluency, and boys…they just don't…they don't like it." She implied that her family enjoys being outside and would rather be active than stay inside and read a book. She did state that David was the most "inside kid" - in other words, he enjoys staying indoors playing video games, while her other children enjoy playing outside.

Social Fit for Adolescents

When interviewed about her son's social strengths, David's mother indicated that although he enjoys a leadership role among his peers, as he gets older (especially this year in 8th grade), David has struggled to find where he fits in. He has athletic friends, academic friends,

and friends from different classes; but like other middle-schoolers, he struggles to identify who

he is and where he wants to fit in. David's mother also said that as her son has gotten older, he

has become more aware of his stroke symptoms, and instead of sharing them with his class, he is

rather embarrassed of them and tries to hide his symptoms from his middle-school peers. Social

interaction is another function of the learning process and plays a role in how and what students

learn (Schifter, 1996). It is possible that David's achievement in areas where he does not excel

academically are compromised by what he perceives as social inadequacy.

Active Learning and Giftedness

David's eighth grade mathematics setting is designed for advanced eighth graders. This

course, Algebra 1, consists of the state curriculum for ninth grade and follows an active learning

approach. The overall goal for active learning is to use intellectual, social, and physical

engagement to empower students to use their problem-solving skills and critical thinking skills to

learn new information. (Edwards, 2015).

One of the researcher's major assumptions within the current study is that in order for

students to learn mathematics effectively, they must construct knowledge for themselves. This

construction includes exploring mathematical concepts, representing mathematics in multiple

ways, justifying their answers, discussing the concepts with peers using mathematical

vocabulary, using prior knowledge, describing patterns and mathematical reasoning,

investigating, and predicting; and being active in the world around them (Boaler, 2002, 2016;

Countryman, 1992).

When asked to describe David's academic strengths, his mathematics teacher reported

that he is an exceptionally good student who is motivated by grades. She indicated that David

was a joy to have in class, and that he has a very strong work ethic. She stated that he was a

remarkably responsible and organized student. When asked about David's academic weaknesses, she pointed to David's lack of self-confidence. She reported that he would often be hesitant to share his answer in mathematics class because he feared he had the incorrect answer. Despite this, she reported that David has a lot of friends, and seems to be well-liked by peers and teachers. She indicated that he makes friends easily and is able to communicate his needs to others, including adults.

When asked, "How do you think students with perceived dual exceptionalities perform in the mathematics classroom in general?" she replied that in her experience, students with both disabilities and characteristics of giftedness have typically been excellent at mathematics but seem to lack confidence either academically or socially. She went on to state that one-on-one tutoring was equally effective as collaborating with others. Working in groups or peer-tutoring, she disclosed, seemed to help David greatly. Young adolescents between the ages of 10-15, are developmentally-sensitive and they desire to be social with their peers. This applies to students with dual exceptionalities as well. According to the Association for Middle Level Education, one sign of a successful middle school is that teachers allow students to work collaboratively in pairs or groups to provide opportunities for students to improve social development (Association of Middle Level Education, 2015).

"How would you teach mathematics?"

David's interview went very quickly, and he answered each question minimally and to the point. He claimed,

> This year, in Algebra 1, it has been the hardest yet. You got to come in every day and work. There's no days off. The EOC is for an actual grade (20% of your grade). That is different than other middle school mathematics (Student Interview Transcript).

When asked about what he likes and dislikes about mathematics, he said, "I like mathematics because it is constant, and not controversial. It never changes." David went on to explain that he does not enjoy explaining his reasoning to an open-ended mathematical word problem. He implied that it was difficult for him to verbalize constructed mathematical responses.

On the other hand, he revealed that he found Algebra-solving equations and the consistency of common algorithms positive aspects of mathematics. When asked about what he thought was challenging about mathematics, he responded, "The rules that don't work every time. The rules or short cuts that only work sometimes…those are frustrating and confusing."

When asked, "If you were the teacher, how would you teach mathematics?" David was very clear in his response. He said that he would not make students take as many notes. He would incorporate more hands-on activities and allow for group work. He stated that his current teacher did this already:

> She does a lot of activities and group work. That's what helps me. Honestly, I think that's what helps the most. Because some people get what others don't get, and it's just easier to understand it from my friends. Peer tutoring, you know?" (Student Interview Transcript).

"We are all working together"

When analyzing David's drawings, they appeared rushed and lacking detail. For the first drawing, he was instructed to draw what it looks like when he was in his mathematics class. There are only two stick figures in the picture – he and his teacher. The desks in the classroom are rearranged in groups of four, and there were two rows of five desks lined up in front of the room. This was actually an accurate drawing of the classroom. When he was asked to explain

this drawing, he said, "This is pretty much it. This is me in mathematics class, and I am paying attention. That's it."

In the next excerpt, David explained what it looks like when he is learning best in mathematics class, stating

"Well, this is my teacher, and she is explaining to us how to do a slope-intercept problem, adding "oh, that's my group over there and we are all working together. We are paying attention and learning what she is saying. I learn mathematics best when I work together with my group and do a lot of group work." (Student's Interpretation of Drawing).

Rao et. al. (2017) suggest that students who exhibit giftedness and possess learning disabilities are able to make sense of the ideas and concepts they are learning and are able to become metacognitively aware of own individual educational needs and learning abilities, as in David's case.

Cross-Case Analysis: Caleb and David

Caleb and David's data were entered into the file labeled "Gifted Primary" and the interviews were transcribed. The researcher reviewed the data multiple times in order to become immersed in the data. Next, the data were thoroughly analyzed, and codes were created in Atlas.ti. Altogether, 293 codes were created for these two students and some data fit into more than one code. Also, if any data fit into an existing code, it was added to the previously created code. This will explain the difference in the total number of codes and the numbers represented in the code groups. Although there were only 293 codes, there were 540 codes represented among the code groups below.
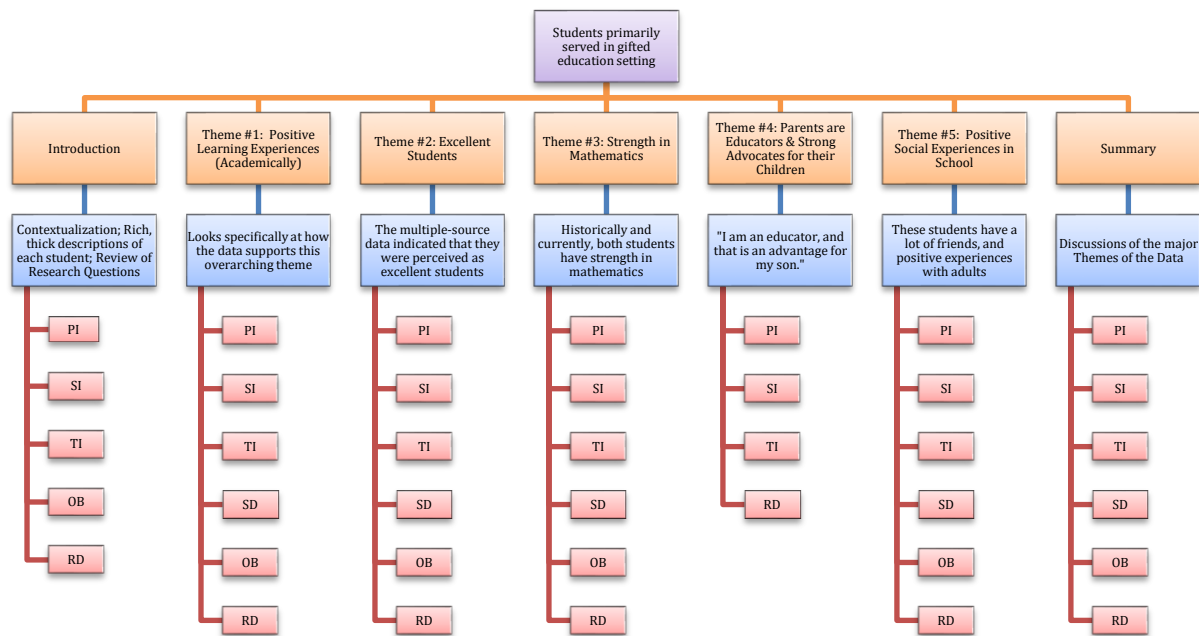
Next, the researcher collapsed these codes into larger groups, or subthemes. Within Atlas.ti, the researcher put each code into one of the following code groups. The number in parenthesis represents the number of codes that fit into each group.

- Confident Leaders (6)

- Excellent Student (107)

- Family Structure (23)

- Learning Styles (57)

- Mathematics is Strength (45)

- Meds Worked Miracles (11)

- Parents are Advocates of their Children (80)

- Parents are Educators- "That is an advantage for my son." (39)

- Positive Learning Experiences (80)

- Social Game on Point (48)

- Weaknesses are Reading and Writing (44)

These groups were then collapsed into larger themes, or networks in Atlas.ti.

Overarching themes

Below are the overarching themes that supported the data sources for students with perceived dual exceptionalities served primarily in a gifted educational setting. Represented are data that describe Caleb and David's academic learning experiences.

Theme 1: Caleb and David both experienced positive academic and social learning experiences overall

This theme was represented across all five data sources: parent interviews, student interviews, teacher interviews, observational data, and review of documents. Both Caleb and David have positive relationships with their teachers and peers, and they both reported that they perceive their learning experiences in school to be positive. Overall, they enjoy school and they desire to do well in school.

Theme 2: Caleb and David are considered to be "Excellent Students"

Another theme that emerged quickly from the data is that Caleb and David were both considered to be excellent students across multiple data sources: parent interviews, student interviews, teacher interviews, student drawings, observational data, and review of documents. "Excellent student" is operationally defined as a student who strives for excellence. This was

evidenced in their ability to be prepared for class, working hard on their assignments, staying motivated, persevering when content became challenging, participating in class, collaborating with others, completing homework, and performing well on tests, quizzes, and standardized assessments.

<div align="center">Theme 3: Caleb and David are academically gifted in mathematics</div>

The next theme to emerge from the data was that both students had a clear, consistent academic strength in mathematics. This theme was represented across all six data sources: parent interviews, student interviews, teacher interviews, student drawings, the observational data, and review of documents. This was evidenced in their academic grades, scores on standardized mathematics assessments, teachers' interview transcripts, parents' interview transcripts, psychological evaluations, and their own interview transcripts. Each student participant scored higher on mathematics assessments than on English Language Arts assessments. Caleb and David's teachers provided current data about the students having a strength in mathematics, and their parents provided historical data about their sons having a strength in mathematics.

<div align="center">Theme 4: Caleb's and David's parents were advocates for their children</div>

Caleb's and David's parents were teachers and kept in close communication with their sons' teachers. Additionally, Caleb's parents and David's parents were advocates for their children. This begs the question, does being the child of a teacher pose an advantage? Both mothers reported that they knew exactly what their child was doing in school, and that they were able to keep in close contact with the teachers. They also reported that they knew the classroom expectations, as well as their child's homework schedule. It was strictly by chance that these students were both children of educators. This was a detail of the study which was unplanned by the researcher. Caleb and David's mothers both reported that they help their sons with homework

and they structure a time for them to sit down and complete their assignments. Caleb's mother also reported that Caleb's father will quiz Caleb with multiplication facts for fun at the dinner table.

Theme 5: Caleb and David seem to be well-liked by others and have many friends

This theme was represented across all six data sources: parent interviews, student interviews, teacher interviews, student drawings, observational data, and review of documents. In the teacher interviews for both of the boys, their teachers reported that they had many friends in class and they were able to work well with others. Based on the parent interviews, the parents of both Caleb and David reported that the boys had long-term friendships from school and from non-school athletic activities. In the student interview, both of the boys reported that they liked working with others and collaborating in mathematics class, and David's drawings support this theme as well.

The last common thread that emerged from the data is that Caleb and David are confident leaders. Whether it is on the field, or in the classroom, the data illustrated both boys as a leader among their peers. David is the president of the Beta Club, and an FCA leader, along with many other extra-curricular activities. Caleb is an advanced gymnast (which takes discipline and focus), a leader on the football team, and is also involved in many extra-curricular activities.

Summary

This chapter enumerated the commonalities between Caleb and David. Themes were constructed based on the data. Overall, the student participants had numerous characteristics and attributes in common, including their giftedness in mathematics, relative weakness in written language and reading comprehension, and in terms of their exceptionalities (i.e., ADHD). In the next chapter, George and Jane will be introduced as student participants who are perceived as

having dual exceptionalities and who receive specially designed instruction within a special

education setting.

Chapter 5

George and Jane: Students Receiving Specially Designed Instruction in a Special Education

Setting

This chapter presents the results of the study based upon the perceptions of George and

Jane, two middle-grade students within a special educational setting. Both students are perceived

to have dual exceptionalities, and both have an active Individualized Educational Program. This

chapter presents a thematic interpretation of the students' perceptions of their learning

experiences from the perspective of their mathematics instructional setting as well as other

academic contexts. Major themes will be presented supported by data provided by the students

themselves, as well as their teachers and their parents. For each student, a thorough review of

documents will be presented, including details about background information, summary of

previous assessments along with current progress in school, and summaries of important

information from interviews and observations. Both cases are presented below:

Case #1: George

George is 12-year old, sixth grade male student receiving academic instruction in the

special education program under the eligibility category of Autism and Speech/Language

Impairment, and mathematics instruction within the Gifted education program. His racial identity

is Black, Not of Hispanic Origin, and his primary language is English. He lives in a single-parent

household and he is the youngest of four children. He lives with his biological father, two

brothers, and one sister. George's father has reported that he and George's mother have been

divorced since 2008, separating when George was an infant. It was not indicated in the review of

documents how often George sees his biological mother, although George's father indicated

during the parent interview that she was incarcerated when George was four years of age.

