EFFECTS OF ONE SPECIAL SCHOOL ON GIFTED AND HIGH ABILITY STUDENTS’ PROJECT QUALITY, ACADEMIC ENGAGEMENT, AND INVESTMENT IN ACADEMIC LEARNING

by

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A DISSERTATION

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ABSTRACT

The purpose of this study was to investigate the effectiveness of Renaissance Academy (RA), one recently developed full-time special program for students (Grades 6-8) interested in the arts, sciences, and technology, as compared to a traditional gifted/advanced program. Subjects included 226 students and 10 teachers in both programs. A mixed methods design was employed to answer three research questions regarding student outcomes in project quality, academic engagement, and investment in academic learning. Student products were assessed by external raters using the Student Product Assessment Form (Reis, 1981). To evaluate academic engagement, class observations were conducted using the William and Mary Classroom Observation Scales-Revised (VanTassel-Baska, Bracken, & Drummond, 2003). Students completed the My Class Activities survey (Gentry & Gable, 2001) to report perceptions toward academic interest, challenge, choice, and enjoyment. Qualitative measures included observations and interviews with students and teachers.

Findings indicated that experimental group students had significantly higher project quality scores than comparison group students as measured by independent t tests, and influential factors included choice, depth and complexity, and audience authenticity. Descriptive statistics revealed that experimental group students displayed engagement behaviors more frequently and at a higher level than comparison group students, with notable differences in general behaviors, problem solving, and research strategies. Multivariate analyses revealed that overall, experimental group students scored significantly higher than comparison group students on the subscales of interest and enjoyment, and grade level comparisons yielded differing results.
Qualitative analyses supported and provided insight into quantitative results. Findings from this study supported previous research on full-time programming for advanced learners and delineated specific factors that may influence program effectiveness in engaging and challenging gifted adolescents.
DEDICATION

This dissertation is dedicated to Jeff and Kate.
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“If I have seen a little further, it is by standing on the shoulders of giants” (Newton, 1976). The completion of this journey never would have been possible without the unending support and encouragement from my dear family, friends, teachers, and students who have blessed my life with their presence.

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was in school, but thank you for always being a reminder of the things that are most important in
life.

“Now all glory to God, who is able, through his mighty power at work within us, to
accomplish infinitely more than we might ask or think” (Ephesians 3:20).
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CHAPTER 1

INTRODUCTION

The current generation of students will compete for jobs in a globally connected society in which critical and creative thinking, communication, collaboration, and proficiency in using technology to learn and create are essential for economic and personal success. In response, the goal of modern education should be to equip students with the knowledge and life skills required to be critical and creative thinkers and producers in this constantly changing digital age. However, United States schools are largely falling short of this aim, especially in the areas of science and technology (National Center for Education Statistics, 2007, 2008). Subsequent reforms to our country’s current educational system are needed, in order to increase the rigor of instruction for our most talented students and facilitate their attainment of creative productivity (National Association for Gifted Children, 2010; National Science Board, 2010). In these trying economic times, innovative programming involving efficient usage of resources is a necessity in providing quality services for all students, and especially those learners at the highest levels of creative and academic potential who hold great promise to become the leaders, inventors, and innovators of tomorrow.

In 2008, the National Science Board (NSB), a group of President-appointed top scientists and experts who guides the policies of the National Science Foundation, instructed their Committee on Education and Human Resources to create a subgroup on Science, Technology,
Engineering and Math (STEM) Innovators. The main objective of this task force was to research the status of STEM education and student development in the United States and report upon their findings. After conducting a 2-year review of substantive research related to these issues, including convening an expert panel discussion group, the group compiled a summative report outlining findings and recommendations, *Preparing the Next Generation of STEM Innovators: Identifying and Developing Our Nation’s Human Capital*, released in May 2010. This report provides an overview of results from PISA (2006), an international assessment, and multiple other key studies that confirm United States’ students are falling behind in the international arena, as they continue to be outperformed by students from other countries. Furthermore, there is a significant decline in college students pursuing science and engineering fields, and a subsequent trend in STEM-related corporations recruiting foreign-born workers instead of our own students. In the opening remarks of a summary of this report, the NSB (2010) stated,

> The development of our nation’s human capital through our education system is an essential building block for future innovation. Currently, the abilities of far too many of America’s young men and women go unrecognized and underdeveloped, and, thus, these individuals may fail to reach their full potential. This represents a loss for both the individual and society. There are students with high potential from every demographic and from every part of our country, who with hard work and the proper educational opportunities, will form the next generation of science, technology, engineering, and mathematics (STEM) innovators. The National Science Board believes that the recommendations set forth in this report will help ensure a legacy of continued prosperity and engender a renewed aspiration towards equity and excellence in U.S. STEM education. (p. 1)

In response to the findings presented in this report, Robinson (2010), President of the National Association of Gifted Children (NAGC), stated,

> The NSB report confirms that our nation is neglecting the needs of our most promising and gifted students and that this neglect is hindering our ability to compete effectively in an increasingly competitive global economy. . . . If we fail to identify and cultivate our most promising minds beginning as early as possible, we will squander this talent and cripple our ability to compete and thrive in the years and decades to come. (p. 1)
The recommendations in this report align closely with goals and established research in gifted education regarding identification and programming (Renzulli, 1978; Renzulli & Reis, 1997). The NSB’s (2010) “keystone recommendations” include the following: (1) “Provid[ing] opportunities for excellence,” (2) “Cast[ing] a wide net,” and (3) “Foster[ing] a supportive ecosystem” (pp. 2-3). Within the realm of “providing opportunities for excellence (p. 2),” curricular practices such as differentiated instruction, curriculum acceleration, and enrichment; professional development for teachers; establishment of partnerships with higher education institutions and industries; and increased technology resources and opportunities were all included as recommended actions to be enacted by schools. “Cast[ing] a wide net” (NSB, 2010, p. 3) refers to identification and nurturance of all kinds of talents among students within all demographic categories, including an increased expansion of and variety among the assessment strategies and tools used to identify students of high potential and talent. “Foster[ing] a supportive ecosystem” (NSB, 2010, p. 3) encompasses fostering a mindset of excellence and innovation in regard to students’ development of thinking skills and products through an enriched school environment in which both students and teachers are held to high expectations.

However, in light of the current economic crisis, which has resulted in steadily diminishing education budgets and scaling back or eradication of many gifted programs nationwide, one might ask how these recommendations might pragmatically be addressed. In its Executive Summary, the NSB concluded with the following statement: “The United States is faced with a clear and profound choice between action and complacency” (p. 4). One school district has decided to take action by applying innovative thinking to existent resources in order to provide full-time research-based programming for gifted and high ability learners in middle Grades 6 through 8. The Renaissance Academy (RA), brainchild of teachers in one Southeastern
school district who were posed with the challenge to create their dream school, is a full-time “program designed for students who have a passion for learning, primarily in the arts, sciences and technology” (Hall County Schools, 2011, p. 2).

Based on Leonardo da Vinci’s strengths and passions, paired with a strong foundation of established educational theories and strategies, RA provides opportunities for excellence in the sciences and arts for selected students “who are curious . . . original thinkers . . . and open to discovering their gifts in a creative educational setting” (Hall County Schools, 2011, p. 2). All interested students district-wide are invited to apply as rising sixth graders, and students are selected through a multifaceted blind review process that considers academic ability, creativity, and communication, and collaboration skills, as assessed through a paper application, writing sample, and a combination of performance tasks that require higher order thinking and 21st century skills. Participating students are offered an interdisciplinary, concept-based, technology infused curriculum focused on a differentiated approach to individual talent development (Crowder, 2011). For each unit of study, students create authentic projects incorporating content from across subject areas. The Museum of Inspired Learning, a key component of the program, is a large room within the school building that serves as an acting museum filled with projects created by Renaissance students, who also serve as docents for visiting schools who travel there for free field trips. In addition, the program is cost-effective, operating under a reduced budget, in which about $2,000 less than the district average is spent per student.

RA’s innovative design and ideology not only appeal to high ability students and their parents, but the program also is centered upon a solid basis of research-supported theories and best practices for gifted learners. The program’s criteria for participation, as evidenced by its multifaceted application requirements, closely mirrors Renzulli’s (1978) three-ring conception of
giftedness, which asserts that individuals are not gifted or talented across-the-board, in all areas at all times, but rather display gifted behaviors when their interests, creativity, and task commitment intersects. Thus, RA invites students to apply who may not formally be identified as gifted/talented, but display creative and/or academic strengths or potential in science, the arts, and technology.

Furthermore, their curriculum reflects numerous research-established best practices for teaching and learning across both general and gifted education programming, including differentiated instruction (Tomlinson, 1999), parallel curriculum (Tomlinson et al., 2002), concept-based curriculum (Erickson, 2002), and problem-based service-learning (Billig, 2007; Renzulli & Reis, 1997), among others.

