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Gifted and Talented Science Instruction at the Middle Level: A Mixed Methods Evaluation of Teacher Practices and Impact on Student Achievement

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GIFTED AND TALENTED SCIENCE INSTRUCTION AT THE MIDDLE LEVEL: A MIXED METHODS EVALUATION OF TEACHER PRACTICES AND IMPACT ON STUDENT ACHIEVEMENT

By
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Approval Page

This dissertation was submitted by James B. King under the direction of the persons listed below. It was submitted to the Gardner-Webb University College of Education and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Gardner-Webb University.

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Abstract

GIFTED AND TALENTED SCIENCE INSTRUCTION AT THE MIDDLE LEVEL: A MIXED METHODS EVALUATION OF TEACHER PRACTICES AND IMPACT ON STUDENT ACHIEVEMENT. King, James B., 2022: Dissertation, Gardner-Webb University.

Middle school students (Grades 6-8) face a unique set of challenges. Add a gifted and talented (GT) identification, and the need for differentiation in instruction for the exceptional adolescent becomes critical. This research focused on specific practices such as ability grouping, curriculum compaction, providing students choice, problem-based learning, and professional development among others in a primarily rural school district. This mixed methods research used an explanatory sequential design and sought to examine what practices are being used in a middle school GT sixth-grade science classroom using a survey instrument to assess frequency of practice. The results of the survey indicated some best practices are present, but the frequency of practice is minimal. It also sought to understand if there is any relationship to how students served in the GT science classroom did on the state achievement test (SCPASS Science). The results of an independent *t* test using unequal variances revealed that the district of study, as a whole, showed no statistically significant growth on the state test following implementation. Focus groups were used to assess both teachers' and instructional leaders' satisfaction. There was general dissatisfaction but also an acknowledgement that the implementation of the program has some positive outcomes which could be built upon. There appears to be a relationship between minimal best practice and overall growth that was not statistically significant on the state assessment. Recommendations for future action and research may help a gifted program in its early stages become more effective.

Keywords: gifted and talented, middle school, achievement, curriculum compaction, problem-based learning, student choice, instruction

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Chapter 1: Introduction

Understanding Adolescent Change

There should be little doubt that students in the middle grades, typically sixth through eighth, face a unique set of challenges. This, in turn, requires a specialized approach within the school charged with addressing their developmental needs. Levin and Mee (2016) noted that since this is such a critical time in academic development, the middle school experience can be a turning point in an adolescent's future academic success. Quas (2014) stated, "The adolescent transition represents one of the most dynamic, broad and influential periods of human development" (p. 1).

Not only are adolescents experiencing great change, but the world is evolving around them at a rapid rate. In a digital age, most students are connected to technology and may interact with devices more than with people. According to Anderson and Jiang (2018) of the Pew Research Center, 95% of teens have access to a smartphone, and 45% say they are online "almost constantly" (p. 2). This connectivity may provide developmental pitfalls, but Giedd (2012) postulated that the adolescent brain is highly adaptive. "A prominent concern is that ease and immediacy of information, and the increasing propensity amongst teens toward multitasking, may promote 'mile wide, inch deep' thinking and a resistance to the patience and persistence required for in-depth scholarship" (Giedd, 2012, para. 15). Educators should therefore not fight the change but should instead seek to help students think critically about the information they encounter and make judgments regarding its credibility.

The Relevance of Gifted and Talented Education

Take an adolescent in the digital age who already has many challenges, and then give them the additional label of "exceptional child." The methodology behind their education becomes of greater importance.

The work of theorist Joseph Renzulli is renowned. The American Psychological Association named Renzulli as one of the top 25 when it comes to psychologists and their influence in the world. He is known for creating the Enrichment Triad Model, the three-ring conception of giftedness, curriculum compacting, and differentiation in the mid-1970s; he continues work today as a board of trustees distinguished professor at the University of Connecticut where he examines the role of gifted education and how it may remain relevant in the 21st century (UCONN Neag School of Education, 2020). Renzulli (2012) believed that "the biggest challenge to gifted education is to extend our traditional and creative capital to include...social capital and the development of executive function skills" (p. 158). Renzulli (2012) expounded by explaining how the development of these skills will be better achieved by beginning at a young age and providing direct involvement versus "teaching and preaching" (p. 158) experiences. In fact, Renzulli's (2012) explanation of the inductive model of learning versus the traditional deductive model closely mirrors the characteristics of project-based learning. Renzulli (2012) explained that inductive learning usually occurs outside of the traditional classroom. Inductive learning can be "summarized as knowledge and skill acquisition gained from investigative and creative activities that are characterized by three requirements" (Renzulli, 2012, p. 154). The three requirements Renzulli (2012) discussed included

1. Student choice: The learning is occurring because the student had input into the topic.
2. Real world approach: Even if it is at a simpler level, students use methodology

as actual practitioners in the real world.

3. Creation: the learning results in a new product or service.

Information gained in the inductive model provides relevance and meaning in that it has been personalized to the learner (Renzulli, 2012). This inductive model is also known as the Enrichment Triad Model, first introduced by Renzulli in 1976. Renzulli's Enrichment Triad Model has become the Schoolwide Enrichment Model used beyond gifted and talented (GT) populations as best practice for improvement of the school as a whole.

Perhaps one of the earliest proponents of inductive learning would be John Dewey. Dewey saw the effects of the industrial revolution on education and believed students needed an experiential approach based on the world around them. Dewey would even begin his own laboratory school in 1894 (Holt, 2020). Many of Dewey's ideas surrounding inquiry-based learning are still relevant today and manifest in current models including Renzulli's (1976) Enrichment Triad Model.

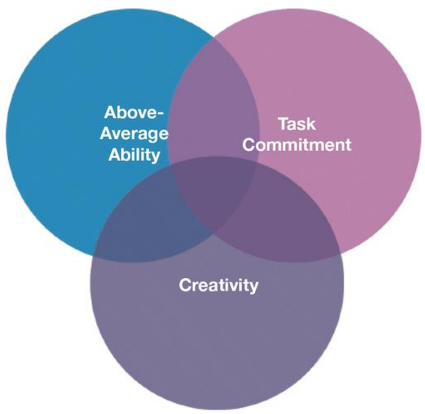
Shortly following Dewey's first school, Dr. Maria Montessori would open the first Montessori school in Rome, Italy in 1907. She also published *The Montessori Method* in 1909 (North American Montessori Center, 2014). Many said that Montessori was ahead of her time. Her approach called for liberal student choice and connections to the world around them. The Montessori model is highly inductive and would spread to all parts of the world as a school of choice (North American Montessori Center, 2014).

The National Association for Gifted Children (NAGC, 2008) explored some common myths about gifted students. The first is the idea that gifted students do not need help. Because gifted students begin sometimes as much as over half the year ahead, they are often overlooked. A study of three states by the National Center for Research on Gifted Education (2019) painted a similar picture. Achievement data for 326,254 students were examined and found that gifted students start third grade on average two grade levels ahead of their non-gifted peers. Their rate of academic growth will be slower than their non-gifted peers in fourth and fifth grade (National Center for Research on Gifted Education, 2019). Boredom can lead to low achievement and the development of poor work habits. Another abundant myth according to NAGC (2008) is that "teachers challenge all students, so gifted kids will be fine in the regular classroom" (para. 5). Farkas and Duffet (2008) conducted a national survey of 900 randomly sampled third- through 12th-grade teachers. Farkas and Duffet's study showed that "58% of teachers surveyed have received no professional development in teaching gifted students" (p. 53) and 73% of teachers agreed that "too often, the brightest students are bored and under-challenged in school—we're not giving them a sufficient chance to thrive" (p. 52). Finally, NAGC (2008) proposed, "That student cannot be gifted, he is receiving poor grades. Underachievement describes a discrepancy between a student's performance and their ability" (para. 10).

Renzulli (2011) shared the research from several historic studies. He shared that in 1926, Lewis Terman believed that giftedness and intelligence went hand in hand and only applied to the top 1%, based on a longitudinal study of 1,000 students. On the other end of the spectrum, Renzulli (2011) explored the work of Witty from 1958 who would say that anyone is gifted who is consistently remarkable. According to Renzulli (2011), the liberal end opens the can of worms of great subjectivity. Renzulli (2011) suggested that there were instead three clusters of traits (Figure 1) from which one's giftedness could be determined and no one cluster was more important than the other. Gifted identification is often done by looking at multiple talents or measures (Renzulli, 2011). As seen in Figure 1, Renzulli (2011) believed giftedness lies within the overlapping areas of the three clusters: above-average ability, task commitment, and creativity.

Figure 1

The Ingredients of Giftedness (Renzulli, 2011)



Purpose of the Study

With these variables in mind, middle school programs should drive curriculum decision-making toward the developmental needs of their clientele. Current trends and reform in education require that instructional programs adjust to better serve the needs of diverse learners. Middle schools should certainly seek to educate the "whole child" and address the unique needs in all domains. A correlation between student successes and the effectiveness of the instructional program may be made. I evaluated a middle school program and its impact on student cognitive achievement. Specifically, I investigated, "What practices are present in the middle level GT science program?" I also investigated, "How do current practices within the GT science classroom impact student achievement?"

Before the 2017-2018 school year, all the district's GT students were served through GT English language arts (ELA). Beyond the need to expand advanced coursework offerings, not all students being served were verbally gifted. Some students' areas of giftedness may be nonverbal or quantitative.

Background of the Study

The district of focus for this research was a suburban school district located in the upstate of South Carolina. It began to focus over the last 5 years on how to increase the number of students who leave high school college and career ready.

In 2002, a national coalition was formed between businesses, educational leaders, and policymakers to focus on 21st century learning for K-12 education. The Partnership for 21st Century Skills (P21, 2009) recognized that "Learning and innovation skills increasingly are being recognized as those that separate students who are prepared for a more and more complex life and work environments in the 21st century, and those who are not" (p. 3). P21 provides a framework that includes not only traditional mastery of knowledge but specific skills that will prepare students for a world of careers that may not yet exist. When educators discuss educating 21st century learners, it is with a recognition that students need to be prepared to be creative and innovative, and possess information, media, and technology skills. P21 proposed that what students need "are the knowledge, skills and expertise students should master to succeed in work and life in the 21st century" (p. 2). Not until the second decade of the 21st century have we seen a focus on the 21st century skills outlined in P21's framework in South Carolina.

Perhaps inspired by the work of P21, the 2010 reauthorization of the Elementary and Secondary Education Act (ESEA) shifted to a national focus on college and career readiness. The U.S. Department of Education (2011) noted that four of every 10 new college students must take remedial classes and are unprepared for college. It also noted that while the U.S. was once first in college completion, we had been passed by 10 countries (U.S. Department of Education, 2011). According to National College and Career Readiness Indicators (2015), indicators that a student is college ready include a grade point average of at least 2.8 on a 4-point scale and success on either an advanced placement exam/course or dual credit for either college English or math, among others. With a focus on college and career readiness in a 21st century learning environment, the study school district is now working to “broaden the circle.” Current practices within the district see vertical training for teachers in math, ELA, science, and social studies with the end goal of expanded enrollment in AP and dual credit courses. The practices are based on the recommendations of the district’s own college and career readiness leadership team. Additionally, the team calls for an expansion of opportunities in the areas of STEM education and various internships and apprenticeships at the district’s career and technology center. The current superintendent of the district in 2016 indicated,

> Our goal is to continue expanding the circle of students taking AP exams…participation in Advanced Placement courses is important for students to be prepared for college. About 65 percent of our students go on to 2- and 4-year colleges after graduating, and we intend to increase that number.

Expanding advanced coursework through the addition of GT science in middle school may certainly be a good place to start. With the implementation of GT science in the 2017-2018 school year, middle school students in the district may now take advanced coursework in ELA, math, and science.

Nature of the Study

The district of study is a large suburban school district in South Carolina that serves approximately 16,000 students in Grades K-12. The district of study currently has 938 students served in GT science in Grades 6-8. This study specifically focused on the 270 students served in sixth grade as they are the only grade that takes the state test for science (SCPASS). As previously stated, students in Grades 6-8 are primarily served as GT in their science class since 2017. It is expected that students served through GT science will also be enrolled in advanced math, ELA, or both depending on their area of giftedness. In the district of study, there was a maximum class size of 25 students. While students must be identified as GT to receive services, scheduling constraints have seen the placement of high achievers in the sections as well. This study focused on the achievement of any student in Grade 6 who is served in GT science.

Statement of the Problem

What practices are present, and how does a middle level GT science program impact the students enrolled? No current research could be found regarding the impact of a GT science program on student achievement. GT students fall under the umbrella of special education yet are often neglected because they are high achievers. Bipartisan legislation was implemented in 2015 as part of the reauthorization of ESEA, specifically intending to ensure the academic growth of the GT population through the TALENT Act (To Aid Gifted and High-Ability Learners by Empowering the Nation's Teachers Act). The legislation noted that prior authorizations of ESEA including No Child Left Behind maintained a focus surrounding efforts to assist low achievers and failed to address the GT student's unique learning needs. The legislation also stressed a greater need to understand excellence gaps, provide public transparency of student achievement data, and research best practices in gifted education (NAGC, 2020). The national legislation was first enacted in 1965 and has been reauthorized eight times since its inception. While there is not a specific year of reauthorization, it happens on average every 5 years, typically when issues in the legislation surface (New America, 2021).

The central problem is identifying the guiding practices within a middle school GT science program that are effective. The secondary problem is the lack of research surrounding the impact on the achievement of science GT programs at the middle level. GT is often done either through specialized coursework or through a pullout program. While the district of study has clearly defined the intent behind GT services through science at the middle level, it is unclear what the pedagogy should be to address the needs of the gifted, beyond students' understanding of the state science standards. It is a reasonable assumption that a GT-certified teacher would recognize the unique learning needs of this group of students and work to address them, but how they do so is unclear. As the researcher, I identified any relationship between services through a middle level GT science model and achievement, as well as what specific practices resulted in the identified achievement.

Theoretical Framework

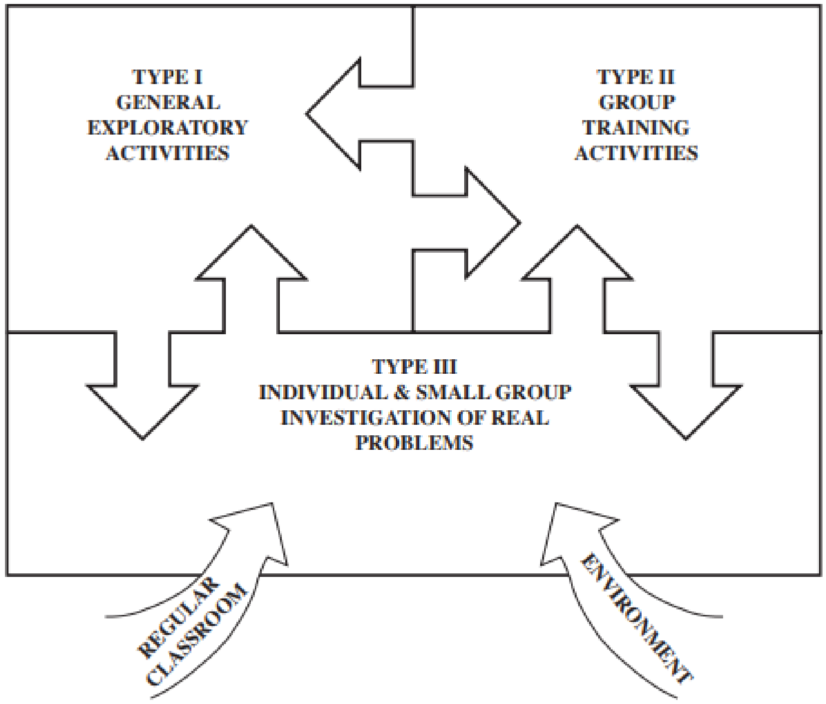
As the researcher, I drew conclusions about the impact of a middle level GT science program on student achievement. With any research study, unidentified variables can influence the results found. With the intention of being comprehensive in nature, the research was mixed methods, but I quantified as much as possible. Specifically, I looked at the data associated with student achievement with the South Carolina standardized test for science (SCPASS Science) in sixth grade and examined pedagogy in the sixth-grade GT science classroom. This allowed me to draw conclusions between the reported practice of the teacher and the achievement of the student.

With this in mind, a positivist, or more specifically, a postpositivist approach was considered. Positivism at its inception was constructed by Auguste Comte. Comte’s main objective with the proposal of the positivist approach was to combat the metaphysical influence of many theoretical approaches of the time. Comte believed objectivity came from the individual science and that a true cause and effect could be concluded in most sciences (Willis, 2008). Modern educational research is more likely to see what is known as a postpositivist approach rather than a traditional positivist approach (Willis, 2008). Postpositivism has replaced positivism in that complete certainty of conclusions is unlikely. Postpositivism is more likely to assert that no matter how much research is done, you will never do enough to absolutely confirm that your research is correct. Despite the findings, further research will be recommended, and new research questions will come to the surface warranting exploration. Postpositivism accepts that a true cause and effect is complex, but that a scientific approach is still the best (Willis, 2008).

Do classroom practices specifically align with the unique learning needs of the gifted learner who finds their way into the district’s gifted science classroom? With nearly 45 years of research to support Renzulli’s (1976) inductive approach to meeting the needs of the gifted, the frequency of connected practices such as curriculum compacting as a means of acceleration, ability grouping, and specialized coursework such as problem-based learning (PBL) was used to assess the scope of practices in the district of study’s gifted sixth-grade science classes. Renzulli’s (1976) inductive approach, by his own admission, most often happens outside of the classroom. Renzulli (1976) believed that a combination of exploration, training, and investigation of real problems was the best model for serving the needs of the gifted, and he illustrated the connectivity and fluidity of three types of activities through his Enrichment Triad Model (Figure 2). How often do teachers move to the Enrichment Triad Model's Type I, Type II, and Type III activities with gifted students, or do practices simply reflect a traditional exploration of the grade-level state science standards? Renzulli (2019) noted that Type I activities expose and motivate students, but the deepest engagement will come through the implementation of Type II and III activities. "A Type I exposure experience may, for example, have value in and of itself, but it achieves maximum payoff if it leads to Type II or III experiences for one or more students" (Renzulli, 2019, p. 5). Figure 2 indicates Renzulli's (2019) belief that any type of activity may lead to another. For example, a problem-based activity (Type III) may develop questions that require further exploration (Type I) or perhaps training (Type II). Type I activities most closely align with a traditional approach to instruction. Types II and III are certainly engaging students at a different level. What frequency of Types I, II, and III activities could be found in the district of study?

Figure 2

The Enrichment Triad Model (Renzulli, 2019)



Research Questions

“Research questions in a dissertation proposal provide specificity to further clarify what the researcher wants to find” (Flamez et al., 2017, p. 117). The purpose of this research was to primarily examine the practices used within the GT classroom to address this subgroup of students’ specific needs. The research also investigated the impact of a GT science program on student achievement. This was a mixed methods study in that by converging quantitative and qualitative data, a deeper understanding of the impact on students was gained. According to Creswell and Creswell (2018), a convergent mixed methods approach will allow the researcher to integrate the information in the reporting of results. Further research can be used to explore contradictions. The research questions of this mixed methods study were as follows:

1. What are the specific GT practices being used by the district's GT science teachers?
2. What are the mean differences in the student achievement level of the GT students on the SCPASS Science Test before and after the implementation of the district's GT science program?
3. How do people perceive practice affects achievement when the data are shared regarding practice trends and achievement, and what is their level of satisfaction with the findings?

Assumptions

This study would like to recognize several assumptions of the research. The secondary research question was focused on the achievement level of sixth-grade science students who were served as GT. This research assumed that all students were appropriately placed in the GT setting and were heterogeneous as a sample. Regardless of their setting, the state test results identified any student labeled as GT as such in reference to their SCPASS Science results. For the purpose of generalization of teacher practice aligned with GT instruction, the research assumed that practices with defined criteria were comparable in nature from one teacher surveyed to another.

Limitations

I identified current practices in the GT science classroom using survey results. Research Question 3 sought to draw correlations between practice and achievement. With this in mind, the data were limited to those tied to current sixth-grade science teachers who were in place during a given year of testing, providing for a smaller sample of information. A secondary weakness was the limited number of years that state test data had been collected since the implementation of the program. State testing did not occur in South Carolina in 2020 due to COVID-19. Data from 2021 was impacted by limited practice and 25% of instruction online due to COVID-19 reopening restrictions in the schools of study. This limited test data to the 2017, 2018, and 2019 school years following implementation of the program. Therefore, the research surrounding achievement was causal comparative and ex-post facto in that no data from the last years of testing were available (Gomez-Galan, 2016).

Delimitations

The scope of the research was limited to the five middle schools that have implemented GT science in the district of study. Achievement data and teacher interviews to correlate practice to achievement were conducted only with teachers who are current sixth-grade science teachers to provide the most current and accurate findings. An additional delimitation of the data is that I wanted to compare the largest sample sizes available for both pre- and post-implementation. In 2017, students were randomly selected to take either SCPASS Science or SCPASS Social Studies which provided a smaller sample size. Beginning in 2018, all sixth graders began taking SCPASS Science which provided for a much larger sample size over the 2018 and 2019 administrations of the test. With the two data sets containing different participants and different sample sizes, the comparison had to be made using an independent *t* test for samples with unequal variances. Equal sample size is not one of the assumptions of a *t* test (Statology, 2022). The specific two-tail test will accommodate two independent samples of varying sizes.

Definition of Terms

The following terms are used with some frequency in this research study.

Curriculum Compaction

The acceleration practice of allowing students to bypass curriculum for which they demonstrate mastery and move on to new material in the form of enrichment or other acceleration activities (Reis, 1992). Curriculum compaction is often used to avoid boredom and underachievement in gifted students.

GT

NAGC (2019a) defined GT students as those who have the capability to perform at higher levels than their peers and require modifications in services to meet their potential. The term GT is used in South Carolina to describe anyone in Grades 1-12 who demonstrates high performance or holds potential in either academics or the visual and performing arts and therefore requires educational services to help them reach their full potential (South Carolina Department of Education, 2013). In the district of study, GT services within the school are to serve the academically gifted. The artistically gifted are served primarily through summer programs. Within the context of this research proposal, GT will refer to those identified as gifted academically in any area and require special services during the academic day.

MAP

The acronym stands for measures of academic progress. This computer-adaptive test gives individuals a unique set of questions based on previous answers. The test is national normed and can track a student’s growth over time in a specific content area. It is most typically used with ELA and math. The student receives a scalable score that can report where a student is at that moment compared to other students and within the content. The test often is used to measure reading, language usage, and math three times a year in the fall, winter, and spring (NWEA, 2022).

PBL

Used interchangeably with project-based learning. PBL is a subset of project-based learning. Both identify a problem and work through a specific process to develop a solution for it. The main difference would be the scope of the learning. When aligned with Renzulli's (1976) Enrichment Triad Model, PBL is aligned with Type III activities. According to the National Research Center on the Gifted and Talented (2021), Type III activities can be done within the curriculum as enrichment or as a replacement strategy for compacted academic standards. Type III products are student-driven and therefore can be produced using visual, written, oral, artistic, or technology mediums (National Research Center on the Gifted and Talented, 2021).

SCPASS

The standardized testing acronym stands for South Carolina Palmetto Assessment of State Standards. It is used for state-wide assessment of science and social studies in both elementary and middle school. A proviso to the state's general appropriations bill suspended testing of social studies in Grades 4 and 7, and science in Grade 8 (South Carolina Department of Education, 2021). The district of study has not administered SCPASS Science for eighth grade since the implementation of the new GT Science model and only tests sixth-grade students.

Summary

Classroom practices in the United States have largely been driven by the reauthorization of ESEA as No Child Left Behind at the turn of the century. Legislation would not acknowledge limited focus on the nation's most gifted students until the TALENT Act of 2015. This new legislation would stress a greater need to understand the achievement of the most gifted students and the practices that serve them best (NAGC, 2020). This dissertation focused on the two given areas stated.

In the district of study, over 1,000 GT students are regularly served in the middle school science classroom. With no current research found on student achievement within the middle level GT science classroom, I proposed that it was an essential area of needed research. Further, practices taking place within the specialized classroom were not regulated. No comprehensive description of practices for the district of study has occurred since the program's implementation in 2017.

Chapter 2: Literature Review

Introduction

Daggett and Harries (2021) discussed the current employment epidemic and how vital rigorous and relevant education is to building a successful workforce for tomorrow. Daggett and Harries's tenets stressed a move from a basic cognitive approach so often embraced in preparing for the standardized state test to one that is highly relevant and highly rigorous which will prepare students for a very different workplace in the near future. I can think of nowhere this approach was more appropriate than in the critical middle. The Center for Collaborative Education (2003) stated, "Between the ages of ten and fourteen, the young adolescent grows and develops more rapidly than during any other developmental stage except for infancy" (p. 8).

Literature Review Overview

The purpose of this study was to better understand teacher practice and the impact of that practice on over 1,000 students being served in a middle level GT science program in the district of study. The new program of service began in 2017 and clearly outlines a rationale for the use of GT science to serve students. Previously, middle school students had been served through GT ELA, but the underlying concern was the GT ELA service may have neglected those students who were specifically gifted in the nonverbal or quantitative areas. Service through science, it was believed, would create greater balance for the verbal, nonverbal, and quantitatively gifted students in one setting. Students would also continue to take advanced coursework in math, ELA, or both, depending on their achievement and area of giftedness. The district was intentional about serving through content within an ability group. No middle school in the district of study uses a pullout program for services. What is unclear in the district plan is what specific pedagogy will best address the unique learning needs of the gifted population at the middle school level. Also, how will the GT program impact student achievement? This review of literature focused on the three research questions:

1. What are the specific GT practices being used by the district's GT science teachers?
2. What are the mean differences in the student achievement level of the GT students on the SCPASS Science Test before and after the implementation of the district's GT science program?
3. How do people perceive practice affects achievement when the data are shared regarding practice trends and achievement, and what is their level of satisfaction with the findings?

With these questions in mind, this review of literature explored what the research said about developmentally appropriate practices at the middle school level that are gifted-centered, and how those gifted practices affect achievement. In my study, I found no research on the practice or effect of specific GT science programs in the United States to date. I also found limited research on the acceleration of other content areas at the middle level.

This study's postpositive approach acknowledged that the findings of this study will add to the body of research on the topics of middle level education, GT services, and specific pedagogical effect on achievement but also recognized that the conclusions drawn will still have limitations and will only lead to further questions and need for research. With this in mind, I began by conducting a review of literature on the following topics: (a) the historical perspective of middle level education; (b) an overview of GT education in South Carolina; (c) the practice of ability grouping on specific learning populations; (d) suggested best practices for serving GT students, including use of the Enrichment Triad Model, compaction, and problem/project-based learning; and (e) the impact on the achievement of content-based GT programs. The review of literature on each topic was intended to provide greater context for the research questions of this study.

Historical Perspective on Middle Level Education

Greater context surrounding a middle level research study was found with a closer look at the history surrounding the inauguration and evolution of middle level practices.

William Alexander is often noted as the father of the middle school movement (Schaefer et al., 2016; Smith & McEwin, 2011). According to Smith and McEwin (2011), in 1963, William Alexander noted that "other evidence abounds that the junior high school has typically been a secondary school following the 4-year high school model rather than being an in-between school, bridging a gap between elementary and secondary education" (p. 16). At that time, Alexander proposed a new "middle" school. From the beginning, some basic ideals of the modern middle school would be outlined:

> Experimentation with a new middle school (best developed in new building programs, although it could be accomplished by modifying present junior high school structures) should serve several purposes, it is suggested:
>
> 1. It would give this unit a status of its own, rather than a junior high school classification.
>
> 2. It would facilitate the introduction in grades 5 and 6 of some specialization and

team teaching in staffing patterns.