While reviewing documents, the researcher noted that there was no information given regarding George's mother's pregnancy. His father did indicate that George's early language skills appeared to develop later than other children. George was nonverbal until the age of four, and significantly behind his peers in all developmental development milestones of childhood.

A review of George's medical history indicates an early diagnosis of Pervasive Developmental Disorder (PDD), and later, Autism Spectrum Disorder and Speech/Language Impairment (SLI). George is not on any medications regularly. George passed all his vision and hearing screenings on file.

According to multiple sources, George had what appeared to be a challenging childhood before starting school. George had difficulty socially transitioning into preschool and elementary school for multiple family reasons. George is academically gifted in mathematics.

Upon entering Kindergarten, George was placed in a substantially separate, or self-contained classroom. A self-contained classroom is a classroom specifically designed for children with disabilities who typically are not able to participate in general education programs. In recent years, school systems across the U.S. have made the general curriculum more accessible to students with disabilities. Providing access to students with disabilities, however, is not uniform, and in some cases marginalizes students with exceptionalities (Fuchs, Fuchs, Compton, Wehby, Schumacher, Gersten, & Jordan, 2015).

While in a self-contained classroom, George became combative, physically aggressive with teachers, and defiant when he was told to complete work (i.e., classwork, transition from one task to another, etc.). He also became physically aggressive with peers when they did not do what he wanted them to do. Throughout elementary school, George regularly engaged in

inappropriate social behavior. According to his father, when George began preschool, he was mostly nonverbal. He describes George's early educational experience in the following excerpt:

> They were so afraid to tell me that I didn't find out until later in the year that he was escaping from the school. He would like break out the back door and run…clear around the back field, all the way around the front of the school and he would just pop up in the front door, and they (the front office staff) would be like, 'Where did you come from?' and he would say, 'Running' and then he would run back in. He loved to run. From the moment he stopped crawling, he started running. And so, he was in that class for like a year, and it was mostly just him. It just so happened that year that it was just him, a teacher, and a para. He made so much progress, so fast. By the time he got to elementary school, it wasn't long before he was eating in the cafeteria, and they finally started putting him in gym and art and everything else. He was still in special needs…um…and he went through half of elementary school like that" (Parent Interview).

A review of George's records indicates that his processing skills were higher than those of his peers according to testing conducted when he was in third grade, and his IQ was substantially higher (high average) than any other student in his self-contained class. It was while he was in third grade that the Child Study Team committee decided to transition him to inclusion classes. This transition proved difficult for George, who found it difficult to adjust socially in the classroom. He did not want to share, take turns, or be involved in group work. He continued to engage in socially inappropriate behaviors his peers, including stabbing other students with sharp pencils, or screaming randomly in the middle of a quiet classroom.

Standardized tests, however, presented a different picture of this student. George scored higher than most of his same-age peers, including those students who had been identified as

being gifted. By fifth grade, George's IEP team decided to place him in all advanced/gifted

education classes. George continued to struggle socially and his teachers reported that he often

appeared to not be paying attention during instruction. It was clear, however, that he was

absorbing information presented in class, as he scored above the proficient range in all content

areas of the fifth-grade standardized tests. By the end of his 5th grade year, his mathematics

teacher reported that George was functioning at a higher level in mathematics than all other

students in the school. George eventually transitioned out of elementary school as a gifted

student, functioning academically in the gifted classroom with accommodations.

A year later, George was referred for testing because he had been experiencing difficulty

following directions, completing work, remaining on task, and using pragmatic language skills.

Previous to this time, George's most recent psychological evaluation was completed by a

different school system in September 2010. Behavioral assessments indicated difficulty in

communication, social interaction, adaptive skills, daily living skills, attention problems, and

impulse control. It was noted that George displayed behaviors associated with Autism Spectrum

Disorder. The results from the Wechsler Intellectual Scales for Children, Fifth Edition (WISC-

V), indicated that George has a Full-Scale IQ of 96 (39th percentile) which falls within the

Average range of functioning. The Full-Scale IQ is derived from the combination of 7 primary

subtests and provides an overall view of a child's thinking and reasoning skills. George's

composite scores on the WISC-V were as follows: Verbal Comprehension Index- 95 (37th

percentile), Visual Spatial Index- 114 (82nd percentile), Fluid Reasoning Index- 100 (50th

percentile), Working Memory Index- 97 (42nd percentile), and Processing Speed Index (23rd

percentile). The results suggest that George has strengths in visual-spatial ability, especially in

the area of visual puzzles. Visual Spatial Index indicates a child's ability to assess visual details

to comprehend visual spatial relationships as well as visual-motor integration. Relative

weaknesses were noted within Verbal Comprehension and Processing Speed. Verbal

Comprehension indicates a child's ability to retrieve and apply acquired word knowledge. The

Processing Speed Index measures a child's speed and accuracy of visual-identification, decision-

making and execution. These weaknesses appear to be responsible for his slow academic

progress in reading.

According to the same psychoeducational report, George was also administered the

Woodcock-Johnson IV Tests of Achievement, which is a set of individually administered, norm-

referenced tests for measuring academic achievement. It revealed that George has a distinguished

strength in mathematics, as seen in his scores in the Mathematics Cluster (95), Broad

Mathematics Cluster (92), Mathematics Calculation Skills (89), Mathematics Facts Fluency (90),

and Applied Problems (103). These tests provide a measure of mathematic achievement as well

as problem solving and computational skills. These subtests require students to analyze and solve

mathematics problems as well as perform mathematical computations.

George was also assessed using the Behavior Assessment System for Children, Second

Edition (BASC-2), which is a behavior rating scale designed to be a comprehensive measure of a

child's adaptive and problem behaviors in the school and/or the home setting. George obtained a

Clinically Significant score in the following areas using the general table norms: Externalizing

Problems, Aggression, Conduct Problems, Depression, Adaptive Skills, Adaptability, Social

Skills, Leadership, Study Skills, Functional Communication, Behavioral Symptoms Index,

Hyperactivity, Atypicality, and Withdrawal.

While George clearly has strengths in Visual Spatial awareness and Mathematics, his

overall scores were inconsistent. While he scored a 114 in Visual Spatial awareness, which is in

the 82nd percentile (the High Average range of functioning), he also scored an 79 on the Reading

Cluster, which is in the 8th percentile (the Low Range of functioning). Although George has

articulation, fluency, and receptive/expressive language skills appropriate for his age, he presents

with pragmatic deficits in social, classroom, and personal interaction skills. According to the

rating scales of the BASC-2, George may have difficulty in the areas of adaptability, leadership,

study skills, social skills, and functional communication. Teacher ratings resulted in clinically

significant and at-risk scores for the overall composite score of Externalizing Problems.

Common characteristics of students with elevated scores on the Externalizing Problems

Composite include disruptive behavior problems including Hyperactivity (the tendency to be

overly active, act without thinking, and rush through work or activities), Aggression (the

tendency to act in a hostile manner that is threatening to others), and Conduct (the tendency to

engage in antisocial or rule-breaking behavior). Clinically Significant scores were noted in the

area of depression. Additionally, Clinically Significant concerns for Atypicality and Withdrawal

were noted. Teacher ratings resulted in At-risk scores for overall School Problems, Attention

Problems, and Learning Problems. Additionally, he also obtained a score in the Extremely Low

range on the Social composite. It has been documented that George has processing deficits in the

areas of short-term memory and visual-motor skills. His pragmatic weaknesses impact his ability

to initiate and maintain conversation, ask for help, answer questions, understand classroom rules,

and explain concepts both socially and academically.

According to recent documentation, George's father's primary concern is that George is

non-compliant with teachers, and has a manipulative and uncooperative attitude. He also

indicated that he is concerned with George's interaction with peers. The researcher noted that

George requires a Behavioral Intervention Plan (BIP), which must be preceded by a Functional

Behavioral Assessment (FBA). George's FBA indicated that he had issues with Aggressive

Behaviors, Disruptive Behaviors, Escape Behaviors, and Avoidance Behaviors. The five target

behaviors for the FBA were: (1) George would be observed hitting or pushing teachers, (2)

George would be observed screaming, making audible and disruptive noises, or making

comments aloud during instructional times that are not intended for comments (3) George would

be observed jumping and spinning during instruction, (4) George would leave the instructional

area, including dropping to the floor, and (5) George would select to avoid school assignments.

George also demonstrated sensory avoidance behaviors such as sound defensiveness and tactile

defensiveness. Data was collected and analyzed on these five target behaviors and the following

hypotheses were created to explain George's behavior:

1) George is using aggressive behaviors such as hitting to communicate distress with personally

   challenging events that appear to be out of his control.

2) George is using escape behaviors such as leaving the instructional area or dropping to the

   floor as an attempt to gain greater control over having to complete threatening assignments or

   transitions due to their difficulty. George is also using avoidance behaviors such as covering

   his ears or dropping to the floor when sensory challenging events occur.

3) George is using disruptive (i.e., externalizing) behaviors such as screaming, making noises,

   or making comments aloud during instruction when demands such as work are placed on him

   or the sensory challenges are greater than his ability to regulate them. The behavior is

   simultaneously maintained by the need for social attention.

George's BIP states that his most important and immediate target behavior concerns not

following directions. According to this BIP, George does not follow teacher directions pertaining

to class assignments, talking out of turn, and leaving assigned areas. He is unmotivated to

complete work and he will not complete work when it is not associated with a stated reward. He

appears to not be internally motivated to complete work. He appears to be inattentive to on-going

verbal directions or discussion in the classroom and unaware of how his own verbal interjections

affects others. It has been noted that George can be an animated participant in a conversation, but

does not know conversational rules (i.e., active listening, turn-taking, etc.). Per George's BIP, the

following proactive strategies have been identified as ways to prevent this behavior: visual

checklists with stated rewards to increase his motivation to complete work, visual contingency

maps that permit him to see the consequences of his compliance as well as the consequences of

noncompliance, visual guidelines for group participation (whether it is "talking tickets" or other

forms of visual turn-taking devices), an overall point system that gives him opportunities to work

for a larger and more delayed reinforcement that encourages the lengthier amounts of

compliance regarding classwork and classroom rules for conversation. In addition to those

interventions, George also receives social skills instruction every morning during homeroom

time. This class is taught by a certified Special Education teacher. Ultimately, George has access

to checklists, visual contingency maps, and points systems, per his IEP.

IEP Goals and Accommodations

        According to George's most recent IEP, he has six measurable annual goals in the areas

of Communication and Speech/Language, Social/Emotional/Behavioral functioning, and Written

Language. George's classroom accommodations include: scheduled use of a valuable

reinforcement for completion of work, visual supports- assignment list, sentence starters for

writing tasks and word banks, use of technology when possible, and copy of notes with portions

missing/guided notes. Supplemental aids and services for George include a behavior chart with a

reward system and social skill support. Occupational Therapy (OT) support as needed and Autism specialist support as needed are included as well.

George has historically performed well on standardized tests. In the fifth grade, he passed all four subject area End-of-Grade assessments. The following were his scores: English/Language Arts- 501 (Developing Learner), Mathematics- 573 (Proficient Learner), Science- 556 (Proficient Learner), and Social Studies- 504 (Developing Learner). In fourth grade, he passed three core content areas, but failed Social Studies. The following were his scores: English/Language Arts- 486 (Developing Learner), Mathematics- 555 (Proficient Learner), Science- 573 (Proficient Learner), and Social Studies- 472 (Beginning Learner). During third grade, George also passed three core content areas, but failed one. This year, he failed English/Language Arts. George attained the following scores: English/Language Arts- 456 (Beginning Learner), Mathematics- 542 (Proficient Learner), Science- 530 (Proficient Learner), and Social Studies- 494 (Developing Learner). These are all the standardized scores recorded on his permanent record. As illustrated in his performance on standardized test scores, George has a clear strength in mathematics and science. He is meeting all of his benchmarks and he is performing on grade level or higher in these 2 content areas. His highest scores were usually in mathematics and historically, he has performed well in mathematics.

George is now in sixth grade, and he receives in the gifted educational setting. His teachers describe him as a smart, quirky, interesting, and funny student, who can rapidly gain rapport with his peers, although he is generally nonverbal. George appears to favor the auditory channel as a learner.

Behavioral and Social/Emotional Challenges

Gifted children are at a higher risk than average children in experiencing asynchronous development, whereby a discrepancy exists between intellectual development and physical and/or social development. In addition, the greater the discrepancy between intellectual and social development, the greater likelihood a child will struggle internally and in social relationships. While experiencing asynchronous development then, a gifted child is prone to social problems. Likewise, children with ADHD are prone to social difficulties (Dumas, 1998; Luteijn, et al., 2000). The similarities in social problems among gifted children and children with ADHD are great (Hartnett et al., 2004).