Statement of the Problem

The United States continues to fall further behind other countries in educational performance in the areas of science, math, and technology. Recent federal reforms enacted by the U.S. Department of Education, such as No Child Left Behind (2001), though well-intentioned, have exacerbated the issue by increasing attention placed on standardized test results at the expense of authentic, individualized, respectful learning opportunities for students of all abilities, especially those at the highest level of ability. This focus on high stakes testing has encouraged teachers to focus on students’ acquisition of basic academic knowledge and test taking skills, while failing to address conceptual knowledge or facilitate connections between content and life experiences, resulting in a curriculum that is wide in scope but shallow in depth and breadth (National Center for Educational Statistics, 2007). The result is a generation of students who are superb test-takers but who lack the knowledge and skills to perform in the 21st
century workforce (NAGC, 2010; NSB, 2010). Gifted educators and advocates chastise NCLB for its role in directing teachers’ attention to remediation for struggling learners at the expense of the needs of high ability students (Crowder, 2011; Gentry, 2006; Hertberg-Davis, 2009), as well as a general lowering of standards for all (Moon, 2009). Moreover, within the current economic crisis, many schools feel forced to remove all programs but the basics, while still striving to serve all students effectively—a seemingly impossible task. Together, these problems serve to create a “perfect storm” for gifted education.

The Renaissance Academy (RA) proposes a practical solution to these issues by providing appropriate, cost-effective services specifically geared toward the needs and strengths of high ability and gifted students. RA is only in its third year of operation and has attracted attention on a local, state, and national level, as the program has been featured as an exemplar school on the Georgia Partnership for Excellence in Education’s 2010 Annual Bus Trip Across Georgia and as an Action Lab for teachers and other gifted education professionals attending the 2010 National Association for Gifted Children’s annual convention. Numerous schools from within the state and across the Southeast also have traveled to RA to observe its setup and operations with the goal of creating a similar model at their own sites, and two elementary schools have already replicated the program.

However, to date, little substantive research has been conducted on this program. One dissertation study investigated RA’s teacher and curricular aspects, with a focus on ideas and practices regarding differentiated instruction (Crowder, 2011). No researchers have studied effects upon participating students. In order to substantiate the mission, organization, and practices of RA, as well as identify potential areas for improvement, a significant need exists for further research to be conducted. In reference to subsequent research on RA, Crowder (2011)
cited “students’ academic performance and creative productivity” as “areas that also warrant future evaluation” (p. 8).

Purpose of the Study

In response to the aforementioned problem, the purpose of this study is to investigate one component of RA’s effectiveness, student outcomes, by comparing RA students to students in a more traditional gifted/advanced program setting. Specific aspects under evaluation include students’ project quality, academic engagement, and investment in academic learning. Due to the brief history of RA, currently in its third year since inception, additional research is needed in order to determine its worth as an effective model to be potentially replicated to serve gifted and high ability students in other settings. Furthermore, on a smaller scale, findings from this study could serve to provide RA’s stakeholders with data to determine the extent to which the program is attaining its stated objectives, as well as aid in identifying areas of strength and need.

Research Questions

In order to accomplish the stated purpose, the following research questions served to guide this study:

1. Do middle school students of high ability in a special school setting and traditional gifted/advanced classes exhibit differences in project quality, as measured by the Student Product Assessment Form (SPAF), observations, and interviews?

2. Do middle school students of high ability in a special school setting and traditional gifted/advanced classes exhibit differences in academic engagement, as measured by observations and interviews?
3. Do middle school students of high ability in a special school setting and traditional gifted/advanced classes exhibit differences in investment in academic learning, regarding interest, challenge, choice, and enjoyment, as measured by the My Class Activities survey, observations, and interviews?

An overview of the study, including a description of measures and analyses for each question, is included in Figure 1.

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| 1                 | Project quality | • Student Product Assessment Form (SPAF)  
• Anecdotal notes taken during observations.  
• Interviews with students and teachers | Independent t-tests on means of subscale and full-scale scores to compare two groups. |
| 2                 | Academic engagement | • Two observations using the William and Mary Classroom Observation Scale Revised (COS-R).  
• Anecdotal notes taken during observations.  
• Interviews with students and teachers. | Descriptive statistics on means of subscale and total scores to compare two groups; coding for qualitative data. |
| 3                 | Investment in academic learning, regarding interest, challenge, choice, and enjoyment | • My Class Activities (MCA) survey.  
• Anecdotal notes taken during observations.  
• Interviews with students and teachers. | MANOVA on means of subscale scores to compare two groups; coding for qualitative data. |

*Figure 1. Study overview.*
Significance of the Study

Lagging performance of U.S. students in the STEM disciplines is a major concern of current leaders in government, industry, and education. Previous federally enacted legislation has ultimately failed to meet the needs of many gifted and high ability learners in general education settings. Cost-effective, specialized programming for gifted students holds great promise in serving both students’ and society’s needs, within these difficult economic times. While numerous special schools for advanced students are in existence, little research exists in the form of rigorous program evaluations (Reis & Renzulli, 1991; VanTassel-Baska, Willis, & Meyer, 1989). Callahan (2004) remarked, “Program evaluation has been considered an important, but neglected, component by experts in the field of gifted education for at least the last three decades” (p. xxiii). There is a significant need for substantive evaluations to be conducted on exemplary gifted programs, such as RA, in order to determine the level of effectiveness for participants, for other schools who may wish to create similar programs, and for potential implications to the entire field of gifted education. This study provides educators and leaders with current research regarding preliminary effects of participation in one innovative special school setting on learners of high ability.

Definition of Terms

For the purposes of this study, the following operational definitions have been selected for usage.

The terms gifted, high ability, and advanced are used interchangeably in the context of this study to refer to students who exhibit advanced academic and/or creative potential as commensurate with Renzulli’s (1978) three-ring conception of giftedness, which refers to
demonstration of gifted behaviors (creativity, above average ability, and task commitment) at specific times and under specific circumstances, as opposed to an across-the-board gifted label based upon a cutoff score. Both programs examined in this study target students who demonstrate gifted behaviors in alignment with Renzulli’s (1978) definition, including students formally identified as gifted according to state special education guidelines, as well as unidentified students with advanced ability.

*Special school* is used to describe a school or program offering full-time services centered around one or more academic areas of focus (i.e., science, math, arts, technology) for interested student participants.

*Traditional gifted class* refers to a pull-out approach to serving students identified as gifted within an inclusive general education setting. For example, many middle or high schools offer a seminar-style course for gifted students paired with social studies, science, or English, which students might attend for one period during each school day.

*Project quality* is defined as a measurement of the *Student Product Assessment Form* (SPAF; Reis, 1981), which assesses the following indicators: early statement of purpose; problem focusing; level, diversity, and appropriateness of resources; logic, sequence, and transition; action orientation; audience; and overall assessment (i.e., originality of idea, attention to detail, etc.).

*Academic engagement* refers to students’ engagement during class activities, as measured by demonstration of the following behaviors included on the *William and Mary Classroom Observation Scales-Revised* (COS-R): general classroom behaviors, response to self-selected or self-paced activities, response to problem-solving strategies, response to critical thinking.
strategies, response to creative thinking strategies, and response to research strategies (VanTassel-Baska et al., 2003).

21st century skills refers to “the skills, knowledge, and expertise students must master to succeed in work and life” (Partnership for 21st Century Skills, 2009, p. 1).

Investment in academic learning is defined as students’ perceptions toward their class activities, in regard to interest, challenge, choice, and enjoyment, as measured by the My Class Activities survey (Gentry & Gable, 2001).

Interest is defined as “a directive force that influences performance and motivation within specific content areas” (Schiefele, 1991, as cited in Gentry & Gable, 2001, p. 2), as measured by subscale items on the My Class Activities survey “that focus on students’ perceptions of how their class addresses their interests, whether they find their class interesting, and whether their class stimulates their interests” (Gentry & Gable, 2001, p. 12).

Challenge is defined as the perceived level of difficulty of a learning activity, as measured by subscale items on the My Class Activities survey (Gentry & Gable, 2001).

Choice is defined as the extent to which students have a voice in selecting learning activities, as measured by subscale items on the My Class Activities survey (Gentry & Gable, 2001).

Enjoyment is defined as the extent to which students are engaged in a learning activity, as measured by subscale items on the My Class Activities survey (Gentry, 2001).

Assumptions

For this study, the following assumptions were made:

1. Participants in this study were volunteers.
2. Participants responded to the surveys and interviews in an honest and forthright manner.

3. Teachers involved in this study followed the Georgia Course of Study standards.

4. Administers of the *My Class activities survey* followed the same protocol when administering the assessment to both groups.

5. Researchers followed the same protocol when conducting interviews and observations with both groups.

6. Researchers followed the same protocol when scoring projects from both groups.

**Limitations**

The investigator acknowledges the following limitations associated with this study:

1. Convenience sampling was employed for both the treatment and control groups.

2. The study was limited to one school district, thus limiting generalizability to other settings.

3. Another limitation included the grade and ability levels of student participants under investigation. This study investigated high ability middle school (Grades 6 through 8) students; as such, results may not be generalized to students at other grade levels and with differing ability levels.

4. This study was conducted over the duration of one semester, and this limited time period for data collection may have limited observation of the full depth and breadth of the learning process.
5. Although the same course of study standards are followed in both settings, the content of student projects varied across groups, and this limitation may have inhibited objective comparison of project quality.

6. Because the teachers and students in this study were volunteers, the John Henry effect, which described participants’ changed behavior as a result of their belief that they are in competition with another group, may have affected group performance (Gall, Borg, & Gall, 2008).
CHAPTER 2
REVIEW OF RELATED LITERATURE

Introduction

The intended purpose of this study was to examine effects of The Renaissance Academy (RA), a full-time specialized program for gifted students, on participating students’ project quality, acquisition of 21st century skills, and perceptions toward learning activities. This review of literature includes a comprehensive overview of various tenets of effective programming for advanced learners, including theoretical foundations, historical background, and research supported best practices, in order to provide a rationale for the proposed study. This review is presented in four major parts: (1) evolution of 21st century skills, (2) historical influences on gifted education services and programs, (3) creative productivity, and (4) special schools and programs for advanced students.