3. It would also facilitate the reorganization of teacher education sorely needed to provide teachers competent for the middle school; since existing patterns of neither elementary nor secondary teacher training would suffice, a new pattern would have to be developed.

4. A clearly defined middle unit should more easily have the other characteristics already described as desirable, than the typical junior high school: (1) a well-articulated 12- to 14-year system of education; (2) preparation for, even transition to, adolescence; (3) continued general education; and (4) abundant opportunities for exploration of interests, individualization of instruction, a flexible curriculum, and emphasis on values. (Smith & McEwin, 2011, p. 22)

Schaefer et al. (2016), in conjunction with the University of South Africa, analyzed 50 years of research from two primary middle level publications, the National Middle School Association, now known as the Association of Middle Level Educators, and Research in Middle Level Education. These two publications were chosen because of their nearly exclusive focus on middle level practices (Schaefer et al., 2016). Schaefer et al. examined 2,208 published documents and examined trends in data surrounding three primary research questions: (a) “What topic did the authors take up in the article,” (b) “What conclusions did the authors make,” and (c) “What recommendations did the authors make?” (p. 3). The resulting data were organized into “sets” by decade with the purpose of examining trends in the middle school movement.

For the purposes of summary, it is notable that the 1960s, 1970s, and 1980s were periods that saw an expansion of the middle school movement with the introduction of new middle schools and growing middle level organizations across the country.

The end of the 1980s revealed a new focus on “the diversity in the middle level age group and teachers used this diversity to design curricula that were responsive to this group’s special needs and characteristics” (Schaefer et al., 2016, p. 7). The 1990s saw a focus on “what works” in middle schools. Specifically, four practices were prevalent in the 1990s: advisory, cooperative learning, teaming, and engaging students. Research surrounding these practices revealed that teaming is a fundamental practice and was accompanied by the finding that common planning was a positive addition to middle school teaming.

Schaefer et al. (2016) further revealed that the first decade of the 2000s was the decade of research-based models of middle school practice and that a focus on exemplary middle schools became a common theme of research. Specifically, “research not only examined high achieving schools, but the needs of special populations and other groups of vulnerable students” (Schaefer et al., 2016, p. 10). A common theme in research surrounding high-achieving middle schools with a focus on 21st century skills revealed a “responsive curriculum, advisory, block scheduling, exploratory courses, and teaming” (Schaefer at al., 2016, p. 11).

Finally, Schaefer et al. (2016) looked at trends with research published in the journals from the Association of Middle Level Educators and the Research in Middle Level Education from 2010 to 2015. The theme of this period of time indicated a focus on restrictions and innovations. Two practices identified in the literature as primarily harmful to the middle school movement included “attempts to standardize the curriculum, and the imposition of standardized tests to measure achievement” (Schaefer et al., 2016,

p. 14).

As a limitation of the analysis, Schaefer et al. (2016) acknowledged that their own experiences as parents of middle schoolers and their own practices as middle school educators may have impacted the research.

The recommendations of the longitudinal research analysis call for more research that focuses on middle school curriculum and “studies including longitudinal ones, which examine the impact of high stakes testing on teaching and learning of young adolescents” (Schaefer et al., 2016, p. 17). The analysis supported my research with the conclusion that “it continues to be critically important that middle level research, policy, and practice be supported…the core middle school practices must continue to grow and thrive” (Schaefer et al., 2016, p. 18).

Musoleno and White (2010) examined how high stakes testing and accountability in the state of Pennsylvania impacted the practices of middle level educators. Using an online survey sent in an invitational email in 2008 to some 4,000 members of the Pennsylvania Middle School Association, Musoleno and White gathered data from 214 respondents who did not complete the demographic section of the survey and 148 respondents who did. Of the 148 respondents who completed the demographic information, 103 were teachers, 41 were administrators, three were counselors, and one was a psychologist. The findings of the research indicated changes in middle level practices before and after the implementation of No Child Left Behind. The data revealed a major shift from a curriculum that is “broad and exploratory in nature to a curriculum that has a narrow focus on high stakes tested subjects” (Musoleno & White, 2010, p. 7, Tables 6 & 7). The conclusion drawn from Musoleno and White based on both respondent data and comments indicated that “movement away from middle school best practice; attention to the learner is being replaced by attention to the test” (p. 8) Nonetheless, most respondents were middle level educators with over 20 years of experience and they continued to try and find a balance between test prep and the unique learning needs of their students but were dissatisfied with the lack of focus on the middle school concept under accountability mandates.

With this in mind, what is the impact of the school model on students today? Does the middle school model first conceptualized almost 60 years ago positively impact student achievement and the unique learning needs of the gifted adolescent student? Olofson and Knight (2018) examined the merits of middle school effectiveness related to recommended practices. Specifically, they intended to address a noted lack of large scale quantitative research studies of middle school model effectiveness. The sample of Olofson and Knight’s study included 1,735 Texas schools that serve young adolescent learners and focused on longitudinal data from 2011 to 2015. Olofoson and Knight first estimated a school value-added model and then regressed the school valued-added effect using the defined predictor variables. They used mathematics, ELA, and attendance as the student level outcomes. The results of the study indicated that the correlation between academic value-added effects and the middle school model was mixed. “Teachers at a campus certified to teach students in the middle grades specifically was not a statistically significant predictor” (Olofson & Knight, 2018, p. 7). Olofson and Knight continued by pointing out that “a larger enrollment and fewer classes in the school day were associated with higher campus-level value-added effects” (p. 7).

Middle school movement proponents frequently argue for school schedules with

> fewer classes that allow students to take deeper dives into material…fewer classes allow students to explore and identify their identities [22, 23]; these results provide evidence that such schedules also support measurable growth on academic and non-academic measures. While this study does not point to the mechanism for this phenomenon, these findings support continued advocacy for such shifts. (Olofson & Knight, 2018, p. 8)

Olofson and Knight (2018) indicated a correlation between the middle school practice of block scheduling and student achievement.

What is the status of other middle level concept programs? McEwin and Greene (2011) comprehensively examined this question. In the first study, McEwin and Greene researched the results of randomly selected middle schools across the country. McEwin and Greene used a random stratified sample of 2,783 public middle schools out of the 13,918 middle schools nationwide. The survey return rate was 30%. Principals were sent an electronic survey that requested data and professional opinions aligned with specific middle school topics. The resulting data were compiled and compared to four surveys done previously throughout the middle school movement. The results were compared to surveys done by Alexander in 1968; Alexander and McEwin in 1989; and McEwin, Dickinson, and Jenkins in 1996 and 2003 (McEwin & Greene, 2011). The first study primarily reported feeling associated with middle level concepts.

In regard to implementation, the highest levels were seen with

> Strong focus on basic subjects (98%), inviting, supportive, and safe environments (98%), educators who value working with adolescents (97%), trusting and respective relationships among administrators, teachers, and parents (94%), A

> shared mission and goals (94%), curriculum that is relevant, challenging, integrative, and exploratory (92%) and teachers and students engaged in active learning (91%; McEwin & Greene, 2011, p. 30).

When comparing perceived importance and implementation, there were several middle school concepts that are valued yet not implemented. Flexible scheduling was considered highly important by 88%, but only 55% reported that they were highly implemented. Advisory programs report 88% important but only 46% highly implemented. Teachers with middle level certification/licensure were highly important at 84% but only highly implemented by 63%. The limitation of this study was that the results compiled comprehensive data regarding implementation and opinions of importance but did not correlate practice to student outcomes.

In the second study completed by McEwin and Greene (2011), a similar survey instrument was distributed, but this highly successful middle school survey was distributed to 186 schools recognized as either schools to watch or as breakthrough middle schools and with 101 schools responding or a response rate of 85.1%. Recognition for both programs is awarded, in part, by standardized test results and by visits from experts in middle level education who serve as outside evaluators. The results of this study led McEwin and Greene to conclude that "the middle school concept as originally proposed by Alexander in 1963 remains valid" (p. 57). The highly successful middle schools engage in practices that can be considered developmentally responsive. The highly successful middle school implemented recommended middle level practices at a higher rate than the average public middle school in the United States. The comparisons between the two are made using data from both the random selection instrument and the highly successful schools instrument. The highly successful middle school used interdisciplinary teams (90% versus 72%), provided at least 10 common planning periods, used cooperative learning (85% versus 64%), had a higher percentage of teachers holding middle level certification, more frequently had advisory groups (65% versus 54%), a higher percentage of students were at or above grade level in English and math, more frequently offered intramurals (65% versus 55%), used ability tracking more frequently, and more strongly supported and implemented the components of a middle level school.

The conclusion of the two studies revealed that the middle school concept is often valued but less fully implemented. The greatest success in current middle schools is shown to be found in environments that are developmentally responsive to the needs of the young adolescent. Lack of understanding and pressure from high stakes testing is often attributed as causes for the lack of comprehensive implementation (McEwin & Greene, 2011).

Research spanning nearly 55 years indicates a clear need for developmentally appropriate middle level practices when serving a unique set of learners. Beyond the unique needs of all middle schoolers, we then add a label of GT to a percentage of these students. The need for a specialized setting and targeted classroom practices becomes even greater for this group of students who are identified as gifted in South Carolina.

GT Education in South Carolina and Beyond

The most comprehensive and longitudinal research regarding GT instruction in South Carolina was conducted by Monrad et al. (2005). The history of the state's GT program spans approximately 45 years with the implementation of programs in three school districts, Richland Two, Kershaw, and Spartanburg 7 in 1973. The programs were successful in that they were able to recruit students who were ranked in the 98th and 99th percentiles. Initially, the programs relied heavily on achievement tests but soon realized that some high-achieving students were not being identified and began to use additional indicators for qualification (Monrad et al., 2005). The Education Improvement Act of 1984 brought funding for programs and a state definition of GT. It also allowed for earlier identification of high-ability students. The program has expanded from just several districts participating to a mandated program for all districts across South Carolina. According to the South Carolina Department of Education (2013), GT is defined as,

> 1. Gifted and talented students are those who are identified in grades one through twelve as demonstrating high performance ability or potential in academic and/or artistic areas and therefore require educational programming beyond that normally provided by the general school programming in order to achieve their potential. 2. Gifted and talented abilities for these regulations include (a) Academic and Intellectual Ability: Students who have the academic and/or intellectual potential to function at a high level in one or more academic areas. (b) Visual and Performing Arts: Students who have the artistic potential to function at a high performance level in one or more of the fine arts (dance, music, theatre, and visual arts. (p. 1)

Monrad et al. (2005) selected eight states for the purpose of comparison (Arkansas, Connecticut, Florida, Georgia, Massachusetts, New Jersey, North Carolina, and Virginia). Major findings of the study revealed the following:

1) While all states use multiple measures to identify gifted students, South

Carolina was only one of two states that used student performance tasks to help identify GT students. The other state was not named.

2) South Carolina serves roughly 10% of their student population in GT programs and this was the fourth highest percentage behind Arkansas, North Carolina, and Virginia.

3) South Carolina only requires six hours of graduate coursework for GT certification while all other states require between 12 and 18 hours.

4) Per pupil expenditures for gifted and talented instruction ranged from $320.24 to $1454.09. South Carolina provided $366.50, and two states did not provide any state funding for gifted and talented students.

5) While all states recognize GT by academic achievement and ability, only South Carolina and Connecticut recognize artistically gifted students (Monrad et al., 2005, p. vii).

Monrad et al. (2005) conducted a District Coordinator Questionnaire and found that the most frequently used program for Grades 3-5 was a pullout model at 69.5%, and most students in Grades 6-8 were most frequently served through special classes in the four core of ELA, math, science, or social studies. High school students are primarily served through honors coursework. Coordinators stated the greatest positive was the quality of the curriculum and instruction, while the most challenging aspect for GT programs was insufficient funding.

For South Carolina, students may qualify for services by meeting criteria in at least two of three dimensions. Dimension A identifies strengths in reasoning abilities. This requires a score at or above the 93rd age percentile. Most often, Dimension A is assessed using the Cognitive Abilities Test, which assesses nonverbal, verbal, and quantitative reasoning using a battery of nine tests for the first time in the second grade (South Carolina Department of Education, 2019). Dimension B is aligned with high achievement in reading or math at or above the 94th percentile on a nationally normed assessment such as MAP or a score of “Advanced” on a state assessment. Currently, this would be done through SC READY reading or math tests. The final dimension, C, identifies strength in intellectual or academic performance. This may be assessed through a grade point average at or above 3.75 or performance on the Project STAR assessment, which may be administered in Grades 3-6 (Monrad et al., 2005).

In 2018, the South Carolina Department of Education published *Gifted and Talented Best Practices Guidelines: Program Evaluation.* The guidelines are intended to assist the local education agency in evaluating and implementing its GT program with fidelity. The document does point out that there is no formal, external program evaluation and that districts are required to submit their plan every 5 years as part of the district plan. The guidelines refer to NAGC’s (2019b) published program standards to assist in examining the quality of a district plan. In regard to program design and service delivery model, state services reflect those illustrated in Monrad et al. (2005). The state has approved services to be delivered through resource pullouts, special classes, and special schools. Students who are GT artistic may also be served through weekend or summer programs. The document provides a crosswalk between requirements in regulations for GT services and guiding questions. Again, no specific reporting of state success related to achievement of GT services is presented in this program evaluation (South Carolina Department of Education, 2018).

At a national level, the NAGC (2015) and the Counsel of State Directors of Programs for the Gifted published the *2014-2015 State of the States in Gifted Education*. The purpose of the study was to assess the quality of education for gifted students in the United States and its territories. Invitations to participate in the study were extended to the employees in charge of oversight for the state's gifted program within its department of education. Data were collected using a survey covering policies, services, funding, and other information. The online survey was one that participants could revisit until completed. Representatives from 42 states completed the survey including South Carolina (NAGC, 2015). The summary of the findings reflected great variation in the structure surrounding a state's education agency and who provided oversight for the state's gifted services. A majority (83%) reported that GT was part of a larger program such as curriculum and instruction, general education, and special education. The cumulative results indicated that the areas of gifted needing the most attention in order from greatest to least were: "1) A national mandate for gifted education, 2) Funding for gifted education, 3) Inclusion of underrepresented students in GT, 4) Professional training for general ed. Teachers in GT, and 5) assess academic growth of GT as a separate group" (NAGC, 2015, p. 49). Nationally, the top delivery methods for GT services in middle school were as follows by number of states for the 22 respondents to the question: "honors/advanced coursework (15) was the most common, followed by regular classrooms (14), and cluster classrooms (13)" (NAGC, 2015, p. 36). Specifically reported from South Carolina as the top middle school delivery models were honors/advanced coursework; self-contained classroom; magnet schools, other: summer/weekend (specifically for GT arts), and virtual school (NAGC, 2015). The district of study used honors/advanced classes to provide GT service. This coursework is a form of ability grouping and was a specific practice of interest in this research study.

Ability Grouping

Ability grouping is a practice used specifically to serve the needs of the GT student academically in the district of study using advanced coursework in math and ELA. The advancement of coursework in GT science is not outlined beyond the state standards. Rather, the implication is that middle level GT science is in place to serve the unique learning needs of the GT artistic population. For example, advanced courses in eighth grade for academically gifted students include high school level English I and Algebra I. There is no such distinction for eighth-grade science other than the title of GT Science; therefore, this study was important to evaluate the specific practices being used.

Ability grouping is often associated with a practice known as tracking in the educational setting. There is research that indicates that tracking and ability grouping are not the same thing and that the homogeneous grouping of students in order to serve their individual academic needs may positively impact achievement.

Collins and Gan (2013) investigated this postulation. The findings definitively proved that homogeneously grouped students, whether high or low, found greater success academically than students in heterogeneously grouped classes, particularly when sorted by previous testing scores (Collins & Gan, 2013). The findings were conclusive in that Collins and Gan studied 9,325 students in 135 schools from a Texas independent school district over multiple years. Collins and Gan created a sorting index and used the following variables: previous year’s test scores, specific class, school, and academic year. When sorting special populations, such as special education, GT, and limited English proficiency, the most positive results were actually generated for the non-GT student but were not statistically significant. More homogeneous grouping allows teachers to narrow their focus to a specific class or group. Ability grouping has always been a controversial idea, but this research shows that when instruction is adjusted according to the ability group, all learners at any level will benefit.

A quantitative research study in 2017 looked at 140 fourth- and fifth-grade students at two elementary schools in a Chicago school district who were ability grouped for math and compared them to a group of 142 fourth and fifth graders at a third school who were heterogeneously grouped (Curran, 2017). The study used pre and posttest data from the STAR math test. The research showed that “flexible grouping may benefit intermediate elementary students but more research is needed to fully gauge its effects” (Curran, 2017, p. 2).

Using a repeated measures ANOVA and paired samples *t* test, Graham (2020) compared the pre and posttest data from the NWEA reading assessment for 91 ability grouped fourth graders to 87 heterogeneously grouped fourth graders. The results of the quantitative study showed statistically significant growth in the experimental group which grew 7 points compared to the 5-point growth of the control group. I noted that the findings aligned with previous research that supports ability grouping.

Gentry (2016) explained that tracking was a practice that tied students to a “rigid academic track” (p. 126), and ability grouping deals with achievement levels.

Bui et al. (2014) and Card and Giuliano (2014) investigated the effects of students identified as gifted and their resulting achievement on standardized tests using a regression discontinuity model. Card and Giuliano analyzed the data from one of the nation's largest school districts in an effort to examine the two main dimensions used to target students as gifted: IQ and academic achievement. Card and Giuliano also explored targeted students' socioeconomic statuses. Over 4,000 students were observed and characterized as non-disadvantaged gifted, disadvantaged gifted, and those placed based on past achievement scores alone. Card and Giuliano used eligibility rules to build regression discontinuity estimates of how the program impacted the student using IQ scores and test score ranks of high achievers. "The findings revealed that the district's gifted program has little effect on the reading or math scores of the gifted students" (Card & Giuliano, 2014, p. 3). They did find that placement in a gifted classroom of non-gifted participants yielded largely positive effects. The district's gifted classrooms were more effective for students targeted based on past achievement than those targeted based on cognitive ability. Card and Giuliano concluded that tracking students into a gifted classroom based on their achievement ability would be a best practice.

A study of 7,328 south Texas fifth graders revealed in a quantitative research study that students enrolled in the GT program (594 students) showed greater gains than those not enrolled in a program in this causal comparative study; however, the study did indicate that the effect size of the gifted program on the state assessment for the gifted participants was minimal (Smith, 2016).

Specific to South Carolina, a 2013 study examined the effects of ability grouping on GT third, fourth, and fifth graders in two public school districts (White, 2013). ELA and math scores for the state test (SCPASS) were gathered for two districts where a pullout model of instruction was used for ELA and math in some schools and an ability grouping of instruction in other schools. The results of the study indicated that students taught in a special class for math outperformed those served in a pull-out model. The study found the opposite for ELA. Regardless, of the model, students in both areas were grouped with their similar peers in one way or another (White, 2013).

In a 2015 mixed methods research study, 32 fifth and sixth graders and three elementary teachers were studied (Pinsonneault, 2015). Qualitative data were collected using student surveys, student journals, interviews, math portfolios, and classroom observations. Quantitative data were collected from a variety of sources including a baseline math skills inventory given pre- and post-topic, benchmark assessment, report card grades, and discipline records. The results from these data concluded that over the period of study, students who were flexibly grouped by ability showed greater engagement in the advanced math setting. Disciplinary referrals were reduced by 71% compared to the previous year. Student survey results indicated that students' ownership of the learning process and personal responsibility for individual learning were noted. Of the students tested, 64% showed growth from the pre- to post-assessment, and 71% of the students increased their math grades (Pinsonneault, 2015). When examining the research findings in the literature, Pinsonneault (2015) also drew a correlation between this study and Renzulli's (1976) three ring conception of giftedness (above average ability, creativity, and task commitment). Pinsonneault concluded that the ability grouping allowed for an adjusted pace to the class, creativity was demonstrated when completing cooperative problem-solving, and commitment was needed for the greater homework load throughout the study. This connection is further support of ability grouping as a best practice for GT students specifically.

Rozzo (2015) examined the grouping practices of award-winning middle schools using a phone survey with principals of 14 of the 33 Schools to Watch in Pennsylvania. The National Forum to Accelerate Middle-Grades Reform developed the Schools to Watch forum to identify the criteria of high-performing schools (The National Forum, 2015). The survey consisted of 44 knowledge-based questions aligned with the research questions and focused on how students were grouped in the successful middle schools. The findings indicated that there was no clear alignment of grouping practices among the survey schools. Ninety-three percent of the successful schools believed in some form of ability grouping, but it was primarily in math (86%) and some in ELA (50%). Random grouping was common for science and social studies. The majority felt that grouping was appropriate for high-ability students. What was unclear from the study was whether the grouping practices were in place because they were appropriate for the learners or because of high stakes testing (Rozzo, 2015).

Negative effects of ability grouping were noted by Becker et al. (2014). Becker et al. noted that advanced students often feel increased pressure to perform when grouped with similar-ability peers. The qualitative study of fifth graders in Berlin, Germany examined 155 high-achieving fifth graders who entered secondary school early. They compared this sample to 3,169 fifth graders who remained on grade level and found that negative self-concept and school anxiety increased in the study group. Positive trends in peer relations seen in the control group were not seen in the accelerated group (Becker et al., 2014).

Stokes (2014) conducted a study of flexible ability groupings and their effect on mathematics achievement and self-concept in sixth graders was conducted in one New England school. Using NWEA’s MAP test, students were ability grouped in mathematics.

Sixteen of the 57 sixth graders were in the high-ability group. In this mixed methods study, the data revealed that there was an increase in academic achievement and academic self-concept for the high-ability group. It was noted that the students' nonacademic self-concept showed a decrease. This negative was not only found in the high-ability group but across all ability groups. Stokes noted that while there is no evidence of a connection to the treatment, the negative nonacademic self-concept was "alarming" (p. 77). Students were reporting a constant comparison of themselves to their peers, concerns with body image, and what their parents thought. Stokes suggested the importance of monitoring self-concept within ability groups was a need for further study.

Ability grouping is a clearly identifiable practice in the study district's GT science program. This research explored how practices change from one ability group to the next using the teacher survey instrument.

Identifying Best GT Science Practice

The study school district has adjusted GT service from ELA formerly to GT Science for Grades 6-8 beginning in 2017. Research indicates there may be little relationship between placement in a gifted program and positive academic achievement (Bui et al., 2014; Card & Giuliano, 2014). In the age of accountability, high stakes testing achievement is relevant but may not be the only correlation between a program and its success. This research study's primary question is, "What are the specific GT practices being used by the district's GT science teachers?" A review of literature surrounding best practices with GT students allowed for the identification of such practices within this research study.

Miller (2011) attempted to identify the factors that make a middle school gifted education program excellent. Miller (2011) explained that little research has been done in the area of gifted education at the middle level specifically. Conducting a qualitative study, Miller (2011) surveyed, interviewed, and observed 362 middle schoolers and 29 middle school teachers of the gifted in the Midwest. The results of her study revealed that students felt most successful when the program provided at least 1 hour of service a day in a skills-based curriculum. Students viewed the program as successful when new learning occurred for themselves. Students, teachers, and administrators also felt that the program should provide challenges for the students. Finally, the study revealed that students were most engaged when grouped with their intellectual peers. According to the results, the subject matter is not as important as the elements identified here. The following overview of an excellent gifted program was outlined in the recommendations of the findings:

> 1. Curriculum should be skill-based and unique in scope, topic, depth, and level. The curriculum should include thematic-based units which meet the affective and academic needs of the student and curriculum centers on new learning that are challenging. Problem-solving, creative thinking, and research & writing skills are developed. Life preparation skills are cultivated for future successes. Technology is incorporated and utilized. Debate is promoted to increase learning. Projects are utilized to assist in deeper understanding.
>
> 2. Structure allows for services at least one hour daily. Students have the opportunity to work with intellectual peers (ability grouped) and taught by gifted certified teachers (Miller, 2011, pp. 150-151).

Many of Miller’s (2011) conclusions align with best practice suggested by NAGC (2012) and support the Next Generation Science Standards (2013). If the skills-based gifted instruction is done through science, it must be challenging and leveled with similar-ability peers.

The Next Generation Science Standards (2013) indicated that science instruction that meets the unique needs of GT students meets the following criteria: (a) fast pacing, (b) different levels of challenge (including differentiation of content), (c) opportunities for self-direction, and (d) strategic grouping.

Common practices can be seen in the Next Generation Science Standards (2013), recommendations from NAGC, and Miller's (2011) middle level gifted research. The practices held in common are closely aligned with the work of Renzulli's (1976) inductive model of learning and the Enrichment Triad Model. When investigating the practices in the district of study, it was important to look for practices in place that not only support the adolescent but also the gifted learner. Further investigation into specific models and practices was needed to better understand how they support the gifted learner.

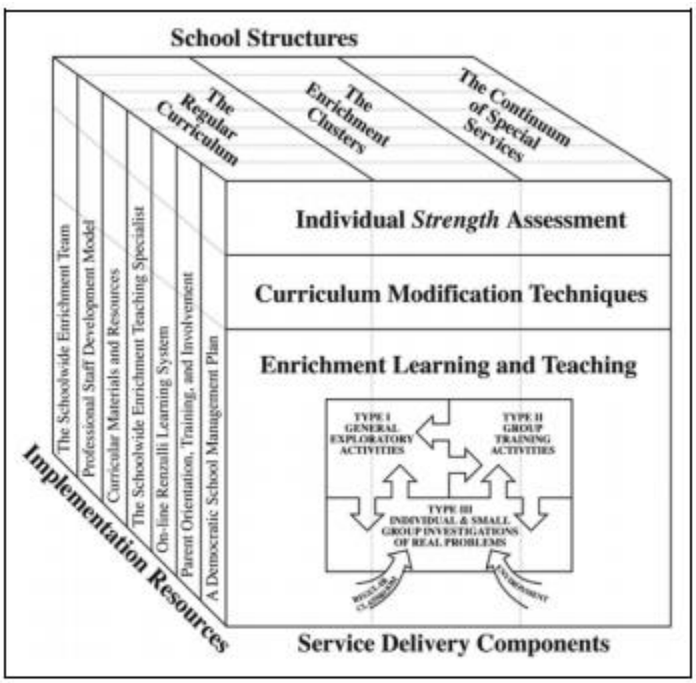
The Enrichment Triad Model

Proven gifted practices are found within the Enrichment Triad Model. The three components of the Enrichment Triad Model include student choice, real world approach, and creation of a new product or service (Renzulli, 2012). Renzulli (2012) had essentially done 40 years of field research surrounding the Enrichment Triad Model and concluded that the model is relevant for all students leading to the derivation: the Schoolwide Enrichment Model. A 2015 research study examined the effects of the Schoolwide Enrichment Model on fourth graders' achievement on the Georgia Criterion-Referenced Competency Test. In this quantitative study, the researcher compared the results of two elementary schools in the same county with similar demographics on the Georgia Criterion-Referenced Competency Test. The findings looked at the test results in math for 550 students from the two schools over a 3-year period from 2011 to 2014. Students from the schools exposed to Renzulli's (1976) model showed significant growth compared to the control school in the number of students scoring in the exceeds category on the state test according to an independent *t* test. The scores of students tested in School A averaged M = 31.28 with an SD = 8.74. The scores of students tested in School B averaged M = 29.79 with an SD = 6.61 The results show a positive effect on the achievement of students exposed to Renzulli's (1976) Enrichment Triad Model (Pendrey, 2015). Renzulli and his colleagues have essentially done a field study of the Enrichment Triad Model and its derivations for over 4 decades. The findings of the nearly half-century of research reflect practices that develop the talents of young people in a gifted or other enrichment program (Reis & Peters, 2021).