For years the field of autism has used the term *theory of mind* to refer to a child's ability to understand and take the perspective of others in social situations (Kennedy & Banks, 2011). Experts in autism recognize that children on the spectrum lack theory of mind- that they suffer from a sort of social blindness that makes them unaware of another's motives, needs, interests, feelings, or drives (Kennedy & Banks, 2011, p. 66).

Gifted children with Autism often suffer additional social isolation because they dominate conversations with monologues on special interests, impulsively interrupt conversations, trample over the feelings of others, and misread or miss common social cues that support reciprocity (Silverman, 2009). Consequently, when a child has impaired theory of mind, he will not pick up on social cues. Sadly, such deficits in theory of mind can also lead to social victimization because social blindness often makes them perfect victims for all types of bullying (Kennedy & Banks, 2011; Silverman, 2009).

George's mathematics teacher was interviewed for the current study. She described

George's work habits in the following excerpt:

> He would make noises every day. Some days, he would just refuse to work and
> come unprepared…without a pencil…and then even when I gave him a pencil, he
> would still not do anything with it. He did have very strong mathematical fluency.
> He was really good at that, and he could do it all in his mind. He would never
> write any work down, but he could get the right answers every time (Teacher
> Interview).

She went on to report that George's biggest weakness was in the area of social

interaction. She indicated that he did not like to verbally communicate. He refused to verbally

communicate with teachers and peers. She stated that he was prone to making noises in place of

talking. She claimed that the other students would try to talk to him, but he would either "scream

or yell in their faces."

She elaborated:

> The one thing that sticks out in my mind is when he would stab people with
> pencils. He got ISS (In School Suspension) for that. That's really what sticks out
> for me. It happened a couple of times. He would get really upset with his peers
> because they were not responding the way he desired, and he would just stab them
> with a really sharp pencil (Teacher Interview).

Despite these behaviors, George was liked by his peers, who seemed to "protect" him as one

would protect a younger sibling. His teacher continued,

> This gifted group of kids are good, kind-hearted kids. I have one particularly
> sweet girl who will stop by his (George's) desk every day and check on him to see

if he needs anything (a pencil, paper, help on his math homework, etc). Most of

the time, he will ignore her, but we are working on improving his responses when

he is spoken to by others. As a matter of fact, we are trying to get him to initiate

conversations with others. It is one of his goals" (Teacher Interview).

When asked, "Now that you have taught him for almost a year, how do you think George

learns best?" his teacher replied,

We are all trying to figure it out. I feel like he does more absorption…you

know…he is probably more auditory…However, in my personal opinion, I think

that it negatively impacts his performance in mathematics because he is not

practicing the skill-based concepts on paper. You know what I mean? Some

mathematics concepts must be written down and worked out on paper, such as

long division or solving complex equations. You cannot do those things in your

head. He has to learn to show his steps, especially as he gets into higher-level

mathematics (Teacher Interview).

George's teacher concluded that he is a very bright student with strengths in

mathematical calculation and mathematical reasoning, who struggles with social weaknesses that

heavily impact his academic achievement and his ability to work well with others.

Middle School and "Fitting In"

The interview with George's father was very pleasant and informational. George's father

was forthright about his son's experience in mathematics, before and following his middle grades

experience. He portrayed a comprehensive portrait of his son and strove to provide as much

information as possible. Rapport was quickly established and maintained throughout the

interview. The interview was almost an hour in length and provided the researcher with rich,

descriptive data of George's current and historical educational endeavors. In the researcher's opinion, the parent interview for each participant was the most informative and insightful contribution of data. Parent interviews provided a more inclusive, broad, and overall perspective of the whole child for each student participant in this study.

George's father painted a portrait of his son in the following excerpt:

> I think with middle school, a little bit of his problem assimilating is that…middle school kids are… (*moment of silence*), they are a little more bigoted. They don't like differences. You have to fit in. The pecking order is strong. And George…with his trouble with social skills, he can't find his little niche. He can't find the geek kids, or the jock kids, or the anything, and so he's been…it's been taking him a while to fit in. But, getting along with people is never his problem. And people in elementary school were very, very accommodating for George. They made all kinds of changes for him. So, he did really well academically…really, really, really well. And so, coming here, the social atmosphere and the structure…just…in the beginning was not what he was used to. George had a very tough transition into middle school" (Parent Interview).

George's dad affectionately recalled details from his son's past.

> Elementary school was *really* tough. The only positive I can think of is that he had excellent teachers who were very diligent to continue to work with George. George was able to make so much progress. Interventions are best when they are early. And he didn't get any interventions until he was five. So, he started out school way behind. He started seeing the neuro-psychologist, going to occupational therapy, and he started working with the school and the therapist

around five years of age. Things were becoming much more positive. For

him…things got so much better. His anxiety began to drop, and he began to

socialize and make friends. His brothers and sisters could get along with him. We

could understand the things he was saying. We could communicate with him. We

tried sign language, and cards with pictures, and just all kinds of things. And

eventually… (*affectionate pause*) we made it work" (Parent Interview).

Stage-environment fit theory (Eccles et al., 1993) suggests that the fit between adolescent

developmental needs and the educational environment is critical. This theory builds on the idea

that some of the negative motivational factors from middle school students are present because

they are not in an environment that fits well with their needs. While George's elementary school

environment appears to have been supportive of his needs, his middle-school environment - at

least initially - did not. This may have important implications for students with perceived dual

exceptionalities who receive instruction in either a gifted educational setting or a special

education setting, based on their particular exceptionality. Data indicate that David (who receives

instruction primarily in a gifted education setting) and George (who receives instruction

primarily in a special education setting) both struggle to "fit in" within middle school, suggesting

that stage environment fit theory may be applied within either educational setting across social

and academic realms.

In the following excerpt, George's father discusses his son's academic strengths and

weaknesses from the perspective of George's behaviors at home:

As far as academic strengths, as far as I know…well...he has that one thing that

kids absolutely have to have to get around in this archaic system, which is…he

has a knack for rote memorization. He sees it, he does it, he knows it, he's got

> it…locked in. And so, he has a very easy time understand, but he doesn't want to work. He doesn't want to do anything extraneous, anything that's not efficient, anything that he doesn't see as worth his time. And he will give you [explicative] for it! George doesn't see any need to be evaluated, to be looked over, he does not understand the point of it. It is as if he is saying, 'I am a free autonomous individual and you can get out of my way…with your four mathematics worksheets! Thank you very much, I already understand fractions! Now, can you give me some money and I'll go to the store to show you how I understand them' (Parent Interview).

When asked about his son's social strengths, his father offered:

> He has absolutely no fear when it comes to meeting new people. He has absolutely no problem telling people what his needs are, and he has absolutely no problem speaking truth of power; he'll tell you when he believes things are unfair. He's got no anxieties about that stuff. He never meets a stranger…just walks right up to people…and tells them all about themselves….to my chagrin. You know, he doesn't know what *not* to say and he doesn't catch hints. He misses a ton of social cues because of the Autism. Since he's been to 5 schools now, he is always meeting new people, and that probably attributes to why he never meets a stranger. Of course, the down side to that is that he moves around too much for long-term friendships. George has a ton of acquaintances, but no long-term friendships, or friends to invite over to the house to hang out (Parent Interview).

George's father went on to say:

As far as conventional academics, you know, he's just not going to do the work. He will not sit and do the mundane task of writing everything out for people, and of course, that is going to be an enormously hard problem going forward; unless he decides to go into coding or programming, in which case, he'll never have to write another essay again. He'll just get to 'work' and 'play' on the computer. Depending on what kind of field he wants to go into, it's going to be limiting for him. (Parent Interview).

When asked about his son's academic weaknesses, George's father replied:

If I had to give an answer, maybe English Language Arts? He won't write for you, but if he finally does, he writes in perfect paragraphs. He'll text me or email me and everything is in perfect paragraphs. George *chooses* what to do or what not to do" (Parent Interview).

In the next excerpt, George's father contemplated deeply on the effect that his son's social problems have had on his academic record and social and personal life, offering:

You know, if George didn't have all the social drawbacks that comes with this particular brand of autism, he would be taking advanced classes from elementary and he'd be in *all* advanced classes now (in sixth grade) and he'd be on track to take AP (Advanced Placement) by the end of his eighth grade.

(*pause…continuing on with thoughtful affection*) He'd have more friends. (*pause*) He'd get invited to birthday parties and he'd have little play groups in the neighborhood. Because as it is…he can't even… (*pause looking down*)…um...he doesn't get invited to stuff. But then in the neighborhood, the only kids socially who he is on the same level with, are much, much younger than him. And the big

kids don't want him around because although he can physically do everything

they can do, he can't *talk* about everything they can *talk* about. And that was

probably really weird for him coming in to middle school, because the kids are

really into their social media; and George is very eclectic about his media

consumption. He's like a little curator when it comes to his stuff. He's not up on

the pop culture and all this junk that we like to take in when we were kids.

So…(*pause*) he's going to be the outcast. So…(*pause*) it's very difficult for him.

And of course, that's going to make it difficult for him to get his school work

done. Because instead of working, he sits there the entire day in school hoping to

fit in…and wondering why people don't talk to him. And all these things are

racing through his mind internally (Parent Interview).

This data is consistent with data provided by George's teacher and by George himself. In

his interview, George rendered answers that were largely insightful and reflective. George's

behavior appeared sophisticated and mature and he answered each question to the best of his

ability. He paused on some questions and struggled to come up with the right words, but he gave

each question significant thought and time. He was given time to think about each question for as

long as he needed.

The first question was, "Describe your experience in middle grades mathematics so far."

George answered, "Um…ah…so far it's doing great." Although data from the parent interview,

and the teacher interview both contradicted his answer, it is interesting to note that from his

perspective, school experiences were positive.

For another question, George was asked, "What is it about mathematics that you like the

very best?" He replied,

> The best of it is actually trying to figure it out in your own head, especially if you
>
> don't have a calculator to use. I like geometry the best, because there might be
>
> activities where you can just do your own kind (Student Interview).

The researcher presumed that George meant "your own kind" of project or perhaps an individualized assignment where he could use his creativity. When asked about what is was about mathematics that he didn't like, he responded, "Mainly the part when it's the hardest one and you can't even figure it out." George added, "Mainly when the questions are too easy. I want to be challenged a little bit! (*pause; points finger at me and with a straight face*) …but not too hard!"

When asked about what he found easy about mathematics, George answered, "Mainly the part where I think about it in my head. I don't usually like it when I get it wrong, but I just think about it in my own head" (Student Interview).

He continued:

> I would say geometry. Because a square can be anything… (he mumbled here and
>
> the recorder did not pick up and he did not want to clarify when I asked him) …
>
> really it can be any quadrilateral from a rhombus, to well…a trapezoid. That's all
>
> the classifications. Basically, a square is also classified as a rectangle because,
>
> well…because it has all four sides (Student Interview).

When the researcher inserted, "A quadrilateral is a square if and only if it has four congruent sides and four right angles," George was not appreciative of the input. He argued, (as to correct the interviewer) replying, "Yes…but all the sides are the same, so it is mostly classified as a square." George blinked and looked away as if he had just won that mathematical debate.

When asked, "If you were the teacher, how would you teach mathematics?" George had a difficult time answering this question. He put his finger on his chin and answered,

> Hmm…I don't know…maybe in a few easy ways…it could be that I could just…do what I do…and teach it the normal way. Or I could do it with fun activities? I don't know…I could just…Well, I just don't know. I've never thought of that before (Student Interview).

George was asked what he would like his teacher to know about him and the way he learns. This was potentially one of the most profound statements of the entire study. It has implications in the field of mathematics and it supports the research of Dweck (2007, 2010, 2014). He articulated clearly: "*The way I learn is just making mistakes*…It's just one of the ways I learn" (Student Interview).

George's response is aligned with findings that suggest that the brain actually grows when it makes a mistake and students who view learning as something they can improve upon (not because of innate talent, but because of effort and work ethics) are the most successful in life (Dweck, 2007, 2010, 2014). George's response is aligned with recent findings that support the notion that mistakes are not only opportunities for learning, but also an opportunity for mind growth. Understanding the power of mistakes is critical, since students often feel badly or incompetent when they make a mistake in mathematics. Some students with fixed mindsets (the opposite of growth mindset) think it means they are not a "math person," because they have been educated in a performance-based culture (Boaler, 2014b) where mistakes are not valued, but rather, punished (Dweck, 2015). As Dweck (2015) asserts,

> growth mindset is based on the belief that your basic qualities are things you can cultivate through your efforts, your strategies, and help from others. Although

people may differ in every which way—in their initial talents and aptitudes,

interests, or temperaments—everyone can change and grow through application

and experience (p. 7).

The implications of this for current mathematics teachers is significant, especially when

mistakes in the mathematics classroom are usually associated with negative feedback. When

students make a mathematical error in front of the class, they may be less likely to share their

answer next time…specifically female students (Buerk, 1982, 1985). More specifically, some

students can become altogether math-avoidant after making only a few calculation errors (Buerk,

1985).