The first section, which focuses on 21st century skills, includes components on learning theories, the Framework for 21st Century Skills (Partnership for 21st Century Skills, 2008), and experiential learning environments, including problem-based learning, service-learning, and instructional technology. The second section provides an overview of historical background of gifted education services and programs, including historical influences on the definition and identification of gifted students, implications of national reports and reforms on gifted services, and recommendations for modern gifted educational programming. The third section on development of creative productivity encompasses instructional models that facilitate creative productivity and research on student product development. The final section on special schools
and programs for advanced learners covers characteristics and needs of gifted students, ability grouping, and an overview of The Renaissance Academy.

In conducting this literature review, the researcher performed both manual and electronic searches of the following types of relevant materials: books, journal articles, government publications, dissertations, websites, and periodicals. Studies and reports cited in this literature review are located in journals and publications from the fields of educational psychology, educational research, educational leadership, gifted education, special education, science education, and instructional technology.

**Evolution of 21st Century Skills**

What is the purpose of education today? While this question might elicit a wide variety of answers from different individuals, John Dewey (1938) stated, “The whole process of education should thus be conceived as the process of learning to think through the solution of real problems” (as cited in Renzulli, 1982). In accordance, The Renaissance Academy (RA) has established a novel philosophy on teaching and learning centered on students’ demonstration of creative productivity through acquisition and application of 21st century skills. Developed through a collaborative effort of leaders in industry and education, 21st century skills are part of a larger Framework for 21st Century Learning, which includes a set of skills and standards in the areas of life and career, learning and innovation, and information technology that are necessary for innovation and productivity in the current global economy, delivered through both core subjects and 21st century themes (Partnership for 21st Century Skills, 2004). This section will outline theoretical and historical influences on the development 21st century skills and research
on experiential learning environments, including problem-based learning, service-learning, and instructional technology.

**Theoretical Foundations**

*Pragmatism.* Active learning pedagogies have deep roots in the constructivist theories of John Dewey, an educator, psychologist, and founder of the philosophy of pragmatism, who asserted that learning should be hands-on, problem-based, and authentic in nature (1916). In his transformational publication, *Democracy and Education*, Dewey (1916) expressed his concerns regarding current traditional educational methods and advocated for a broader, more holistic approach involving the community and engaging learners in acquisition of knowledge and skills through active engagement in complex problems. In sharp contrast to the conventional approach to education, which focused on teaching discrete content and skills in a manner disconnected from life experiences, he advocated for a more pragmatic view of education in which students would be equipped to become productive members of society (Dewey, 1916).

Dewey (1916) proposed three specific components of a successful educational model: authenticity of instruction, active engagement of students, and a focus on thinking skills (Ramey, 2010). First, learning should be authentic, in regard to both content and context (Dewey, 1916). Dewey placed great importance on the connection of education to society, carried out through involvement of students in inquiry-based learning. He also noted the importance of the environment in which students work and learn, as well as teachers’ role in ordering it. In Dewey’s (1916) opinion, teachers should purposefully strive to control the classroom environment in a way that effectively engages students with the objects within it (Ramey, 2010).
Subsequently, education should facilitate a link between learning and action, as students take an active role in solving problems representative to those that occur in society (Dewey, 1916). Dewey believed that learning and doing are inseparable; thus, education that fails to engage students in action is ineffective. As such, Dewey asserted that children learn best through methods that facilitate a natural evolvement of inquiry, as people are inherently curious. Today, this pedagogy initially conceptualized by Dewey is commonly referred to as problem-based learning. According to Dewey (1916), thinking skills are a vital component of problem-based learning experiences. Dewey viewed thinking skills as a necessary predecessor to content acquisition, as students should apply thinking skills across all subject areas, in order to both acquire and utilize content knowledge. In accordance, he viewed the scientific method as a form of critical thinking useful in application across all disciplines, as opposed to its sole usage in science (Dewey, 1916).

Social development theory. Les Vygotsky’s (1978) social development theory is also foundational to constructivist learning theories and similar to Dewey’s belief that learning results from the interconnectedness of students and the community. Vygotsky (1978) believed that cognitive development is shaped through individuals’ social interactions with others, as learning occurs first in a socio-cultural context and then personally within the child, as evidenced by his statement, “Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people . . . and then inside the child. . . . All of the higher functions originate as actual relationships between individuals” (Vygotsky, 1978, p. 57).
A key feature within social development theory is the More Knowledgeable Other (MKO), which includes either an adult or peer who holds a more advanced level of understanding or skill than a learner. Students learn best during active learning experiences which include frequent opportunities for social interactions with these MKOs (Vygotsky, 1978). Thus, teachers should place more focus on collaborating with and guiding students, as well as giving them frequent opportunities for collaboration with others, as opposed to lecturing or similar instructor-based approaches.

Another component of Vygotsky’s (1978) social development theory is the Zone of Proximal Development (ZPD), which refers to the distance between a student’s ability to independently solve a problem and his or her ability to problem solve with support or guidance. Vygotsky (1978) asserted that learning ideally should take place within this zone, and due to differences in students’ abilities and skills, instruction should be individualized to continuously target students’ ZPDs.

*Discovery learning.* Similar to both Dewey’s and Vygotsky’s learner-centered theories, Bruner (1961) proposed a theory of discovery learning, in which inquiry is key to students’ discovery of information and conceptual relationships. In discovery-based learning, students apply an inductive approach to reasoning, as they progress from specific to general understandings (Bruner, 1961). Closely related to Vygotsky’s conception of the ZPD, Wood, Bruner, and Ross (1976) developed the term *scaffolding* to describe the role of support adults provide to young children as they learn language, which should decline as student competency increases; this concept has since been widely applied across the field of education.
While educational implementation of constructivist psychological theories have been effective in increasing both learning and engagement for students, an approach emphasizing an appropriate degree of teacher involvement, or scaffolding, has been recommended by several researchers. Shulman and Keisler (1966) stated that guided discovery is the optimal method of discovery-based learning, as compared to pure discovery methods, as students benefit from a certain degree of guidance toward attainment of identified learning goals. Similarly, in a review of research conducted on constructivist discovery instructional methods during the 1960s, 1970s, and 1980s, Mayer (2004) concluded that “overall, the constructivist view of learning may be best supported by methods of instruction that involve cognitive activity rather than behavioral activity, instructional guidance rather than pure discovery, and curricular focus rather than unstructured exploration” (p. 14). Kirschner and Clark (2006) also documented the effectiveness of student-centered learning approaches while emphasizing the necessity of teacher guidance in facilitating student success in true inquiry-based settings.

**Experiential learning theory.** Experiential learning theory was conceptualized by David Kolb (1984), who, like his predecessors, Dewey, Vygotsky, and Bruner, employed a holistic approach to cognitive development, in which he emphasized the concept of experience. Kolb (1984) believed that students develop knowledge “through the transformation of experience” (p. 41), as they progress through the following four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation. He asserted that learners may enter this cycle at any point but must proceed through each step in the specified order. Kolb (1984) also proposed a set of learning styles that match each stage: accommodators, who learn best through concrete experiences; divergers, who learn best through observation and reflection;
assimilators, who learn best through forming abstract concepts; and convergers, who learn best through application of new concepts during experimentation.

*Framework for 21st Century Learning.* The aforementioned theorists and educational leaders (Dewey, Vygotsky, Bruner, and Kolb) share a focus on learning through experience, inquiry, and collaboration, commonly known as constructivism. In constructivism, learning is a dynamic process in which students create, or construct, their own knowledge through guided participation in methods focused on inquiry. Constructivists believe that learning occurs through students’ active engagement with their environment, as each learner constructs his or her own knowledge by connecting it to prior knowledge through personal interaction with materials and surroundings, as well as through social interactions with others.

In order to operationalize constructivist theory and practice in modern educational settings, the Partnership for 21st Century Learning (2009) has created a set of standards “to help practitioners integrate skills into the teaching of core academic subjects” (p. 1). Known as the *Framework for 21st Century Learning,* this set of standards includes four sub-categories: Core Subjects and 21st Century Themes; Learning and Innovation Skills; Information, Media, and Technology Skills; and Life and Career Skills. The category of Learning and Innovation contains the sub-components of Creativity and Innovation, Critical Thinking and Problem Solving, and Communication and Collaboration. Creativity and Innovation includes three sub-skills: “Think creatively,” “work creatively with others,” and “implement innovations” (Partnership for 21st Century Skills, pp. 3-4). Critical Thinking and Problem Solving involves the following four skills: “Reason effectively,” “use systems thinking,” “make judgments and decisions,” and “solve problems” (Partnership for 21st Century Skills, 2009, p. 4).
Communication and Collaboration are further broken down into two sub-skills: “Communicate clearly,” and “collaborate with others” (Partnership for 21st Century Skills, 2009, p. 4).

**Experiential Learning Environments**

Whereas theories and standards provide educators with a means for identifying key goals to guide instruction, conceptualization and application of concrete teaching and learning strategies serve to make those goals a reality. A common thread across constructivist theories (Bruner, 1961; Dewey, 1916; Kolb, 1984; Vygotsky, 1978) and the Framework for 21st Century Learning (Partnership for 21st Century Skills, 2004) is a focus on inquiry and experience in the learning process. Inductive processes mirror humans’ natural ways of learning, as evidenced by young children’s free exploration of their environment to gain both knowledge and language (Llewellyn, 2002; Ramey, 2010). Colburn (2000) broadly defined inquiry-based instruction as “the creation of a classroom where students are engaged in essentially open-ended, student-centered, hands-on activities” (p. 42). Inquiry-based instruction is a general term used to describe a wide variety of teaching and learning methods, and three specific inquiry-based instructional approaches are problem-based learning, service-learning, and technology integration, selected for inclusion in this literature review on the basis of their strong presence in The Renaissance Academy’s curricula.