The depth of the proven practices is seen in the evolution of the Enrichment Triad Model in Figure 3 over 30 years since its inception. Structures, resources, and specific details regarding implementation and delivery have been added. Beyond the specific learning activities, the model now also includes training, assessment, and curriculum modification, all of which align with specific practices being reviewed. In greater detail, the Enrichment Triad Model involves three types of learning activities. Type I activities are those that allow the learner to explore. This might be done through speakers, field trips, demonstrations, interest centers, webinars, and other means to dive into knowledge, not in the regular curriculum. Type II activities are where students begin to really develop their creative thinking and problem-solving. They learn how to learn using advanced reference materials. They also learn how to communicate what they have learned. Type III activities are where individuals and small groups really investigate real world problems and create products and solutions for the problems investigated. Reis and Peter's (2021) review of literature surrounding the longitudinal research concluded that gifted programs that use an enrichment model approach "helped focus students' academic development and productivity in their areas of interest" (p. 24). Reis and Peter's research concluded that individual elements of the Enrichment Triad Model provided positive outcomes for learners.

Figure 3

The Enrichment Triad Model In-Depth (Reis & Peters, 2021)



A Miller (2019) qualitative research study examined the implementation of the Enrichment Triad Model in alignment with place-based education in a rural school setting. The study used interviewing and observation to gather data. Miller (2019) discovered that the GT teacher did not implement the model in its entirety but did use pieces. Despite that, the results of the study concluded that the components used strengthened the gifted teacher's practice and facilitated greater student learning (Miller, 2019). "Students were engaged in transformative action, assessed their situations, and sought to improve it" (Miller, 2019, p. 189).

Multiple practices within the Enrichment Triad Model were identifiable in this research study. Even if the teachers surveyed are not formally pursuing the model, I looked for information regarding practices in use from within the Enrichment Triad Model including student choice, alternative assignments, curriculum compacting, and PBL.

PBL

A common theme seen from the Enrichment Triad Model, the NAGC standards, and the Next Generation Science Standards is the need for students to problem solve real world issues and to create solutions. Generically, this is often referred to as PBL or project-based learning.

The National Society for the Gifted and Talented (2016) explained why PBL can be effective for gifted learners. The National Society for the Gifted and Talented explained that gifted students "exhibit qualities often associated with expert problem solvers, making PBL a natural methodology for them" (p. 1). While it can motivate students of all levels, PBL is effective in addressing the unique learning needs of the gifted that are harder to address in the more traditional setting. There is a strong correlation between the characteristics of an expert and a problem solver. It also indicates that students learning through PBL gain a deeper understanding of the content than through traditional methods and are more deeply engaged.

Jensen (2015) examined the effects of PBL and project-based learning on academic achievement in sixth through 12th graders using meta-analysis. The researcher defined PBL and project-based learning as "students working in small, collaborative groups confronting real world, authentic, or ill-structured problems" (Jensen, 2015, pp. 5-6). The meta-analysis used a random-effects model and included only quantitative studies where the outcome measures reflected individual achievement. Seventy-two studies met the initial criteria, but further screening led to a sampling of 34 studies. The results of the meta-analysis show that PBL students outperformed traditionally instructed students, g = 0.54, on content and skills exams across subject areas and grade levels.

Trimble's (2017) mixed methods study on the effects of project-based learning at one Kentucky middle school, a newly implemented PBL program was evaluated. The researcher used survey and questionnaire data of teachers across content areas and state report card data to measure the success of the program. The results revealed that there was a decrease in the number of students who scored distinguished on the state standardized test. On the other hand, students who scored at the novice level decreased, and those who scored proficient increased. From 2012 to 2016, there were fluctuations in the data. The survey data revealed that teachers did feel that the PBL did provide somewhat of a barrier when it came to covering the standards. While the achievement results were mixed, teachers and administrators reported learning increases in attaining 21st century skills and helping students think outside the box. Trimble concluded that the positive effects of PBL and the disconnect to report card results show a divergence between what educators value and the values aligned with state accountability. Trimble noted that schools have an obligation to teach not only content but life skills.

Synonymous with PBL or project-based learning would be the idea of enrichment clusters. These clusters are weekly opportunities for students to focus learning around an area of interest and for a teacher to facilitate the creation of a product or service around that interest. Trimble (2017) indicated positive effects of this type of learning with greater life and process skills. Reis and Peters (2021) noted that students at both the elementary and middle school level benefit from enrichment clusters and that teacher practice was also improved. After facilitating enrichment clusters, teachers generated more thinking and problem-solving strategies in the regular classroom. They were also more comfortable exploring challenging curriculum and differentiated methodology.

The assumption was made that teachers of the GT implement practices to meet the specialized learning needs of these exceptional children. On the other hand, teachers also desire strong results on the standardized test of their subject. It would be appropriate during the interview phase of the research to explore the motivation behind pedagogy. Does the test push teachers toward a more traditional approach that allows more efficient use of their time than perhaps PBL would? Perhaps teachers can find greater time for real world pedagogy through practices such as curriculum compacting.

Curriculum Compacting

One form of differentiation that may have a positive impact on student learning is curriculum compacting. Curriculum compacting is simply the idea that students who have already been exposed to specific content or can learn specific content at a greater rate should not be subjected to the curriculum at the same pace or scope. Compacting allows for greater individualization to address the specific learning needs of the gifted student.

The latest research indicates that academically, GT students can have 24% to 70% of the regular curriculum eliminated and substituted with appropriately challenging work (Reis & Peters, 2021). Further, these students scored just as well or better in the accelerated level post-achievement tests using the Iowa Test of Basic Skills. Specifically, students outscored those who did not have curriculum compaction in math and science (Reis & Peters, 2021).

A foundational study by Reis and Westberg (1994) investigated the professional development and implementation of curriculum compaction across 20 school districts in the United States. The results of the study reflected that those trained in compacting were able to successfully eliminate 42% to 54% of the curriculum and replace it with ability-appropriate learning. Reis and Westberg noted that the greater the training, the higher the compaction that occurred. A survey of the teachers in the study indicated that a majority were enthusiastic about this method to modify the curriculum for learners (Reis & Westberg, 1994).

James's (2017) action research study, curriculum compaction and its effect on third-grade higher order thinking in mathematics were analyzed. Using quantitative methodology, James used pre-posttest data to analyze growth that resulted from the differentiated teaching methods for 16 students in a third-grade gifted math class. Before the compacted instruction, 60% of the students successfully completed the math computations of the pre-posttest. Following a 9-week intervention, five students made a perfect score, and all students showed a raw gain of at least 55%. Even though the sample size was small, the results reflected the positive impact of curriculum compacting for use with a third-grade gifted math class. James's findings indicated that the curriculum compacting of the given unit reduced underachievement. It promoted higher order thinking in that students could not only work through the problems but also justify their answers effectively. James also indicated a third socio-emotional benefit of reduced anxiety. Surprisingly, this is often attributed to underachievement and a gifted student's exposure to curriculum they had already mastered. Future implications indicated a need for further study and greater empirical data to be gathered (James, 2018). This seems to be a recurring need when reviewing the research of practices intended to serve the GT. Specifically, curriculum compacting is one area that was assessed through this research study adding to the breadth of research surrounding this practice.

Student Achievement in Accelerated Curriculum

"To be gifted is to be vulnerable. To have the mental maturity of a fourteen year old and the physical maturity of an eight year old poses a unique set of challenges analogous to those that face the fourteen year old body, and the eight year old mind" (Silverman, 1997, p. 37) Silverman's (1997) construct painted a picture of the challenge that many GT students and their families face. The student is well ahead of their peers intellectually, yet their learning needs are often not addressed. A student with an IQ of 170 will have the intellectual age of a 20-year-old at age 12. Do the most gifted 12-year-olds in the middle school receive the differentiation they deserve? Oftentimes, educators of the gifted consider the achievement levels required by state testing and not the achievement levels we should push the gifted to achieve. Ritchotte (2013) suggested that the underachieving middle schooler needs a functional behavior analysis to intervene.

Underachievement may be just as important as achievement when considering the results of a state assessment and its correlation to classroom pedagogy when working with a GT population.

While I was not able to find any research specifically addressing the impact of a GT science program on student achievement or underachievement at the middle school level, one research study looked specifically at middle level science instruction with GT students. Horak and Galluzzo (2017) investigated gifted middle school students' achievement in science using PBL. The study compared the achievement results of 206 gifted students who participated in a science classroom to 243 students in a comparison group who received traditional instruction in the middle level science classroom. The pre and posttests were comprised of questions related to the common core state standards. The results of both tests were analyzed using SPSS. The results of the pretest indicated no significant difference between the PBL and comparison groups. However, the results of the posttest indicated a statistically significant difference between the PBL and comparison groups where the PBL group outperformed the traditional counterparts. "PBL post-test = 23.5, *SD* = 1.40; comparison post-test = 22.54, *SD* = 2.06, $p < .01$" (Horak & Galluzzo, 2017, p. 39).

Further data were gathered regarding the perceptions of both groups using the Student Perceptions of Classroom Quality scale. The scale measured perceptions surrounding meaningfulness, challenge, choice, appeal, and self-efficacy. The data indicated that the choice component favored the PBL group, while self-efficacy and appeal favored the comparison or traditional instruction group. Horak and Galluzzo (2017) indicated that this was most likely the case in that PBL was new to the students, so they were unsure of the process or themselves within it despite higher achievement gains. There was no statistical difference between the two groups in regard to challenge and meaning on the scale. This finding is an important one for teachers new to the pedagogy. It illustrates that beginnings may be awkward when addressing the learning needs of the gifted through PBL (Horak & Galluzzo, 2017).

While no specific studies were found regarding GT science programs, the review of literature paints a comprehensive picture regarding specific gifted practices, the impact on student achievement, and self-concept. Middle level educators must work to address the unique learning needs of this transient population, not only cognitively but in other domains as well.

Summary

The review of literature indicates a need to specifically identify any GT students and then serve their unique needs through differentiated and specialized curriculum. This is an even greater need at the middle level where so much change occurs in the adolescent experiencing significant development in multiple domains (Center for Collaborative Education, 2003). While there is much research on the gifted and the general impact on achievement and efficacy based on specific practices, there was no current research found on the impact of a GT science program at the middle school level. It was my goal to identify what specific practices are in use in the district of study and how they compare to the best practices identified in this review of literature. Secondly, I used the identified practices and attempted to correlate them to achievement data.

Students in the district of study are served in a GT grouping in science and are served in science by teachers who are certified in GT. While this is true, that same GT-certified teacher is also serving students of different ability levels in other sections throughout the school day. These other groupings may be heterogeneous or homogeneous ability. How much specialization of instruction with GT is really happening in the district of study?

While not current, two studies were found regarding specific practices with GT students and validated this specialization of practice inquiry. Furthermore, the questionnaires used in the following studies provided vetted instrumentation for the needed investigation.

Archembault et al. (1993) looked at specific GT practices across the country in third- and fourth-grade classrooms in an attempt to identify what type of differentiation was really happening in the regular classroom. In total, 4,977 teachers in both public and private school settings were identified and invited to participate. Roughly 50% responded. The results of the survey showed that regardless of public, private, minority demographic, or region of the country, only minor modification in practice was made to serve the needs of the gifted learner compared to the practice used with all other learners. The survey also reported little difference in practice between schools with a formal gifted program and those without a formal gifted program (Archembault et al., 1993).

In Robinson’s (1998) dissertation analyzing middle level practices with GT students, a modified classroom practices questionnaire from the previously noted study was sent to a random sample of 2,000 seventh-grade teachers of ELA, math, science, and social studies in then junior high and middle schools across the country. Of the 2,000 questionnaires sent, 957 were returned and 742 were completed. Similar to the prior study, the results of the practice data indicated that classroom teachers in all four subject areas made only minor modifications between what was being done with the GT student and the average student. Of the minor modifications made, there were slight statistical differences between GT and average students in the practices of self-directed learning and content modification (Robinson, 1998).

A similar practices survey from Robinson’s (1998) study was used to identify current practices with the district’s 938 middle school GT students to answer the primary research question, “What are the specific GT practices being used by the district’s GT science teachers?”

The research was a mixed methods study and used a post-positivist approach to investigate current practices, student achievement, and any correlation that might be made between the two. I believe the lack of research literature in this area made this study not only valuable to the district of study but to any reader who seeks to better understand the implications of a middle level GT science program. We owe it to the gifted students of the critical middle to better understand how to serve their unique abilities and needs.

Chapter 3: Methodology

Restatement of the Problem

The central problem for this research was to identify in the district of study what practices are present in the GT science classroom and how a middle level GT science program impacts the adolescents served within that program. The review of the literature points to sound research surrounding best GT practice, but no reference could be found specifically to middle level GT science.

Additionally, the current age of accountability is under scrutiny from today's educational leaders such as Dr. Bill Daggett. Daggett and Harries (2021) pointed out that students must be equipped with the skills necessary to be competitive in a rapidly changing workforce and society. The old model simply does not work, according to Daggett and Harries. Do classroom practices reflect what is best for all learners? With the landscape of education being examined so closely by educational leaders, it is an optimal time to better understand current practices and dig deeper to understand how those practices are impacting students.

Setting of the Study

The district of study was a large suburban school district set in a county of 125,381 people in South Carolina. It serves, on average, 16,000 students in Grades K-12. According to MDR (2022), or Marketing Data Retrieval, a marketing research company with a focus on education, any school district with over 10,000 students is considered large. Large school districts educate over half of the American students today (MDR, 2022). Specifically, this study focused on the needs of the 3,583 students served in Grades 6-8 and, more specifically, the needs of the 938 students who are served in an academically gifted program.

The district of study serves four distinct communities within one South Carolina county. According to the 2020 U.S. Census data, the median household income in the U.S. is $64,994. In South Carolina, the median household income is $54,864, and in the district of study, the median household income is $51,032. Of the people who reside in the district, 16.4% live below the poverty line, and an average of 13% of school-age children or those under 18 are in this category. While the district of study is considered suburban as a whole, there are areas that are rural and some that are urban as well. The district of study's economic growth is driven primarily by manufacturing, with approximately 130 manufacturing plants in the county served by the district. Secondarily, economic growth is supported with education. There is one major university in the district that employs over 3,500 faculty and staff, and a smaller university as well. Tourism also plays a significant role when looking at economic growth for the district of study.

In regard to state testing, the district of study traditionally does well and scores above the state average in most areas. The 2021 state test data reflect the district of study's secondary students scoring at or above the state average in Grades 6-12 in the following areas: algebra; biology; U.S. History; sixth-grade ELA; eighth-grade ELA; sixth-, seventh-, and eighth-grade mathematics; and sixth-grade science, which was the area of focus for this research. The data listed in Tables 1-4 show the average score of test takers in 2021 in Grades 6-12 (South Carolina Department of Education, 2022a). The End of Course Examination is the primary benchmarking measure for South Carolina high school students. SC READY and SCPASS, as previously described, are the means for benchmarking middle schoolers in English, mathematics, and science.

Table 1

End of Course Examination Test Score by Subject

Algebra	65.84	66.15
Biology	65.27	65.85
English 1	54.58	No Data
English 2	76.54	76.42
U.S. History and the Constitution	64.59	65.69

Note. Data gathered from the South Carolina Department of Education (2022a) Assessments Website.

The state of South Carolina requires that all students score at the meets or above level for each test they take in middle school before they are considered proficient. Tables 2, 3, and 4 provide a comparison of the district of study's student results in 2021 to the mean score on the ELA, mathematics, and science standardized tests. Table 2 illustrates that students within the district of study were above the state average in sixth and eighth grade but below the average in seventh grade for ELA. Interestingly, even though seventh graders were below the state percentage for meets or exceeds in seventh grade, the mean score of the district was nearly 100 points higher than that of the state.

Table 2

State Versus District Results in ELA on 2022 SC READY

Grade	Number tested (state)	Number tested (district)	Meets or exceeds expectations (state)	Meets or exceeds expectations (district)	Mean score (state)	Mean score (district)
6	50,681	1,014	41.8%	42.80%	427.3	551.20
7	50,972	1,241	42.5%	41.20%	495.8	594.40
8	50,359	1,174	41.9%	43.50%	527.1	622.60

Note. Table adjusted from South Carolina Department of Education (2022a) website.

In mathematics, data presented in Table 3, it can be seen that all three grades (sixth through eighth) were above the state average in mathematics. The math percentages were lower than the ELA percentages, yet all three grade levels were almost 7 percentage points above the state percentages.

Table 3

State Versus District Results in Mathematics on 2022 SC READY

Grade	Number tested (state)	Number tested (district)	Meets or exceeds expectations (state)	Meets or exceeds expectations (district)	Mean score (state)	Mean score (district)
6	50,963	1,029	33.9%	40.60%	513.2	535.70
7	51,230	1,247	30.4%	37%	536.4	552.90
8	50,480	1,171	30.7%	37.30%	571.0	599.20

Note. Table adjusted from South Carolina Department of Education (2022a) website.

In Table 4, science data indicate that sixth grade is the only middle level grade that takes the state standardized science test (SCPASS) and that the district’s students were over 7 percentage points above the state average. Science is an area of focus for Research Question 2.

Table 4

State Versus District Results in Science on 2022 SCPASS

Grade	Number tested (state)	Number tested (district)	Meets or exceeds expectations (state)	Meets or exceeds expectations (district)	Mean score (state)	Mean score (district)
6	50,592	1,027	42.1%	49.6%	1,646.7	1,650.5

Note. Table adjusted from South Carolina Department of Education (2022a) website.

Participants

In the district of study, there are five middle schools that feed four high schools within four distinct communities. For the purpose of this study, the five middle schools being studied are labeled Schools A-E in correlation to the alphabetical order of the school's name. The state of South Carolina produces a report card and assigns a grade that correlates with achievement, growth, and climate in a given school year. Due to COVID-19, the last year a grade was given was for the 2018-2019 school year. The following information by school was useful in understanding the general success and demographics within each community. The participants for this study were sixth-grade students and their teachers; therefore, more specific demographics were offered for the students and teachers of this population.

Table 5 describes the rating system used by the state of South Carolina to rate schools based on the criteria linked to the profile of the South Carolina Graduate (SC School Report Card, 2022). Each of the five schools received a score and a corresponding ranking last in the 2018-2019 school year.

Table 5

South Carolina Middle School Report Card Ratings

Rating	Range of scores	Description
Excellent	56 to 100	School performance substantially exceeds the criteria to ensure all students meet the Profile of the SC Graduate
Good	48 to 55	School performance exceeds the criteria to ensure all students meet the Profile of the SC Graduate
Average	36 to 47	School performance meets the criteria to ensure all students meet the Profile of the SC Graduate
Below average	29 to 35	School performance is in jeopardy of not meeting the criteria to ensure all students meet the Profile of the SC Graduate
Unsatisfactory	28 and below	School performance fails to meet the criteria to ensure all students meet the Profile of the SC Graduate

Note. Table reprinted from the SC School Report Card (2022) website.

Participants – School A

In 2021-2022, School A served 273 students. Of the 273 students, 54, or 19.78%, were identified as GT. In 2019, School A received a rating of excellent on the state report card with a score of 67. School A has one teacher providing GT services through science. Table 6 illustrates the demographics for the sixth grade as a whole and by GT in the 2021-2022 school year. A dash in the table indicates no students within the specific demographic. The gifted student represents 23% of the sixth-grade population. While the ratio of females to males is similar at School A, other demographics do not reflect a similar balance. Pupils in poverty represent approximately 41.17% of the sixth-grade gifted population at School A. White students represent 100% of the gifted population, but they also make up 96% of the sixth-grade population.

Table 6

School A GT Versus Total Number Per Demographic for Sixth Grade

Subgroups	GT	Total subgroup
Females	7	38
Males	10	36
Special Education	1	14
Pupils in Poverty	7	52
Migrants	-	-
Multilingual Learners	-	1
American Indian or Alaskan Native	-	1
Asian	-	-
Black or African American	-	2
Native Hawaiian or other Pacific Islander	-	-
White	17	71
Total students in sixth grade	17	74

Participants – School B

In 2021-2022, School B served 464 students in Grades 6-8. Of the 464 students, 89 or 19.18% were identified as GT. In 2019, School B received a rating of good on the state report card with a score of 48. School B has one teacher providing GT services through science. Table 7 illustrates the demographics for the sixth grade as a whole and by GT in the 2021-2022 school year. Of the 139 sixth graders at School B, 15.10% are identified as academically gifted. It is noteworthy that at School B, 71% of the gifted students are pupils in poverty. Like School A, 100% of the students identified at School B as academically gifted are White. There is little diversity at School B within the GT population.

Table 7

School B GT Versus Total Number Per Demographic for Sixth Grade

Subgroups	GT	Total subgroup
Females	7	63
Males	14	76
Special Education	-	34
Pupils in Poverty	15	105
Migrants	-	-
Multilingual Learners	-	9
American Indian or Alaskan Native	-	1
Asian	-	2
Black or African American	-	10
Native Hawaiian or other Pacific Islander	-	-
White	21	126
Total students in sixth grade	21	139

Participants – School C

In 2021-2022, School C served 620 students in Grades 6-8. One hundred eighteen of the 620 students or 19.03% were identified as GT. In 2019, School C received a rating of average on the state report card with a score of 39. School C has two teachers providing GT services through science. Table 8 illustrates the demographics for the sixth grade as a whole and by GT in the 2021-2022 school year. Of the 170 sixth graders at School C, 15.29% are identified as academically gifted. Poverty impacts 42% of the gifted students. Like Schools A and B, 100% of the students identified at School C as academically gifted are White. With 90% of the student body identified as White, there is again no representation from other subgroups with the academically gifted population at School C.

Table 8

School C GT Versus Total Number Per Demographic for Sixth Grade

Subgroups	GT	Total subgroup
Females	12	87
Males	14	83
Special Education	-	45
Pupils in Poverty	11	123
Migrants	-	-
Multilingual Learners	1	6
American Indian or Alaskan Native	-	2
Asian	-	15
Black or African American	-	0
Native Hawaiian or other Pacific Islander	-	-
White	26	153
Total students in sixth grade	26	170

Participants – School D

In 2021-2022, School D served 849 students. Of the 849 students, 326, or 38.39%, were identified as GT. In 2019, School D received a rating of excellent on the state report card with a score of 56. School D has two teachers providing GT services through science. Table 9 illustrates the demographics for the sixth grade as a whole and by GT in the 2021-2022 school year. Approximately one of every three sixth-grade students at School D is identified as gifted with a percentage of 33.96%. Again, the male-to-female ratio is similar, but other demographics are also underrepresented at School D. The number of students living in poverty is 26.96%. Regarding ethnicity, 87.6% of the gifted population are White, 9% are Asian, 1% are American Indian or Alaskan Native, and 2% are Black or African American.

Table 9

School D GT Versus Total Number Per Demographic for Sixth Grade

Subgroups	GT	Total subgroup
Females	47	128
Males	42	134
Special Education	2	37
Pupils in Poverty	24	127
Migrants	-	1
Multilingual Learners	3	17
American Indian or Alaskan Native	1	3
Asian	8	15
Black or African American	2	33
Native Hawaiian or other Pacific Islander	-	-
White	78	211
Total students in sixth grade	89	262

Participants – School E

In 2021-2022, School E served 1,379 students in Grades 6-8. Of the 1,379 students, 351, or 25.45%, were identified as GT. In 2019, School E received a rating of good on the state report card with a score of 54. School E has three teachers providing GT services through science. Table 10 illustrates the demographics for the sixth grade as a whole and by GT in the 2021-2022 school year. Of the 430 sixth graders at School E, 27.20% are identified as academically gifted. Poverty impacts 44% of the gifted students. The ethnicity of the gifted population reflects that 86.32% are White, 7.69% are Black or African American, 1.71% are Asian, 1.71% are American Indian or Alaskan Native, and 0.85% are Native Hawaiian or Pacific Islander.

Table 10

School E GT Versus Total Number Per Demographic for Sixth Grade

Subgroups	GT	Total subgroup
Females	55	214
Males	62	216
Special Education	1	51
Pupils in Poverty	52	277
Migrants	-	-
Multilingual Learners	3	27
American Indian or Alaskan Native	2	12
Asian	2	6
Black or African American	9	71
Native Hawaiian or other Pacific Islander	1	1
White	101	340
Total students in sixth grade	117	430

Review of the Research Questions

This research study investigated the following questions using an explanatory sequential mixed methods approach allowing for a deeper understanding of the descriptive data gathered (Creswell & Creswell, 2018). The central questions of this study were as follows:

1. What are the specific GT practices being used by the district's GT science teachers?
2. What are the mean differences in the student achievement level of the GT students on the SCPASS Science Test before and after the implementation of the district's GT science program?
3. How do people perceive practice affects achievement when the data are shared regarding practice trends and achievement, and what is their level of satisfaction with the findings?

The 2017-2018 school year was the inaugural year of the district's middle school

GT students receiving services specifically for GT through their science classroom. Students currently are only tested for science in sixth grade. With this in mind, the students, teachers, and administrators being studied were those in or who teach sixth-grade science at the district's five middle schools.

In alignment with the three research questions, this study employed a previously used survey instrument from Robinson (1998) in collaboration with the University of Connecticut's National Center for Research on Gifted Education. The survey evaluated specific practices in the middle level classroom across the United States. The survey asked classroom teachers about the frequency of practices with both average and high-achieving students to see not only what practices were present but also if there was a differentiation in the practice. This classroom practices survey allowed analysis of pedagogy present in the sixth-grade science classrooms within the district of study. Teachers' practices were certainly challenged by the restrictions of COVID-19 classroom teaching. This was considered when examining the results.

COVID-19 has created inconsistencies with achievement data from this year's test (2022) and last year's (2021). There was no achievement data in 2020. With this in mind, the study examined longitudinal data for sixth-grade science achievement from 2016 and 2017 before the model was implemented, and 2018 and 2019 after the GT science model was implemented to identify any possible differences.

Finally, focus groups were held to gain perceptions of science teachers who are currently in the sixth-grade science classroom and instructional leaders who have also supported the GT science programs. In addition to perceptions of practice, the participants were asked to draw correlations of success. Information from the Middle

School Practices Survey and the test data were used in some focus group questions.

Methodology

By design, research can be quantitative, qualitative, or mixed methods. The close-ended data of a quantitative study and the open-ended data of a qualitative study both have strengths and limitations. Combining the strengths of both in a mixed methods study allows for research that focuses on the strengths of both mixed together. “This ‘mixing’ or blending of data, it can be argued, provides a stronger understanding of the problem or question than either by itself” (Creswell, 2014, p. 264). This mixed methods study used a post-positivist approach in that, regardless of the findings, further research will certainly be needed and suggested.