Classroom Support Services for Students with Autism

Observations of George in mathematics class (two were conducted) yield interesting

results. George refused to look at his teacher or pay attention to her while she taught. During the

second classroom observation (Anecdotal) George remained disinterested in what his teacher

asked of him and the rest of the class. The teacher came by his desk again and said, "Get out

your notebook and get started, or I will be calling your dad this afternoon." This statement

seemed to motivate him, and he let out a loud irritated sigh and opened his notebook with

frustration. He copied down the notes from the board but completed only the minimum. A few

minutes later, he scribbled all over his paper in frustration. It wasn't until a technology

assignment was introduced that George showed interest in his mathematics class. George was

more than willing to start this assignment. It was almost as though he had been waiting all class

period to be given permission to open his computer. He quickly got out his laptop and logged

into the mathematics program. He started the correct assignment, but then when the teacher was

not looking, he swiped the screen over to what appeared to be a game that he had been running in

the background earlier. He played for a few seconds, and when the teacher came in close

proximity again, he swiped back to the mathematics assignment.

Students with autism typically rely upon visual information. Visual information is less

fleeting and will remain long after verbal information has ended. Students with autism need

different levels of visual support (Diamond, 2018). Students with autism also benefit from more

written examples prior to attempting more complex assignments. Students with autism often

perform better with visual models on their paper rather on the class board, i.e., graphic

organizers, flashcards, and independent practice (Diamond, 2012). Highlighting, shortened

assignments, and instructional breaks are strategies that also work well for students with autism.

Importantly, students with autism require direct instruction in social/behavioral skills.

They are typically poor at learning appropriate social behaviors through observation of others

(Diamond, 2018). George may benefit from direct instruction which would allow him to learn

social communication and social behavioral skills to understand how to appropriately interact

with others.

"The Robot"

George's drawings may have resembled those of a young child, but his explanation of

what they represented denoted deep meaning and reflection. Asked about the first picture, which

he rendered to the prompt: draw yourself in mathematics class" George explained,

> Mathematics is so easy to me that I understand really hard problems. See? In my
>
> head, I am doing 5,193,678 multiplied by 9,026,734. Piece of cake. I don't like to
>
> show my work in math. It is pointless, when I can do it all in my head. (Student
>
> Drawing Interpretation)

To the second prompt: "Draw a picture of what it looks like when you are learning best in mathematics class" George became frustrated. He said, "Can't you see? Ugh!" When asked about the hat he drew on his head, he replied,

> No! No! No! This is my brain working out mathematics problems in my head! I am saying, 'I got this' because mathematics is so easy for me that I am doing it in my head. This is how I learn mathematics best. (Student Drawing Interpretation)

Finally, George was asked to interpret his third drawing which was completed to the prompt: "Draw what it looks like when you are the best student you can be." In a voice he perceived a robot would use, George replied:

> I am a robot. (*pause, again in the voice of a robot*) I am a robot. See my hands? They look a little bit like Lego hands, but I couldn't draw them any better. But that's what I meant. I am a robot. If I am going to be the best student that my teachers want me to be, then I have to be like a robot.

George's explanation of his drawing was so profound that the researcher felt the need to re-evaluate her own teaching practice as a mathematics instructor. Upon further analysis of this picture, the researcher realized that there was a line over the word, "AH!!!" which is interesting because in mathematics, this line would mean, "Repeat," as in a repeating decimal. The interesting part is that it looks like the line is colored in with pencil over and over (with dark lines) and it clearly covers the span of the entire phrase-even to the last exclamation point. Perhaps George perceives himself as a robot, or is depicting himself as a robot as he may feel his mathematics instruction causes him to feel or act as one. For the researcher, this begged the question, is George possibly trying to convey that the rules of mathematics obligate him to become robotic? Might George's autism be manifest in mathematics or in the rules that govern

mathematics? Studies have shown a link between autism and "systemizing" (Baron-Cohen, Wheelwright, Burtenshaw, & Hobson, 2007; Iovannone, Dunlap, Huber, & Kincaid, 2003). Baron-Cohen et al. (2007) claim that mathematical talent is linked to autism. They suggest that students with Autism Spectrum Disorder exhibit superior mathematical information processing characterized by a unique pattern of brain organization which could be compared to a robotic or systematic cognitive processing (Iuculano, Rosenberg-Lee, Supekar, Lynch, Khouzam, Phillips, Uddin, & Menon, 2014). Studies suggest that cortical regions of the brain typically involved in perceptual expertise may be utilized in novel ways in Autism Spectrum Disorder (Iuclulano et al., 2014).

Adolescents with ADHD have social difficulties because he or she does not choose to slow their mind down enough to pay attention to social cues (Busi, 2010). Experts in the field of ADHD claim that a child with ADHD has the capacity to develop social understanding, but they do not apply it (Busi, 2010). In addition to ADHD, George's social difficulties are layered with his autism. Although both fields (ADHD and Autism), recognize and describe the same social deficits, autism's long-standing assumption of an impaired theory of mind offers a more thorough explanation of why these students struggle socially (Kennedy & Banks, 2011). In addition to ADHD and autism, George is also gifted, which adds another layer of social/emotional difficulties. Gifted children generally are prone to experiencing social isolation and ostracism. When ADHD is also added to this, the gifted child experiences a deep sense of alienation stemming from the verbal or physical aggressiveness that may characterize his or her interactions with peers. In the midst of these difficulties with classmates and the ensuing negative consequences, the child's attitude toward school and academic achievement will also be affected (Mendaglio, 2005).

Gifted students with ADHD who are also autistic often have impairments in theory of mind, which are often expressed through explosive, oppositional, and emotionally detached behaviors that could be misjudged by teachers and other professionals as simply "bad behavior." (Kennedy & Banks, 2011). Strategies using Applied Behavior Analysis (ABA) have been documented to be effective in systematically teaching target behaviors (Dunlap, 1999, p. 224). Within these various formats, specific instructional procedures (e.g., prompt delivery, shaping, fading) are provided at a level and intensity that fits the context and the unique characteristics of the student (Harrower & Dunlap, 2001). Some strategies based on ABA principles include intense structured approaches (e.g., discrete trial training), naturalistic approaches (e.g., incidental teaching, pivotal response training), and self-management procedures. ABA principles can improve the rate of acquisition of novel skills and to maintain and generalize learned skills. This is important because children with autism thrive in systematic instruction taught with ABA principles (Iovannone, Dunlap, Huber, & Kincaid, 2003), such as the systematic way mathematics is taught. Perhaps this is why George feels like a robot when he is completing mathematics work; because he thinks of mathematics as being highly systematic.

<p style="text-align:center">Case #2: Jane</p>

Jane is a 12-year old sixth grade female student with an active IEP, who receives instruction in a special education setting. She exhibits a disability in the area of Deaf/Hard of Hearing, and presents with characteristics of creativity, motivation, and academic strength in mathematics. Her ethnicity is Hispanic. She is considered an English Learner (EL) student, although she does not currently receive ESOL services. Her primary language is Spanish, and although she speaks English, she is additionally fluent in American Sign Language. Jane's

family speaks Spanish at home, her teachers speak English at school, and her interpreter uses American Sign Language to communicate and provide direct instruction in the classroom.

Jane lives with her biological mother along with a younger brother (age 8) and sister (age 1). Her younger sister is also deaf/hard of hearing. It was unclear to the researcher whether Jane's biological father resided with them in the same. The researcher is unsure about the marital status of the parents, as this was not a direct question in the parent interview and it was not provided explicitly in the review of documents. The researcher was unable to gain any other background information related to Jane's family life.

Jane was diagnosed with a moderate to severe bilateral sensorineural hearing loss at the age of two. She was born with hearing loss, and has missed a significant amount of foundational and incidental learning, including vocabulary and background knowledge, as a result of her disability. Her disability negatively impacts her reading comprehension, which is a concern as academic content becomes increasingly more complex and vocabulary-driven. Jane wears hearing aids with an FM system attachment to connect wirelessly to a microphone that her teachers wear; but even with this device, she is not able to hear as well as her typically developing peers. Jane also has a sign-language interpreter who accompanies her to each class throughout the day and interprets all direct instruction using American Sign Language. Her teachers describe her as a very sweet, shy girl who is hard-working. She completes her classwork and homework, and she demonstrates a strength in mathematics. Her teachers have described her as a talented artist who is constantly doodling in class.

Jane is currently performing well academically. On the End of Grade tests last year in 5th grade, Jane passed all four subjects at a Level 2, which denotes that she is performing at an Achievement Level consistent with that of a Developing Learner. According to her teacher who

provides support for Jane's exceptionality, Jane struggles with reading comprehension, due to her lack of vocabulary and background knowledge.

Jane was given a battery of ability and achievement tests, including the Differential Ability Scales, second edition (DAS-II), the Beery-Buktenica Developmental Test of Visual Motor Integration 6th edition (VMI-6), and the Woodcock-Johnson IV Tests of Achievement (WJ-IV Ach). The DAS-II is a gives information about general cognitive functioning. Jane scored in the average range in nonverbal reasoning (standard score 97, 42nd percentile), and spatial abilities (standard score 100, 50th percentile) subtests of the DAS-II. She scored in the very low range in the verbal abilities' subtest (standard score 68, 2nd percentile). Her general cognitive ability score was on the high end of below average (standard score 86, 18th percentile). The special nonverbal composite score, devised for students not fluent in English, who are Deaf and hard of hearing, and have speech/language impairments, was also in the average range (standard score 98, 45th percentile). In the verbal ability cluster, there are two subtests that measured Jane 's verbal knowledge and development, expressive and receptive language, general knowledge, and retrieval of factual information from long term memory. Jane scored in the low range in word definitions (T-score 25, 1st percentile). This subtest measures word knowledge and language expression. On the similarities test, which measures inductive reasoning, Jane scored a T-score of 36 (8th percentile). These scores corroborate what her teachers report - Jane has difficulty understanding many of the words she is able to decode and struggles with general knowledge and incidental language.

According to Jane's psychoeducational evaluation results, her general cognitive ability score was on the high end of (below) average range. The special nonverbal composite score, devised for students not fluent in English, Deaf and hard of hearing students, and students with

speech/language impairments, was in the Average range for Jane. These scores match what her

teachers observe in the classroom, i.e., Jane has difficulty understanding many of the words she

can decode, and struggles with general knowledge. Jane's Lexile level is currently 801. An

average Lexile is 850 for sixth graders. Her E/LA teacher stated that Jane reads all the time and

seems to enjoy it.

According to Jane's most recent IEP, she has three measurable annual goals. Her first

goal is in the category of Reading in the area of Comprehension. The annual goal states that,

"Jane will correctly answer implicit questions on grade level text that she has read." This goal is

based on the Evaluation Method of Data Collection, with 80% Accuracy. This is not an Extended

School Year (ESY) goal. Jane's second annual goal is in the category of written language in the

area of paragraph development. The goal states that, "Jane will edit her writing and make

corrections with a) subject/verb agreements and b) verb tenses. The Evaluation Method for this

goal with be Data Collection with 80% Accuracy. This is not an ESY goal. Jane's third annual

goal is in the category of written language in the area of paragraph development as well. This

goal states that, "Jane will include a citation and give adequate explanation when asked to give a

written response." The Evaluation Method for this goal will also be Data Collection with 80%

Accuracy. This is also not an ESY goal.

As stated in her IEP, Jane will participate in the state required assessments for E/LA and

Mathematics with the following accommodations including (1) audio amplification devices or

noise buffer/listening devices, (2) explained or paraphrased directions for clarity (in English

only), and (3) signed directions. Jane also receives extended time up to twice the time typically

allotted.

In addition to her state testing accommodations, Jane also receives the following instructional accommodations: (1) copy of teacher notes and/or information on board, (2) closed captioning on all videos shown in class or assigned online, (3) cues when she omits ending sounds while reading aloud, (4) redirection, (5) extended time for writing assignments, and (6) obtain visual attention before giving instructions. Jane's supplemental aids and services include: access to FM system and personal hearing aids.

According to Jane's most recent IEP, her special education services include "Interpreting Service" in the category of "Related Services." She works with an Interpreter for five segments per week, for six hours and 30 minutes per day. Also, in the category of "Special Education," Jane receives instruction in a "Separate Class" by the Special Education Teacher of the Deaf/Hard of Hearing for two segments per week, for 30 minutes per session.

 Giftedness in Mathematics and Drawing

Triangulated data suggests that suggests that Jane is a visual learner. Nikolaraizi, Vekiri, and Easterbrooks (2013) examined the importance of using visual resources and visual supports for deaf students who were also gifted. The study underscores the importance of mediated instruction in "visual literacy" skills that enable students to learn how to process visual aids in a way that supports their reading comprehension (p. 458).

Like Caleb, David, and George, she demonstrates strength in mathematics. Her teacher reports,

> I feel like with her, she is stronger with mathematical fluency and computation. Probably more weaknesses with dissecting word problems and more math reasoning were weaknesses for her. Um, and it could be because you know

because she's missing some of what's being said because she's not watching her

interpreter all the time (Teacher Interview).

Jane's teacher conveyed that Jane seemed to enjoy drawing and that she would draw

pictures on her mathematics homework every week, depicting her as an artist and adding that

Jane appears to doodle all the time.

When asked whether her teacher thinks that because Jane is perceived to have dual

exceptionalities, it affects her social interaction at all, her teacher replied,

I think that, you know, with the not being able to hear, um...she doesn't intact as

much as a lot of the other kids; I would say the disability affects her the most. I

think that she doesn't participate in class as much either because of that. Like she

won't raise her hand, even if she knows the answer. She is definitely a visual

learner (Teacher Interview).