**Problem-based learning.** Prince and Felder (2006) suggested that inductive teaching and learning methods are more effective than traditional deductive methods in engaging students, as learners are motivated to learn when they deem content necessary and valuable. Inquiry-based learning is defined as “an umbrella term that encompasses a range of instructional methods,
including inquiry learning, problem-based learning, project-based learning, case-based teaching, discovery learning, and just-in-time teaching” (p. 123). Across these approaches, the following components collaboratively or independently create a context for learning: authentic, complex, open-ended questions or problems; major projects; and/or case studies (Prince & Felder, 2006).

Problem-based learning (PBL), which originated in the medical field, is an inquiry-based instructional strategy frequently employed in K-12 and higher education settings today. In PBL, students are presented with an open-ended, real world problem related to a subject area, and learning takes place through acquisition of specific skills and knowledge related to development of potential solutions for the problem (Davis, 2009). Barrows and Tamblyn (1980) are credited with further development of the PBL model in facilitating problem-solving skill acquisition in pre-service medical students. Nearly two decades later, Maudsley (1999) described the strategy of PBL as both “innovative” and “elusive” (p. 178) in regard to terminology and practice, and he proposed the following guidelines for structuring PBL experiences: includes methods and philosophy; spans across and supported by curriculum; engages learners in active, self-directed acquisition of knowledge and skills through participation in a series of relevant, contextual problems; relates to prior knowledge; facilitates critical thinking, content integration, reflection, and enjoyment; and utilizes both group work and independent study (p. 184).

General research on problem-based learning. On the basis of numerous research studies, several major educational organizations, including the American Association for the Advancement of Science (2001) and National Research Council (2000), propose inquiry as an effective method for delivering science instruction to learners of all abilities, as research
indicates students participating in an inquiry-based approach exhibit increases in content mastery, higher order thinking skills, and attitudes toward science (Clark, 1999; Ramey, 2010).

Bredderman (1982) conducted a meta-analysis of quantitative studies that investigated effects of three activity-based elementary science programs funded by the National Science Foundation (NSF), in which 57 studies were analyzed for effects on student outcomes, involving over 900 classrooms and about 13,000 students. Results indicated that students participating in the NSF’s activity-based programs scored 20 percentage points higher on science process tests, on average, than nonparticipating students, with significantly greater gains demonstrated by disadvantaged students (Bredderman, 1982). In a subsequent publication discussing the same data, Bredderman (1983) documented statistically significant ($p = .05$) positive differences between mean scores on measures of science process, intelligence, and creativity for students in the activity-based group, as compared to students participating in traditional science instruction.

Within this same meta-analysis, 12 studies on classroom practices in activity-based and non-activity based classrooms also were synthesized (Bredderman, 1982). In activity-based classrooms, students participated in hands-on activities 10% more often than their nonparticipating peers. In regard to teacher activity in these activity-based classrooms, lecturing decreased by 7%, and talk decreased by 9% (Bredderman, 1982).

Furthermore, research suggests that an inquiry-based approach is especially effective for use with students of disadvantaged and culturally diverse backgrounds and those identified as gifted. Clark (1999) described the current underrepresentation of minorities within science and engineering fields in the United States (NSF, 1996) and specifically recommended inquiry-based science instructional methods “to foster enthusiasm, interest, and competence both for pursuing careers in the field and for the acquisition of skills and knowledge demanded by an increasingly
technological society” (p. 4). The researcher suggests that effective inquiry-based practices for minorities in science should include hands-on activities, cooperative learning, problem-based instruction, high expectations, intellectual challenge, and connections between science and students’ lives (Clark, 1999).

Problem-based learning with gifted students. In addition, problem-based learning has been recommended across the curriculum as a best practice for responding to gifted learners’ unique characteristics and learning needs, as well as facilitating academic performance and development of critical and creative thinking abilities (Boyce, VanTassel-Baska, Burruss, Sher, & Johnson, 1997; Dods, 1997; Gallagher, 1997, 2000, 2005; Gallagher, Sher, Stepien, & Workman, 1995). A main reason gifted students benefit from a problem-based approach is their possession of many of the same qualities as those of expert problem solvers, including an extensive knowledge base, conceptual reasoning abilities, problem-solving skills, metacognitive strategies, and “expert-like dispositions” (i.e., recognition that a complex problem may have multiple solutions; Gallagher, 2005, p. 287).

Gallagher (2005) advocated for a differentiated approach to PBL, in order to meet the needs of all learners, as evidenced through her statement, “although it is true that PBL is appropriate for all students, it does not necessarily follow that PBL is exactly the same for all students” (p. 285). Subsequently, she noted the importance of adapting problem-based learning experiences for gifted students through the following modifications: advancement of content, relation to concept-based curriculum, connection of multiple disciplines, inclusion of higher order thinking skills, and discussion of ethical issues (Gallagher, 2005).
**Service-learning.** Featuring characteristics of problem-based learning, but employed more widely across the curriculum, service-learning has roots in experiential education, which is defined as “a philosophy and methodology in which educators purposefully engage with learners in direct experience and focused reflection in order to increase knowledge, develop skills and clarify values” (Association for Experiential Education, 2007). An experiential approach to teaching and learning is not confined to the school walls, as an experiential educator is defined as “anyone who teaches through direct experience” (Association for Experiential Education, 2007). John Dewey (1938) is considered the founder of experiential education, as the concept was originally documented in his landmark book *Experience and Education*, in which he related some of his earlier philosophical views on constructivist education to curriculum. Dewey (1938) stated that effective experiential education should be continuous, as it builds upon previous experience and leads to future experiences, and interactive, as it resonates with an individual’s personal goals. Kolb’s (1984) experiential learning theory also served to create a foundation for experiential education pedagogies, as his proposed four-stage model provided structure for the practice of experiential learning. Both Dewey (1938) and Kolb (1984) emphasized the importance of reflection in the process of learning through experience.

Today, service-learning is an instructional strategy employed by schools and community groups, which integrates community service involvement with academic content, often resulting in students’ participation in an event or series of events, or the creation of a project to respond to a real community problem, with both the participants and recipients of the service reaping benefits. According to Learn and Serve America (LSA), a federal organization within the larger Corporation for National and Community Service (CNCS, 2009), which provides large scale grants to schools across America each year, service-learning is defined as “a teaching and
learning strategy that integrates meaningful community service with instruction and reflection to enrich the learning experience, teach civic responsibility, and strengthen communities.”

Service-learning gained prevalence in schools with the use of students of all abilities after the passing of the National and Community Service Act of 1993, which created AmeriCorps and the Corporation for National and Community Service (CNCS). In the same year, the Association of Supervision and Curriculum Development (ASCD) endorsed the strategy as an important means for linking service and learning (CNCS, 2010). According to Newman and Bailis (2008), the National and Community Service Act of 1993 and CNCS include the following components in their definition of service-learning:

(a) Service learning is conducted in and meets the needs of the community, (b) it is coordinated with a school and the community, (c) it helps foster civic responsibility, (d) it is integrated into and enhances the academic curriculum of students, and (e) it provides structured time for students to reflect on the service experience. (p. 4)

However, not all service-learning experiences are created equal in regard to fidelity of implementation. While the “learning” portion of the term itself implies a focus on the instructional aspect, uses of the term range widely from referring to true content-linked experiences in which students seek to solve real societal problems by providing service to others, to experiences which could be chalked up to little more than volunteerism loosely linked to an academic content area. In an attempt to establish a level of consistency for the term’s definition and usage, in 2008 the National Youth Leadership Council (NYLC) developed a set of eight research-based quality indicators, *K-12 Service-Learning Standards for Quality Practice*: duration and intensity, link to curriculum, partnerships, meaningful service, youth voice, diversity, reflection, and progress monitoring. These standards provide a way for educators and researchers to measure what constitutes quality service-learning in more quantifiable terms (Billig & Northup, 2008; NYLC, 2008).
General research on service-learning. Research demonstrates service-learning is a powerful tool for generating academic and civic outcomes which can benefit all stakeholders, including students, educators, and the community. Although service-learning is a broadly used term to describe a wide diversity of instructional practices on a long continuum, by definition, quality experiences should exhibit the following characteristics: meaningfulness to participants; inclusion of cooperative learning; engagement of participants in problem-solving strategies within an authentic context; promotion of higher order thinking; and furtherance of students’ personal, civic, and cognitive development (Eyler & Giles, 1999, as cited in Learn and Serve America, 2010). Typically, there are two major outcomes in K-12 service-learning experiences: (1) academic outcomes (i.e., student attainment of required academic knowledge and skills, academic engagement, and motivation), and (2) civic outcomes (i.e., student attitudes toward and engagement in community affairs, community involvement in school affairs, and community improvement; Billig, 2002, 2009; Billig, Root, & Jesse, 2005; Melchior & Bailis, 2002; Newman & Bailis, 2008).