To answer Research Question 1, survey data from educators were gathered. Descriptive statistics were collected and analyzed for the survey. To answer Research Question 2, standardized test data were collected and broken down by level of not met, met, approaches, and exceeds. After the implementation of the model, the mean and standard deviation for the scores of the GT population for each school and the district as a whole were identified and compared to the mean and standard deviation of the gifted students’ scores achieved before the model implementation in science. Research Question 3 was answered qualitatively, and the design used the descriptive data from Research Questions 1 and 2 in the form of Likert responses, scale scores, and mean data as a basis for several of the focus group questions. Data from Research Question 1 were used to share the frequency of practices and identified themes. Data from Research Question 2 provided mean scores by school and district for the pre- and post-implementation years being studied. Data directly reported numbers of students scoring not met, approaching, met, and exceeds expectations on the state standardized test (SCPASS Science). According to a 2017 descriptive analysis guide for educational research, Loeb et al. (2017) expressed that “good descriptive research relies primarily on low-inference, low-assumption methods that use no or minimal statistical adjustments” (p. 39). Descriptive analysis for Research Questions 1 and 2 identified data that revealed patterns from school to school, teacher to teacher, and student to student demographics by identifying central tendencies, variances, and frequency. Specific descriptive analysis practices were further explained in the research design for each research question. Data compiled from Research Questions 1 and 2 were reported using a narrative to describe themes that emerged from the data analysis. This methodological approach allowed participants to express satisfaction or a lack thereof with the findings of the first two research questions in response to the culminating research question of this study.

Mixed Methods Design and Rationale

This research used a mixed methods design. More specifically, it used an explanatory sequential design. According to Fetters et al. (2013), an explanatory sequential design collects and analyzes quantitative data from the initial phases of research and then uses those data to inform further study in a qualitative phase. In this research study, the practices survey results were quantified by item and descriptively analyzed for the frequency of the specific practice for both the regular education student and the GT student. The frequency of each item gave a comparison for differences in practice between average and GT students. The test data were also analyzed for the mean and standard deviation of achievement levels described in the research design. Specifically regarding standardized test data, I looked for any differences in the mean scores from the pre-implementation of GT science to the scores in the post-implementation years using an independent *t* test. Did more students exceed as a result of the program? Trends in both sets of data were used to develop the final stage of data collection, which was focus groups. Integration through methods in this approach occurred through building. Building is the approach of conducting one phase of data collection to inform the other (Fetters et al, 2013). Analysis of both the survey (Research Question 1) and the state test results (Research Question 2) were used to build the final qualitative phase of data collection for Research Question 3. Finally, themes within the resulting data from both phases were interpreted and reported using an integrative narrative where the quantitative and qualitative results are woven together. The design explained in Fetters et al.'s research is organized by the specific methodology, approach, and definition in Table 11.

Table 11

Explanatory Sequential Design

Methodology	Approach	Definition
Design	Explanatory sequential	Initial data trends are quantified and are used to create the final design collection phase.
Method	Building	Results inform the subsequent data collection approach.
Interpretation and reporting	Narrative	Final quantitative and qualitative data is reported using a narrative that focuses on themes within the results.

Note. Table design excerpted from original table found in *Achieving Integration in Mixed Methods Designs—Principles and Practices* by Fetters et al., 2013, *Health Services Research, 48*(6), p. 2136.

Wong and Cooper (2016) examined the reliability and validity of an explanatory sequential design. The study surveyed 75 randomly selected students to analyze different teaching methods in person and online and their relationship to a student's English proficiency. In the first phase, a cause-effect relationship between teaching methods and student learning could not be confirmed. A second phase used qualitative interviews where Wong and Cooper could confirm the cause-effect relationship and gain insight into the students' perspectives. This building approach provided a better understanding surrounding the teaching method's impact on students' perceived success. It also provided a greater understanding of what effective online learning looks like (Wong & Cooper, 2016). This is significant to this study in that test data and survey data from the first phase alone would not have been as conclusive. Examination of the quantitative data allowed for the development of qualitative interviews done in focus groups. This mixed method approach provides further explanation surrounding specific emerging themes which would not be possible without the explanatory sequential design.

Research Question 1 Design

I surveyed the district of study's sixth-grade science teachers to collect data regarding specific practices in the GT classroom. In the district of study, all GT students receive direct services in the science classroom. The district of study's philosophy behind GT science is that students who are gifted verbally, nonverbally, or quantitatively may find appropriate challenges within the specific content exploration. Prior to 2017, all academically gifted students were served through advanced English coursework. The shift came with a recognition that a lack of focus may be present for those who were not verbally gifted. While advanced math coursework was and is provided, GT was specifically served through ELA. Does the shift to gifted science align with best practices for serving academically gifted students, or do current science practices reflect those already present before the shift? A survey of practice was used to explore what is happening within the classroom.

During the review of literature, a vetted survey identified as The Middle School Classroom Practices Survey was identified from a 1998 survey where teachers were questioned nationally to identify specific differentiation practices with GT students (Robinson, 1998). Teachers were to answer 25 questions surrounding specific practices aligned with differentiation for high-achieving students. Themes within the survey items included curriculum compaction, acceleration, students' choice, PBL, presentation, independent work, and alternative locations. Teachers responded regarding practices with both average students and high-achieving students with the following Likert scale: 0 – never, 1 – once a month, or less frequently, 2 – a few times a month, 3 – a few times a week, 4 – daily, and 5 – more than once a day (Robinson, 1998).

For this study, I analyzed the frequency of practice for each survey of practice item for both the average and GT students. The frequency of specific practices with the two groups was then compared to identify variations in practice used for the gifted student. Can differences in practice be identified, and what are the practices?

The original researcher, Dr. Frank Robinson, was contacted, and permission was gained to edit and excerpt the original Middle School Classroom Practices Survey (Appendix A). The survey was modified to reflect data surrounding sixth-grade teachers and students versus seventh-grade teachers and students as found in the original survey. The modified instrument also specifically asked about academically gifted students versus high-achieving students. The survey was converted into an electronic format using Qualtrics (Appendix B).

Beyond the classroom practices sections of the survey, it includes questions regarding teacher background, school and district information, middle school issues, and GT identification. The questions in the sections beyond classroom practices provide a better understanding of the expertise of the survey respondent.

The Modified Middle School Practices Survey was sent to all identified teachers who provided GT services in the sixth-grade science classroom between 2017 and 2019 during the implementation years of the district's GT science program. The classroom practices results were analyzed to identify the frequency of practice for each of the 25 items in the Practices Survey. Results were then organized by item based on the frequency. The new organization provided the opportunity to identify trends in practice aligned with best practices previously identified. Frequency data were shared with teachers, principals, assistant principals, and instructional coaches aligned with specific questions during focus groups as the final phase of the research.

Research Question 2 Design

I focused on collecting and analyzing SCPASS Science data for Grade 6 students from each of the district of study's five middle schools from 2017-2019. As previously stated, when discussing the limitations of this study, the test data were ex-post facto in that the last 2 years of results (2020 and 2021) either do not exist or were significantly impacted by the effects of COVID-19 on schools. Further, following the 2016 SCPASS Science, the scale was adjusted from three levels to quartiles, and the scale score level was adjusted. These factors made a comparison of the 2017 data to the 2018 and 2019 data most valid. Analyzed populations within the study were simply GT or non-gifted. For each of the five schools, longitudinal test results indicated *exceeds expectations, meets expectations, approaches expectations,* or *does not meet expectations* for each student. Each indicator was also accompanied by a scale score ranging from 1570 to 1730 for each sixth grader as described in Table 12 (South Carolina Department of Education, 2022b). The percentage of students was reported for each of the four levels of achievement for the gifted students overall and by school within the district. Further, the mean scale score for the gifted population was identified as well as the range and frequency of score levels overall and by school and year. The described data allow for the identification of any trends that occurred from one school to another or for the district compared to normed scores for the state per testing year. Specifically, the data were used to identify any statistical difference from the 2017 test pre-implementation to the 2018 and 2019 test post-implementation. An independent *t* test was used to identify a statistical difference in Schools A-E and in the district of study. The *t* test was independent in that the two samples do not compare the same group of students. Rather, they are comparing a specific type of student before and after the implementation of the program. Any trend data may or may not be an effect of the philosophy of practice for the district or the specific school as studied in Research Question 1.

Table 12

SCPASS Science Performance Level Scale Score Ranges

Grade	Does not meet	Approaches	Meets	Exceeds
4	1370-1433	1434-1449	1450-1467	1468-1530
6	1570-1636	1637-1649	1650-1664	1665-1730

Note. Table reprinted and American Psychological Association formatted from the South

Carolina Department of Education (2022b) website.

Research Question 3 Design

In order to analyze how educators perceive the effects of their practice on student achievement, focus groups were used. Focus groups were held with instructional leadership team members which include building-level principals, assistant principals, and instructional coaches. A focus group was also conducted with teachers who completed the Modified Middle School Classroom Practices Survey. Biello (2009) suggested that participatory research driven by a focus group can be powerful, but the design of the focus group is important. Biello suggested using the Krueger method of designing focus groups.

Krueger (2002) outlined specific formatting for an effective focus group. Krueger suggested that clear communication of the purpose of the focus group is important. The focus group should begin with a clear introduction, a transition, and then three or four key questions in which participants have a chance to share their experience with the data. It is suggested that the questions are open-ended questions that do not ask why. Rather, questions should focus on participants thinking back and sharing experiences. Questions should be sequenced from general to more specific. After the key questions are asked surrounding the themes of the program, a summary question should be asked to ensure that the main ideas of the responses are adequate. Finally, ask if anything has been missed (Krueger, 2002).

For this focus group, the participants were very limited, and participation was important. It was essential to set a time when all invited were able to participate. The focus group was conducted by proxy. The ground rules for the focus group were set, and the timeline was given. Introduction questions focused on the experiences of the group surrounding GT science. Participants were asked to describe their experience with a GT science classroom. A transition question might ask what changes they had seen since the implementation of the GT science model. The key questions were designed to gain professional insight into the data gathered from Research Questions 1 and 2. Several questions surrounding the practices survey were asked. One line of questions focused on frequency means from the practices survey grouped data. It was also important to ask about specific practices in the classroom that the educator feels are essential for addressing the needs of the academically gifted student effectively. For Research Question 2, descriptive data were shared, and satisfaction was assessed. What do the participants think is the link between specific practices and the results? Follow-up questions were anticipated for each key question. The focus group was audio recorded, and note-taking was very clear. A bulleted list of responses was created from the analysis of the recording of the focus group with attention paid to quotes from respondents for each question asked. After multiple focus groups were conducted, the identification of themes was considered. The findings were described in a narrative using quotes for illustration, and the format was question by question (Biello, 2009).

Summary

The explanatory sequential design of this research provided for a deeper understanding surrounding the practices within a GT science classroom and their impact on the academically gifted student. This research is important in that little to no research could be found specifically dealing with the middle level GT science classroom and the practices within. A vetted and reliable survey was used to identify the frequency of specific practices within the classroom, and longitudinal test data were used to analyze student achievement. Results of both the practice survey and descriptive data were used to dig deeper with educators within focus groups. In this post-positivist research, the findings were important in that they led the way to more in-depth research surrounding this critical topic.

Chapter 4: Results

Discussion of the Findings

Chapters 1-3 of this research study proposed the need to investigate the practices in a middle level GT science model and its potential effects on achievement. The review of literature revealed best practices for teaching the gifted including curriculum compaction or acceleration, real world approach to learning, and student choice. The methodology for the research that was conducted was a mixed methods study that used an explanatory sequential design. Research Question 1 explored teacher practices with the gifted in the district of study and was both qualitative and quantitative in nature. Research Question 2 examined test scores prior to the implementation of the GT science program compared to test scores following the program implementation and provided quantitative data. Research Question 3, by design, was answered using data from the first two questions' results and provided a deeper understanding of the data collected with respect to the first two research questions. It provided qualitative data gathered in focus groups.

Results of Research Question 1: What Are the Specific GT Practices Being Used by the District's GT Science Teachers?

The Middle School Survey of Classroom Practices was first used by Robinson (1998). With Dr. Robinson's permission (Appendix A), the original classroom practices survey was modified and converted to an electronic survey (Appendix B) using Qualtrics software. The survey consists of 43 question items and was designed to gather information including demographics of the practitioner, school model, GT professional development, gifted identification, district information, specific practices, satisfaction with the GT science program, and invitation to participate in a focus group. In the district of study's five middle schools, eight current sixth-grade science teachers of the gifted were identified and the survey was distributed to each of them via email. Five of the eight teachers (62.5%) completed the electronic 2022 Middle School Survey of Classroom Practices. The following is an analysis of responses from the survey that specifically apply to classroom practice. The results are reported using descriptive statistics. Item analysis is provided for the following items.

Item 3. Years of Teaching Experience

The average number of years of teaching experience for the five participants was 15.8 with a range of 12-27 years of experience in the classroom. According to the National Center for Education Statistics (2022), in 2017-2018, 63% of United States teachers had more than 10 years of teaching experience. All five participants (100%) have 12 or more years, placing the surveyed group above the national average in experience.

Item 4. Highest Degree Earned

All the respondents (N = 5) held an advanced degree, with three teachers (60%) holding a master's degree and two teachers (30%) having earned their doctorate. The national average of teachers holding a post baccalaureate degree is 63%. This reveals a sample that is again above the national average (National Center for Education Statistics, 2022).

Item 5. GT Training

When asked about training that prepared the teachers to serve the gifted student, all five respondents (100%) indicated that they had completed coursework to add a GT endorsement to their credentials. Two teachers (40%) also indicated that they had completed graduate coursework in this area. Table 13 provides a visual regarding the options for the preparation paths available and reveals a lack of ongoing professional development once initially endorsed to teach the gifted.

Table 13

Survey Responses for Teacher Preparation to Serve the Gifted

#	Answer	%	Count
1	District in-service	0%	0
2	Undergraduate school course(s)	0%	0
3	Graduate school course(s)	28.57%	2
4	Educational degree in area	0%	0
5	Coursework completed to add gifted and talented endorsement	71.43%	5
6	None	0%	0
	Total	100%	7

Note. Table reformatted from Qualtrics survey report.

Item 17. How Are Students Grouped in Sixth-Grade Science Classes?

When asked how students are grouped for sixth-grade science classes, there were five respondents to the question ($N = 5$). The results are illustrated in Table 14. Eighty percent of the respondents ($n = 4$) indicated that the classes were grouped homogeneously with students of the same or similar ability and 20% ($n = 1$) indicated a combination of one or more homogeneous classes and the rest heterogeneous. In the district of study, scheduling of content classes requires that there are enough necessary sections in the schedule to group GT students in science class. The remaining regular education classes are primarily homogeneous, but one participant felt that further ability grouping is possible outside of the gifted, and multiple ability groups are present in some sections, making them heterogeneous.

Table 14

How Are Students Grouped in Sixth-Grade Science Classes?

#	Answer	%	Count
1	Homogeneously – students of the same or similar ability	80%	4
2	Heterogeneously – students of mixed ability	0%	0
3	Combination – One or more homogeneous classes and the rest heterogeneous	20%	1
	Total	100%	5

Item 19. Do You Use Pretests to Determine if Students Have Already Mastered the Content of a Unit?

Regarding the use of pretests with gifted students, 60% of respondents indicated that they used pretests to determine if students had already mastered the content of a unit. Forty percent indicated they did not. While a majority of respondents did a check for mastery before a unit, it is not a unanimous practice as part of a district philosophy for serving the gifted. Reis and Peters (2021) indicated the benefits of curriculum compaction for those who have already mastered the content of a unit.

Item 20. Do You Allow Students to Set Individual Learning Goals in Your Classes?

A common challenge identified with many gifted students is that they typically will be successful regardless of the pedagogy compared to many of their regular education peers. This does not mean that they are not underachieving based on their ability. Underachievement was identified by Ritchotte (2013) as just as important as achievement when examining student results, and intervention may be needed. Pushing GT students may be accomplished through goal setting. Teacher responses to Item 20 indicate that 40% (*n* = 2) sometimes have students set individual learning goals, 20% (*n* =

1) seldom have students set learning goals, and 40% (n = 2) never have students set learning goals.

Item 21. Do You Use Portfolio Assessments in Your Class?

The responses to Item 21 were identical to those found in Item 20 regarding individual goal setting. Teacher responses to Item 21 also indicate that 40% (n = 2) sometimes have students set individual learning goals, 20% (n = 1) seldom have students set learning goals, and 40% (n = 2) never have students set learning goals. The findings of Items 20 and 21 may reflect the personalization of learning for students present in the classroom. This will be explored further with the descriptive analysis of Items 40 and 41.

Items 24 and 25. Does Your District Have a Policy Regarding the Acceleration of High Achieving Students Through the Regular Curriculum?

Survey Item 24 looked deeper into the respondents' understanding of the practice of curriculum acceleration as related to any district policy. One respondent did not answer the question. This is most likely because they did not know, and that was not a response choice on the survey. Of the four respondents to Item 24, 75% indicated yes, the district does have a policy regarding acceleration through the regular curriculum, and 25% indicated no, there is no policy regarding the acceleration of high-achieving students through the regular curriculum. In the district of study, acceleration of students beyond the specific grade-level curriculum to another grade level may be considered on a case-by-case basis. This refers specifically to a student moving from sixth-grade science to seventh-grade science, for example. It does not address acceleration of curriculum within the grade level. Teacher responses to Item 25 indicate the respondents' understanding of this policy. This understanding of policy is illustrated in Table 15 and which answer would apply to acceleration most fittingly.

Table 15

Application of Acceleration Practices in the Regular Curriculum

#	Answer	%	Count
1	Classroom teachers are encouraged to accelerate students into the next content level (e.g., sixth graders study seventh-grade content) or the next academic grade.	0%	0
2	Classroom teachers are encouraged to provide higher level or enriched content material in their classrooms but are not permitted to accelerate students to the next level or academic grade.	100%	3
3	Classroom teachers are not allowed to provide advanced level curriculum for higher achieving students and are not permitted to accelerate students into the next level or academic grade.	0%	0
4	Other	0%	0
	Total	100%	3

Note. Respondents to Item 25 were only those who answered yes to Item 24.

Item 40. What Is the Frequency of the Following Practices With Your Gifted and Talented Students?

In Item 40, respondents were asked to reply regarding the frequency of 25 specific practices used within the classroom on a Likert scale. The 25 items were unaltered from the original survey items used by Robinson (1998). Respondents were to indicate: 0 – never, 1 – once a month, or less frequently, 2 – a few times a month, 3 – a few times a week, 4 – daily, or 5 – more than once a day. All respondents completed a frequency choice for all 25 items. When analyzing the responses, frequency of practice varied from respondent to respondent. Table 16 illustrates the frequency of practice by the five respondents. According to the data, there were no respondents who indicated doing any of the practices more than once a day. Only one of five respondents indicated any daily practices within the survey. Those daily practices by one respondent included 8) “Have students relate the topic under discussion or investigation to their own lives,” 10) “Ask students to synthesize information,” 18) “Invite students to support one side of a controversy,” and 19) “Give students the choice to work independently rather than with the class.” On the other end of the range, 100% of respondents (*N* = 5) indicated that they never used the following practices: 15) “Make available higher grade level textbooks,” and 22) “Allow students the option to work elsewhere in the school.” More responses were recorded in *once a month or less frequently* followed by *never* as the most frequent selections made on the Likert scale for all practices with GT items.

Table 16

Frequency of Practice With GT Students

#	Question	0- Never	1- Once a month, or less frequently	2- A few times a month	3- A few times a week	4- Daily	5- More than once a day	Total
1	Give student the task of interpreting the facts.	0%	0%	20%	80%	0%	0%	5
2	Allow students to select their own projects.	0%	80%	0%	20%	0%	0%	5
3	Eliminate content that students have mastered.	0%	100%	0%	0%	0%	0%	5
4	Propose that students create an alternate solution to a problem.	0%	60%	0%	40%	0%	0%	5
5	Permit students to design their own projects.	0%	80%	0%	20%	0%	0%	5
6	Adjust the pace for students who can master content quickly.	20%	0%	80%	0%	0%	0%	5
7	Authorize students to determine how their projects will be presented.	0%	80%	0%	20%	0%	0%	5
8	Have students relate the topic under discussion or investigation to their own lives.	0%	0%	20%	60%	20%	0%	5
9	Encourage students to develop the criterion for evaluating their projects.	60%	20%	0%	20%	0%	0%	5
10	Ask students to synthesize information.	0%	0%	20%	60%	20%	0%	5
11	Allow students to evaluate their own projects.	40%	40%	0%	20%	0%	0%	5

(cont.)

#	Question	0- Never	1- Once a month, or less frequently	2- A few times a month	3- A few times a week	4- Daily	5- More than once a day	Total
12	Present a mini-lesson on research skills.	40%	60%	0%	0%	0%	0%	5
13	Expand a lesson by having an expert in the field discuss the topic with students.	60%	40%	0%	0%	0%	0%	5
14	Give students the challenge of evaluating different solutions to a problem.	0%	60%	40%	0%	0%	0%	5
15	Make available higher grade level textbooks.	100%	0%	0%	0%	0%	0%	5
16	Require students to refine their original product or concept.	0%	60%	20%	20%	0%	0%	5
17	Permit students to find their own problem to investigate.	60%	20%	0%	20%	0%	0%	5
18	Invite students to support one side of a controversy.	40%	40%	0%	0%	20%	0%	5
19	Give students the choice of working independently rather than with the class.	0%	0%	40%	40%	20%	0%	5
20	Make available a wide variety of primary source materials to complement a unit.	0%	60%	20%	20%	0%	0%	5
21	Request that students find a solution to a real world problem.	0%	80%	20%	0%	0%	0%	5
22	Allow students the option to work elsewhere in the school.	100%	0%	0%	0%	0%	0%	5
23	Include content areas from 7th and/or 8th grade curriculum.	80%	0%	0%	20%	0%	0%	5

(cont.)

#	Question	0- Never	1- Once a month, or less frequently	2- A few times a month	3- A few times a week	4- Daily	5- More than once a day	Total
24	Encourage students to present to an audience outside the classroom.	80%	20%	0%	0%	0%	0%	5
25	Assign students to the library for research.	60%	20%	0%	20%	0%	0%	5
	Item response frequency of 50% or more	8	10	1	3	0	0	

Note. Data transferred to table from Qualtrics survey report.

To better understand what practices are occurring, descriptive statistics of the GT practices were analyzed for the minimum frequency (0), maximum frequency (5), mean, standard deviation, and variance. Items with an above-average mean would have a value of 2.5 or more. The standard deviation reveals how close to the mean the data points were, and the variance reveals the distance between the data set. The data were gathered in a report and sorted by highest to lowest mean. Sorting the data in an excel spreadsheet in this manner organized the data from highest to lowest average frequency for all respondents. This is illustrated in Table 17. The descriptive statistics revealed that there were eight practices above the average of 2.5. The two most frequent practices had a mean value of 4, a standard deviation of 0.63, and a variance of 0.4. These practices were 8) "Have students relate the topic under discussion or investigation to their own lives" *(M* = 4), and 10) "Ask students to synthesize information" *(M* = 4). The other practices with a mean of 2.5 or higher as used with GT students in descending frequency included 1) "Give student the task of interpreting the facts" (*M* = 3.8), 19) "Give students the choice of working independently rather than with the class" (*M* = 3.8), 4) "Propose that students create an alternate solution to a problem" (*M* = 2.8), 6) "Adjust the pace for students who can master content quickly” (*M* = 2.6), 16) “Require students to refine their original product or concept” (*M* = 2.6), and 20) “Make available a wide variety of primary source materials to complement a unit” (*M* = 2.6). The practice with the greatest standard deviation and variance revealed a minimum value of 1 and a maximum value of 5 was 18) “Invite students to support one side of a controversy.” Two respondents never invited students to support one side of a controversy, and one respondent replied that they do this daily. The other two respondents reported doing this once a month or less. The distribution of higher to lower frequency of practices revealed 12 practices with a mean of 2.6 or higher and 13 practices with a mean of 2.2 or lower.

Table 17

Frequency of Practice With GT Students Sorted by Mean

Item	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
8	Have students relate the topic under discussion or investigation to their own lives.	3	5	4	0.63	0.4	5
10	Ask students to synthesize information.	3	5	4	0.63	0.4	5
1	Give student the task of interpreting the facts.	3	4	3.8	0.4	0.16	5
19	Give students the choice of working independently rather than with the class.	3	5	3.8	0.75	0.56	5
4	Propose that students create an alternate solution to a problem.	2	4	2.8	0.98	0.96	5
6	Adjust the pace for students who can master content quickly.	1	3	2.6	0.8	0.64	5
16	Require students to refine their original product or concept.	2	4	2.6	0.8	0.64	5
20	Make available a wide variety of primary source materials to complement a unit.	2	4	2.6	0.8	0.64	5
2	Allow students to select their own projects.	2	4	2.4	0.8	0.64	5
5	Permit students to design their own projects.	2	4	2.4	0.8	0.64	5
7	Authorize students to determine how their projects will be presented.	2	4	2.4	0.8	0.64	5
14	Give students the challenge of evaluating different solutions to a problem.	2	3	2.4	0.49	0.24	5
18	Invite students to support one side of a controversy.	1	5	2.2	1.47	2.16	5

(cont.)

21	Request that students find a solution to a real world problem.	2	3	2.2	0.4	0.16	5
3	Eliminate content that students have mastered.	2	2	2	0	0	5

Item	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
11	Allow students to evaluate their own projects.	1	4	2	1.1	1.2	5
9	Encourage students to develop the criterion for evaluating their projects.	1	4	1.8	1.17	1.36	5
17	Permit students to find their own problem to investigate.	1	4	1.8	1.17	1.36	5
25	Assign students to the library for research.	1	4	1.8	1.17	1.36	5
12	Present a mini-lesson on research skills.	1	2	1.6	0.49	0.24	5
23	Include content areas from 7th and/or 8th grade curriculum.	1	4	1.6	1.2	1.44	5
13	Expand a lesson by having an expert in the field discuss the topic with students.	1	2	1.4	0.49	0.24	5
24	Encourage students to present to an audience outside the classroom.	1	2	1.2	0.4	0.16	5
15	Make available higher grade level textbooks.	1	1	1	0	0	5
22	Allow students the option to work elsewhere in the school.	1	1	1	0	0	5

Note. Data sorted in Excel was originally calculated using Qualtrics reports.

Item 41. What Is the Frequency of the Following Practices With Your Regular Education Students?

Similar to Item 40, respondents were asked to reply regarding the frequency of 25 specific practices used within the classroom on a Likert scale. The respondents to this survey are teachers who instruct both GT students and the regular education students. GT students are typically grouped into one class section, while the regular education students would be found in other sections. This time, they were supposed to think about classroom practice when instructing those students not identified as GT. The same 25 practice items were used and respondents were once again asked to indicate 0 – never, 1 – once a month, or less frequently, 2 – a few times a month, 3 – a few times a week, 4 – daily, or 5 – more than once a day Only four of the five respondents completed a frequency choice for all 25 items. Table 18 illustrates how often the practices were reported as being used by the teacher respondents. The data reveal a decrease of frequency in practice with regular education students. Only one respondent indicated any daily practice within the survey item. Those items were 8) “Have students relate the topic under discussion or investigation to their own lives,” and 10) “Ask students to synthesize information.” These were only used daily by one respondent with gifted students as a daily practice as well, but two other daily practices were also indicated with the gifted by one respondent. They included 18) “Invite students to support one side of a controversy,” and 19) “Give students the choice to work independently rather than with the class.” The final two items had a daily zero frequency with the regular education students.