Although Jane's teacher's interview was short, it provided a glance into Jane's classroom

behaviors. She implied that Jane is sometimes too shy to answer the questions in class, that she is

a visual learner, and that she is artistically inclined.

Data culled from Jane's mother's interview seemed to corroborate Jane's teacher's

statements. Jane's mother primarily *speaks* Spanish, but she has learned some English since her

children *began* school. Jane's mother was contacted prior to the interview to ask if she would

like to have a Spanish-to-English interpreter at the interview. She politely declined and said that

she did not need an interpreter. Jane's mother was forthright about her daughter's experience in

mathematics, before and during her middle grades experience thus far. She portrayed a

comprehensive portrait of her daughter and strove to provide as much information as possible.

The interview with Jane's mother was concise and to the point. At times during the interview,

Jane's mother found speaking English a challenge. and some answers were choppy. Any confusion was quickly remedied by rephrasing the question or statement at hand.

During the interview, Jane's mother reported that Jane had a "good" experience overall in elementary school, also that she was unaware that her daughter was deaf until Jane was 18 months old. Jane's mother spoke softly:

> The doctors told me that she passed the hearing test when she was born. I don't know what happened. I don't know? When she turned one-year old, she would not talk or nothing. She also would not turn around if her name was called (Parent Interview).

Jane's mother told her pediatrician and the pediatrician recommended testing. The testing concluded that Jane was deaf. It seemed to the researcher that Jane's mother wanted to add more to the conversation at this point, but she was having a difficult time thinking of the English translations of the words she wanted to use, so she became very quiet. According to Jane's mother, Jane has been receiving interpreter services since first grade. Jane's mother reported that overall, Jane seems to like school, and for the most part, she thinks the work is easy. Jane's mother reported that her best subject is mathematics, and sometimes, science. She could not name any specific social strengths, but she disclosed that she thinks Jane has friends at school. Jane's mother did not report any weaknesses and stated that Jane is very smart. Jane is a little shy and she does not like to talk to new people or strangers. Jane's mother also stated that Jane starts her homework as soon as she gets home in the afternoon. She claims that Jane is very responsible with her schoolwork. Her mother worries sometimes that Jane misses important concepts being taught because of her deafness. She reiterated at the end of the interview that mathematics is Jane's strength and that she helps Jane with mathematics at home.

"Feels good about learning the mathematics, but not really good about the class"

Jane's sign language interpreter accompanied her to her interview and signed each question to Jane using American Sign Language. Typically, Jane is mostly nonverbal. It has been observed by teachers that when Jane does talk, her voice levels can vary, and she is hyper-aware of her voice. She cannot hear when she is being loud or quiet, so for the most part, Jane chooses to be nonverbal. She was asked to verbalize her answers for the interview for two reasons. First, the researcher wanted her to feel comfortable enough to share her thoughts, and second, the researcher wanted to hear her verbalize the answers in her own voice so that nothing would get lost in translation.

When asked how she felt about mathematics, Jane replied that she "feels good about learning the mathematics, but not really good about the class." When questioned about what she likes about mathematics, Jane answered that she enjoys geometry, specifically finding the volume using the formula. She also stated that she likes to divide fractions. When asked what she does not like, she stated, "How the students talk and distract me." Jane quietly reiterated, "I don't like it when the other students talk around me."

Jane was asked how she would teach mathematics if she were the teacher. She said, "I guess I would do group work. I would have students working together."

Throughout the interview, Jane was very shy and was asked to repeat herself her answers due to her soft delivery. Jane reiterated how she does not feel "good" about the class, and her desire to work or collaborate with her peers. She desires social interaction with peers and this is a common thread throughout all of her data; especially her drawings.

Deafness and Isolation

When viewing Jane's drawing, which depicts how she feels in her mathematics class;

she is depicted alone and isolated. Jane reported that she feels invisible, as if no one can see her. In reality, data reveals that Jane does not communicate with peers or adults. Jane will typically work individually despite being seated physically with another student. Studies have indicated that feelings of isolation are common for students who are deaf. "Investigations concluded that the deaf are likely to suffer from isolation and detachment that can result in aggression, apparent when deaf people attempt to communicate" (Winstanley, 2003, p.113). According to Iovannone, Dunlap, Huber, and Kincaid (2003), a case-by-case analysis of the data suggested that hearing loss may be especially frustrating and difficult to cope with in gifted people, because it can stand in the way of intellectual development and career opportunities. This is even more true of those with progressive or late-onset hearing losses, who often found that their hearing loss robbed them of their career, isolated them from friends, and damaged or destroyed their family (Iovannone et al., 2003; Ringdahl & Grimby, 2000). Further, females who are deaf or hard of hearing experienced a greater sense of isolation in comparison to their male counterparts (Becker, & Jauregui, 2018).

Clinically, the overall mental health of gifted deaf/hard of hearing people, including how they cope with and feel about their deafness, is the single most important factor determining their psychological adjustment (Iovannone et al., 2003) Those who become a part of the deaf social community, learn to sign, choose careers in which deafness is not a major drawback, and perform work involving other deaf people (e.g., teaching, social work, or otherwise serving the needs of deaf people or institutions) seem to have made the best psychological adjustments from adolescence into adulthood (Iovannone, Dunlap, Huber, & Kincaid, 2003).

Educational intervention for deaf people has a long history, a history dominated by the notion of deficit. The growing trend in the literature on deaf people is to recognize that they are

not deficient but form a cultural and linguistic minority group that deserves appropriate

educational programs. Deaf people report great frustration with their experiences of schooling as

they have invariably been treated as intellectually inferior. Yet, a significant number of deaf

people are gifted and have had the double hurdle of overcoming their deafness in a hearing world

and an education service that does not meet their needs (Iovannone et al., 2003).

        In terms of her renderings, Jane demonstrated an affinity for drawing. She was able to

produce detailed, accurate, and evocative pictures in a short amount of time. With assistance

from her interpreter, Jane smiled bashfully and nodded her head to indicate that she understood

the prompts given by the researcher. Jane seemed to enjoy herself while she was drawing. It

seemed to be a passion of hers, and after seeing her completed drawings, it would appear that it

is not only a passion, but a talent as well. She was very quiet, concentrated, and relaxed. Jane

only had time to complete two drawings during the allotted time frame, so the final one was sent

home with her to complete and bring back over the weekend. She brought it back to the

researcher completed.

        Jane's interview session came next, where the researcher communicated to her through

her interpreter. Although Jane is deaf/hard of hearing, she is able to speak in English and

Spanish. For this project, instead of using ASL to sign her answers back to the interpreter, the

researcher asked her if she would be comfortable giving verbal responses so that the researcher

could record her answers. Jane agreed that she felt comfortable providing verbal answers.

        The details and intricacies of Jane's drawings were overwhelming. She drew students'

facial expressions with detail and their clothes with accuracy. In the first drawing (see Appendix

K), there is a large empty white space at the bottom left corner of the picture. The researcher

thought that perhaps she was not finished with the picture. Jane was asked if she was sure that

she was finished, and she said "yes." In this drawing (and in all her drawings), the sign language

interpreter is absent. For someone to be so detailed with her drawings, it was curious that she left

out the one person who travels with her all day long. This could have been consciously or

unconscientiously, but either way, it was a glaring absence. When Jane was asked where her

interpreter was, she blushed a little and smiling, shrugged her shoulders. She was asked if there

was a reason she left her out, but Jane would not respond. She may have been embarrassed

because the interpreter was there with us when I asked her about it, or she may have legitimately

forgotten to draw her. Regardless of the reason, it is a notable absence in the picture.

 Another significant feature of the picture is that there is no white board, posters on the

wall, agenda on the board, mathematics work displayed, or clock. Another observation about

Jane's first drawing is that the teachers are not in close proximity to her. One teacher actually

looks like she has horns on her head, and she is frowning at a student who is talking, or

"yakking." This particular student has struggled with behavior issues all year and has taken a lot

of the teacher's time with discipline procedures. The second teacher in the back of the room has

a puzzled look on her face (or maybe even a helpless look), as she looks at the. Jane is the only

one in the class who is completing the mathematics assignment, and it looks like she is stuck on

number "four." Her look is one of confusion. A thought bubble reads, "Wait, what's my

answer?????" The other students in the class are either not working, or do not have pencil or

paper. Each student appears to be off-task and/or confused. The twins in the back of the picture

(the boy and girl with orange hair), have facial expressions of confusion and/or sadness. These

two students struggle in mathematics and they usually do display these facial expressions. The

male student with brown hair in the very back is always hungry. Lunchtime is during this

mathematics class, and this student lets everyone know that he is ready for lunch. The female

student who is about to hit the aforementioned male student is usually having to defend herself

against boys who regularly disturb her possessions. Jane picked up on all of those details, despite

sitting at the front of the class with her back to her peers and being unable to hear them speak.

Other notable interactions are depicted in Jane's in the drawing.

The last, and possibly most important observation, is that Jane is alone. The chair next to

her is empty. Jane reported during her student interview that *she feels invisible*. One might

interpret from her drawings that Jane longs for social interaction with her peers. Everyone else is

Jane's drawing is engaged in communication with another person-even if not positively. Jane,

however, is the only one sitting alone and thinking to herself (see Appendix K). During the

student interview, Jane was asked to explain her drawing. She pointed to herself in the drawing

and said, "This is me," pointing to the girl in the middle of the paper, in the front row of

mathematics class.

Jane's second drawing (see Appendix L), had a much different tone. The prompt for this

drawing was, "Draw a picture of what it looks like when you are learning best in mathematics

class." This drawing is also superb, with accurate details as well. The way Jane captured each

detail can be illustrated in the way she drew her laptop bag on the ground next to her. The bag

looks 3-dimensional and has a yellow name tag with tiny writing on it. Her facial expressions for

each student is realistic and the details in the desk, students' hair, clothes, and even personalities

suggests that Jane is observant. In this picture, she is sitting in the front row working diligently.

She is almost finished with a full page of math, and she has her tongue out slightly with a facial

expression indicating concentration. She has a thought bubble that says, "This is easy!"

Although Jane is not alone in this picture (the female student was present for this day),

the researcher noticed that Jane is still not working "with" her partner. Her partner looks

confused and she has a thought bubble that says, "Shriek!" and she has a facial expression of fear and/or shock. Like the first picture, Jane is the only student in the classroom who is working on the mathematics assignment and is exhibiting on-task behavior. For the most part, the other students are having both appropriate and inappropriate social interactions with one another and teachers are not in close proximity to Jane. In this drawing, the general education teacher is giving "another (discipline) step" to the same student who has a shirt that says, "Live to talk." The special education teacher has a look of worry on her face as she is listening to a student say, "Blah, Blah, no idea, Blah, Blah".

Jane's third drawing (Appendix M) to the prompt, "Draw what it looks like when you are the best student you can be," suggests that Jane perceives girls to be "good," while boys are perceived to be "bad." Jane's drawing depicts her receiving first place and the award of, "Best student that could ever be," while the girls in her drawing have received second place, and the boys are in the lowest tier in third place. The girls are all looking up to her and they are reaching for her as if they were fans at a concert. They want to be her, and they aspire to be like her when she is being the best student she can be. Perhaps this is Jane's way of demonstrating her desires to be accepted and admired, which is the opposite of feeling invisible. The boys are all drawn in small boxes stacked on top of each other, and their faces are either angry, unhappy, or indifferent. None of the boys are smiling, and none of them are desiring to be like Jane. It is clear that she does not think the boys are good students, and the one male student is verbalizing, "Yak, yak, yak".

Cross-Case Analysis: George and Jane

After all data was collected, the researcher analyzed the data using a qualitative analysis software called Atlas.ti. George and Jane's data were entered into an Atlas.ti file labeled,

"Special Education Primary," and the raw data was transcribed and uploaded. This version of

Atlas.ti gave the researcher the ability to store audio and visual files as well, so the researcher

uploaded all original audio recordings of each interview, as well as a scanned copy of each

document from the review of documents. The anecdotal notes from the observations were also

uploaded. The researcher reviewed that data multiple times in order to become truly immersed in

the data. Next, each individual piece of data was thoroughly analyzed, and codes were created

based upon the data given. While the researcher meticulously went through each interview, she

also highlighted quotes to be used in the final manuscript.

As with the first cross-case analysis between Caleb and David, the second cross-case

analysis between George and Jane contained numerous data. Altogether, 311 codes were created

for these two students; however, some data fit into more than one code. The codes were then put

into code groups, which are general ideas from common themes of the data. Overall, there were

311 codes created, but there were 451 codes represented among the code groups. Also, if any

data fit into an existing code, it was added to the previously created code. This explains the

difference in the total number of codes and the numbers represented in the code groups below.

The researcher collapsed these codes into larger groups, or subthemes. Within Atlas.ti,

the researcher put each code into one of the following groups. The number in parenthesis

represents the number of codes that fit into each group.