Of the eight K-12 Service-Learning Standards for Quality Practice—duration and intensity, link to curriculum, partnerships, meaningful service, youth voice, diversity, reflection, and progress monitoring (NYLC, 2008)—research has indicated that link to curriculum is the most important component of a quality service-learning experience, in regard to predicting students’ academic outcomes (Billig, Root, & Jesse, 2005). Link to curriculum is defined in the following way: “Service-learning is intentionally used as an instructional strategy to meet learning goals and/or content standards” (NYLC, 2008). For this standard, a service-learning experience should exhibit the following indicators: has clearly articulated learning goals, is explicitly aligned with the academic and/or programmatic curriculum, helps participants learn
how to transfer knowledge and skills from one setting to another, and takes place in schools and is formally recognized by school board policies and in student records (NYLC, 2008). Indicators of this standard within a service-learning experience include clear articulation of learning goals, explicit alignment with academic and/or programmatic curriculum, focus on transfer of knowledge and skills from one setting to another, and formal recognition by school board policies and student records (NYLC, 2008).

Several studies detailing strong connections between service-learning experiences and content and instructional objectives resulted in a positive impact on students’ academic outcomes, including both academic achievement and engagement and civic development (Billig & Northup, 2008; RMC Research Corporation, 2007). Results of numerous studies cite significant academic gains on standardized achievement tests or performance-based academic measures made by students participants in service-learning, as compared to nonparticipating peers, in both elementary and secondary settings (Ammon, Furco, Chi, & Middaugh, 2001; Billig, 2003; Billig & Klute, 2003; Billig & Meyer, 2002; Davila & Mora, 2007; Klute, 2002; Laird & Black, 2002; RMC Research Corporation, 2007). Service-learning has also positively affected students’ academic growth over time, as evidenced by increased GPA and writing performance (Kraft & Wheeler, 2003; RMC Research Corporation, 2007). In addition, researchers note significantly higher levels of academic motivation and engagement in K-12 service-learning participants, as compared to nonparticipants (Billig & Klute, 2003; Billig & Meyer, 2002; Billig, Root, & Jesse, 2005; Furco, 2002; Hecht, 2002; Ritchie & Walters, 2003; RMC Research Corporation, 2007). In one longitudinal study, results indicated that students who participated in service-learning activities were more likely to stay in school (Laird & Black, 2002) and attend and graduate from college (Davila & Mora, 2007), as compared with
nonparticipating peers (RMC Research Corporation, 2007). Also, research supports the effectiveness of service-learning as a strategy to narrow the achievement gap by increasing academic engagement and achievement of students of minority and low socioeconomic status (Hecht, 2002; Scales & Roehlkepartain, 2005), as well as students with behavior problems (Kraft & Wheeler, 2003; Laird & Black, 2002; RMC Research Corporation, 2007).

In regard to civic outcomes, research demonstrates positive effects of service-learning in developing participating students’ civic values, knowledge, and skills, including leadership abilities (Billig et al., 2005; Melchior & Bailis, 2002; Morgan & Streb, 2001; RMC Research Corporation, 2007). Also, in a study of 761 students across 35 classrooms who participated in Colorado’s Learn and Serve service-learning program, results indicated that student participants were significantly more connected to their school and community, and demonstrated higher levels of responsibility than the control group (Kim & Billig, 2003).

However, Billig (2002) cautions that much of the research in service-learning consists of program evaluations rather than scientific studies; thus, the results may not be widely applicable, although they “begin to make the case that service-learning is indeed a promising practice for schools that seek to raise achievement scores, help develop more responsible students and citizens, and raise awareness of career options” (p. 185).

Service-learning in gifted education. Service-learning has been likened to a key theory of learning in the field of gifted education, creative productivity, a term widely used to refer to students’ participation in authentic, curriculum-linked experiences with the goal of identifying and solving a real problem within a student’s field of interest (Newman & Bailis, 2008). As a main part of Renzulli’s (1978, 1986) three-ring conception of giftedness, and later in the
Enrichment Triad Model (Renzulli, 1976) and Schoolwide Enrichment Model (Renzulli & Reis, 1985, 1997), a product-focused methodology has been implemented by many gifted specialists, as well as some general education educators, for the past several decades, as numerous students have effectively incorporated service with learning through participation in real world investigations which result in quality project development and service delivery (Olenchak & Renzulli, 1989; Renzulli & Reis, 1994).

The Enrichment Triad Model (Renzulli, 1976) employs a problem-based approach to service-learning to engage gifted learners, as well as students of all ability levels, in content-related, interest-based real world investigations called Type III projects, during which students learn and utilize creative and critical thinking skills required for project completion (Renzulli & Reis, 1997). Newman and Bailis (2008) reported that numerous studies in gifted education have indicated students benefit more when higher order thinking skills are applied to authentic problem-solving scenarios than when used in a nonrelated context (Newman, 1991, 2005; Renzulli & Reis, 1986; Schlichter, 1986; Sternberg, 1985). In addition, the application of gifted methodology, such as implementation of the Talents Unlimited model for teaching creative and critical skills in a problem-solving context, has been effective in increasing achievement and product quality of all students, not just those identified as gifted (Newman, 1991, 2006; Newman & Bailis, 2008; Schlichter, 1986).

Technology integration. Modern students have been called digital natives (Prensky, 2001), as they were born into an Information Age filled with portable personal technologies and endless opportunities for ubiquitous computing. In effect, their early and frequent experiences with technology have led them to acquire a set of common styles and preferences toward
learning, known as millennial learning styles (Raines, 2002). As a result of technology immersion, these millennial learners highly value their access to technology and deem it as important to their education and learning; resultantly, they exhibit an overarching preference for digital, collaborative, and highly customizable learning tools and experiences (Dede, 2005; Kennedy et al., 2008, Prensky, 2001, 2006; Raines, 2002).

Advanced learners display many characteristics, such as advanced intellectual ability, high creativity, task commitment, and intense interests (Davis & Rimm, 2004; Renzulli, 1978; Renzulli & Reis, 1997), which are a natural fit with the use of technology to learn and create (Siegle, 2004). Technology tools and strategies may be employed in various ways in general and gifted classrooms to help students learn content and process skills, conduct research on topics of interest, and develop high quality products (Mulrine, 2007). Research suggests specific uses of Web 2.0 (free, online) technology tools to differentiate gifted students’ learning environment in regard to content, process, and products, to facilitate development of students’ 21st century skills (Bell, 2010; Eckstein, 2009; Sheffield, 2007; Siegle, 2004).

Sheffield (2007) and Siegle (2004) advocate for the use of technology with gifted students in differentiating instruction, building 21st century skills, and creating authentic learning environments that foster development of higher order thinking skills. General research on instructional technology has indicated its multiple positive impacts upon participating students, as two large-scale studies with K-12 students report significant gains in both achievement and engagement when technology implementation is purposeful, authentic, and closely connected to content (Sandholtz, 1997; Schacter, 1999). Although there is a large paucity in substantive studies relating to outcomes of gifted and high ability students’ technology uses, a
number of conceptual and practitioner focused articles exist on the topics of effective technology usage with advanced learners (Siegle, 2004).

One research-based application of instructional technology with high ability learners is Renzulli Learning Systems (RLS), a web-based manifestation of the Enrichment Triad Model integrating research-based applications of instructional technology, in which students create a learning profile, visit a personalized set of pre-screened quality websites to gain knowledge, and develop necessary skills, with the end goal of creating an authentic, interest-based Type III projects. Renzulli and Reis (1997) emphasized the importance of “just in time” process skills related to students’ needs in developing a product. The technological component of RLS serves to meet this need by providing students with a plethora of age appropriate Internet sites, databases, and tutorials on a wide range of topics. Furthermore, the web-based program aids with organization of a project, as it features forms for students and an area in which teachers and parents may guide and monitor students’ activities.

Preliminary research on RLS, in the form of two dissertations and one thesis, has reported positive outcomes on student engagement and achievement (Eleck, 2006; Field, 2007; Housand, 2008). In a study of the effects of RLS on 200 participating students in enrichment programs and classrooms, Eleck (2006) documented that about half of the students generated product development ideas as a result of using the RLS, and 80% of students reported great enjoyment in using the program. Field (2007) examined effects of RLS on elementary (Grades 3-5) and middle school (Grades 6-8) students’ reading fluency, comprehension, and science and social studies achievement. Quantitative analysis of achievement measures for a treatment and control group documented significantly higher performance for the treatment group in the reading comprehension \( p < .001 \), oral reading frequency \( p = .016 \), and social studies achievement \( p = \)
.013), with no significant differences in science achievement between the two groups. Similarly, Housand (2008) conducted a mixed methods study to investigate the effectiveness of instruction delivered through RLS. Outcomes of interest were student achievement, as measured by scores on the Iowa Test of Basic Skills (ITBS); teachers’ perceptions of student motivation for learning, as measured by a student rating scale; and description of actual teacher usage of RLS, as measured by observations. The study involved 23 classes divided into a treatment (n = 168) and control group (n = 186). Findings from ANOVA indicated the treatment group demonstrated significantly (p = .023) higher performance in social studies achievement, after a 16-week period of participation in RLS, although no significant differences were identified in the other subject areas represented on the ITBS nor in teachers’ perceptions of student motivation across groups. Observations indicated that social studies was the subject area in which RLS was most frequently applied, and identified barriers to implementation included of access to technology and instructional time spent on preparation for standardized testing (Housand, 2008).