Table 18

Frequency of Practice With Regular Education Students

Item	Question	0- Never	1- Once a month, or less frequently	2- A few times a month	3- A few times a week	4- Daily	5- More than once a day	Total
1	Give student the task of interpreting the facts.	0%	25%	50%	25%	0%	0%	4
2	Allow students to select their own projects.	50%	50%	0%	0%	0%	0%	4
3	Eliminate content that students have mastered.	50%	50%	0%	0%	0%	0%	4
4	Propose that students create an alternate solution to a problem.	0%	100%	0%	0%	0%	0%	4
5	Permit students to design their own projects.	25%	75%	0%	0%	0%	0%	4
6	Adjust the pace for students who can master content quickly.	25%	25%	50%	0%	0%	0%	4
7	Authorize students to determine how their projects will be presented.	50%	50%	0%	0%	0%	0%	4
8	Have students relate the topic under discussion or investigation to their own lives.	0%	0%	25%	50%	25%	0%	4
9	Encourage students to develop the criterion for evaluating their projects.	100%	0%	0%	0%	0%	0%	4
10	Ask students to synthesize information.	0%	0%	50%	25%	25%	0%	4

(cont.)

Item	Question	0- Never	1- Once a month, or less frequently	2- A few times a month	3- A few times a week	4- Daily	5- More than once a day	Total
11	Allow students to evaluate their own projects.	75%	25%	0%	0%	0%	0%	4
12	Present a mini-lesson on research skills.	75%	25%	0%	0%	0%	0%	4
13	Expand a lesson by having an expert in the field discuss the topic with students.	50%	50%	0%	0%	0%	0%	4
14	Give students the challenge of evaluating different solutions to a problem.	25%	50%	25%	0%	0%	0%	4
15	Make available higher grade level textbooks.	75%	25%	0%	0%	0%	0%	4
16	Require students to refine their original product or concept.	25%	75%	0%	0%	0%	0%	4
17	Permit students to find their own problem to investigate.	50%	50%	0%	0%	0%	0%	4
18	Invite students to support one side of a controversy.	50%	25%	25%	0%	0%	0%	4
19	Give students the choice of working independently rather than with the class.	25%	0%	25%	50%	0%	0%	4
20	Make available a wide variety of primary source materials to complement a unit.	0%	75%	25%	0%	0%	0%	4
21	Request that students find a solution to a real world problem.	0%	100%	0%	0%	0%	0%	4
22	Allow students the option to work elsewhere in the school.	100%	0%	0%	0%	0%	0%	4

(cont.)

Item	Question	0- Never	1- Once a month, or less frequently	2- A few times a month	3- A few times a week	4- Daily	5- More than once a day	Total
23	Include content areas from 7th and/or 8th grade curriculum.	75%	25%	0%	0%	0%	0%	4
24	Encourage students to present to an audience outside the classroom.	100%	0%	0%	0%	0%	0%	4
25	Assign students to the library for research.	100%	0%	0%	0%	0%	0%	4
	Item response frequency of 50% or more	14	11	3	2	0	0	

Note. Data transferred to table from Qualtrics survey report.

Table 19 reports majority practices of all respondents for both the gifted and the regular education students. The data reveal that majority practice is, overall, low frequency for both groups. Frequency of practice by an above-average number of respondents is greater for the gifted but by narrow margins. With 25 items, the data also reveal variation in practice for many items that do not reflect a common frequency of practice for respondents.

Table 19

Item Response Frequency of 50% or More

Response scale	0- Never	1- Once a month, or less frequently	2- A few times a month	3- A few times a week	4- Daily	5- More than once a day
Item choice frequency of 50% or more with gifted and talented students	8	10	1	3	0	0
Item choice frequency of 50% or more with regular education students	14	11	3	2	0	0

Frequency of Practice by Theme in Items 40 and 41

When considering best practices embedded in the specific practice survey items, three themes were repeated in the review of literature. Those themes or highly successful practices centered on curriculum compaction, student choice, and PBL. The following is a breakdown of specific practices within Items 40 and 41 by theme.

Curriculum Compaction or Acceleration

Three practices were specifically aligned with curriculum compaction in Items 40 and 41.

Practice 3. This practice was to eliminate content that students have mastered. One hundred percent of respondents (N = 5) indicated that they used this practice once a month or less frequently with their gifted students. This was a higher frequency than with regular education students. Fifty percent of respondents (n = 2) stated that they never eliminated mastered content for regular education students, and 50% of respondents (n =

2) stated that they did this once a month or less with regular education students.

Practice 6. This practice, "adjust the pace for students who can master content quickly," was indicated as a more regular practice by respondents with the GT in that 80% of respondents (*n* = 4) indicated that they did this a few times a month and 20% of respondents (*n* = 1) indicated that they never did this. With the regular education students, this practice was done a few times a month by 50% (*n* = 2), once a month or less frequently by 25% (*n* = 1), and never by 25% (*n* = 1).

Practice 23. This practice indicated, "including content areas from $7^{th}/8^{th}$ grade." With the gifted, 80% of respondents (*n* = 4) stated that they never did this and 20% (*n* = 1) stated that they did this a few times a week. With the regular education students, 75% (*n* = 3) stated that they never did this and 25% (*n* = 1) indicated that they did this once a month or less.

The data reveal minimal use of curriculum compaction practices by the respondents of the school district of study.

Student Choice

Seven practices aligned with the practice of student choice. There is some overlap in practice with those that might be considered PBL.

Question 2. Allow Students to Select Their Own Projects. This practice was indicated as being used once a month or less frequently with the gifted by 80% of respondents (*n* = 4), and 20% of respondents (*n* = 1) indicated that they allowed students a few times a week to select their own projects. With regular education students, this practice was never done according to 50% of respondents (*n* = 2), or only done once a month or less frequently according to the other 50% of respondents (*n* = 2).

Question 5. Permit Students to Design Their Own Projects. This practice was also indicated as being used once a month or less frequently with the gifted by 80% of respondents (*n* = 4), and 20% of respondents (*n* = 1) indicated that they allowed students a few times a week to design their own projects. With regular education students, this practice was never done according to 25% of respondents (*n* = 1), or only done once a month or less frequently according to the other 75% of respondents (*n* = 3).

Question 7. Authorize Students to Determine How Their Projects Will Be Presented. As with Questions 2 and 5, **t**his practice was indicated as being used once a month or less frequently with the gifted by 80% of respondents (*n* = 4), and 20% of respondents (*n* = 1) indicated that they allowed students a few times a week to determine how their projects would be presented. With regular education students, this practice was never done according to 50% of respondents (*n* = 2), or only done once a month or less frequently according to the other 50% of respondents (*n* = 2).

Question 8. Have Students Relate the Topic Under Discussion of Investigation to Their Own Lives. This practice was indicated as being used a few times a month with the gifted by 20% of respondents (*n* = 1), a few times a week by 60% of respondents (*n* = 3), and 20% of respondents (*n* = 1) indicated that they allowed students daily to relate the topic under discussion to their own lives. With regular education students, the percentages were 25% (*n* = 1) a few times a month, 50% (*n* = 2) a few times a week, and 25% (*n* = 1) daily.

Question 17. Permit Students to Find Their Own Problem to Investigate. Gifted students are allowed to find their own problems to investigate by responding teachers never according to 60% of respondents (*n* = 3), once a month or less frequently according to 20% of respondents (*n* = 1), or a few times a week according to 20% of respondents (n = 1). With regular education students, the practice of students finding their own problem to investigate was never done according to 50% of respondents (*n* = 2), or only done once a month or less frequently according to the other 50% of respondents (*n* = 2).

Question 19. Give Students the Choice of Working Independently Rather Than With the Class. Giving students the choice to work independently was a higher frequency practice with both the gifted students and regular education students. With the gifted, respondents indicated a frequency of practice of 40% (*n* = 2) gave this choice a few times a month, 40% (*n* = 2) gave this choice a few times a week, and 20% (*n* = 1) gave this choice daily to the gifted students. With the regular education student, the frequency of practices was never by 25 % of respondents (*n* = 1), a few times a month by 25 % of respondents (n = 1), and a few times a week by 50 % of respondents (*n* = 2).

Question 22. Allow Students the Option to Work Elsewhere in the School. All respondents for both the GT (*N* = 5) and the regular education student (*N* = 4) indicated that this was never a practice option 100% of the time.

On average, the survey responses indicate that the practice questions aligned with student choice are happening once a month at most but are often happening less frequently or never at all.

PBL

The question items that follow align specifically with PBL. Some items overlap with choice practices already reviewed. The analysis of those items will be duplicated. The frequency of practice for each question is shared.

Question 2. Allow Students to Select Their Own Projects. This practice was indicated as being used once a month or less frequently with the gifted by 80% of respondents (*n* = 4), and 20% of respondents (*n* = 1) indicated that they allowed students a few times a week to select their own projects. With regular education students, this practice was never done according to 50% of respondents (*n* = 2), or only done once a month or less frequently according to the other 50% of respondents (*n* = 2).

Question 4. Propose That Students Create an Alternate Solution to a Problem. This practice was indicated as being used once a month or less frequently with the gifted by 60% of respondents (*n* = 3), and 40% of respondents (*n* = 2) indicated that they propose that students create an alternate solution to a problem. With regular education students, this practice was done once a month or less frequently by 100% of respondents (*n* = 4).

Question 5. Permit Students to Design Their Own Projects. This practice was also indicated as being used once a month or less frequently with the gifted by 80% of respondents (*n* = 4), and 20% of respondents (*n* = 1) indicated that they allowed students a few times a week to design their own projects. With regular education students, this practice was never done according to 25% of respondents (*n* = 1), or only done once a month or less frequently according to the other 75% of respondents (*n* = 3).

Question 7. Authorize Students to Determine How Their Projects Will Be Presented. This practice was indicated as being used once a month or less frequently with the gifted by 80% of respondents (*n* = 4), and 20% of respondents (*n* = 1) indicated that they allowed students a few times a week to determine how their projects will be presented. With regular education students, this practice was never done according to

50% of respondents (*n* = 2), or only done once a month or less frequently according to the other 50% of respondents (*n* = 2).

Question 9. Encourage Students to Develop the Criterion for Evaluating Their Projects. With the gifted student, this practice was never done by 60% of respondents (*n* = 3), was done once a month or less frequently with the gifted by 20% of respondents (*n* = 1), and done a few times a week with the gifted by 20% of respondents (*n* = 1). With regular education students, encouraging students to develop their own criteria for evaluating their projects was never done by 100% of respondents (*N* = 4).

Question 11. Allow Students to Evaluate Their Own Projects. Teacher respondents indicated that they never let gifted students evaluate their own projects according to 40% of respondents (*n* = 2), allowed the gifted to evaluate their own projects once a month or less frequently according to another 40% of respondents (*n* = 2), and a few times a week according to 20% of respondents (*n* = 1). When it comes to allowing regular education students to evaluate their own learning, respondents indicated the following: never according to 75% of respondents (*n* = 3), and once a month or less often according to 25% of respondents (*n* = 1).

Question 12. Present a Mini-Lesson on Research Skills. In support of PBL, presenting mini-lessons supports students' PBL. This is also a Type I activity in Renzulli's (1976) Enrichment Triad Model. The respondents who presented mini-lessons on research skills indicated never according to 40% of respondents (*n* = 2) or once a month or less often according to 60% of respondents (*n* = 3). With regular education students, 75% of respondents (*n* = 3) never present mini-lessons on research skills, and 25% of respondents (*n* = 1) present mini-lessons on research once a month or less often.

Question 13: Expand a Lesson by Having an Expert in the Field Discuss the Topic With Students. As with Question 12, bringing in experts to discuss a topic with students or as an Enrichment Triad Model Type I activity supports PBL with students. The respondents indicated the use of experts in a field to discuss topics with the gifted was never done according to 60% of respondents (n = 3), or once a month or less frequently according to 40% of respondents (n = 2). Having experts in a field discuss a topic with regular education students was never done by 50% of respondents (n = 2) or done once a month or less frequently according to the other 50% of respondents (n = 2).

Question 14. Give Students the Challenge of Evaluating Different Solutions to a Problem. Researching a problem and providing alternative solutions is a practice rooted in PBL that reflects an ongoing process. The practice of having your gifted students evaluate different solutions was conducted by respondents in the following frequency categories: once a month or less frequently – 60% (n = 3), and a few times a month – 40% (n = 2). With regular education students, the practice of evaluating different solutions was used less frequently by respondents with the following frequency percentages: never –25% (n = 1), once a month or less frequently – 50% (n = 2), and a few times a month – 25% (n = 1).

Question 16. Require Students to Refine Their Original Product or Concept. In PBL, students should learn to evaluate their original product or concept and make revisions as necessary. In the district of study, the practice of refinement is done once a month or less frequently by 60% of respondents (n = 3), a few times a month by 20% of respondents (n = 2), and a few times a month by 20% of respondents (n = 2). Regular education students were never required to refine their original product or concept according to 25% of respondents (*n* = 1), or once a month or less frequently according to 75% of respondents (*n* = 3).

Question 17. Permit Students to Find Their Own Problem to Investigate. Gifted students are allowed to find their own problems to investigate by responding teachers never according to 60% of respondents (*n* = 3), once a month or less frequently according to 20% of respondents (*n* = 1), or a few times a week according to 20% of respondents (*n* = 1). With regular education students, the practice of students finding their own problem to investigate was never done according to 50% of respondents (*n* = 2), or only done once a month or less frequently according to the other 50% of respondents (*n* = 2).

Question 20. Make Available a Wide Variety of Primary Source Materials to Complement a Unit. In support of effective PBL, the availability of a wide variety of primary source materials to complement the learning is needed. Providing such materials for the gifted in the district of study is done by respondents once a month or less frequently – 60% of respondents (*n* = 3), a few times a month – 20% (*n* = 1), and a few times a week – 20% (*n* = 1). With regular education students, a wide variety of print materials are made available once a month or less frequently – 75% (*n* = 1), or a few times a month – 25% (*n* = 1).

Question 21. Request That Students Find a Solution to a Real World Problem. Students finding solutions to real world problems adds the element of relevance to the PBL. Requiring gifted students to find a solution to a real world problem was done in the district of study by respondents once a month or less frequently – 80% of respondents (*n* = 4), or a few times a month – 20% (*n* = 1). With regular education students, finding solutions to real world problems occurs once a month or less frequently according to 100% of survey respondents (*N* = 4).

Question 24. Encourage Students to Present to an Audience Outside the Classroom. Students presenting their research, product, or concept to an audience outside of the classroom encourages presentation and communication skills. Encouraging the gifted to present outside of the classroom was never done by 80% of respondents (*n* = 4) and encouraged once a month or less frequently by 20% of respondents (*n* = 1). Regular education students are never encouraged to present outside of the classroom according to 100% of respondents (*N* = 4).

The themed data surrounding specific items aligned with PBL indicate that overall, the practices are happening once a month or less frequently with both the GT and regular education students. They do occur more often with the gifted but not significantly.

Descriptive Statistics for Items 40 and 41

Descriptive statistics were analyzed for the frequency of practices with regular education students for the purpose of comparison to practices with the gifted. Personalization of practice would be one way to assess how well a GT program is addressing the unique learning needs of gifted students. The minimum value (1), maximum value (5), mean, standard deviation, and variance for the reported frequency of regular education practices are displayed for every item in Table 20. To better illustrate frequency of practice, the data have been sorted in descending order from the highest mean practice to the lowest mean practice. The GT mean data revealed eight practices with a mean greater than 2.5. The mean data for practices with regular education students revealed 50% fewer practices with a frequency mean greater than 2.5. The four higher frequency practices for regular education students include 8) “Have students relate the topic under discussion or investigation to their own lives” (*M* = 4), 10) “Ask students to synthesize information” (*M* = 3.75), 1) “Give student the task of interpreting the facts” (*M* = 3), and 19) “Give students the choice of working independently rather than with the class” (*M* = 3). Both GT practice and regular education practice revealed that Item 8 was the most common practice for both groups. Despite it being the most common practice, it was only used on average a few times a week and daily by one respondent.

Only one survey item revealed a standard deviation greater than 1. Question19 (Item 41), “Give students the choice of working independently rather than with the class,” had a standard deviation of 1.22 and a variance of 1.5. This showed the greatest dispersion from the mean of the data set. The data reveal some pedagogical differences between respondents when it comes to letting students work on their own.

Table 20

Frequency of Practice With Regular Education Students Sorted by Mean

Item	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
8	Have students relate the topic under discussion or investigation to their own lives.	3	5	4	0.71	0.5	4
10	Ask students to synthesize information.	3	5	3.75	0.83	0.69	4
1	Give student the task of interpreting the facts.	2	4	3	0.71	0.5	4
19	Give students the choice of working independently rather than with the class.	1	4	3	1.22	1.5	4
6	Adjust the pace for students who can master content quickly.	1	3	2.25	0.83	0.69	4
20	Make available a wide variety of primary source materials to complement a unit.	2	3	2.25	0.43	0.19	4
4	Propose that students create an alternate solution to a problem.	2	2	2	0	0	4
14	Give students the challenge of evaluating different solutions to a problem.	1	3	2	0.71	0.5	4
21	Request that students find a solution to a real world problem.	2	2	2	0	0	4
5	Permit students to design their own projects.	1	2	1.75	0.43	0.19	4
16	Require students to refine their original product or concept.	1	2	1.75	0.43	0.19	4
18	Invite students to support one side of a controversy.	1	3	1.75	0.83	0.69	4
2	Allow students to select their own projects.	1	2	1.5	0.5	0.25	4

(cont.)

Item	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
3	Eliminate content that students have mastered.	1	2	1.5	0.5	0.25	4
7	Authorize students to determine how their projects will be presented.	1	2	1.5	0.5	0.25	4

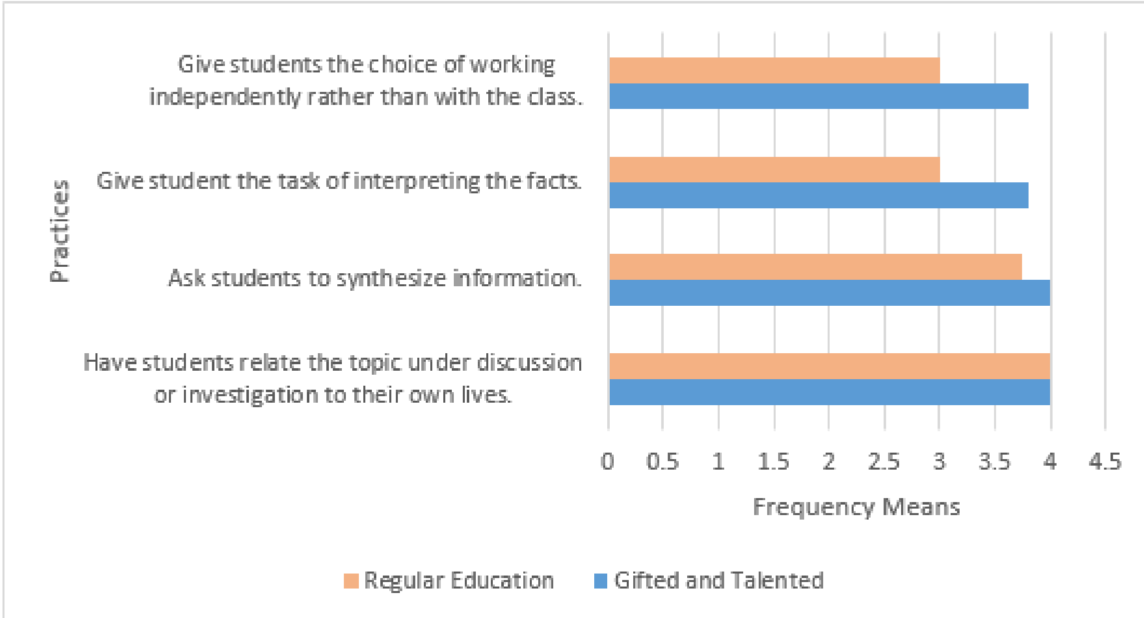
Item	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
13	Expand a lesson by having an expert in the field discuss the topic with students.	1	2	1.5	0.5	0.25	4
17	Permit students to find their own problem to investigate.	1	2	1.5	0.5	0.25	4
11	Allow students to evaluate their own projects.	1	2	1.25	0.43	0.19	4
12	Present a mini-lesson on research skills.	1	2	1.25	0.43	0.19	4
15	Make available higher grade level textbooks.	1	2	1.25	0.43	0.19	4
23	Include content areas from seventh- and/or eighth-grade curriculum.	1	2	1.25	0.43	0.19	4
9	Encourage students to develop the criterion for evaluating their projects.	1	1	1	0	0	4
22	Allow students the option to work elsewhere in the school.	1	1	1	0	0	4
24	Encourage students to present to an audience outside the classroom.	1	1	1	0	0	4
25	Assign students to the library for research.	1	1	1	0	0	4

Note. Data sorted in Excel was originally calculated using Qualtrics reports.

Further comparison reveals that the four above-average practices with the regular education students were also the top four practices with the gifted. Figure 4 reveals similar frequency means between the top four practices for both the gifted and regular education students. While the top four practices are similar, the mean frequency of gifted practice is higher for three of the four items. The highest frequency practice holds the same mean for both groups.

Figure 4

Mean Comparison of Practice With Regular Education and GT Students



Item 42. What Do You Believe Are the Best Practices You Use Regularly With Your Gifted and Talented Students?

Item 42 was added to the original Middle School Survey of Classroom Practices to provide respondents the chance for open-ended responses regarding their beliefs surrounding best practices when serving the GT. The responses provided a deeper understanding of the teachers' beliefs regarding practices.

Two respondents gave answers that reflect their response choices in Item 40, as they spoke specifically about investigation into real world problems and either connecting to content or applying to their real life.

One respondent was more specific regarding the modality for real world problems and indicated the use of *genius hour*. "The teacher provides a set amount of time for the students to work on their passion projects. Students are then challenged to explore something to do a project over what they want to learn about" (Genius Hour, 2022, para.

5). Students research an idea and create a product to present to the class. Genius hour addresses a number of GT best practices, including student choice, working at their own pace on the project, and real world investigation.

One respondent stated the following:

> With my GT students, I challenge them to be more independent in their learning, to be more in control of their own education, by providing them with less structure or scaffolding to give them more freedom of choice in what they are doing to solve a problem that they are presented with during a lab when we have the time to complete these.

The response indicates a greater understanding of best practice with GT students. According to Renzulli's (1976) Enrichment Triad Model, giftedness can be addressed within the model through student choice, alternative assignments, curriculum compacting, and PBL. Four of the five responses to Item 42 align with some best practice.

The final respondent discussed "addressing misconceptions in the area in which we are learning." This is certainly important and a best practice for teaching across the board. It may not be a specific best practice for differentiation with the GT.

Item 43. Do You Believe the Current Model for Serving Gifted and Talented Through Science Is Successful? Why or Why Not?

Item 43 was one final addition to the survey. The intention of Item 43 was to gauge the teachers' satisfaction with the current model. The general theme revealed in the open-ended response was that there was a general lack of satisfaction due to the size of the classes. Most felt that there were either too many students in the GT class or that there were not enough gifted students to fill sections without adding additional high-level students who were not labeled as GT. Teachers also reported in Item 43 a lack of resources, lack of time to prepare properly, or lack of time with the GT students in class to "challenge beyond their peers." The overall theme reflects a general lack of support, be it time or resources, to work with exceptional children in the most appropriate way. Table 21 lists the specific responses of each respondent to Item 43.

Table 21

Individual Responses to Survey Item 43

Yes or No – Why?
Yes, but it would be more successful if class sizes were kept at 25 and that requirement was not waived. I had 32 in a GT class last year and it makes it very difficult.
Not always, Teachers are required to serve both regular and gifted students with no additional prep time to plan for a second class.
No, I feel there are limitations due to the size of the classroom and the low number of gifted/talented students. There are no resources available to these students to expand their learning outside of the classroom. They need to be all in one class.
No, I do not because we do not have a true gifted class as there are not enough students. We have limited resources and classes are heterogeneously mixed.
I do not feel that we are given the amount of time that we need to be successful in science with the GT students. We do not have the support that is necessary for the students to be challenged beyond their other peers.

Results of Research Question 2: What Are the Mean Differences in the Student Achievement Level of the GT Students on the SCPASS Science Test Before and After the Implementation of the District's GT Science Program?

Research Question 2 was intended to look longitudinally at the possible effects of the GT science program's implementation. Test scores prior to the implementation in 2018 were compared to test scores following the implementation to identify any mean or statistically significant difference in the two sets of scores. The test of measure was the SCPASS Science test. This test is only administered to sixth graders in middle school; therefore, sixth graders and their teachers were the sample populations for this study.

The data collected were ex-post facto due to limitations on the data for both pre- and post-implementation comparison. Following the 2016 admission of SCPASS, the state changed the scale from three levels to quartiles. The 2017 test saw an adjustment to the scale and the level of the raw scale scores. The 2017 scale has been used through the 2022 administration. A second limitation to the data came from the 2020 and 2021 data being significantly impacted by COVID-19. There was full closure of South Carolina schools in the spring of 2020, and the test was not administered. In 2021, sixth graders returned to school in a hybrid model. This led to highly limited instructional practices in 2021. Due to the limitations, the 2017 pre-implementation data were compared to the 2018 and 2019 post-implementation data. Since this is a comparison of independent samples with unequal variance, the sample sizes will not be equal.

The test data were collected, and student identifiers were redacted for the 2017-2019 data. The sample size for the post-implementation data shows 2 years' worth of data and also a general increase in the GT population that was tested. Specific schools for each student were given a label to protect the identity of the school. Each sixth-grade student received a scale score ranging from 1570 to 1730. Additionally, the score was associated with a quartile level of achievement in regard to expectation, including does not meet, approaching, meets, or exceeds. The percentage of students who fell into each of the four levels of achievement for the gifted students overall and by school within the district was calculated and analyzed. Table 22 contains the percentages for the district and each middle school within the district for each expectation quartile of achievement. The percentages indicate a decrease in the overall grade-level performance following the implementation, but the number of students labeled as gifted who were tested had also increased. Regardless, most GT students within the program met or exceeded expectations.

Table 22

Pre- and Post-Implementation Percentages on SCPASS Science for the District of Study

Expectation level	Does not meet	Approaches	Meets	Exceeds	Met or above
2017 Pre-Implementation	0.95% (2)	3.82% (8)	21.53% (45)	73.68% (154)	95.21% (199)
2018/2019 Post-Implementation	1.8% (13)	4.45% (32)	25.34% (182)	68.38% (491)	93.72% (673)

To identify any statistically significant change following the implementation of the program, the mean scale scores were analyzed for the district as a whole and by school within the district. Since we have two independent samples of students before and after the implementation, the two sets of data for both the district and Schools A-E were compared using an independent *t* test. Again, this was not a comparison of change for a specific sample of students but was rather a comparison of a specific kind of student, the GT. Within the independent *t* test, if the results indicated a figure less than 0.05, a statistically significant change had occurred. For the purpose of displaying data within the reporting, values are reported to the hundredths column. The independent *t* test for each of the five schools revealed the following.

For School A, the results revealed that there was a statistically significant difference in scores pre- and post-implementation, t (15) = -2.43, p = 0.03. The mean score following implementation was an average of 10 points higher than pre-implementation. A summary of the results is displayed in Table 23.

Table 23

T Test: Two-Sample Assuming Unequal Variances – School A

	2017 Only PASS Science > Totals > Scale Score	2018 & 2019 PASS Science > Totals > Scale Score
Mean	1665.22	1675.38
SD	10.69	15.85
df	15	
t Stat	-2.43	
Sig.	0.03	

Note. SD= Standard Deviation, df= degrees of freedom, *t* Stat= the *t* test statistic, and Sig.= *p* value associated with the correlation. >0.05 is statistically significant.