Academic Strength=Mathematics (56)

Academic Weakness=Reading and/or Writing (28)

Negative Learning Experiences (71)

Negative Social Experiences (48)

Parent-Expressed Frustrations (22)

Parents Express worry about their child's future (35)

Restricted Access to Resources/Communication with School Personnel (42)

Student does not conform to "the system" (17)

Student is truly Brilliant (52)

Students not medicated (21)
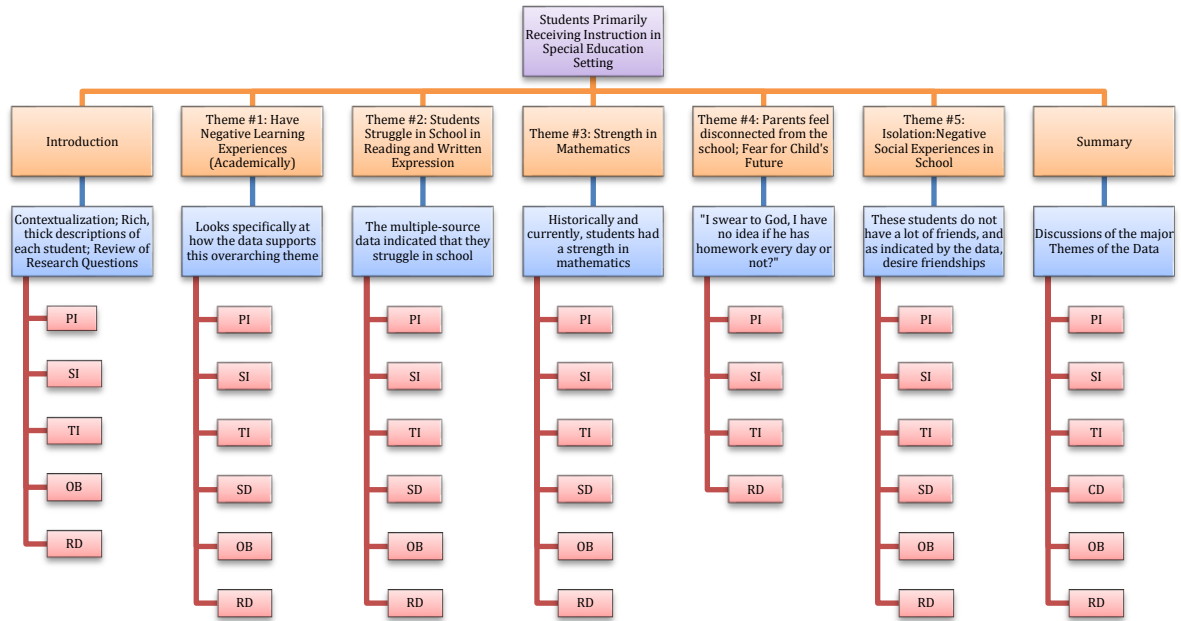
Students struggle in school (30)

Teacher perceptions about special education portrayed as deficit (18)

Tough transition to middle school (11)

These groups were then collapsed into larger themes, or networks in Atlas.ti. These themes, or patterns represent the major common threads of the data between the two students receiving instruction primarily in a special education setting.

Overarching themes

Below are the overarching themes that supported the data sources for students with perceived dual exceptionalities educated primarily in a special education setting. Represented are data that describe George and Jane's learning experiences.

Students Primarily Receiving Instruction in Special Education Setting						
Introduction	Theme #1: Have Negative Learning Experiences (Academically)	Theme #2: Students Struggle in School in Reading and Written Expression	Theme #3: Strength in Mathematics	Theme #4: Parents feel disconnected from the school; Fear for Child's Future	Theme #5: Isolation:Negative Social Experiences in School	Summary
Contextualization; Rich, thick descriptions of each student; Review of Research Questions	Looks specifically at how the data supports this overarching theme	The multiple-source data indicated that they struggle in school	Historically and currently, students had a strength in mathematics	"I swear to God, I have no idea if he has homework every day or not?"	These students do not have a lot of friends, and as indicated by the data, desire friendships	Discussions of the major Themes of the Data
PI	PI	PI	PI	PI	PI	PI
SI	SI	SI	SI	SI	SI	SI
TI	TI	TI	TI	TI	TI	TI
OB	SD	SD	SD	RD	SD	CD
RD	OB	OB	OB		OB	OB
	RD	RD	RD		RD	RD

Key Linkages between Data and Assertions	
PI = Parent Interview	SD = Student Drawing
SI = Student Interview	OB = Observational Data
TI = Teacher Interview	RD = Review of Documents

Theme 1: George's and Jane's Exceptionalities: Disability Over Giftedness

George and Jane's disabilities (George: Social/Behavioral and ADHD; Jane: Diminished Auditory Integrity) appear to mask their giftedness in mathematics. Their learning and social difficulties, depicted within interview, observation, document, and drawing data, seemed to take precedence over their mathematical giftedness. This theme was represented across five of the six data sources.

Theme 2: George's and Jane's Academic and Social/Emotional Difficulties Began Early

This theme was represented across all six data sources: parent interviews, student interviews, teacher interviews, student drawings, observational data, and the review of documents. Both George and Jane experienced less than auspicious beginnings upon entering school.

Theme 3: George and Jane Demonstrate Giftedness in Mathematics

This theme was strongly represented across all six data sources. Jane's mother and George's father depicted their child as being mathematically talented. George has always been competent and confident in mathematics, as has Jane. Parent data was corroborated by teachers, documentation of learning, and the student participants themselves.

Theme 4: George's Father and Jane's Mother Fear for their Child's Future

This theme was represented particularly within parent interviews. Both George's father and Jane's mother expressed concern about their child's future, socially and academically. Another documented challenge for students with dual exceptionalities relates to the lack of collaboration between schools and parents of students with dual exceptionalities (Besnoy et al., 2015). The literature eludes to an overall deficit of knowledge and resources that parents need to advocate for their child (Besnoy et al., 2015). George's and Jane's parents fear seemed to be fueled by their uncertainty about their child's experiences in school and their future educational paths.

Theme 5: George's and Jane's Feelings of Isolation

This theme was strongly represented across all six data sources, particularly within student interviews and drawings. George and Jane share a sense of loneliness within middle school, despite having the ability to make friends and have peers generally like them.

Summary

This chapter enumerated the commonalities between George and Jane. Themes were constructed based on the data. Overall, the student participants had numerous characteristics and attributes in common, including their giftedness in mathematics, relative weakness in written language, reading comprehension, social/emotional skills. In the next chapter, Caleb's, David's

George's and Jane's experiences will be compared and contrasted within the discussion of

findings. Chapter 6 will present a summary of the investigation, the research questions, the

findings, implications for P-12 schools and districts, recommendations for future research, and

the conclusion.

Chapter 6

Summary, Discussion of Findings, Implications, Recommendations, and Conclusion

Chapter 6 presents a summary of the investigation, the research questions, a discussion of

the findings, implications for P-12 schools and districts, recommendations for future research,

and the conclusion.

Summary

This study has been guided by the following research questions: How do adolescent

students with perceived dual exceptionalities view their learning experiences within a middle-

grades mathematics setting? How do they perceive their learning experiences in different

educational settings? How do those perceptions influence how students view themselves as

learners? How are students' perceptions consistent with what their parents and teachers report?

Overall, the answers to these research questions vary from case to case. As stated in the

introduction, students who possess both a disability and characteristics of giftedness are referred

to as having dual exceptionalities. This paradoxical relationship of disability and gifted

exceptionalities creates a challenge for teachers and students, particularly in schools that do not

have a specific program for students with dual exceptionalities. Most of these students are either

served exclusively in the special education program, or exclusively in the gifted program. Often,

students with both disabilities and characteristics of giftedness have learned how to mask their

disabilities and capitalize on their strengths. These students have a unique view on the world and

their learning experiences are filtered through the lenses of their disability and talents. In this

qualitative case study, the researcher explored the learning experiences of students with

perceived dual exceptionalities through their perspectives, their teacher's perspectives, and their

parent's perspectives. While it may be subjective to invoke the opinion of an adolescent, perception is reality, and their feelings *are* their reality.

The conceptual framework that undergirds this study is the Constructivist Theory offered by Piaget (1952) and elaborated by Vygotsky's (1978) socio-cultural theory. Building upon these is the theoretical framework of the Stage-Environment Fit Theory which attempts to explain the fit between adolescent developmental needs and the educational environment. Student participants generated drawings in order to express their perceptions of their learning experiences. Other data sources included semi-structured interviews, observations, and a document review. All data was triangulated and analyzed using three analysis strategies offered by Creswell and Poth (2017), consisting of (1) data preparation and organization (i.e., transcribing data for analysis, or preparing student drawings/image data for analysis), (2) development of themes through a process of coding, and (3) writing up the results of the study and representing the data in tables and figures.

This 6-month qualitative inquiry utilized the multiple-case study design (Creswell & Poth, 2018; Marshall & Rossman, 2016; Miles et al., 2014). This design was chosen because this approach looks in depth into a topic using a variety of data sources (Creswell & Poth, 2017; Stake, 2005; Yin, 2014) and utilizes the review of literature to instantiate or refute the study's findings.

There were 13 participants in the current study. The participants of this study included four student participants in middle grades, four parent participants, and five teacher participants. All participants within this qualitative investigation are delineated below:

Participants of the study engaged in creative drawings in order to express their perceptions of school and their learning experiences. Interviews were conducted with parents and teachers. The researcher conducted the student observations in the student's mathematics class. Data was analyzed using the cross-case analysis method (Stake, 2005). Multi-case research with cross-case analysis has been recommended as an effective type of dissertation research (Stake, 2005). Findings were informed by the themes and are wholly consistent with the review of the literature.

Discussion of Findings

The current study portrayed four middle grades students – Caleb, David, George and Jane - each of whom were distinctly different yet shared several similarities. Each of them exhibited academic and social strengths and weaknesses as well as characteristics of giftedness and disability. Academically, each of them exhibited a strength in mathematics; each, however, experienced academic weaknesses in Reading, Reading Comprehension, Writing, and Social Skills. Socially, they all appeared to be fighting their own separate battles; however, the goal for each of them was to learn where they "fit in" as middle school students and young adolescents.

The literature suggests that a commonly cited potential challenge for students with dual exceptionalities is academic underachievement (Lupart & Pyryt, 1996a, 1996b; Reis & McCoach, 2000). More specifically, it is well documented that students with ADHD (Barry, 2002; Hinshaw, 1992a, 1992b) and gifted students (McCoach & Siegle, 2003a, 2003b, 2003c; Reis & McCoach, 2000) have the potential to be underachievers in their academic area of weakness. Lupart and Pyryt (1996a) claimed that gifted students with disabilities (such as ADHD) may not receive the appropriate interventions because underachievement is either exclusively treated as a gifted program issue or an ADHD program issue. Zentall et al. (2001)

unearthed data in their case studies that revealed that students with ADHD only, *and* students with giftedness/ADHD both demonstrated underachievement. This thread was common among each of the student participants, who struggled with underachievement despite their giftedness.

The data also suggest that students who were served in special education versus gifted experienced school differently. Students experienced school differently based upon the settings in which they received instruction. Caleb and David, both of whom were served primarily in Gifted education settings, had positive learning experiences in school, overall. Their parents were involved in their school lives and, as educators, easily "navigated the ropes" while advocating for their sons.

The major findings from this study suggest that (1) Students perceived to have dual exceptionalities who receive instruction primarily within gifted educational settings may use their giftedness to mask their disability; (2) Conversely, students perceived to have dual exceptionalities who receive instruction primarily within special educational settings may use the tools or opportunity to leverage their giftedness to mask their disability; (3) Academic and/or Social/Emotional difficulties that begin early in the educational careers of students perceived to possess dual exceptionalities can become exacerbated by time they reach the middle-school level (Stage Environment Fit Theory); and (4) Students who are perceived to have dual exceptionalities and who suffer from feelings of isolation, may experience these feelings regardless of the setting in which they receive the majority of their instruction. They are elaborated below:

Students perceived to have dual exceptionalities who receive instruction primarily within gifted educational settings may use their giftedness to mask their disability. A student who is able to mask their disability with their giftedness will most likely never be referred to special

education. To stay in the mainstream general education because these students have mastered the

phenomena of masking their disability with their giftedness and therefore they never seem to

possess noticeable characteristics of giftedness or a disability (Foley-Nicpon et al., 2013; Foley-

Nicpon et al., 2015).

Students perceived to have dual exceptionalities who receive instruction primarily within

special educational settings may not have the tools or opportunity to leverage their giftedness to

mask their disability. The literature suggests that students served in special education may

experience stigma in their educational learning experiences (Fellner, Comesañas, Duperoy, &

Duperoy, 2017; Franklin, 2017; Shifrer, 2013; Katchergin, 2012). Research has also shown that

poorer outcomes for students with disabilities are often credited to the student's own deficiencies

or cumulative disadvantage, and that placement in special education could possibly limit

(opposed to expands) these young adolescent's opportunities (Shifrer, 2013).