Historical Background on Gifted Education Services and Programs

In order to initiate a discussion on designing appropriate services for gifted students, definition and identification of this population must first be established. Numerous definitions for gifted exist, ranging from extremely narrow conceptions considering only an IQ score (Terman, 1925), to broader models emphasizing multiple talents (Gardner, 1983; Sternberg, 1997; Taylor, 1978) and demonstration of gifted behaviors (Renzulli, 1978), and a wide variety of identification measures have been created in accordance. Borland (2008) inquired, “To what extent can research on the identification of gifted students assist practitioners in making their identification procedures more effective (and more equitable), and to what extent can it assist
scholars and policy makers in their efforts?” (p. 261). In response, this portion of the literature review outlines key research centered on defining and identifying advanced ability in educational settings.

In addition, historical events and educational reforms have significantly impacted gifted education programming, as well as all aspects of the teaching and learning process for United States’ students of all backgrounds and abilities. In accordance, a concise description of major historical events, reports, and reform movements which shaped gifted services over the past century and resultant recommendations for modern best practices in educating advanced students are included in this review, in order to provide a background and strengthen the rationale for the proposed study.

Progression of Definition and Identification of Gifted Students

Throughout history, numerous definitions for gifted have existed, ranging from extremely narrow conceptions considering only an IQ score (Terman, 1925), to broader models emphasizing multiple talents (Gardner, 1983; Sternberg, 1977; Taylor, 1978) and demonstration of gifted behaviors (Renzulli, 1978), and a wide variety of identification measures have been developed in accordance. Borland (2008) inquired, “To what extent can research on the identification of gifted students assist practitioners in making their identification procedures more effective (and more equitable), and to what extent can it assist scholars and policy makers in their efforts?” (p. 261). A subsequent review of the research on the topics of definition and identification of giftedness is necessary in order to explore this question, with the ultimate goal of identifying the optimal method of identifying and further developing students’ potential to achieve creative productivity.
Intelligence as a sole predictor of giftedness. Following creation of the Stanford-Binet Intelligence Scale in 1916, in 1922 a Stanford psychologist Lewis Terman and associates conducted the Genetic Studies of Genius, a well-known longitudinal study of 1,528 children, of an average age of 12 and with IQ scores above 135, who composed the top 1% of students in metropolitan California cities (Terman, 1925; Terman, Burks, & Jensen, 1930; Terman & Oden, 1959). Results of Terman’s research made many important contributions to the infancy of gifted education, namely the widespread usage of intelligence tests as a means for identifying students as gifted, but they were also significantly biased, as the majority of the subjects came from affluent families with educated parents, thus “undermin[ing] the case for the predictive validity of the Stanford-Binet as a measure of giftedness” (Borland, 2008, p. 264). While Terman’s subjects appeared to be more successful than their peers with lesser IQs in regard to academic, psychological, social, and physical performance, those not accelerated in school failed to achieve the same level of performance as those who were (Borland, 2008). Also, Terman’s optimistic conclusions about his subjects’ social and emotional health falsely “swayed educators for many decades to ignore the sometimes desperate counseling needs of gifted children” (Davis & Rimm, 2004, p. 7). Cox (1926) conducted similar studies on high achieving children and adults, and although this body of research did not yield conclusive results in the area of gifted identification, it provided in-depth knowledge of characteristics and needs of gifted children and laid an important foundation from which future researchers were able to springboard (Colangelo & Davis, 2003).

Borland (2008) stated that while a few more recent studies (Anastasi, 1988; Kamphaus, 1993; Reynolds & Kaiser, 1990) have indicated that intelligence and achievement measures are an unbiased predictor of future academic performance, most leading experts in gifted education
advocate for consideration of multiple indicators of intellectual and creative potential (Gardner, 1999; Renzulli & Reis, 1997; Sternberg, 2003; Taylor, 1978;). Gardner (1999) stated, “Intelligence is too important to be left to the intelligence testers” (p. 3). In accordance, Borland’s (1986) work indicated that although IQ tests may have high predictive validity, they fail to measure the broad spectrum of an individual’s intelligence or account for ethnic or racial differences among students (Robinson, Shore, & Enersen, 2007). Likewise, Ford (2004) asserted that underrepresentation of students of culturally and linguistically diverse backgrounds in gifted programs is due largely to their poor performance on traditional intelligence tests, and she promoted the use of nonverbal tests and application of principles and practices that promote equity, in order to best assess the strengths and needs of this population.

Broadened conceptions of giftedness. Terman is often referred to as the “father” of gifted education, and Leta Hollingsworth as its “nurturant mother” (Stanley, 1976, as cited in Davis & Rimm, 2004), in regard to her work in calling attention to recognition of and response to the unique intellectual, social, and emotional characteristics and needs of gifted children. Hollingsworth’s identification procedures were the first to include multiple criteria, and she advocated for differentiated services to meet their exceptional abilities and needs, especially for those students with extremely high IQ scores (Davis & Rimm, 2004).

In 1958, Getzels and Jackson composed “one of the most influential papers in the history of the field of gifted education” (Borland, 2008, p. 265). Getzels’ and Jackson’s (1958) research centered on two groups of students in a Midwestern school—one group with high IQ and low demonstrated creativity, and one group with low IQ but high creativity. The researchers concluded that the two groups both achieved at a level higher than average, as compared to the
entire student population, although a 23-point mean difference existed between the groups’ IQ scores (Getzels & Jackson, 1958, p. 76). Getzels and Jackson utilized an assessment to measure divergent thinking, as an indicator of creativity, and a major outcome of this study was interest in development and use of similar creativity instruments to identify this previously overlooked group of gifted students, such as the *Torrance Tests of Creative Thinking* (Torrance, 1966), which are still in use today (Borland, 2008).

In 1978, Joseph Renzulli similarly disputed the narrow conception of IQ as a singular basis for defining giftedness, through his landmark conceptual paper published in *Phi Delta Kappan*, entitled “What Makes Giftedness? Reexamining a Definition.” In this piece, Renzulli presented his Three-Ring Conception of Giftedness, asserting that individuals exhibit gifted behaviors when the “three rings” of above average ability, creativity, and task commitment intersect within an area of interest, based upon his observation of demonstrated characteristics of those considered the world’s most highly gifted individuals. Subsequently, Renzulli, Reis, and Smith (1981) proposed the Revolving Door Identification Model (RDIM) as a practical means for identifying students to participate in services aligning with their demonstration of gifted behaviors. In the RDIM, students identified with above average ability form a talent pool and subsequently revolve in and out of a gifted program to undertake independent or small group investigations related to personal interests, with the goal of producing creative products. In regard to this work by Renzulli and associates, Borland (2008) commented, “Both the conception of giftedness and the identification model designed to operationalize it were, at the time of their introduction, close to being revolutionary” (p. 268).

A number of leading researchers have introduced similar theories supporting a broadened conception of giftedness based upon demonstration of advanced creative and practical abilities.
necessary for productivity and innovation. Sternberg’s (1977, 1985) triarchic theory of intelligence asserted that the concept of intelligence contains three components, or subtheories: (1) componential subtheory (i.e., analytical reasoning), (2) experiential subtheory (i.e., creative thinking and action), and (3) contextual subtheory (i.e., practical, adaptive thinking and action). Similarly, Gardner (1983) introduced the Multiple Intelligences theory, which asserted that individuals may demonstrate intelligence through eight different avenues, termed “intelligences”: linguistic intelligence, logical-mathematical intelligence, visual-spatial intelligence, bodily-kinesthetic intelligence, musical intelligence, interpersonal intelligence, intrapersonal intelligence, and naturalist intelligence. Closely related, Taylor (1978) conceptualized the Multiple Talent Model, a model based upon identifying and developing student talents in nine areas: academic, creativity, decision making, planning, forecasting, communication, implementing, human relations, and discerning opportunities.

Multiple criteria as a means for identification. Hollingsworth (1942), Gentzels and Jackson (1958), Renzulli (1978), and others (Gardner, 1983; Sternberg, 1997; Taylor, 1978) paved the way for inclusion of creative potential and multiple talent areas as criteria alongside academic achievement and intelligence in most widely accepted modern definitions for giftedness. Resultantly, this new broadened conceptualization of giftedness, based upon students’ demonstration and further development of real-world abilities and skills, enacted a paradigm shift in many gifted educators’ consideration of identification of and services for children of high potential. The National Association for Gifted Children (NAGC, 2008) stated,

The current federal definition of gifted students was originally developed in the 1972 Marland Report to Congress, and has been modified several times since then. The current definition, which is located in the Elementary and Secondary Education Act, is “Students, children, or youth who give evidence of high achievement capability in areas
such as intellectual, creative, artistic, or leadership capacity, or in specific academic fields, and who need services and activities not ordinarily provided by the school in order to fully develop those capabilities.” (n.p.)