For School B, the results revealed that there was not a statistically significant difference in scores pre- and post-implementation, t (23) = 0.95, p = 0.35. The mean score following implementation was an average of 4 points lower than pre-implementation. A summary of the results is displayed in Table 24.

Table 24

T Test: Two-Sample Assuming Unequal Variances – School B

	2017 Only PASS Science > Totals > Scale Score	2018 & 2019 PASS Science > Totals > Scale Score
Mean	1674.93	1670.74
SD	14.96	18.03
df	23	
t Stat	0.95	
Sig.	0.35	

Note. SD= Standard Deviation, df= degrees of freedom, *t* Stat= the *t* test statistic, and Sig.= *p* value associated with the correlation. >0.05 is statistically significant.

For School C, the results revealed that there was not a statistically significant difference in scores pre- and post-implementation, $t\ (28) = -0.07$, $p = 0.95$. The mean score changed less than three-tenths of a point positively. A summary of the results is displayed in Table 25.

Table 25

T Test: Two-Sample Assuming Unequal Variances – School C

	2017 Only PASS Science > Totals > Scale Score	2018 & 2019 PASS Science > Totals > Scale Score
Mean	1666.06	1666.30
SD	12.29	16.23
df	28	
t Stat	-0.07	
Sig.	0.95	

Note. SD= Standard Deviation, df= degrees of freedom, *t* Stat= the *t* test statistic, and Sig.= *p* value associated with the correlation. >0.05 is statistically significant.

For School D, the results revealed that there was not a statistically significant difference in scores pre- and post-implementation, $t\ (132) = -0.71$, $p = 0.48$. The mean score following implementation was an average of 2 points higher. A summary of the results is displayed in Table 26.

Table 26

T Test: Two-Sample Assuming Unequal Variances – School D

	2017 Only PASS Science > Totals > Scale Score	2018 & 2019 PASS Science > Totals > Scale Score
Mean	1673.13	1675.03
SD	13.30	18.09
df	132	
t Stat	-0.71	
Sig.	0.48	

Note. SD= Standard Deviation, df= degrees of freedom, *t* Stat= the *t* test statistic, and Sig.= *p* value associated with the correlation. >0.05 is statistically significant.

For School E, the results revealed that there was a statistically significant difference in scores pre- and post-implementation, t (145) = -2.96, p = 0.004. The mean score following implementation was an average of 8 points higher than pre-implementation. A summary of the results is displayed in Table 27.

Table 27

T Test: Two-Sample Assuming Unequal Variances – School E

	2017 Only PASS Science > Totals > Scale Score	2018 & 2019 PASS Science > Totals > Scale Score
Mean	1676.36	1684.15
SD	15.67	17.74
df	145	
t Stat	-2.96	
Sig.	< 0.01	

Note. SD= Standard Deviation, df= degrees of freedom, *t* Stat= the *t* test statistic, and Sig.= *p* value associated with the correlation. >0.05 is statistically significant.

Looking at the mean data, pre- and post-implementation for the district as a whole, the results revealed that there was not a statistically significant difference in scores pre- and post-implementation, *t* (395) = -0.08, *p* = 0.93. The mean score following implementation was an average of one tenth of a point higher than pre-implementation. A summary of the results is displayed in Table 28. With many variables impacting student achievement, a direct correlation of practices to achievement is limited. Possible variables that may influence the data include teacher practice, the students themselves, and any environmental factors in the year of testing.

Table 28

T Test: Two-Sample Assuming Unequal Variances – School District

	2017 Only PASS Science > Totals > Scale Score	2018 & 2019 PASS Science > Totals > Scale Score
Mean	1673.75	1673.86
SD	14.54	17.39
df	395	
t Stat	-0.08	
Sig.	0.93	

Note. SD= Standard Deviation, df= degrees of freedom, *t* Stat= the *t* test statistic, and Sig.= *p* value associated with the correlation. >0.05 is statistically significant.

The overall picture of post-implementation data shows little change from the pre-implementation data. When examining comprehensively the data together in Table 29, there were two schools that showed statistically significant growth, but the district as a whole did not show statistically significant growth following the implementation of the middle school GT science program. The results of the data were shared with focus groups for their feedback regarding their satisfaction. A deeper understanding of the practitioner's point of view on the SC PASS data may be revealed through this explanatory sequential design when looking at the responses to the focus groups.

Table 29

Mean Raw Scale Score and Independent t Test Results by School and for the District

School	2017 Pre-Implementation	2018/2019 Post-Implementation	P (T<=t) Value in a two tail test. <0.05 Statistically Significant
District	1673.75	1673.85	0.93
A	1665.72	1675.38	0.03
B	1674.93	1670.73	0.35
C	1666.06	1666.30	0.95
D	1673.13	1675.02	0.48
E	1676.36	1684.15	< 0.01

Results of Research Question 3: How Do People Perceive Practice Affects Achievement When the Data Are Shared Regarding Practice Trends and Achievement, and What Is Their Level of Satisfaction With the Findings?

In this mixed methods study, an explanatory sequential design was used. The process builds in that the data from Research Questions 1 and 2 were analyzed and used to formulate the questions for a focus group with the intention of answering Research Question 3. Multiple focus groups were conducted.

One focus group was conducted with the sixth-grade teachers who had completed the survey and were daily engaged in the practice of serving their GT students. Eight participants were invited to participate, and four accepted the invitation to do so. Three of the five schools were represented in the focus groups. All five schools were represented in either the survey component or focus group component of the data collection.

A secondary focus group was held with the district's instructional leaders who work directly with the GT teachers. An email was sent to 18 potential participants who, by role, are principals, assistant principals, and instructional coaches at the district's five middle schools. Five of the 18 volunteered and participated in the focus groups representing four of the five middle schools in the district of study.

The following findings are reported by a question with a focus on themes and are reported using a narrative with quotes for illustration of the themes. The focus groups were conducted by proxy. The questions of the focus group facilitator and the answers of all participants were audio recorded and then transcribed in a bulleted format.

Topic 1. Achievement Data

The first three questions focused on participants' satisfaction with the achievement data. The following information was shared before the questions were asked:

- 2017 data reflect a range of scores from 1633 (does not meet) to 1717 (exceeds).
- 2018/2019 data reflect a range of scores from 1618 (does not meet) to 1730 (a perfect raw scale score).
- Pre- and post-implementation data reflected students' scores falling in does not meet, approaches, meets, and exceeds with the following percentages (Table 22 was shown to the respondents).
- The district and all five schools' data reflect an average scale score falling in the level of exceeds expectations.
- In 2017, the mean score on the test of the GT science students across the district was 16733.75. Following implementation, the mean scale score in 2018 and 2019 was 1673.85. The comparison of the data revealed that p=0.93.

It would need to be less than 0.05 to be statistically significant. Here is the pre- and post-implementation data for all five middle schools that have been coded (Table 29 was shared with the focus group.)

- Note: Data for the district and all five schools reflect an average scale score falling in the level of exceeds expectations.

Question 1. What Is Your Satisfaction Level With the Data I Just Shared?
The teacher focus group, in general, was not satisfied with the data shared. The facilitator spent time explaining the variables and the differences in the *n* values for the pre- and post-implementation sample sizes. This was the primary focus for Question 1 with the teacher focus group with no real statement regarding satisfaction with the achievement data.

The instructional leadership group better understood the data they were looking at based on their responses. In general, the satisfaction was good. One respondent stated,

> I would open up very satisfied, the average scale score of the district schools being at the exceeds level with the transition with our state standards to college and career ready standards that took place also in the area of science. That is a very high bar that has been set by our state Department of Education. And the fact that the scale scores are all within the highest level on that state evaluation is certainly something to be satisfied with.

Another participant noted that four of the five schools showed some growth, but it was not overall significant.

Further conversation was had surrounding Question 1 and the size of the samples. The group recalled that in 2017 and years before, a random selection of students was chosen to take the state test in science, while others were selected to take social studies.

> It looks like there were more students that had the opportunity to take it post-implementation, because before not all GT students were perhaps identified in taking that, because there were substantially more students taking it in 2018 and 19 than were in 2017. 2017 I believe was the year that in sixth grade they either took science or social studies and it was a random selection, so there wouldn't have been as many students taking the science test in 2017 for that reason I bet.

The group would like to have seen a true comparison of pre- and post-implementation data with the same group of students. Since the SCPASS Science test is only administered to sixth graders, this would not be a possibility. As discussed in the methodology, a correlation of the data to practice may not be possible to make. The focus group discussed a potential delimitation, but they did not understand that the pre- and post-implementation data were independent of each other, and that is why the independent *t* test was used recognizing unequal variances of the data. With many variables influencing test data, it was decided in the methodology that the correlation may be hard to make and that the study would primarily focus on practice.

Question 2. What Factors May Influence Your Gifted Students' Achievement on the State Test Outside of Their Giftedness? A theme that was truly present for Question 2 reflected a general understanding of the adolescent student in the responses. The facilitator summarized the teacher respondent's observations when they said, "Just the maturity…. We've covered several things. Home engagement, maturity level, just being distracted, overthinking, over analyzing."

The instructional leadership group pointed out that the SCPASS Science test is usually the fourth and final test that students will take. It is weighted the least in accountability measures, so it usually is taken after students have taken three standardized tests for reading, writing, and math. Other issues discussed that may influence the achievement included any gender bias with the content matter, the student's type of giftedness, and test fatigue.

Question 3. Are There Any Other Observations or Insights on the Data Points Shared? When asked about other observations or insights on the data points shared, here are some other points made by the participants: "Well if you add meets and exceeds together, it's about the same. You said at percentage wise. So there's not as many exceeds but there's enough meets to make up the difference."

> It'd be interesting to dig a little bit further and look at the ones that were does not meet to see if they had also scored that poorly on some of their other tests. Because a GT student you just wouldn't expect to be in the does not meet category, so I think it'd be interesting to look further into why they're falling in that category.

> I think the other piece with that for smaller schools like School B, I would assume School A as well. I have one science teacher for each grade level and so I have to fill those classes. And so you end up with students in there that are not actual GT students and that does impact what you can do and how far you can take it. And I think that overall, if your hope is your GT is taking it much further, then really you need somebody that's dedicated to GT. Because you have one teacher that's teaching all of the kids in that grade level, one that's multiple plannings and trying to do it at a different level in that room. But then also I have to fill those

classes, because I have nowhere else to put them.

"But you can have students that would be GT and do really well in English, but also have an IEP (Individualized Education Plan) because of math which could impact science. I mean there's so much behind [inaudible]."

The focus groups pointed out many variables that may influence a student's achievement on the state's standardized test for science beyond their giftedness. There are certainly some delimitations surrounding the achievement data and what the data really tell us.

Topic 2. Teacher Preparation for Practice

The following was stated to the focus groups when exploring the topic of teacher preparation when working with the GT student: "When looking at Survey Item 5, 'What training prepared you to serve the gifted student,' 100% indicated that they were trained through coursework completed to add GT endorsement. Forty percent indicated specific graduate courses."

What Do You Believe Are the Strengths and Weaknesses of the Preparation of Teachers to Work With Their Gifted Students? Is There Anything Else You Wish Teachers Had Received as Part of Their Training? When asked about the strengths and weaknesses of teacher preparation to work with gifted students, a clear theme was that teachers are not being prepared properly for their work with the gifted, in that there is no comprehensive ongoing professional development. All teachers received the required endorsement, but limited opportunities are present to refine practice. One teacher noted that there has been one half day of professional development since she has been teaching GT where teachers had time to collaborate and build units surrounding PBL, but the respondent would have loved to have more time to work with the practical side of it. Along the same lines, another respondent noted that the training was just good teaching that applied to all their students. The training had some voice and choice, but again, that is just good teaching. The dialogue indicated that there was some initial training when the program was first implemented, but

> as with all things education, the focus shifted to something else and so it just sort of dropped off. And so I had already been there teaching but I think back on new science teachers who were also GT certified, there was no initial training for them or even a professional development to my knowledge. There may have been but to my knowledge, there was no ongoing.

One teacher also noted that one of the survey questions asked about a district GT facilitator:

> And even in the questions for the survey talked about having a facilitator come in, a GT facilitator, my eyes lit up like, "Oh that's a thing." I would've loved to have had someone's brain to pick at even a district level to come into the courses and help me facilitate that and understand the practical application of the difference between my regular GT and now my regular and my GT.

The instructional leadership group voiced similar sentiment regarding the need for ongoing professional development that is specific to GT science. The group discussed a general training for teaching GT but not specific ongoing training tied to science. One respondent noted the PBL training mentioned by a teacher respondent that was more science-specific and even included some supplies. The respondent went on to say that this was a positive but there is much greater time dedicated to training around general education than GT specific to science. Another respondent noted that many of the district's sixth-grade teachers are elementary certified and do not have a science background either. A comment made as an aside to the professional development topic is that if teachers have four to five sections a day and only one is GT, preparation for the gifted section may be watered down.

Topic .3 Teacher Practices With the Gifted

Survey Item 42 asked respondents to reflect on frequency of practice. Table 30 depicts the items having an above-average mean with regard to frequency. The data reflect more regular use of the practice compared to other practices in the survey.

Table 30

Above Average Mean for Practices With the Gifted

#	Field	Minimum	Maximum	Mean	Std. Deviation	Variance	Count
8	Have students relate the topic under discussion or investigation to their own lives.	3	5	4	0.63	0.4	5
10	Ask students to synthesize information.	3	5	4	0.63	0.4	5
1	Give student the task of interpreting the facts.	3	4	3.8	0.4	0.16	5
19	Give students the choice of working independently rather than with the class.	3	5	3.8	0.75	0.56	5
4	Propose that students create an alternate solution to a problem.	2	4	2.8	0.98	0.96	5
6	Adjust the pace for students who can master content quickly.	1	3	2.6	0.8	0.64	5
16	Require students to refine their original product or concept.	2	4	2.6	0.8	0.64	5
20	Make available a wide variety of primary source materials to complement a unit.	2	4	2.6	0.8	0.64	5

Note. Table excerpted from Table 17 to illustrate high mean practices.

What Is Your Level of Satisfaction With the Practices Presented in the Data Here? The teacher focus group commented primarily on the highest frequency practice of, “Have students relate the topic under discussion or investigation to their own lives.” One respondent stated,

Now I like the first one, have students relate the topic under discussion or

> investigation to their own lives. I just noticed with my class, that's something that I really try to focus on. I think students, when they can relate it to themselves and what's happening with their life, they seem so much more interested in just seems like I get a better result every time when I do that.

One teacher primarily voiced their opinion regarding their level of satisfaction with the practices here, but they felt very strongly about this practice, saying that even minor topics saw better outcomes with students when it is relevant to their own lives.

The instructional leadership focus group voiced sentiments regarding satisfaction with the second and third highest frequency practices of synthesizing information and the task of interpreting facts. They were pleased with the higher order thinking involved with these practices and that teachers may be using these practices more regularly than others. Respondents stated the following:

> The fact that that is occurring more often, the middle school learner at those levels where they are interpreting their own meanings and creating and synthesizing for multiple sources their own summaries. That is definitely high level learning skills that are occurring as one of the most frequent practices in these classes. I think that's a positive sign and one that is extremely high level for middle school learners. They have a tendency to be direct and almost copy and not have as much of their own thought. But the gifted learner here, as these teachers are summarizing, are doing that as a practice almost twice as much as some of those other skills shown near the bottom (Anonymous correspondence, 2022).

> It's just not the call of information, they're taking that information and going a little bit deeper with it on their own. That's very encouraging.

> I think our students, in general, have a strength in that area, because of our elementary schools and the inquiry-based foundation that they have laid before they come into grade six, where it is then served through science classes. Just gives a good environment to have that as a good base for much of your teacher practice. As well as the science standards, obviously, that have inquiry has a big focus.

While it is not specifically related to best practices listed in the review of literature, it is worth noting that higher order thinking is beneficial for gifted students. The Glossary of Education Reform (2012) referred to higher order thinking as critical thinking. It noted that critical thinking would include practices such as interpreting facts and synthesis. Such thinking is necessary to find success in challenging careers and processing increasingly complex information. The glossary also discussed the premise that standardized testing is driven by recall and memorization, which often skews classroom practice away from teaching higher order or critical thinking (Glossary of Education Reform, 2013). The respondents also noted the importance of inquiry in the new science standards and its link to higher order thinking skills.

Are There Practices Not Represented in the Data Table That You Would Like to See Used With Greater Frequency? When asked about practices not represented in the data table that respondents would like to see done with higher frequency, one teacher noted that he would like to see more activities with greater choice. Another respondent noted that with the choice should be topics that are interesting to the students. One respondent specifically stated,

> I guess if students having to pick a topic or anything like that, giving them a list of

> options that they can choose from and choosing a topic that they want, giving them that responsibility, that choice. I think sometimes they like that and that sometimes can work out in everyone's favor.

Choice is aligned with best practice data shared from Renzulli's research and the Enrichment Triad Model (Renzulli, 1976). It is also strongly advocated as a best practice by NAGC (2012).

The instructional leadership team focused primarily on the importance of collaboration. One respondent noted that giving students the choice to work independently rather than with the class was a higher frequency practice in the survey data. One respondent stated,

> Well our students, particularly middle school students, don't know how to work together. That is one of those college and career ready skills that they need. And we have the choice of allowing students to work independently rather than with the class, which I get a lot of our GT students want that. But I would like to see them problem-solving together as a group and working together to come up with solutions. And not just doing a jigsaw, but truly working together and learning how to take everybody's thoughts and opinions and mesh them with yours.

The group noted that GT students are often the first to find a way to avoid group work. The group felt that within any PBL or real world approach it is essential that students learn to collaborate in alignment with the 21st century learning skills.

Topic 4. Teacher Practices With the Regular Education Science Student

Survey Item 41 asked respondents to reflect on frequency of practice with regular education students. Table 31 illustrates the items having an above-average mean in regard to frequency. The data reflect more regular use of the practice compared to other practices in the survey.

Table 31

Above Average Mean for Practices With Regular Education Student

Item	Field	Minimum	Maximum	Mean	Std. Deviation	Variance	Count
8	Have students relate the topic under discussion or investigation to their own lives.	3	5	4	0.71	0.5	4
10	Ask students to synthesize information.	3	5	3.75	0.83	0.69	4
1	Give student the task of interpreting the facts.	2	4	3	0.71	0.5	4
19	Give students the choice of working independently rather than with the class.	1	4	3	1.22	1.5	4

Note. High mean frequency data excerpted from Table 20.

What Are Your Thoughts on Frequent Practices Used With Your Regular Education Science Students Compared to Those Used With Your Gifted Students? The facilitator shared the highest frequency practices within the survey used with regular education students and asked for their thoughts regarding those practices compared to those used with their gifted students.

In the teacher focus group, one teacher noted that while the high frequency practices at the top of the list for both groups were the same, the standard deviation and variance of those practices were much higher. The respondent stated,

> Well, looking at the standard deviation of number 19, for example, it’s much higher for the regular ED than it is if you flip back and look at it for the gt. But

> that just tells me that we're kind of all over the place about how we teach regular science versus gt. With regard to that one was talking about choice, student choice. So I mean I would agree. Piggyback on one person, I'm not sure who it was that said good teaching is good teaching student choice is always good. And if you looked at the data table before, a lot of those, a lot of the align items as you went down, it was more student centered and the numbers, the mean went down as well. So it seemed like the more student centered we got, the less we got away from those practices just based on that one list that's solely on that one list. But it looks like while the means are similar, you look at the deviation that tells a whole other story about how we approach it as a district.

Another teacher reinforced this observation saying that while practices are similar, it is sometimes easier to give greater choice to the gifted students due to behavioral concerns. They referred to this as "the halo effect." Since they are gifted, one teacher stated that they feel more comfortable giving them greater choices or options.

The instructional leadership focus group had a different perspective on the comparison of practice. The consensus of the group in regard to the frequency of practice was that it was basically the same with both the GT and regular education students. They did wonder about the pace. They wondered if perhaps they were using similar practices but the process was different and that there was an increased pace in presentation for the gifted. The idea of pace would be aligned with curriculum compaction and acceleration. Question 6 in the survey item on practices asked about adjusting the pace for students who can master content quickly. For the gifted students, teacher practice frequency had a mean of 2.6. With the regular education student, it was 2.25. While the mean frequency for the gifted student was higher, it was not significantly higher. One respondent stated that the practices are aligned with the exemplary level on the teacher evaluation rubric. They went on to say that the practices are aligned with good teaching, which should be for all students, and perhaps the pacing part is what is really important for differentiation with gifted students. A final comment was that during observations, the instructional leader was just not seeing a lot of difference in practice at their school. Anecdotally, the respondents felt that there may be some pacing difference in practice, but there was little other diverging practice used between the gifted and regular education students.

Topic 5. Teacher Satisfaction With the Current GT Model In Middle Level Science

As discussed when analyzing the results for Research Question 1, survey respondents reported a general dissatisfaction with the current GT model in middle level science when asked if they thought the current model was successful. Four of five said no. One said yes but stated that they wish the class size was kept at 25. Survey respondents said no because of class size, lack of resources, or time to prepare. They did not feel that the classes were always homogeneous, and they did not have what they needed to properly challenge the gifted learner. The results of Item 43 were shared with the two focus groups, and they were asked to share their level of satisfaction.

In response, while the teachers shared general dissatisfaction with some facets of the model in the survey, those who responded during the focus group indicated that they enjoyed teaching GT science. The following dialogue from three of the four teachers in the focus group supports the general interest of the teachers to work with the GT:

Teacher 1: So by current model do you mean teaching it through science?

Facilitator: Yes.

Teacher 1: Okay. Well, I love that part of it. I love having a GT class because you get an opportunity to really teach and not discipline and really delve into things and you can go off on a tangent with them and still get them back because they'll follow what you're talking about rather than never returning to the topic. Some other classes will, so now I wouldn't like to give it up for sure.

Teacher 2: Yeah, I agree. Spot on.

Teacher 1: Yeah. I mean the other classes are fun too, but when you're in your GT classes you're going, "All right, now it's time for this." Yes.

Teacher 2: I feel it benefits them more too.

Teacher 3: Absolutely.

The same teachers who shared dissatisfaction in the survey made these statements. The responses in the survey indicated concerns around class size, true grouping, resources, and preparation. The conversation in response to this question in the focus group seemed to center more around satisfaction with getting to teach the gifted because they found them generally enjoyable and interested in what was happening in science class.

The instructional leadership group was asked to analyze the responses from Survey Item 43 and share their satisfaction with the GT science model. Their responses were different. The group expressed general dissatisfaction with the model. One respondent discussed that gifted students would be better served if there were different opportunities that met their area of giftedness. If a student is verbally gifted, they would do well in a GT English setting, or perhaps they are gifted artistically, and they should attend a gifted art class. The district of study chose science for this very reason. Before the implementation of this program, all students were served through GT English, which did not account for those who are gifted nonverbally or quantitatively. With limited resources, if services must be offered through content, science was believed to be the best overall fit. Students who are identified as gifted artistically are invited to attend a summer program with other students with similar giftedness. Other possible models may include pullout programs such as many elementary programs do but this presents the issue of students missing instruction to attend. Perhaps this may accompany acceleration or compaction. The underlying theme for both focus groups seemed to be a general dissatisfaction with the nuances of the program, which may be addressed with ongoing training and evaluation.

Topic 6. Final Thoughts

The focus groups were asked to give any thoughts on achievement correlation, what they felt should be the primary objective of a GT science program, and anything else they would like to share. Here are the conclusions given by three of the four teacher respondents:

> Teacher 4: Sorry, I'm not sure what they were saying before, but I do want to reiterate on the data from the slide before the year that we had, we followed the 25 rule was magical. We got a lot of stuff done, a lot of extra things. I am currently serving 35 in one class entire year in one semester. That's not sustainable. I know why we're doing it because we're trying to branch out and go to the career center. But I would love us to try to shift back to smaller class sizes and just get more resources and professional development ongoing.
>
> Teacher 1: Academic achievement is not ever my real goal. I want them to be able to take care of me when I retire. Do you know what I'm saying? I want them to

ask them, you've got to invent this hydrogen car. These are the things that you have to do. I want them to be productive and stay with science. Because a lot of them don't think they have an opportunity for that. They don't see themselves doing something in science and you want them to. You want them to not let go of it just because they graduate and get a job somewhere. No. You need to still stay with it. I'm always showing them people that are working in the field and showing them the dark thing the other day where I showed them that whole thing and these are just kids, they're just a little bit older, you got to stick with it. And that's my main goal with them is to make them lifelong scientist-type people and stick with that kind of thing. So that's what I think it should be because we need them. And that's what I tell them. We need every single one of you, if we're going to get out of this mess we're in. Test scores are test scores and kids that know how to do things and are interested in trying new things are way more important. Yeah. Yeah.

Teacher 2: I think also for number 11, challenging them is a major thing that I always think of. They like to be challenged with GT students, they like that challenge or they get bored. And I guess to just help motivate them to learn and be successful. Just learn anything in life. You got to work hard and you got to work for something.

Responses indicate a general desire to have the necessary resources and training to improve practice with gifted students in science. Responses further indicated a desire to challenge the gifted student and push them to embrace the sciences, as they can impact the world positively through the sciences.

The following are some of the final thoughts from the instructional leadership group based on theme.

Achievement. The group as a whole responded that truly gifted students will be successful from an achievement standpoint regardless of the teacher. They reflected that many gifted students are intrinsically motivated and will do well driven by that motivation. Those who are not intrinsically motivated may find that motivation from a teacher with whom they connect or who makes the content engaging. One respondent shared that they may not be motivated by either, and they will still score extremely well on the state test because of their giftedness. This led to a discussion surrounding "should achievement be the primary objective or something else?"

Program Objective. Most respondents indicated that the primary objective of the gifted program should be something beyond student achievement on the state standardized test. One respondent stated that the objective is still linked to achievement, but perhaps it is something larger such as the skills tied to being college and career ready. Respondents had the following discussion in regard to the gifted program's objective.

> Leader 1: Yeah, I think schools, we're always guilty to go straight to the academic state assessment, summative assessments. And so yes, I think we are transitioning there. I think we have some early implementation levels of it. I don't think it's been fully realized in our district yet. I think it is developing a little bit. Project-based learning is one example, that is a recent add-on of our district to these GT science classes. It was impacted by the pandemic, so that is a factor the past three years. So it's at an infancy stage, teachers receive supplied money for it, some training for it. But I think it still needs to be fleshed out more and certainly having

that as a primary goal could enhance these programs. And I think the teachers not being satisfied with how it's being implemented, I think it would improve that as well.

Leader 2: Because they've learned over time how to play school really well, they don't always know how to do those other skills. And these kids, you couldn't teach them anything. If you just gave them the book and then gave them the test, they're going to pass the test, because that's how they are, they're worried about what's going to be on there. But if we're not teaching them those wider skills that they're going to use in the workforce and in college, then I think personally we're doing a disservice.

Leader 3: I agree. I keep thinking about last night when they hit the asteroid and all the scientists and engineers and all in the room just started celebrating when it happened. So obviously there was a lot of collaboration, teamwork, and of course individual work also, but it all came together...

Leader 2: For one big thing.

Leader 3: For one big thing. And I wish that we could get to that.

Leader 2: But as long as there are state tests held over us...

Leader 3: We will not.

Leader 2: We won't get to that.