Academic and/or Social/Emotional difficulties that begin early in the educational careers

of students perceived to possess dual exceptionalities can become exacerbated by time they

reach the middle-school level. Studies have indicated that the unique characteristics of students

with dual exceptionalities have been a factor in causing these students to feel low self-efficacy,

anxiety, depression, and other behavioral issues (Barber & Mueller, 2011; Kauder, 2009). Foley-

Nicpon et al. (2013) found that it was common for students with dual exceptionalities to exhibit

certain social-emotional physiognomies such as fear of failure, anger, fear of success, and low

self-esteem. Overall, studies have reported that students with dual exceptionalities exhibit certain

psychological vulnerability to emotional difficulties (Neihart, 2002), as well as more socio-

emotional impairment than that of their same aged peers, or typically developing peers (Fletcher

et al., 2005). Academic and/or Social/Emotional difficulties which began at a young age became

exacerbated by the middle school years. There could be many reasons for this. Adolescence is marked with a need to assert autonomy and searching for identity, therefore any cognitive dissonance may lead to stress and strained relationships in different social environments (Gutman & Eccles, 2007). If the adolescent, for instance, is in a school environment that they perceive to have greater teacher control, to be less friendly and caring, with problematic relationships (which seems to happen more often with secondary school teachers), it may lead to a change in their attitude towards learning, a dip in academic motivation, and negative self-image during transitions from primary to middle/secondary school (Booth & Gerrard, 2014).

Ultimately, middle school can be a difficult time for young adolescents. According to stage-environment fit theory, the adolescents whose social environments change in developmentally regressive ways are more likely to experience difficulties, compared to those whose social environments respond to their changing needs (Gutman & Eccles, 2007). Developmentally appropriate or regressive shifts in the nature of social and learning environments, at home and school, may help in explaining individual differences in the quality and trajectory of students' academic motivation, educational achievement, and social-emotional well-being during these years (Roeser, 2005) with impact on their future trajectories (Gutman & Eccles, 2007).

The perception of students' environment fit (specifically school environment), partly depends on positive interactions and relationships with teachers and peers (Zimmer-Gembeck, Chipuer, Hanisch, Creed, & McGregor, 2006). School fit and engagement are mediators linking relationships with teacher and peers at school at students' academic achievement (Zimmer-Gembeck et al., 2006).

Students who are perceived to have dual exceptionalities and who suffer from feelings of isolation, may experience these feelings regardless of the setting in which they receive the majority of their instruction. The literature suggests that students served in special education may experience stigma in their educational learning experiences (Fellner et al., 2017; Franklin, 2017; Shifrer, 2013; Katchergin, 2012). Research has also shown that poorer outcomes for students with disabilities are often credited to the student's own deficiencies or cumulative disadvantage, and that placement in special education could possibly limit (opposed to expands) these young adolescent's opportunities (Shifrer, 2013). According to Goffman (1968), stigma refers to a stigmatized individual "who is disqualified from full social acceptance" (p. 9), because of "an attribute that is deeply discredited" (p. 11), mainly based on physical attributes. According to Finlay (1999): "If stigma is defined by the reactions of others, it can be seen as being created in the eye of the beholder, and is fundamentally, therefore, a social phenomenon" (Finlay, 1999, p. 31).

Research has indicated that SPED students attract much stigma (Farrell & Polat, 2003; Hastings & Brown, 2002; Jull, 2008; O'Connor, Hodkinson, Burton et al., 2011; Orsati & Causton-Theoharis, 2012). Generally, research agrees that this stigmatization interferes with their development and learning (Cole & Knowles, 2011; Corbett, 2001). Literature suggests that stigma not only affects the stigmatized individual; it also affects those closely associated with them (Crawford & Simonoff, 2003; Glogowska & Campbell, 2004; Goffman, 1968; Gray, 1993; Peters & Jackson, 2009; Runswick-Cole, 2007).

Implications for P-12 schools and districts

This study has implications for P-12 education, special education, and the ways in which students who are perceived as having dual exceptionalities are served and the curriculum that

works best for them, and gifted education. In addition to implications for practice, this study may also have implications for policy, settings, and also for future research.

Overall, there is still a lot of work to do in identification and interventions for students with perceived dual exceptionalities. The issue with these students is both multilayered and complex. The problems are not only theoretical or conceptual, they are also organizational and financial. Most educational systems do not have room in their budget to add dual exceptional services. Therefore, students with both disabilities and characteristics of giftedness are either labeled as needing gifted education *or* special education.

Because of the challenges with identification and resources available, therefore, students with dual exceptionalities remain under-identified, under-served, and neglected in education and research endeavors (Foley-Nicpon et al., 2011; Lee & Olenchak, 2015; Leggett, et al., 2010; Mayes & Moore, 2016; Missett et al., 2016; Rizza & Morrison, 2007).

There is still plenty of room for growth and transformation in the area of dual exceptionalities amongst schools in our nation. These questions may help to address the ambiguity found in the literature, as well as fill in the aforementioned gaps in the body of research.

Another implication for practice is in the importance of Stage-Environment fit theory. Since Stage-Environment fit can have such a substantial impact on young adolescents' achievement and motivation, it is important that the school and home environments are developmentally aligned. According to Bollmer, Cronin, Brauen, Howell, Fletcher, and Gonin, (2016), providing adolescents with more independence, autonomy, and a clear role in any decision-making will lead to a developmentally appropriate environment. Similarly, creating

opportunities for improved peer and staff relationships might support this. The structure of school and small class sizes might also help with the sense of belonging (p. 160).

Another implication may be the destruction of an adolescent's sense of identity. The consequences of stigmatization can be parasitic and very difficult to reverse (Diken & Lausten, 2005). Another result of stigma is that it can lead to a lower placement in a social hierarchy (Link & Phelan, 2001). This lower placement of cultural hegemony encourages direct and indirect economic and social discriminatory practices (Jacoby et. al, 2005).

Mindsets in Mathematics

Another implication involves the importance of students' mindsets in this study, specifically in mathematics. As George articulated clearly: "*The way I learn is just by making mistakes*" He went on to say, "It's just one of the ways I learn." The implications of this for current mathematics teachers is significant, especially when mistakes in the mathematics classroom are usually associated with negative feedback.

Buerk (1985) states that there are, "two distinct issues which are problematic for many…as they experience mathematics. One is the view that mathematical knowledge is absolute and all known. The second points to the need to see mathematics as a human creation, to find a way to make a connection with the material in some personal way—to gain a "handhold." (p. 60).

According to Boaler (2014b), her goal is to teach students to change their mindset—or to change their relationship with mathematics, and start believing in their own potential. She teaches the following facts about what the results of brain science has taught us:

- There is no such thing as a math person—anyone can learn mathematics to high levels.

- Mistakes, struggle, and challenge are critical for brain growth

- Speed is unimportant in mathematics

- Mathematics is a visual and beautiful subject, and our brains want to think visually about

  mathematics (Boaler, 2014b, p. 3).

Mathematics has always been a conceptual subject, and the importance of students learning

mathematics in a slow, deep, and conceptual way, cannot be overstated (Boaler, 2014b). Instead

of racing through mathematical ideas and trying to memorize each rule, Boaler (2014a) suggests

that we should take a more conceptual approach specifically because of the way the brain

processes mathematics. Students who have a growth mindset as opposed to a fixed mindset, may

experience more success in school, and have a more positive academic career (Boaler, 2014a,

2014b).

Recommendations for future research

The current study could be expanded to include a greater number of student participants;

a greater number of overall participants; and student participants at the elementary and high

school level. It would have been interesting to follow these students as they transition from

middle school to high school and find out whether their perceptions have changed, altered,

become modified, or remained the same. Future research may want to situate the study in a

different socioeconomic region or setting. Another recommendation for expanding the current

study may be to choose student participants whose dual exceptionalities mirror one another for

purposes of comparison and contrast.

Finally, this investigation might be enhanced by the use of visual technology, i.e., video,

and/or role play or simulation, as in a documentary or short film, either of which may evoke new

and deeper understandings of what it means to have dual exceptionalities.

Conclusion

Students who possess both a disability and characteristics of giftedness are referred to as students with dual exceptionalities. This paradoxical relationship of disability and giftedness creates a challenge for teachers and students, particularly in schools that do not have a specific program for students with dual exceptionalities. Most of these students typically receive the majority of their instruction either within a special education program, or a gifted education program. Students with perceived dual exceptionalities are often able to mask their disabilities with strengths in other major areas. The students in this investigation all demonstrated strong talent in mathematics. They each have a unique view of the world and their learning experiences are filtered through the lenses of both their disabilities and their talents.

The researcher wishes to conclude this investigation with an excerpt from a modern educator whose advice parents and educators may wish to heed (as cited in Webb, Amend, & Webb, 2005),

> *Try to see your child as a seed that came in a packet without a label. Your job is to provide the right environment and nutrients and to pull the weeds. You can't decide what kind of flower you'll get or in which season it will bloom.*

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Appendix A: Data Collection & Analysis Matrix

What do I Need to Know? (Research Questions)	Why Do I Need to Know This?	From Which Sources Must Data Be Elicited?	Results-Major Themes or Patterns	Initial Insights/ Interpret-ation	Assertions, Lessons learned, Questions raised
Question A-1: a) How do adolescent students with perceived dual exceptionalities view their learning experiences within a middle-grades mathematics setting? b) How do they perceive their learning experiences in different educational settings? c) How do those perceptions influence how students view themselves as learners? d) How are students' perceptions consistent with what their parents and teachers report?	**Reason A-1:** To understand how students with perceived dual exceptionalities perceive their school experiences **Reason A-2:** To understand how students with perceived dual exceptionalities learn best, so that teachers can serve them better	**Data A-1:** Student Obser-vations **Data A-2:** Student Drawing **Data A-3:** Teacher Interview **Data A-4:** Parent Interview **Data A-5:** Student Interviews **Data A-6:** Review of Docu-ments	**Theme A-1: Students primarily served in the *Gifted Education* setting:** (a) Experienced positive academic and social learning experiences overall (b) Considered to be "Excellent Students" (c) Are academically gifted in mathematics (d) The parents were advocates for their children (e) Seemed to be well-liked by others and have many friends Had positive learning experiences **Theme A-2: Students**	**Interp. A-1:** Students with dual exceptionalities had very different learning experiences according to their service setting. This is important because students served in the Gifted setting will earn a high school credit in mathematics during middle school, but those served in a Special Education setting will not. This will give some a head start in high school. **Interp. A-2:** It seemed to the researcher that the students served in the Gifted setting	**Assertion A-1:** Students perceived to have dual exceptionalities who receive instruction primarily within gifted educational settings may use their giftedness to mask their disability; **Assertion A-2:** Conversely, students perceived to have dual exceptionalities who receive instruction primarily within special educational settings may use have the tools or opportunity to leverage their giftedness to mask their disability; **Assertion A-3:** Academic and/or Social/Emotion

			primarily served in the *Special Education* setting: (a) Disability Over Giftedness (b) Academic and Social/Emotional Difficulties Began Early (c) Demonstrate Giftedness in Mathematics (d) George's Father and Jane's Mother Fear for their Child's Future (e) Experienced feelings of Isolation	were able to mask their disabilities with their characteristics of giftedness, while those served in Special Education seemed as though their disability masked their giftedness.	al difficulties that begin early in the educational careers of students perceived to possess dual exceptionalities can become exacerbated by time they reach the middle-school level (Stage Environment Fit Theory); **Assertion A-3:** Students who are perceived to have dual exceptionalities and who suffer from feelings of isolation, may experience these feelings regardless of the setting in which they receive the majority of their instruction.

Appendix B: Observational Protocol

<u>OBSERVATIONAL FIELD NOTES</u>	
DATE:	
LOCATION:	
TYPE OF SETTING:	
TIME IN SETTING:	
Descriptive Observation ▼	**Observer's Comments** ▼

Appendix C: Protocol for Student Drawings

<u>Auditory prompt to be given to students who will be drawing:</u>

1. Draw what it looks like when you are in mathematics class.

2. Draw a picture of what it looks like when you are learning best in mathematics class.

3. Draw what it looks like when you are being the best student you can be.

Appendix D: Teacher Protocol for Interviews

1. Tell me a little bit about ___ (name of student participant) ___, and what his or her
   typical day looks like in your mathematics classroom.

2. What are his or her strengths and weaknesses? Be specific.

3. Can you think of a specific story, or experience, that you have had with this child that
   summarizes who they are? (For instance, perhaps he or she was helping a friend pick up
   their books at the locker because he or she is kind).

4. How would you (in your own words) define "dual exceptionalities."

5. If you had to identify students with dual exceptionalities, how exactly would you do that?
   In other words, what would you be looking for?

6. How do you think students with perceived dual exceptionalities perform in the
   mathematics classroom, in general? (It does not have to be your classroom specifically).

7. Do you think ___ (name of student participant) ___ is placed correctly? Gifted vs. Special
   Education?

8. Do you think that because this child is perceived to have dual exceptionalities, it affects
   his or her academic achievement at all? (could include placement, grades, standardized
   test scores, etc.)

9. Do you think that because this child is perceived to have dual exceptionalities, it affects
   his or her social interaction at all? (could include making friends, adult interaction, etc.)

10. How do you think this student learns the best?

11. Add any specific questions from the observation.

Appendix E: Parental Protocol for Interviews

1. Give me a brief history of your child's experience in elementary school.

2. How does your child feel about school, overall?

3. What are your child's academic and social strengths?

4. What are your child's academic and social weaknesses?

5. How did your child initially either enter [the gifted program], or a program where he or she is offered specially designed instruction? Did teachers initially recognize your child's giftedness or disability?