Robinson, Shore, and Enersen (2007) cited gifted education literature’s support of using multiple criteria for identification as being “a desirable practice in general” as well as “especially useful to overcome the underrepresentation of minority students in gifted and talented programs” (p. 235). Numerous research studies have substantiated the use of multiple criteria in identifying culturally and linguistically diverse students as gifted (Ford & Harris, 1999; Frasier, Garcia, & Passow, 1995). In accordance, many states and programs now use multidimensional measures in order to determine students’ eligibility for gifted services. In a 1994 descriptive study, researchers analyzed 49 states with gifted and talented education policies and found that, of these policies, all 49 employed an IQ or achievement measure, 46 considered data from extracurricular activities, 43 included creativity assessments, and many solicited input from teachers, parents, students, and other related individuals (Coleman & Gallagher, 1994, as cited in Robinson et al., 2007). In a position statement entitled Using Tests to Identify Gifted Students, issued in 1997, the National Association for Gifted Children (NAGC) stated,

> Given the limitations of all tests, no single measure should be used to make identification and placement decisions. That is, no single test or instrument should be used to include a child in or exclude a child from gifted education services. The most effective and equitable means of serving gifted students is to assess them - to identify their strengths and weaknesses, and to prescribe services based on these needs. (p. 1)

*Influences on American Gifted Education*

Historical influences. Davis and Rimm (2004) stated, “In early America, concern for the education of gifted and talented children was not great” (p. 4). In the 1800s, some large cities, such as St. Louis and Cambridge, initiated tracking and acceleration practices to allow advanced
students to progress more quickly through elementary and middle grades (Davis & Rimm, 2004). In the early 1900s, conditions began to improve, as the first specialized school for gifted children was founded in Massachusetts (Davis & Rimm, 2004). In 1916, Los Angeles and Cincinnati schools created special classes for identified gifted learners, followed by creation of similar specialized gifted classes in two-thirds of large U.S. cities (Davis & Rimm, 2004). In the late 1800s and early 1900s, Sir Francis Galton and Alfred Binet conducted the foundational research on intelligence testing, culminating in Binet’s development of a series of intelligence tests designed to measure students’ mental age and subsequently separate students by ability (Binet & Simon, 1905, as cited in Davis & Rimm, 2004). Psychologist Lewis Terman and associates conducted longitudinal research conducted on a group of individuals with IQ scores greater than 135. This research led to the common practice of identifying students for participation in gifted programs on the basis of a high IQ score, and contributed to the myth that highly intelligent individuals are also superior in social and emotional respects (Terman, 1925; Terman & Oden, 1959).

Hollingswoth (1942), of Columbia University, worked extensively in New York City public schools to improve gifted education by developing identification strategies and counseling methods to meet the social and emotional needs of advanced students, and she published two major books to share her experiences and findings (Davis & Rimm, 2004). Colangelo and Davis (2003) stated,

In contrast with Terman’s accurate conclusion that gifted children, as a group, are more emotionally stable, Hollingsworth drew attention to the strong emotional problems and counseling needs of many gifted students, arguing that the greater the gift, the greater the need for “emotional education.” (p. 7)

The most notable historical event to propel gifted education in the United States was the launch of the Sputnik satellite by Russia in 1957 (Colangelo & Davis, 2003). Following this
demonstration of the Soviet’s intellectual prowess, several reports critiquing shortcomings of the American education system in serving gifted students were considered by policymakers and the public, and numerous educational interventions for advanced learners ensued (Davis & Rimm, 2004). In what Tannenbaum (1979) referred to as a “total talent mobilization,” subsequent advances in gifted programming included increased standards for all learners; use of formalized identification procedures; implementation of advanced curricular modifications for advanced students, such as acceleration, ability grouping, curriculum compacting, and enrichment; and advancement of curriculum in math, science, and foreign languages (Davis & Rimm, 2004).

Spurred by Sputnik, the United States became a world leader in scientific and technological innovations, both in education and industry. However, in the decades following a notable emphasis upon stellar educational practices and programs in science, technology, engineering, and math (STEM) disciplines, “this national sense of urgency had diminished, and complacency soon supplanted the ideal of excellence in education” (National Science Board, 2010, p. 1).

**Influences of National Reports and Reforms.** Modern attention toward gifted education is the result of three major national reports, beginning in the 1970s (Colangelo & Davis, 2003). In 1972, Commissioner of Education S. P. Marland wrote a landmark report to Congress, commonly known as the “Marland Report,” which “brought gifted education to the national forefront” (Colangelo & Davis, 2003, p. 9). This report included key information regarding current research on identification of gifted and talented students and identified major gaps in necessary services to meet the needs of this population. Major outcomes included establishment of a federal definition for gifted and talented emphasizing consideration of multiple criteria, as
well as promotion of appropriate programming for gifted students, paired with increased federal funding (Colangelo & Davis, 2003).

In 1983, a report by the National Commission on Excellence in Education, titled *A Nation at Risk*, documented a disturbing decline in academic performance of American students, as evidenced by scores that fell behind other industrialized nations in 19 assessments of international achievement, lower national average achievement demonstrated by high school and college students than in previous years, and dramatic falls in college students’ Scholastic Aptitude Test (SAT) scores. This study documented “a steady decline in science achievement scores of U.S. 17-year-olds as measured by national assessments of science in 1969, 1973, and 1977” (NCEE, 1983). The authors of this report issued a call to renewed excellence in educational programs and practices in order to prepare students for an increasingly technological society, including recommended reforms to increase the rigor of five educational components: content, standards, time, teaching, leadership, and fiscal support (A Nation at Risk, 1983). While not explicitly directed toward gifted education, this report directed the public’s attention to many shortcomings of the current state of education for all students, and specifically for those with advanced abilities (Colangelo & Davis, 2003).

The third and final report, published in 1993 by the U.S. Department of Education, titled *National Excellence: A Case for Developing America’s Talent*, called attention to our country’s “quiet crisis in educating talented students,” as evidenced by the first chapter’s title. This report drew attention to a number of issues, including “America’s ambivalence toward intellect, the importance of social/emotional issues, issues of rural schools and urban schools, the challenges of identifying culturally diverse students, and again the warning of international competition especially in science and mathematics” (Colangelo & Davis, 2003, p. 8). Notable outcomes of
this report include the establishment of an updated federal definition for gifted and talented and increased support for the Jacob K. Javits Gifted and Talented Education Act, initially passed in 1988 (Colangelo & Davis, 2003). Further recommendations included increasing the challenge of standards, curriculum, and assessment for all learners, including those identified as gifted; adding multifaceted opportunities for advanced learning both in and out of school; increasing attention to advanced opportunities for talented children of minority races and low socioeconomic status; and improving teacher training in methods for meeting the needs of advanced learners (Davis & Rimm, 2004).

The United States has always prided itself on a quality democratic education system, in which students of all abilities, races, and socioeconomic backgrounds are granted equal opportunities to learn and achieve; however, this tension between equity and excellence may hinder development of our most talented students (Crowder, 2011; Fetterman, 1988). Fetterman (1988) stated,

The term *equal educational opportunity* is often associated with the socioeconomically disadvantaged, and discussions of this concept generally reach esoteric levels of abstraction. However, equal educational opportunity is a real issue in the daily lives of gifted children of all socioeconomic backgrounds in educational institutions throughout the United States. Gifted children are often denied the opportunity to develop their potential. (p. 3)

The most recent example of a legislative attempt at equity and excellence in United States education is the No Child Left Behind Act (NCLB, U.S. Department of Education, 2001). NCLB was enacted with the purpose of promoting equity among subgroups of students in the United States, in regard to access to educational services and success in academic performance, through increased accountability procedures to measure schools’ adequate yearly progress in the form of standardized testing. The primary goal of NCLB is “to ensure that all children have a fair, equal, and significant opportunity to obtain a high-quality education and reach, at a
minimum, proficiency on challenging state academic achievement standards and state academic assessments (U.S. Department of Education, 2001, Section 1001). To attain this objective, NCLB mandates that school districts employ a specified set of statewide content standards in the areas of math and reading, as well as measure students’ progress in attaining these standards in Grades 3 through 8. States are mandated to administer these standardized assessments, although they are given some degree of choice in their method of evaluation. Resultantly, student scores on these assessments determine a school’s attainment of adequate yearly progress (AYP), which involves predetermined expectations for student performance at a minimal level of proficiency. Schools who do not meet this AYP standard over a period of time receive various sanctions, such as undergoing state control and replacement of administrators and teachers (Crowder, 2011; U.S. Department of Education, 2001).

Numerous educators and researchers in the field of gifted education have widely criticized NCLB for its negative impact upon current programming for, and performance of, students of high ability (Gentry, 2006; Loveless, 2008; Moon, Brighton, & Callahan, 2003; Moon, Brighton, Jarvis, & Hall, 2007). In a large-scale national study sponsored by the National Research Center for the Gifted and Talented (NRCGT), Moon et al. (2003, 2007) employed a mixed methodology to investigate effects of standardized state testing on participating schools, teachers, and students. From results of a survey of a stratified random sample of over 8,000 teachers across the United States and focus group interviews with selected groups of teachers and students, the researchers found that both teachers and students experienced significant feelings of pressure to perform well on these tests, with even greater pressure at disadvantaged schools, and this pressure impedes the teaching and learning process in many ways, as teachers employ a majority of drill and practice techniques which fail to engage students in authentic learning.
Likewise, gifted students report that their perceptions of this test-driven pace and style of instruction result in feelings of disengagement, frustration, and resentment (Moon et al., 2003, 2007).

Moreover, researchers have documented the role of NCLB and other similar test-driven reforms in lowering standards for all students, disguised as increased achievement and equity among student subgroups, while creating a proverbial ceiling to inhibit our most talented students (Crowder, 2011; Gentry, 2006; Moon et al., 2003; Moon et al., 2007). Crowder (2011) stated, “Given what we know about the reality of differences in students’ abilities, if all students can meet the same standards, they are likely too low for our most capable learners” (p. 24).

Findings of a national study by the Thomas Fordham Institute confirmed these concerns, as analysis of data from the National Assessment of Educational Progress (NAEP) during 2000 and 2007, during the decade since NCLB was instated, showed rapid gains in reading and math achievement for the lowest 10% of students (at and below the tenth percentile), yet only minimal gains for students in the top 10% (at and above the ninetieth percentile; Loveless, 2008, p. 2). Loveless (2008) pointed out that this trend of “stronger progress for lower achievers than for high achievers” is a common outcome of all forms of accountability systems and is not unique to NCLB, as evidenced by outcomes of similar testing programs enacted during the 1990s (p. 8).