Leader 3: We will not be able to get to that.

Leader 5: And it starts with the creativity, the thinking outside the box, like those students, "Am I going to be graded on this?" Well, we just want you thinking. But when you tie an assessment to evaluation where they're going…

> Leader 2: Student evaluation, teacher evaluation, school evaluation, it's lost everything.

The underlying theme surrounding the discussion seemed to be the need to move beyond the focus on the test and to provide powerful learning experiences to really challenge gifted students to think. A final dialogue was held around the premise that sixth grade was the only grade level that takes the state assessment, and there could be a real opportunity in seventh and eighth grade to go beyond the test.

> So I think there's a great opportunity, at least state of South Carolina, there are two of the three middle school grade levels that are not tested and they have maybe, possibly more freedom to deploy some of these other skills and exploration activities that we're talking about with some CCR skills more in play than just a state test. Sometimes in grade levels where there's a state test, there's a tendency to hyper focus on what's on the test. But that is a consideration possibly with further research that there are classrooms that don't have a state test. And it would be interesting to see if they report any differences compared to grade levels that feel the burden and the pressure of the state test.

The respondents concluded by discussing that the current survey and achievement data do not seem to reflect that the current practices are having the impact wanted with the GT science program and that perhaps necessary stakeholders should revisit what practices should be in place to truly serve them. One example given was that students with an Individualized Education Program receive the services they need in the areas in which they are needed. A similar approach is needed with gifted students.

Summary of the Results

Using a mixed methods approach, I used quantitative and qualitative data to answer Research Question 1, quantitative data to answer Research Question 2, and qualitative data to answer Research Question 3. The design was explanatory sequential. The questions that drove the results for Research Question 3 were formulated based on the results analyzed from the first two research questions. This is a building approach in that the first two phases informed the final phase (Fetters et al., 2013).

The data analyzed to answer Research Question 1 revealed only minor differences in practice with the GT versus the regular education. The Likert scale responses in regard to the frequency of teacher practices with both GT students and the regular education students revealed a higher mean for some practices with the gifted, but the highest mean practices were the same for both the gifted and regular education students. Additional open-ended questions provided qualitative data that displayed a general dissatisfaction by teachers with the program and insights into what practices teachers feel are best for the gifted.

The data analyzed for Research Question 2 was reported and analyzed using descriptive statistics. Pre-implementation and post-implementation state test data (SCPASS Science) was compared through an independent *t* test to determine if there were any statistically significant differences in achievement. The data revealed that for the district as a whole, student achievement had changed very little for the gifted student in science since the implementation of the program. When looking at school by school, only two of the five middle schools in the district of study showed statistically significant growth after implementation of the GT science model. In fact, by percentage, the number of students who scored “exceeds” decreased somewhat.

The data analyzed for Research Question 3 were qualitative and reported in a narrative with quotes used to exemplify the thoughts of the narrative. Two focus groups were conducted and audio recorded. The audio recordings were transcribed and analyzed by topic.

The focus groups provided a deeper understanding of the data gathered for Research Questions 1 and 2. The findings of the focus group revealed a general dissatisfaction with the achievement data. The focus group pointed out that in the pre-implementation year, not all students in sixth grade took the state test for science. Some were randomly selected for science and some for social studies. Even though the sample size was smaller, each was greater than 15. The independent *t* test was run as having unequal variance and compared the mean scores and was not a student-to-student comparison.

The focus groups noted that practices were highly similar with the gifted as they were with the regular education student, but the teachers, in general, expressed greater comfort exploring more options and giving more choices to the gifted students. While the survey result revealed a general dissatisfaction with the current gifted model due to resources and class sizes primarily, the GT teachers expressed enthusiasm for providing the service through science. They expressed the importance of preparing great scientists for the future, and this may be done well in this format provided the proper setting, training, and resources. The instructional leaders made the observation that the preparation for the end-of-the-year test negatively impacts practice. They also believed that the achievement data and survey results revealed a need to revisit the model and provide greater practice for the gifted based on their unique learning needs.

Chapter 5 provides a deeper analysis of the results and explains further the findings regarding practices as aligned with those practices determined to be best in the review of literature and any final conclusions which may be drawn from the achievement data. Recommendations for practice with the current GT middle school science model are also provided.

Chapter 5: Discussion

Introduction

The challenges of educating today's adolescents can be many. Beyond the normal developmental challenges, today's middle school students must deal with the trials that come with access to technology and those dealing with a world that is full of anxiety following a global pandemic and societal discord. On top of all of that, the identified gifted student has even greater needs that should be recognized and addressed. Understanding the needs of a gifted adolescent is crucial. Classroom practices must align with their unique learning needs and provide opportunities for growth in multiple domains and challenging curriculum. This research has also led to a greater understanding that achievement with exceptional children cannot come simply from their raw score on a once-a-year test. Authentic assessment aligned with identified best practices may be the key.

The purpose of this study was to look deeper into the practices being used by the classroom teacher in a gifted program that is unique. No research could be found that identified practices being used specifically in a middle level GT science classroom. The implementation of such a unique program was done to provide a content area where it would be possible to accommodate both the verbally gifted and also the nonverbally or quantitatively gifted.

A secondary purpose of the study was to examine achievement levels of the gifted students in the district of study's middle schools both before the implementation of the program and following the implementation of the program to see if there was any statistically significant growth to be found. Examination of the SCPASS Science test scores for sixth graders was analyzed and shared with focus groups to add a deeper understanding of what was being seen in the results.

The final purpose of this study was to gauge the satisfaction level of practitioners within the program of practice and the possible effect of practice on achievement. The satisfaction of both the GT science teachers and the instructional leadership teams that work directly with the GT programs was assessed using focus groups.

This mixed methods study used an explanatory sequential design which allowed for data to be collected that was primarily quantitative in nature. I then built the questions for the second phase of qualitative research which intentionally provided a deeper understanding of the initial data points analyzed.

Summary of the Findings and Conclusions by Research Question

This mixed methods research centered around three research questions. The data collected to answer each research question were analyzed to discover findings for each question. The following is a summary of the methods used to collect the results and the findings from those results.

Research Question 1. What Are the Specific GT Practices Being Used by the District's GT Science Teachers?

The primary purpose of this research was to examine the practices being used in the sixth-grade GT science classrooms across the district of study to determine if best practices were being used to serve the gifted student. The primary instrument used to determine classroom practices in the district of study was the 2022 Middle School Survey of Classroom Practices. Current GT science teachers who work with sixth-grade GT across the district of study were asked to respond to 43 survey items related to their role as a GT teacher. Eight teachers who are currently practicing teachers of both the GT and regular education sixth graders were invited to complete the survey. Five volunteered to participate and completed the survey. Specific items from the survey are referenced in the summary of practices for different best practices.

A 2011 study of 101 highly successful middle schools revealed that those schools used practices that were developmentally responsive (McEwin & Greene, 2011). Beyond practices that are developmentally responsive for all students, this study wished to identify and examine alignment with practices that are research-based best practices for middle level gifted students. The review of literature revealed overlap in specific best practices which were thematic. Those best classroom practices include ability grouping, curriculum compaction or acceleration, student choice, and PBL.

Ability Grouping. The 2022 Middle School Survey of Classroom Practices included one question that asked about the grouping practices associated with the GT students in sixth-grade science.

Item 17 of the survey asked how students are grouped for sixth-grade science classes. There were five respondents to the question ($N = 5$). Eighty percent of the respondents ($n = 4$) indicated that the classes were grouped homogeneously with students of the same or similar ability and 20% ($n = 1$) indicated a combination of one or more homogeneous classes and the rest heterogeneous. In the district of study, scheduling of content classes requires that there are enough necessary sections in the schedule to group GT students in science class. The remaining regular education class is primarily homogeneous, but the regular education sections are sometimes heterogeneous.

Survey Item 17 responses indicate an awareness of the ability grouping of GT students by the respondents. Pullout classes, special programs, or ability grouping to serve the GT in South Carolina are the required models from which districts can choose (South Carolina Department of Education, 2018). Specialized coursework is the required practice in the district of study. The ability grouping of the gifted in the district of study should yield positive results according to some research. Multiple studies were conducted where statistically significant growth was seen using ability grouping versus schools that used a pullout model for the gifted (Collins & Gan, 2013; Graham, 2020; Pinsonneault, 2015). Further, NAGC (2022) recognized the value of practices such as ability grouping, curriculum compaction, and specialized coursework when serving gifted students. This research determined that ability grouping indicated by respondents in the study is a best practice taking place for the gifted and is happening regularly and consistently across the district of study. If the findings of NAGC hold true, the gifted student served in the middle level science class in this study should also be engaged in curriculum compaction and specialized coursework such as PBL.

An additional result found in this research was that there was dissatisfaction expressed by teachers in Survey Item 43 regarding the grouping. One respondent reported that class sizes for their GT were too large and that they had 32 students present. Two additional respondents reported that there were not enough GT students, so the GT sections had been filled with non-GT high achievers. In an instructional leadership focus group, one respondent indicated that staffing limitations force sections to be filled with non-gifted participants. Card and Giuliano (2014) indicated that the inclusion of non-gifted high achievers in the district of study may be a positive practice. Their research indicated that the gifted student labeled based on cognitive ability showed minimal growth in reading and math from the program. In South Carolina and the district of study, this is the primary determination for the gifted label. The high achievers who were added to the gifted classes showed significant growth. Their conclusion was that gifted classes should include students who show high achievement versus simply those with high cognitive ability (Card & Giuliano, 2014). While the research referenced before indicates the possible benefits of true ability grouping, an unintended effect indicated by the filling of sections with high achievers not labeled as gifted, according to the respondents, may be positive achievement gains for the non-gifted participants. This could warrant further study within this school district if non-gifted participants are included. How many non-gifted participants are scheduled in gifted science, and what are the effects on their achievement?

Curriculum Compaction or Acceleration. Curriculum compaction or acceleration of curriculum are strategies that allow students to bypass learning around content for which students can already demonstrate mastery. Students may also learn content at a quicker pace and should not have to learn the material at the same grade level pace or scope as their regular education peers. I hoped to discover if the practice of curriculum compaction is being used in the district of study. If so, I would like to better understand how.

The 2022 Middle School Survey of Classroom Practices included five items that assessed curriculum compaction in the district of study. The results for the five items were discussed in Chapter 4 and revealed mixed use of compaction with the gifted and sometimes regular education students with minimal frequency. The results of those items were analyzed using descriptive statistics.

Item 19 asked if teachers used pretests to determine if GT students have already mastered the content of a unit. Sixty percent of respondents (*n* = 3) reported that they did use pretests and 40% of respondents (*n* = 2) indicated that they did not use pretests to check for mastery. This would be a simple way to determine the level of instruction needed based on student prior knowledge. The fact that 40% of teacher respondents do not use a pretest indicates that they also do not practice curriculum compaction with their students.

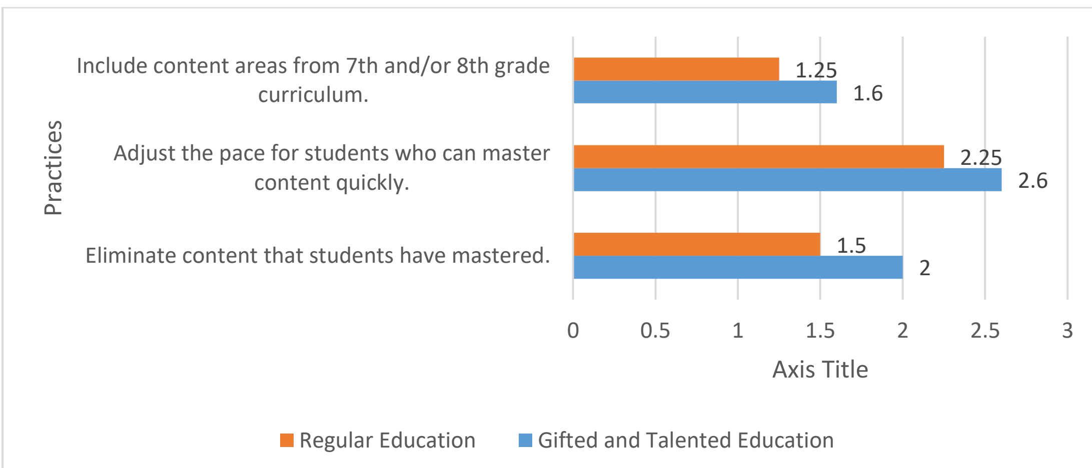
Survey Item 25 responses accurately indicated that the district allowed classroom teachers to provide higher levels of enriched content material in their classroom but that students could not be accelerated to the next academic grade level within the content.

With the district of study allowing higher levels of enriched content material in their classroom, a pretest would be necessary to determine who may be able to bypass some content instruction and allow for enrichment content in its place. As previously noted, Reis and Peters (2021) reported that gifted students can have 24% to 70% of the regular curriculum eliminated and substituted with more challenging work. The students in the study scored just as well or better in math and science than those who did not have the compaction (Reis & Peters, 2021). Ability grouping would possibly result in a large number of students who could bypass traditionally spiraled curriculum.

Items 40 and 41 asked specifically about the frequency of practices with either GT or regular education students respectively. Three items specifically addressed compaction or acceleration. Those items include Practice 3, “Eliminate content that students have mastered”; Practice 6, “Adjust the pace for students who can master content quickly”; and Practice 23, “including content areas from $7^{th}/8^{th}$ grade.” Figure 5 illustrates the mean frequency of acceleration or compaction practices included in the survey and their frequency with the gifted and regular education students. The highest possible mean score is 6. The figure illustrates a mean score for most practices being never to once a month or less frequently on average. The instructional leadership focus group wondered if perhaps the practices with the GT students and the regular education students were similar but, perhaps the pacing for the gifted was higher. The data in Figure 5 reveal this is not the case.

Figure 5

Mean Frequency of Curriculum Compaction With Gifted and Regular Education Students



The summary of findings regarding acceleration or curriculum compaction with the district of study's GT students indicates that teachers seldom or never practice eliminating content or providing advanced content. The most common compaction practice is adjusting the pace for those who can master content quickly, but this was still only done a few times a month by most teachers with their gifted students. Reis and Westberg (1994) determined that those who had the proper training could eliminate 42% to 54% of the curriculum and replace it with content that was more ability appropriate.

The underachievement of gifted students often occurs when they are not challenged. The gifted student's continued exposure to curriculum they have already mastered is often attributed to underachievement (James, 2018). If students are being made to relearn content that they have mastered and curricular adjustments are not made, their level of engagement in the content area will decrease.

Curriculum compaction is a best practice for the gifted student. Based on the results aligned with curriculum compaction in the district of study, this is a practice that should be expanded in frequency and will yield positive results according to the research. The implication of curriculum compaction as a frequent practice, with students who the research indicates can benefit from it, is that the gifted student would have more time for enriched learning perhaps of their own choice, which would add significant relevance.

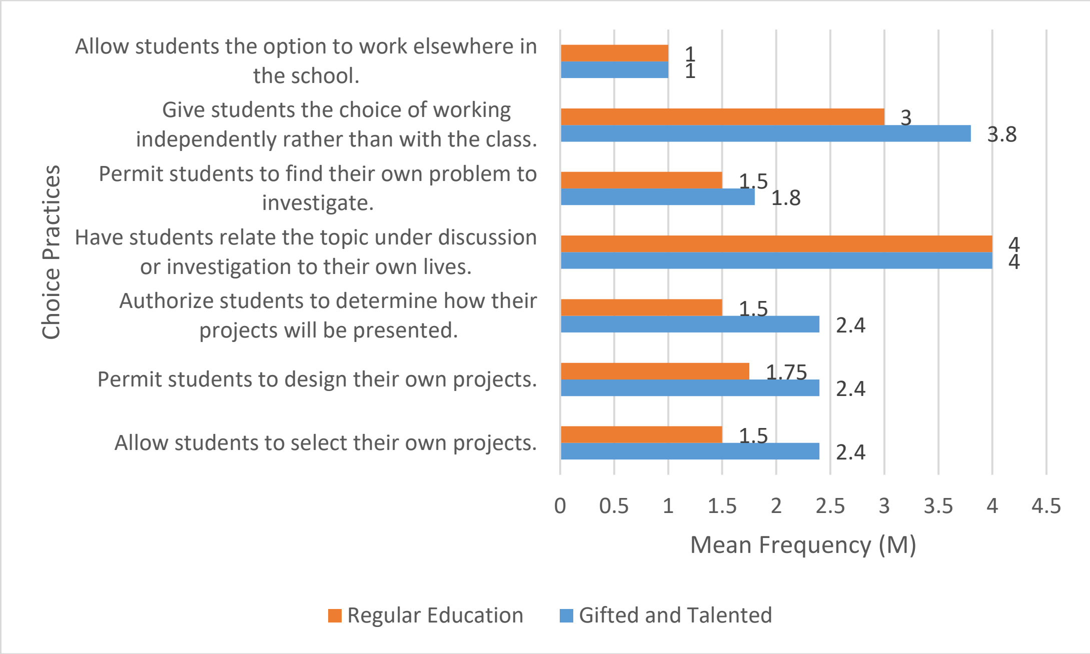
Student Choice. Renzulli (2012) stated that learning occurs because the student had input into the topic. Montessori called for liberal student choice in learning (North American Montessori Center, 2014). Based primarily on the exhaustive literature by Renzulli in support of his model, student choice is one practice I hoped to better understand within the confines of current practices in the district of study's middle school GT science classrooms.

To assess practices regarding student choice, specific practices were embedded in the 2022 Middle School Survey of Classroom Practices. Frequency of practice items were analyzed using descriptive statistics. In order to gain a deeper understanding surrounding specific practices, feedback was gathered from survey respondents through the use of focus groups. Focus group responses were described through a narrative that included quotes for illustration of themes. Both focus group responses and descriptive statistics for survey items surrounding choice were reported in Chapter 4.

Figure 6 shows the mean frequency regarding all seven practices related to choice in Items 40 and 41 in the survey of practice. In general, the mean frequency of practice is higher for choice than it was for compaction. The maximum mean value is 6 (*M* = 6) and the minimum mean value is 1 (*M* = 1). With the gifted, the highest frequency practices are having students relate the topic to their own lives (*M* = 4) and allowing students to work independently (*M* = 3.8). The frequency with regular education students was lower in value for allowing students to work independently (*M* = 3) but still quite high in frequency compared to other practices. The mean frequency of practices shows that most occurred once a month or less frequently with an average of 2.54. Student choice was the most used of the themed practices found in Items 40 and 41.

Figure 6

Mean Frequency of Student Choice With Gifted Students and Regular Education Students



Student choice is another practice that is, at most, happening once a month or less frequently in the district of study. The findings regarding student choice revealed the highest frequency practice was having students relate the topic to their own lives (M = 4), which indicates a few times a week. The practice of having students relate the topic to their own lives should be a relatively easy one to engage in and provides much-needed relevance to the content area for the gifted learner. If a teacher requires a student to think through a connection to their own lives and share them, it builds real world examples to provide greater reinforcement of a concept. Faulty examples given by students would also allow a teacher to address potential misconceptions in the content.

A step further would allow students to investigate problems of greater meaning in their own lives. The teacher focus group discussed how powerful student choice could be for helping students really engage. They discussed the desire of seeing more activities with greater choice. Choice topics should be high interest and students' desires to have choice and the positive outcomes that come from it. Overall, the student choice practice is only occurring between once a month or less frequently or a few times a month. The three practices of choosing, designing, and presenting a project are happening once a month or less frequently on average. Student choice provides the opportunity to engage the gifted student in high interest, higher order thinking and problem-solving and should be considered as an area where practice can be increased for the district of study. Student choice is a key component of Renzulli's (1976) Enrichment Triad Model. When students investigate a problem of their choosing, the learning is meaningful and deeply connected to them. Renzulli's inductive approach to learning as part of his Enrichment Triad Model advocates and even requires that learning includes student choice (Renzulli, 2012).

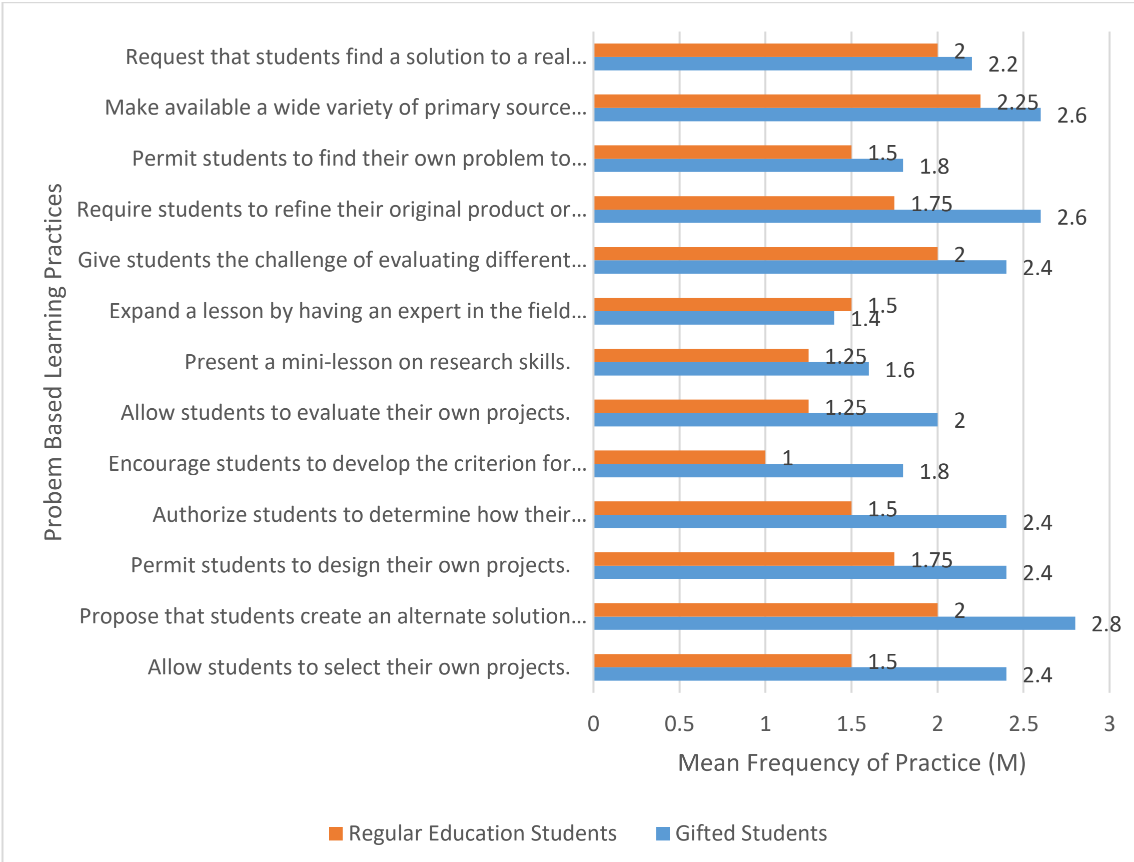
PBL. PBL is sometimes referred to as project-based learning. The two terms are often used interchangeably. The research surrounding PBL as a practice with GT students is strong. In Renzulli's (1976) Enrichment Triad Model, PBL is often described as a Type III activity. In this model, PBL can be done as enrichment or as a strategy to supplement the scope of compacted curriculum.

Using the supporting research, PBL was identified as a best practice for serving GT students. To identify possible PBL practices with the gifted middle school science students in the district of study, survey items embedded in the 2022 Middle School Survey of Classroom Practices were analyzed using descriptive statistics and reported in depth in Chapter 4. Additionally, any PBL themes within the focus groups' transcribed narratives were identified.

Survey Items 40 and 41 asked specifically about practices with the GT student and regular education student respectively. Thirteen questions in the classroom practices survey items relate to some degree to PBL. Descriptive statistics were gathered for each practices question within Items 40 and 41 on the survey. Figure 7 illustrates the mean frequency of practice surrounding the questions related to PBL. The minimum mean for a specific practice has a value of $M = 1$ (never for all respondents), and a maximum mean of 6 ($M = 6$, or more than once a day for all respondents). With 13 questions on survey Items 40 and 41, it is the practice most assessed. Some practices overlap with student choice. The frequency of problem-based practices with the gifted had an average of 2.18, meaning they occurred on average once a month or less frequently. The frequency of PBL practices with the regular education students was 1.63, which means that more PBL practices never occur than do occur with any frequency.

Figure 7

Mean Frequency of PBL With Gifted and Regular Education Students



The summary of findings for PBL as a practice in the district of study indicates that it happens, again, rarely to at best once a month or less frequently on average. Teachers may feel that PBL hinders the covering of standards, but the research shows positive yields for students in regard to 21st century skills and life skills in general (Trimble, 2017).

While teachers' frequency ratings indicate that it happens minimally, four of five teachers reported PBL as a best practice with GT students. If this is a reported best practice, then there is a disconnect between reported practice and desired practice. The disconnect may come due to the current accountability model and pressure teachers feel to prepare for the state assessment, yet students engaged in PBL may outperform their traditional counterparts (Horak & Galluzzo, 2017; Jensen, 2015).

Teacher focus group respondents indicated some minimal professional development and resources for PBL being provided in the past but not ongoing. The teachers had some time to collaborate across the district and build a PBL unit. They received some supply money to support the unit, but the pandemic interfered with the work in its infant stage. The district of study would benefit from increasing the use of PBL with the gifted and installing it as a consistently required practice. Prior research indicates that teacher practices may improve through the use of PBL enrichment practices (Reis & Peters, 2021), and it can even increase achievement on standardized tests. PBL requires teachers to go outside of the traditional preparation to facilitate PBL. In Renzulli's model, the result is often a product presented in different mediums (National Research Center on the Gifted and Talented, 2021). The gifted student is often viewed as an excellent problem solver, which makes problem-solving a good fit for them (National Society for the Gifted and Talented, 2016). Along with curriculum compaction and student choice, PBL is a low-frequency practice in the district of study and would see a positive impact on practice and student achievement through an increase of practice across the district of study.

When answering Research Question 1, "What are the specific GT practices being used by the district's GT science teachers," the findings of the research indicate that best practices found in the research of Renzulli, Reis, Peters, and others are minimally present in the district of study. While the GT students are ability grouped into the GT science classroom, best practices such as curriculum compaction, student choice, and PBL are happening once a month or less often on average. The mean frequency of practice with the gifted is higher than the frequency of practice with the regular education student. Nonetheless, the higher frequency is minimal.

Research Question 2. What Are the Mean Differences in the Student Achievement Level of the GT Students on the SCPASS Science Test Before and After the Implementation of the District's GT Science Program?

A secondary purpose of this research was to examine the student achievement levels in relationship to the newly implemented middle level GT science model. As previously stated, sixth-grade science is the only grade level in the middle school that takes the end-of-the-year state test to measure achievement. The impact of achievement measures on practice is not always positive. As discovered in the review of literature, Schaefer et al.'s (2016) meta-analysis of 50 years of middle school practices revealed that 2010 to 2015 was a time that was harmful to the middle school movement with restrictions as schools attempted to standardize curriculum and the imposition of standardized tests (Schaefer et al., 2016). Nonetheless, in the age of accountability, standardized testing is still the primary measure of a school and the success of its programs.

The summary of findings for Research Question 2 is that there is no statistically significant growth for the sixth-grade GT student in the district of study following the implementation of GT science in the 2017-2018 school year. The findings of the *t* test, as illustrated in Table 29, show that the sixth-grade GT science data for the district of study reflected no significant growth in achievement following the implementation of the GT science model with an independent *t* test value of 0.93. School A and School E were the only schools to show statistically significant growth, with values of 0.02 and 0.03 respectively. Schools B, C, and D did not show statistically significant growth, with values of 0.35, 0.94, and 0.47 on the independent *t* test respectively.