6. Describe your child's homework routine?

7. Do you believe your child's academic achievement or social interactions have been influenced in any way as a result of his or her giftedness and/or disability? (could include placement, grades, standardized test scores, etc.)

8. What do you believe about your child's performance in his or her mathematics class? Has he/she been historically competent and confident with mathematics?

Appendix F: Student Protocol for Interviews

Question Protocol for Participants

1. How would you describe your experience in learning mathematics?

2. What is it about mathematics that you like?

3. What is it about mathematics that you don't like?

4. What do you find easy about mathematics?

5. What do you find difficult or challenging about mathematics?

6. If you were the teacher, how would you teach mathematics?

7. What would you like your teacher to know about you and the way you learn?

Appendix G: Student Drawings Checklist

Feature Present in Drawing:	Rater 1	Rater 2
Student working alone		
Student working with peers		
Student sitting at desk		
Students standing		
Whiteboard blank		
Whiteboard with math work		
Whiteboard with other writing		
1 Teacher present		
2 Teachers present		
Teacher(s) at desk		
Teacher(s) standing up		
Teacher(s) in front of classroom		
Clock present		
Windows present		
Sunlight is shining into room		
Classroom is decorated (posters, etc.)		
Student work on student desks		
Student work on teacher desk		
Teacher has flowers on desk		
Students are throwing things in classrom		
Students talking or disrupting instruction		
Faceless students		
Faceless teachers		
Stick figure students		
Stick figure teachers		
Class being told to "be quiet" or "shut up"		
Teacher is frowning		
Teacher is smiling		
Students ask for help (raise hand, etc.)		
Students are smiling		
Students are frowning		
Some students are sleeping		
Students are working at desks		
Students interact with one another		
Teachers give answers to students		
No teacher present		
No other students present		
Only self present in drawing		

Appendix H: Interpretive Checklist Sample

Student Drawings	# of responses	%age of respon
Student(s) have faces		
Student(s) sitting in rows		
Student(s) is/are well behaved		
Student views teacher as approachable		
Students actively learning		
Students not actively learning		
Students taking notes		
Students seem engaged in the math		
Students seem on-task		
Students appear to be interested		
Students understand respect		
Students know importance of agenda		
Students are academically stimulated		
Students are not academically stimulated		
Students seem to respect teacher		
Students seem to be actively involved		
Students smiling		
Students relaxed		
Students not being rewarded		
Students apathetic about learning		
Teacher(s) have faces		
Teacher circulates room		
Teacher does not seem to be engaging		
Teacher seems kind		
Teacher seems enthusiastic about math		
Teacher seems helpful		
Teacher likes students		
Teacher appears to like his or her job		
Teacher acts professionally		
Teacher appears to be organized		
Teacher does not respect students		
Teacher seems to be optimistic		
Teacher seems approachable		

Appendix I: Holistic Review

1. What types of patterns do you see in the drawing?

2. Why do you think you are seeing these patterns?

3. What do you think might be done differently in your class as a result of what you see?

Appendix J: Schedule of Data Collection

March 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26 OBSERVATION *Student #1*	27 PARENT INTERVIEW *Student #1*	28 OBSERVATION *Student #2*	29 PARENT INTERVIEW *Student #2*	30 TEACHER INTERVIEW *Student #1*	31

SCHEDULE

Observation
I will observe student participants for the first 20 minutes of their math class. I will take descriptive notes throughout the observation.

Interviews
I will interview the parents and the math teachers of the student participants.

Student Drawings
Student participants will draw pictures based off the questions provided in the Appendix of my proposal.

April 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2 SPRING BREAK	3 SPRING BREAK	4 SPRING BREAK	5 SPRING BREAK	6 SPRING BREAK	7
8	9 OBSERVATION *Student #3*	10 OBSERVATION *Student #4*	11	12 PARENT INTERVIEW *Student #3*	13 PARENT INTERVIEW *Student #4*	14
15	16 2nd OBSERVATION *Student #1*	17 (TESTING)	18 (TESTING)	19 (TESTING)	20 TEACHER INTERVIEW *Student #2*	21
22	23 2nd OBSERVATION *Student #2*	24 STUDENT DRAWINGS/ STUDENT INTERVIEWS *Student #1*	25 STUDENT DRAWINGS/ STUDENT INTERVIEWS *Student #2*	26 STUDENT DRAWINGS/ STUDENT INTERVIEWS *Student #3*	27 STUDENT DRAWINGS/ STUDENT INTERVIEWS *Student #4*	28
29	30 2nd OBSERVATION *Student #3*					

May 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 TEACHER INTERVIEW *Student #3*	2 2ND OBSERVATION *Student #4*	3 TEACHER INTERVIEW *Student #4*	4 MAKE-UP OBSERVATIONS	5
6	7 MAKE-UP OBSERVATIONS	8 MAKE-UP STUDENT DRAWINGS/ STUDENT INTERVIEWS	9 MAKE-UP STUDENT DRAWINGS/ STUDENT INTERVIEWS	10 MAKE-UP STUDENT DRAWINGS/ STUDENT INTERVIEWS	11 MAKE-UP STUDENT DRAWINGS/ STUDENT INTERVIEWS	12
13	14 MAKE-UP PARENT INTERVIEWS	15 MAKE-UP PARENT INTERVIEWS	16 MAKE-UP PARENT INTERVIEWS	17 MAKE-UP PARENT INTERVIEWS	18 MAKE-UP PARENT INTERVIEWS	19
20	21 MAKE-UP TEACHER INTERVIEWS	22 MAKE-UP TEACHER INTERVIEWS	23 MAKE-UP TEACHER INTERVIEWS	24	25	26
27	28	29	30	31		

Appendix K: Jane's perception of her mathematics class

Appendix L: Jane's view of what it looks like when she is working best in mathematics class

Appendix M: Jane's perception of being the best student she can be

Appendix N: George's perception of his mathematics class

Appendix O: George's view of what it looks like when he is learning best in mathematics class
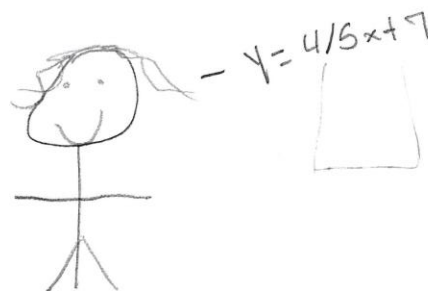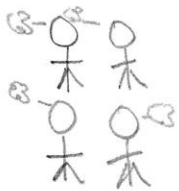
Appendix P: George's perception of himself being the best mathematical student he can be

Appendix Q: David's perception of his mathematics class
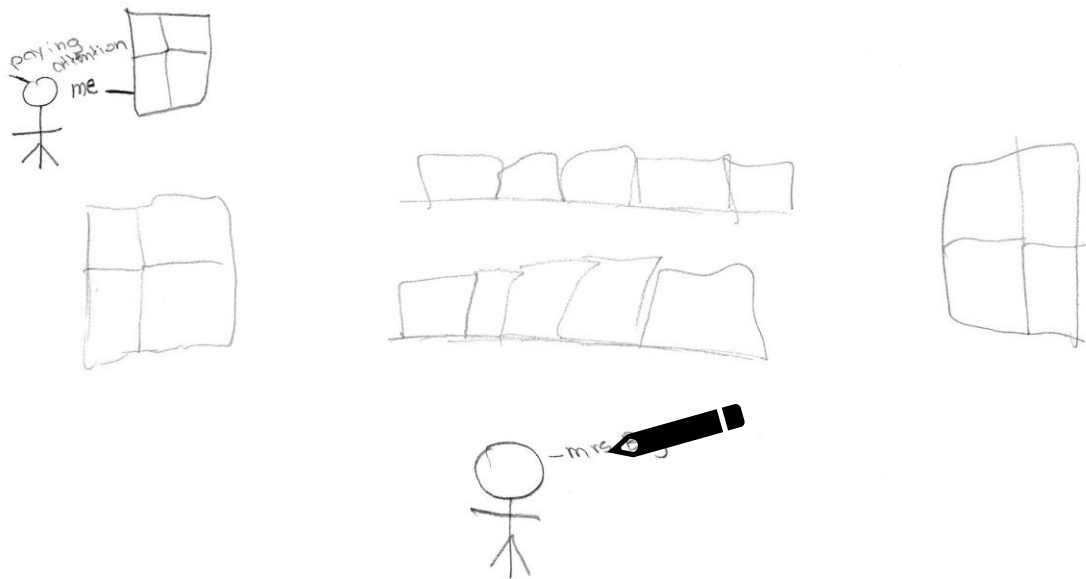
Appendix R: David's view of what it looks like when he is learning best in mathematics class

$y = 4/5x + 7$

Appendix S: David's perception of himself being the best student he can be

I - ☺ -36
Loving math - I'm gonna answer ever question

3
× 12

Appendix T: Caleb's perception of his mathematics class

Appendix U: Caleb's view of what it looks like when he is learning best in mathematics class

Feel in math class

attentive

eager

ready to listen

Appendix V: Caleb's perception of himself being the best student he can be

Appendix W: Student Drawing Analysis Chart

Students with perceived dual exceptionality being educated in Gifted Education	Students with perceived dual exceptionality being educated in Special Education
• Students have faces	• Students have faces

• Students are well behaved • Student views teacher as approachable • Students are actively learning • Students seem engaged in the mathematics • Students seem on task • Students appear to be interested • Students understand respect • Students know importance of agenda • Students are academically stimulated • Students seem to respect teacher • Students seem to be actively involved • Students are smiling • Students are relaxed • Students working alone • Students sitting at desk • Students standing • Student work on desk • Students are working at desks • No other students present (67%) • Stick figure students (100%) • Stick figure teachers • Teacher is smiling • 1 Teacher present • Teacher standing up • Teacher in front of classroom • Teacher(s) have faces • Teacher seems kind • Teacher seems enthusiastic about mathematics • Teacher seems helpful • Teacher likes students • Teacher appears to like his or her job • Teacher acts professionally • Teacher appears to be organized • Teacher seems to be optimistic • Teacher seems approachable	• Students not well behaved • Student does not view teacher as approachable • Students not actively learning • Students do not seem engaged in the mathematics • Students not on task • Students are not academically stimulated • Students do not seem to respect teacher • Students not smiling • Students apathetic about learning • Student working alone • Student sitting at desk • Students standing • 2 Teachers present • Teachers standing up • Teachers in front of classroom • Student work on student desk • Students taking or disrupting instruction • Class being told to "be quiet" or disciplining students • Teacher is frowning • Some students are smiling • Most students are frowning • Students are working at desks • Students interact with one another (positive or negative) • No teacher present (50%) • No other students present (50%) • Only self present in drawing (50%) • Teacher(s) circulate room • Teacher does not appear to like students • Teacher does not appear to like their job • Teacher acts professionally

Appendix X: Patterns in the drawings by student

Student Name	Analyzer #1	Analyzer #2

Caleb **Primarily Gifted** **7th grade**	-There is a lot of empty space in the drawings for Caleb/the kids are far apart -It seems as though he likes his space. He probably works best when he has some space to work. -It appears that the other kids may bother him with off-task behavior	-He looks isolated -No teacher, no face, there's nothing on the whiteboard -There is a window, but you cannot see anything out of it -The teacher still does not have a face in the first one. -He used words to describe himself -He is doing what he is supposed to be doing, but others are not. -He is happy, and it seems like those around him are happy as well.
David **Primarily Gifted** **8th grade**	-"David seems like he wants to be a good kid, and do what he is told." -He will do the mathematics, even if it's not his favorite thing in the world. -He is compliant and seems to want to please	-Not a lot of detail in David's pictures -He only drew himself and his group, no other students. -In two of his drawings, the teacher has a face in two out of three pictures; and he only has a face in one drawing. -He is collaborating in one, but the other two pictures he is by himself -The teacher is up in the front of the room talking, but not writing on the whiteboard
George **Primarily Special** **Education** **6th grade**	-It is clear that George does not want to write things down in mathematics class. -He wants to do everything in his head -He wants to do it his way, and not the way the teacher wants him to show his work in mathematics	-He's always alone -Nobody else is in any of his drawings -Mathematics is in his head -Nothing is verbalized -He has a pencil in his hand, yet nothing is written -He is frowning and looks unhappy while doing mathematics work. -He looks like he is "up to something"

		-He has a brain drawn in each picture; potentially indicating that his brain is overworked.
Jane **Primarily Special Education** **6th grade**	-The students are off-task -The kids are insane -The teachers are turned away from her -She perceives herself as the only one ever on task in every picture -There's no direct instruction -Absence of teaching materials (such as whiteboards, agendas, clocks, mathematical reference charts, etc.) -No windows in the room	-She's always alone -She's always in the front -She's doing her work, and in her third drawing, it appears that she has already accomplished all of her work. -The two teachers in the room are always separated and not in close proximity. -Each character in her drawing has a distinct personality. -She has "speech" bubbles for everyone else, but only "thought" bubbles for herself (indicating she does not speak to others like peers do). Perhaps she feels like she can't speak to others? -Communication barrier- because she is deaf? -The interpreter is missing -In all of Jane 's drawings, the females have small feet which are consistently turned inward. This could be a nonverbal sign of meekness, and perhaps the way she views females in general?