When answering Research Question 2, “What are the mean differences in the student achievement level of the GT students on the SCPASS Science Test before and after the implementation of the district’s GT science program,” the findings of the achievement data show no statistically significant growth in the mean difference in the student achievement level before and after the implementation. The lack of statistically significant achievement growth following the implementation of the GT model seems to relate to the low frequency of gifted practices within the program. The gifted practices of curriculum compaction, student choice, and PBL as aligned with Renzulli’s (1976) Enrichment Triad Model are happening once a month or less frequently on average. The frequency of these practices is only slightly lower with the regular education students. This leads me to conclude that instruction in the GT classroom does not look significantly different than what is seen in the regular education classroom as reported by observers. In fact, while the scale score of the post-implementation data for 2018 and 2019 classify 93.72% of students (Table 22) as having scored meets or exceeds on SCPASS Science, this is almost 1.5 percentage points lower than pre-implementation data where 95.21% of the gifted students scored at the meets or exceeds expectations level. It is noteworthy that the sample sizes were not equal, but the data reflect overall percentages. It is also important to note that the average scale score for both pre- and post-implementation groups was approximately 1673, which falls in the exceeds expectations category.

The slightly lower percentage of students achieving the meets or exceeds expectations level following post-implementation may reflect greater underachievement. If the students have an expectation of what a GT science classroom looks like and they are still subjected to the learning of information they already know, have limited choice, and there is minimal enrichment, their engagement may be decreased. The minimal frequency of best practices in the newly implemented GT science model would be mirrored in the scores that would reflect practices students were already accustomed to prior to the implementation in the regular science classroom. Boredom can lead to lower achievement and the development of poor work habits (National Center for Research on Gifted Education, 2019).

Research Question 3. How Do People Perceive Practice Affects Achievement When the Data Are Shared Regarding Practice Trends and Achievement, and What Is Their Level of Satisfaction With the Findings?

A final research question was asked to assess the practitioners' within the middle school GT science programs general satisfaction with the model used to serve exceptional children. The results from Research Questions 1 and 2 were used to form focus groups designed to share and gather feedback regarding the results of Research Questions 1 and 2. Key themes are reported in a narrative of the focus groups and were presented in Chapter 4.

The summary of the findings from the focus groups reveals general dissatisfaction with current practice. The teachers and instructional leadership respondents would like to see a move toward GT practice not hindered by the pressure of the state test. Daggett and Harries (2021) looked at the needs within a rapidly changing society and noted that students need skills that will make them competitive. The old model simply does not work, according to Daggett and Harries. Nonetheless, the pressure of the state test and to cover the standards in full may be reflected in the lack of frequent practice reported in this study.

Despite data that reflect minimal frequency, desired practices mentioned in the focus groups included pacing; student choice; PBL, i.e., genius hours; critical thinking; and college and career ready skills such as collaboration. The quantitative data for frequency from the survey of classroom practices does not mirror what the focus groups would like to see. The focus groups reported dissatisfaction with their own practice. The focus groups indicated caring for students and serving their needs. Multiple respondents recommended an evaluation of the model by the district and the need for greater professional development, resources, and proper scheduling.

The general dissatisfaction from the focus groups in regard to practice is encouraging. It reflects an understanding of what gifted students need and a desire to provide it. The disconnect in practice to belief is present. This leads me to believe that environmental pressures such as the state test and a lack of expectation to implement specific practice with the gifted are present in the district of study.

The summary of the findings also revealed a general dissatisfaction with the results of the state assessment. The achievement data presented in Chapter 4 results were shared with the focus groups. The focus groups were not satisfied with the results overall. One respondent shared satisfaction, pointing out that the South Carolina standardized testing is rigorous and that all of the mean scores for both pre- and post-implementation fall in the exceeds expectations range. Other respondents were dissatisfied that the percentage of students who were meet or exceeds trended downward following implementation. As previously discussed, the lack of frequency with GT-centered practices may be a large contributing factor to the downward trend in the achievement data following implementation. Students who are under-challenged or not engaged often result in underachievement. Underachievement is the difference between a student's performance and their ability (NAGC, 2008). Practices such as curriculum compaction would address a gifted student's ability and also has been shown as a practice, among others, that improves achievement (Reis & Peters, 2021).

The groups attributed multiple factors to student success in achievement beyond the student's giftedness and specific practice. The factors included test fatigue, the specific students taking the test, and other environmental factors. Hammond (2021) interviewed both highly motivated and unmotivated students to investigate the factors that influenced their motivation. The students' past school experiences were the greatest influencer on their current level of academic confidence. Gifted students who are continuously under-challenged from elementary school forward will develop a lack of confidence in the value of their learning, and this may lead to underachievement academically.

The general level of satisfaction for both achievement and practice with the focus groups indicates an understanding of what achievement and practice should look like for the gifted student served in the middle level gifted science classroom. General dissatisfaction was expressed for both the lack of statistically significant growth in achievement and the minimal frequency of best practices used in the GT science classroom. The encouraging implication of the findings is that there is a desire for greater practice and greater achievement. Research Questions 1 and 2 data are also positive in that some practices are already present and could be increased with the implementation of a consistent practices model. The achievement data are also relatively high for gifted students. While there are students below the exceeds expectations standard often held for the gifted student, the mean average of the scale scores still falls in this range. Growth for a student who scores as exceeds expectation would be to maintain that level. The program implementation also marked an improvement in that the content material allows for the gifted teacher to address the specific learning needs of the verbal, nonverbal, and quantitatively gifted student through an inquiry-based model. Recommendations for action and further research may lead to a positive change in areas where the district of study's practitioners have expressed dissatisfaction.

Recommendations for Further Action

The answer to Research Question 1 reveals that best practices such as curriculum compaction, PBL, and student choice are present but frequency of the practices is minimal. There is little difference in practice between the regular education students and the gifted students.

The answer to Research Question 2 reveals some statistically significant growth in achievement for two schools, but for three schools and the district as a whole, there is no statistically significant growth in the mean scores of the gifted sixth-grade science students following the implementation of the GT science program. Research shows that students involved in practices such as curriculum compaction and PBL often outperform students who do not participate in these practices.

The answer to Research Question 3 revealed a general dissatisfaction with the GT science program for middle schoolers and its resulting achievement on SCPASS Science.

Participants in the focus groups believed that practices should reflect those that benefit our gifted students, such as faster pacing, PBL of real world problems, and student choice. These practices should be used across the district of study.

Based on the findings of the research questions, the following recommendations for further action are suggested:

1. Per the recommendation of the instructional leadership focus group, a committee should be formed to conduct a full program evaluation of the middle school GT science model. The committee may consider vertical alignment with the elementary schools by evaluating how students are being served before they arrive at the middle school. For alignment with the high school, it may be worth considering a high school credit honors science such as honors physical science. The committee should be representatives from instructional services at the district level, middle level instructional leaders, middle level GT teachers, parents, and community representatives. The program may be evaluated using NAGC’s (2019b) Pre-K to Grade 12 Programming Standards, and/or the South Carolina Department of Education’s (2018) Gifted and Talented Best Practices Guidelines: Program Evaluation.
2. Evaluate middle school staffing practices to ensure that gifted students can be truly ability grouped and served in settings of less than 25 students. Staffing should allow for true service of a GT cohort even when the cohort cannot be filled. Middle school staffing was discussed by the focus group, and recommendations were made to evaluate middle level staffing to ensure

developmentally appropriate practices or those that embrace the middle school concept.

3. Provide professional development for GT teachers in best practices surrounding curriculum compaction, student choice, and PBL such as the Enrichment Triad Model. Curriculum compaction would naturally allow for PBL. Standards that do not have to be covered or can be covered in an accelerated fashion with great success can provide the necessary time for meaningful PBL. Professional development should be meaningful, robust, and ongoing. In a study of 900 teachers of the gifted, Farkas and Duffet (2008) reported that 58% of teachers had received no professional development for teaching exceptional children.
4. Create PBL opportunities where greater student choice can be given and students are forced to think and problem solve at a high level. Student-driven projects or project-based learning support the Next Generation Science Standards, the profile of the South Carolina graduate, and 21st century learning skills. Use the genius hour or Renzulli's (1976) Enrichment Triad Model as a framework for PBL, which provides for in-depth student choice.
5. Hire a full-time master gifted teacher to provide ongoing support, professional development, and evaluation of the gifted program at the secondary level and one at the elementary level to provide district-wide consistency and alignment of the GT program.

Recommendations for Future Research

While the results of the research did not indicate that the current GT science program has seen full implementation, the opportunity for implementation and further study is abundant. The following are some further investigations that could provide a greater understanding of the current model and beyond.

1. What is the effect of curriculum compaction on the middle level gifted student in science? The results of the research of Reis and Peters (2021), Reis and Westberg (1994), and James (2018) indicated incredible success for students who are engaged in the practice of curriculum compaction and the teachers who receive the proper professional development to compact the curriculum for the gifted student. Curriculum compaction or acceleration would allow for greater time to engage students in PBL as enrichment to grade-level standards. In the district of study, if curriculum compaction is implemented as a best practice, what are its effects on the achievement of the middle level GT students? This may be done by creating both a group of gifted students who are allowed curriculum compaction and a control group of gifted students who are not and studying the instructional outcomes. One group would receive a compacted curriculum followed by enrichment. The control group would receive regular on-grade-level instruction at the normal pacing for the unit. The results either on the state achievement test or a created summative measure would provide a picture of the impact of the practice. The larger the sample sizes available, the more valid the results would be.
2. What is the effect on achievement and the gifted student's self-efficacy when required to engage in project-based learning of their own choice? Following the implementation of consistent PBL using a vetted model such as the

Enrichment Triad Model or genius hour, it would be important to evaluate its effects on the gifted student within the GT model. Reuer (2017) reported that "although a very limited body of research currently exists on Genius Hour, anecdotal evidence, coupled with practitioner-level findings suggests that it is an instructional technique that may promote identity development, innovation and self-efficacy" (pp. 2-3). There is supporting research that reports positive student achievement as a result of PBL (Horak & Galluzzo, 2017; Jensen, 2015). Similar to the study done by Horak and Galluzo (2017), the Student Perceptions of Classroom Quality could be used with gifted students. According to the Gifted Education Research and Resource Institute (2022), the Student Perceptions of Classroom Quality can be used to measure student perceptions of meaningfulness, challenge, choice, self-efficacy, and appeal. The instrument is often used to measure classroom quality and with school improvement measures (Gifted Education Research and Resource Institute, 2022).

3. Provide a pre and posttest assessment around the implementation of a specific gifted practice such as curriculum compaction or PBL to assess its effects. A member of the leadership focus group mentioned that it might be beneficial to look at the effect of practices within the GT science model when assessing one group of students. Providing a pretest before the implementation of a specific practice and a posttest at the end with a specific group of students would provide greater control of the variables when attempting to analyze their effects.

4. Does a more comprehensive practices model of GT science impact the results of the end-of-the-year assessment? It is my hope that one of the implications of this study is that the program, in concept, is a good one. With the system-wide implementation of specific practices supported by ongoing professional development and frequent evaluation, it would be beneficial to once again compare the data from SCPASS Science before adjustments to the program to achievement and the achievement data following adjustments to the program with sixth-grade GT science students. It would be beneficial to see what the results following the implementation of a comprehensive practices model showed regarding frequency of practice and achievement.
5. How many non-gifted participants are scheduled in gifted science, and what are the effects on their achievement? The research of Card and Giuliano (2014) indicated that non-gifted participants enrolled in a GT program showed positive effects for those students. In fact, they showed achievement gains where the gifted students in their study showed no growth in achievement. Any non-gifted students participating in the gifted sections are not labeled as gifted. Further study to identify these non-gifted participants and analyze their achievement on SCPASS Science would be helpful in determining if the conclusions of Card and Giuliano hold true in the district of study.

Conclusions

The groundwork for a strong GT model is present in the middle school science classrooms in the district of study. While best practices such as curriculum compaction, student choice, and PBL reflect minimal frequency for the district as a whole, the practices are being done by some in varying amounts. While there was no significant growth in achievement following the implementation of the GT science model, students are achieving on average at the exceeds expectations level on SCPASS Science, and two of the five schools did show statistically significant growth. The results of the data collection indicate that there is a foundation of implementation present. The disposition of teachers and instructional leaders during focus groups was good. They see the needs and seem willing to make necessary changes to improve the program with some systems direction.

The research indicates that an Enrichment Triad Model would be an optimal approach. The gifted student would benefit from a combination of curriculum compaction coupled with choice around PBL. The compaction and PBL complement each other. The program needs to be revisited, and teachers need the recommended changes in order for the gifted students to maximize their potential.

Renzulli (1999) said, “The first purpose is to provide young people with opportunities for maximum cognitive growth and self-fulfillment through the development and expression of one or a combination of performance areas where superior potential may be present” (para. 12). It is fitting to close this research with words of wisdom from the leading theorist in gifted education. Renzulli (1999) pointed out that superior potential is present in our gifted youth. It is our obligation to continually analyze and adjust our practices if necessary. Gifted students deserve to receive the services needed to challenge them and foster their growth across the domains.

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Appendix A

Permission to Modify and Use the Survey

From: James King
Sent: Tuesday, October 12, 2021 8:31 AM
To: George Robinson **Subject:** Re: My survey

Thank you again.

Warm Regards,

James B. King
(Redacted)

From: George Robinson
Sent: Monday, October 11, 2021 3:02 PM
To: James King
Subject: Re: My survey

Yes. Whatever you need for your study.

George Robinson Ph.D.

On Oct 11, 2021, at 11:41 AM, James King wrote:

Dr. Robinson,

Thank you very much! If needed, may I also excerpt it? I am doing a local study and some demographics aren't needed for my research.
You reaching out to me is certainly appreciated.

James B. King
(Redacted)

From: George Robinson
Sent: Monday, October 11, 2021 11:31 AM
To: James King
Subject: My survey

Mr. King

You have my permission to use my survey. Good luck.

George Robinson Ph.D.

Appendix B

2022 Middle School Survey of Classroom Practices (Qualtrics)

Start of Block: Teacher Information

Gender

☐ Male (1)

☐ Female (2)

Q2 Ethnicity

○ Hispanic-American (1)

○ African-American (2)

○ Native-American (3)

○ Caucasian-American (4)

○ Asian-American/Pacific Islander (5)

○ Other (6)

Q3 Years of teaching experience

____

Q4 Highest Degree Earned

○ BA/BS (1)

○ MA/MS (2)

○ Ph.D/Ed.D (3)

Q5 What training prepared you to serve the gifted student?

- District Inservice (1)
- Undergraduate School Course(s) (2)
- Graduate School Course(s) (3)
- Educational Degree in Area (4)
- Coursework completed to add gifted and talented endorsement (5)
- None (6)

End of Block: Teacher Information

Start of Block: Middle School Issues

Q6 How is your school building organized?

- Middle School (1)
- Junior High School (2)
- Other (3)

Q7 Which grades are in your middle or junior high school?

____

Q8 Is your school a Magnet School?

- No (1)
- Yes (2)

Q9 How often does you interdisciplinary team meet?

- Every day (1)
- 2-4 Times a week (2)
- Once a week (3)
- Once a month (4)
- Once a quarter (5)
- Once a semester (6)
- No Team (7)

Q10 Does a gifted and talented specialist attend these meetings?

- Yes (1)
- No (2)
- Don't Know (3)
- Does not apply (4)

Q11 Do 6th grade teachers in your school have common planning time?

- Yes (1)
- No (2)
- Don't Know (3)

Q12 Does your school use flexible scheduling (having a structure that allows a team of teachers to adjust the schedule on a periodic basis)?

- ◯ Yes (1)
- ◯ No (2)
- ◯ Don't Know (3)

Q13 Does your school use flexible grouping (having a structure that allows a team of teachers to rearrange student grouping on a periodic basis)?

- ◯ Yes (1)
- ◯ No (2)
- ◯ Don't Know (3)

Q14 Does your school have an advisor-advisee program?

- ◯ Yes (1)
- ◯ No (2)
- ◯ Don't Know (3)

Q15 How are students grouped for sixth grade English classes?

- ◯ Homogeneously- students of the same or similar ability -or- (1)
- ◯ Heterogeneously- students of mixed ability -or- (2)
- ◯ Combination- One or more homogeneous classes and the rest heterogeneous? (3)

Q16 How are students grouped for sixth grade Social Studies classes?

- ○ Homogeneously- students of the same or similar ability -or- (1)
- ○ Heterogeneously- students of mixed ability -or- (2)
- ○ Combination- One or more homogeneous classes and the rest heterogeneous? (3)

Q17 How are students grouped for sixth grade Science classes?

- ○ Homogeneously- students of the same or similar ability -or- (1)
- ○ Heterogeneously- students of mixed ability -or- (2)
- ○ Combination- One or more homogeneous classes and the rest heterogeneous? (3)

Q18 How are students grouped for sixth grade Math classes?

- ○ Homogeneously- students of the same or similar ability -or- (1)
- ○ Heterogeneously- students of mixed ability -or- (2)
- ○ Combination- One or more homogeneous classes and the rest heterogeneous? (3)

Q19 Do you use pretests to determine if students have already mastered the content of a unit?

- ○ Yes (1)
- ○ No (2)
- ○ Don't Know (3)

Q20 Do you allow students to set individual learning goals in your classes?

- Frequently (1)
- Sometimes (2)
- Seldom (3)
- Never (4)

Q21 Do you use portfolio assessments in your classes?

- Frequently (1)
- Sometimes (2)
- Seldom (3)
- Never (4)

End of Block: Middle School Issues

Start of Block: School and District Information

Q22 In which setting is your school located

- Rural (1)
- Urban (2)
- Suburban (3)

Q23 What is the total sixth grade enrollment in your school building?

____

Q24 Does your district have a policy regarding the acceleration of high achieving students through the regular curriculum?

○ Yes (1)

○ No (2)

○ Don't Know (3)

Q25 If yes to the previous question, which of the following applies?

○ Classroom teachers are encouraged to accelerate students into the next content level (e.g. 6th graders study 7th grade content) or the next academic grade. (1)

○ Classroom teachers are encouraged to provide higher level or enriched content material in their classrooms, but are not permitted to accelerate students into the next level or academic grade. (2)

○ Classroom teachers are not allowed to provide advanced level curriculum for higher achieving students and are not permitted to accelerate students into the next level or academic grade. (3)

○ Other (4) ____

Q26 Does your school have a gifted and talented program?

○ Yes (1)

○ No (2)

End of Block: School and District Information

Start of Block: Gifted and Talented Program

Q27 Has a formal definition of giftedness been adopted by your district?

- Yes (1)
- No (2)
- Don't Know (3)

Q28 Which of the following measures and/or checklists does your district use to formally identify gifted students? (Check all that apply.)

- IQ Tests (1)
- Teacher Nomination (2)
- Creativity Tests (3)
- Achievement Tests (4)
- Parent Nomination (5)
- Student Interviews (6)
- Grades (7)
- Student Self-Nomination (8)
- Peer Nomination (9)
- Teacher Rating Scales (10)
- Student Products/Portfolios (11)
- Don't Know (12)

Q29 For which middle school grades does your school have a formal gifted program? (Check all that apply.)

- ☐ 5 (1)
- ☐ 6 (2)
- ☐ 7 (3)
- ☐ 8 (4)
- ☐ 9 (5)
- ☐ Other (6) ____________________

Q30 Does your school employ a district coordinator for the gifted?

- ○ Yes (1)
- ○ No (2)
- ○ Don't Know (3)

Q31 Is there a full-time teacher of the gifted in your school building?

- ○ Yes (1)
- ○ No (2)
- ○ Don't Know (3)

Q32 Is there a part-time teacher of the gifted in your school building?

- ◯ Yes (1)
- ◯ No (2)
- ◯ Don't Know (3)

Q33 How often do you interact professionally with the teacher of the gifted?

- ◯ Every day (1)
- ◯ 2-4 times a week (2)
- ◯ Once a week (3)
- ◯ Once every two weeks (4)
- ◯ Once a month (5)
- ◯ Once a quarter (6)
- ◯ Once a semester (7)
- ◯ Once a year (8)
- ◯ Never (9)
- ◯ I am the teacher of the gifted (10)

Q34 Are students in your school building regularly transported to a different school or site to participate in the gifted program?

- ◯ Yes (1)
- ◯ No (2)
- ◯ Don't Know (3)

Q35 Do students in your school building go to a resource room/pull-out program for instruction provided by a teacher of the gifted?

○ Yes (1)

○ No (2)

○ Don't Know (3)

Q36 How many students are formally identified as gifted students in the sixth grade in your school building?

____

Q37 Are there students in the sixth grade you believe are gifted but have not been formally identified as such by your district?

○ Yes (1)

○ No (2)

○ Don't Know (3)

Q38 If Yes, approximately how many?

____

End of Block: Gifted and Talented Program

Start of Block: Classroom Practices with the Gifted vs. the Regular Education Student

Q39 This section is designed to provide information about the instructional strategies and approaches you use in your classroom. It is very important that the answers you provide reflect actual practices. Please be assured that your individual answers will be kept

completely confidential. Addendum- You may consider your normal instructional practices from year to year outside of Covid restrictions.
Directions: Please use the following response scale based on the academic year to indicate what actually occurs in your classroom. Check the most appropriate response for what you do with the gifted and talented student.

Response Scale
0- Never
1-Once a month, or less frequently
2- A few times a month
3- A few times a week
4- Daily
5- More than once a day

Q39 What is the frequency of the following practices with your gifted and talented students?

Give student the task of interpreting the facts. (1)	▼ 0- Never (1) ... 5- More than once a day (6)
Allow students to select their own projects. (2)	▼ 0- Never (1) ... 5- More than once a day (6)
Eliminate content that students have mastered. (3)	▼ 0- Never (1) ... 5- More than once a day (6)
Propose that students create an alternate solution to a problem. (4)	▼ 0- Never (1) ... 5- More than once a day (6)
Permit students to design their own projects. (5)	▼ 0- Never (1) ... 5- More than once a day (6)
Adjust the pace for students who can master content quickly. (6)	▼ 0- Never (1) ... 5- More than once a day (6)
Authorize students to determine how their projects will be presented. (7)	▼ 0- Never (1) ... 5- More than once a day (6)
Have students relate the topic under discussion or investigation to their own lives. (8)	▼ 0- Never (1) ... 5- More than once a day (6)
Encourage students to develop the criterion for evaluating their projects. (9)	▼ 0- Never (1) ... 5- More than once a day (6)
Ask students to synthesize information. (10)	▼ 0- Never (1) ... 5- More than once a day (6)
Allow students to evaluate their own projects. (11)	▼ 0- Never (1) ... 5- More than once a day (6)
Present a mini-lesson on research skills. (12)	▼ 0- Never (1) ... 5- More than once a day (6)
Expand a lesson by having an expert in the field discuss the topic with students. (13)	▼ 0- Never (1) ... 5- More than once a day (6)
Give students the challenge of evaluating different solutions to a problem. (14)	▼ 0- Never (1) ... 5- More than once a day (6)
Make available higher grade level textbooks. (15)	▼ 0- Never (1) ... 5- More than once a day (6)
Require students to refine their original product or concept. (16)	▼ 0- Never (1) ... 5- More than once a day (6)
Permit students to find their own problem to investigate. (17)	▼ 0- Never (1) ... 5- More than once a day (6)

Invite students to support one side of a controversy. (18)	▼ 0- Never (1) ... 5- More than once a day (6)
Give students the choice of working independently rather than with the class. (19)	▼ 0- Never (1) ... 5- More than once a day (6)
Make available a wide variety of primary source materials to complement a unit. (20)	▼ 0- Never (1) ... 5- More than once a day (6)
Request that students find a solution to a real world problem. (21)	▼ 0- Never (1) ... 5- More than once a day (6)
Allow students the option to work elsewhere in the school. (22)	▼ 0- Never (1) ... 5- More than once a day (6)
Include content areas from 7th and/or 8th grade curriculum. (23)	▼ 0- Never (1) ... 5- More than once a day (6)
Encourage students to present to an audience outside the classroom. (24)	▼ 0- Never (1) ... 5- More than once a day (6)
Assign students to the library for research. (25)	▼ 0- Never (1) ... 5- More than once a day (6)

Q40 What is the frequency of the following practices with your average or regular education students?

Give student the task of interpreting the facts. (1)	▼ 0- Never (1) ... 5- More than once a day (6)
Allow students to select their own projects. (2)	▼ 0- Never (1) ... 5- More than once a day (6)
Eliminate content that students have mastered. (3)	▼ 0- Never (1) ... 5- More than once a day (6)
Propose that students create an alternate solution to a problem. (4)	▼ 0- Never (1) ... 5- More than once a day (6)
Permit students to design their own projects. (5)	▼ 0- Never (1) ... 5- More than once a day (6)
Adjust the pace for students who can master content quickly. (6)	▼ 0- Never (1) ... 5- More than once a day (6)
Authorize students to determine how their projects will be presented. (7)	▼ 0- Never (1) ... 5- More than once a day (6)
Have students relate the topic under discussion or investigation to their own lives. (8)	▼ 0- Never (1) ... 5- More than once a day (6)
Encourage students to develop the criterion for evaluating their projects. (9)	▼ 0- Never (1) ... 5- More than once a day (6)
Ask students to synthesize information. (10)	▼ 0- Never (1) ... 5- More than once a day (6)
Allow students to evaluate their own projects. (11)	▼ 0- Never (1) ... 5- More than once a day (6)
Present a mini-lesson on research skills. (12)	▼ 0- Never (1) ... 5- More than once a day (6)
Expand a lesson by having an expert in the field discuss the topic with students. (13)	▼ 0- Never (1) ... 5- More than once a day (6)
Give students the challenge of evaluating different solutions to a problem. (14)	▼ 0- Never (1) ... 5- More than once a day (6)
Make available higher grade level textbooks. (15)	▼ 0- Never (1) ... 5- More than once a day (6)
Require students to refine their original product or concept. (16)	▼ 0- Never (1) ... 5- More than once a day (6)
Permit students to find their own problem to investigate. (17)	▼ 0- Never (1) ... 5- More than once a day (6)

Invite students to support one side of a controversy. (18)	▼ 0- Never (1) ... 5- More than once a day (6)
Give students the choice of working independently rather than with the class. (19)	▼ 0- Never (1) ... 5- More than once a day (6)
Make available a wide variety of primary source materials to complement a unit. (20)	▼ 0- Never (1) ... 5- More than once a day (6)
Request that students find a solution to a real world problem. (21)	▼ 0- Never (1) ... 5- More than once a day (6)
Allow students the option to work elsewhere in the school. (22)	▼ 0- Never (1) ... 5- More than once a day (6)
Include content areas from 7th and/or 8th grade curriculum. (23)	▼ 0- Never (1) ... 5- More than once a day (6)
Encourage students to present to an audience outside the classroom. (24)	▼ 0- Never (1) ... 5- More than once a day (6)
Assign students to the library for research. (25)	▼ 0- Never (1) ... 5- More than once a day (6)

End of Block: Classroom Practices with the Gifted vs. the Regular Education Student

Start of Block: Further Information

Q42 What do you believe are the best practices you use regularly with your gifted and talented students?

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Q43 Do you believe the current model for serving gifted and talented through science is successful? Why or why not?