Goodkin (2005), an advocate for gifted education, summarized the sentiments of many gifted education proponents in her following statements in The Washington Post:

By forcing schools to focus their time and funding almost entirely on bringing low-achieving students up to proficiency, NCLB sacrifices the education of the gifted students who will become our future biomedical researchers, computer engineers and other scientific leaders. . . . Surely we can find a way to help low-achieving children reach proficiency without neglecting the needs of our gifted learners. If we continue to ignore gifted children, the NCLB may end up producing an entire generation of merely proficient students--a generation that will end up working for the science leaders produced by other countries. (2005, December 27)
Recent results of international assessments appear to confirm the fears held by Goodkin (2005) and other gifted education advocates (Gentry, 2006; Moon et al., 2003, 2007). The National Association for Gifted Children (NAGC, 2010) reported “abundant evidence that U.S. students are not being prepared to compete for seats in our most prestigious universities that produce future scientists, mathematicians, and engineers,” and stated, “in a global economy where jobs and business development cross borders, this is increasingly a matter of concern” (p. 1). Despite a series of reforms enacted over the past 30 years, since publication of *A Nation at Risk* (1983), United States K-12 STEM performance continues to lag in the international arena in this new millennium. In a 2009 international achievement test, Program for International Student Assessment (PISA), administered to 15-year-old students every three years since 2000, United States students trailed many other industrialized counties, including China, Japan, Singapore, Canada, and Australia, coming in 23rd place in science and 31st place in math. Their best performance was in the area of reading, in which students placed 15th, with a score considered to be “average,” as compared with the overall mean. In addition, in the most recent Trends in International Mathematics and Science Study (TIMMS, 2007), which measures academic performance of fourth and eighth grade students internationally, eighth grade students in the United States scored higher than average in science, 35 of 47 countries, but lower than nine countries, all in Europe or Asia, and similar to three countries. However, only 10% of eighth graders’ science scores was the same as or higher than the advanced international benchmark, with six countries outperforming U.S. eighth grade students: Singapore, Chinese Taipei, Japan, England, Korea, and Hungary. Moreover, average scores for both fourth and eighth grade U.S. students were not statistically different than 1995 scores, indicating little to no
growth in the area of national science education over a 12-year period (National Center for Educational Statistics, 2011).

In specific regard to gifted students, the NAGC (2011) reported, “For high potential, low-income students, the problem is especially troublesome” (p. 1), as these students are making marginal gains as compared to their peers of higher socioeconomic status. To exemplify, in Mind the Other Gap: The Growing Excellence Gap in K-12 Education, a review of data from the National Assessment of Educational Progress (NAEP) between 1996 and 2007 indicated that students eligible for the free and reduced lunch program who scored at the advanced level in fourth grade math increased from 1.2% to 1.5%, with a total increase of .3 percentage points (Plucker, Burroughs, & Song, 2010). During the same time period, the percentage of fourth grade students who did not qualify for free and reduced lunch increased from 5.6% to 8.8% in the advanced level of math achievement on NAEP, for a total increase of 3.2 percentage points (Plucker, Burroughs, & Song, 2010). In a similar report entitled The Achievement Trap: How America is Failing Millions of High-Achieving Students from Lower Income Families, researchers found that, in a study of high ability students in advanced math from the beginning to end of high school, only 75% of students of low socioeconomic status remained in the top fourth of their class, as compared to 84% of their non-disadvantaged peers (Wyner, Bridgeland, & Diulio, 2008). NAGC and Wyner et al. (2008) also documented an influx of drop-out rates, underachievement, and boredom among bright secondary students, especially those from disadvantaged backgrounds, due to lack of talent recognition and inappropriate level of curricular challenge.
Recommendations for Modern Gifted Programming

In response to this “quiet crisis” in gifted education originally documented in 1993 and prevailing today as a national crisis in regard to the development of STEM innovators to secure our nation’s future, NAGC (2011) summarizes four key recommendations for promoting modern talent development, presented by both the National Science Board (NSB, 2010) and the President’s Council of Advisors on Science and Technology (PCAST, 2010). First, “cast a wide net” by improving and broadening identification of gifted and talented students, providing school personnel with professional development in talent recognition and development, and increasing federal funding in the expansion of quality beyond-school activities (i.e., extended day programs; NAGC, 2011, p. 2; NSB, 2010; PCAST, 2010). Secondly, “provid[e] opportunities for excellence” through increased access to programs and services for gifted and high ability learners, including accelerative practices such as taking college courses early; creation of 1,000 new schools focused on STEM disciplines; recruitment of excellent teachers; and creation of advanced courses and programs which promote high levels of goal-setting and achievement among talented students, including specialized pull-out programs at the elementary and middle school levels based upon student interests (NAGC, 2011, p. 2; PCAST, 2010). Finally, “remov[e] obstacles and ensur[e] supportive practices” by changing perceptions held by both educators and students about intellectual ability; increasing schools’ accountability procedures for their top students’ performance, with rewards for those who successfully narrow achievement gaps at the top levels; and facilitating creation of local and state policies on appropriate practices for enrichment and acceleration (NAGC, 2011, p. 2; PCAST, 2010).

In addition, PCAST (2010) identified the following national needs for STEM education:

1. “Ensure a STEM-capable citizenry” through a focus on conceptual understandings and
cultivation of the skills of problem solving, data analysis, and critical thinking (p. 15), (2) “Build a STEM-proficient workforce” by equipping more individuals with skills necessary to create and work with technologies, thus furthering our nation’s living standards (p. 16), (3) “Cultivate future STEM experts” by developing individuals both interested and equipped to maintain our country’s status as a 21st century leader in science and technology (p. 16), and (4) “Close the achievement and participation gap” through methods that encourage students of all abilities to become proficient in STEM disciplines and recruit advanced learners to pursue STEM coursework (p. 16). In summary, two key obstacles to attainment of the nation’s STEM goals were identified: “First, too few students are proficient in STEM. Second, too few of those who are proficient pursue STEM fields” (PCAST, 2010, p. 18).

In response to these issues and in order to foster creation of a workforce capable of achieving innovation in the STEM disciplines, PCAST (2010) proposed a two-pronged strategy focusing on both preparing and inspiring students to achieve in STEM disciplines. Preparation relates to skill development, while inspiration is focused on engagement. More specifically, preparation entails enabling all students to become able consumers and producers of knowledge in STEM subject areas through an approach combining “high standards,” “meaningful assessments,” and “tools to enable active, engaged learning,” in addition to giving advanced students “challenges and opportunities to reach even higher” (p. 19). Inspiration involves engaging students’ individual interest in STEM problems through engagement in “exciting experiences that speak to their interests” both within and beyond the classroom walls. Specifically, these experiences should be inquiry-based and engage students in problem-solving, discovery of patterns and phenomena, and creative productivity, as students utilize the same
skills as STEM professionals and make meaningful connections between learning and their own lives (PCAST, 2010).

Furthermore, technology must be an integral component of transformative STEM educational experiences for today’s digital generation. PCAST (2010) noted that technological advances should play a key role in engaging and motivating students in STEM subjects: “When setting the Nation’s goals for STEM education, we must take advantage of the opportunity to inspire students through the many avenues opened up by technological advances. . . .” (p. 20). Information technology is described as “one of the most powerful tools to propel innovation in education” (PCAST, 2010, p. 73). In addition, the U.S. Department of Education (2008) recommended the use of instructional technology “to enrich learning environments and enhance students’ conceptual understanding” (Raulston, 2009, p. 1), and gifted education experts promoted differentiated uses of technology in developing advanced students’ 21st century skills (Housand, 2008; Siegle, 2004). Technology has been shown to increase students’ engagement, time on task and productivity, when teachers employ it in purposeful and individualized ways to respond to deliver content and respond to students’ abilities and interests (Sandholtz, Ringstaff, & Dwyer, 1997).

Creative Productivity

Few people would argue that the most gifted individuals in the world are not necessarily those who possess the highest levels of intelligence but rather the creative producers, who use their knowledge and skills in meaningful, novel ways to innovate and create. In 1978, Joseph Renzulli posed a momentous question, “What makes giftedness?” to which he responded through an article challenging accepted definitions of giftedness and proposing a new framework for
defining and identifying gifted behaviors in students based upon the constructivist notion of creative productivity. In basic terms, creative productivity is an individual’s creation of a product which somehow solves a problem or makes a positive impact upon society. Renzulli’s (1976, 1978, 1986) work enacted a paradigm shift in the field of gifted education by shifting educators’ aim from students’ mere acquisition of knowledge to their creation of novel products and services.

Piaget (as cited in Renzulli, 1999) stated, “The principal goal of education is to create men and women who are capable of doing new things, not simply repeating what other generations have done” (p. 3). Modern leaders and educators in the field of gifted education desire for students to develop their advanced abilities and talents to the fullest potential in order to become productive members of society by learning and applying 21st century skills to solve real world problems. This philosophy is evidenced in the mission, design, and instructional practice of The Renaissance Academy. In accordance, this section of the literature review includes instructional structures for facilitating creative productivity and research on student product development.

**Instructional Models for Facilitating Creative Productivity**

Once students’ advanced ability or potential is identified, the natural next step is design and implementation of appropriate services to respond to their unique strengths and needs. While numerous models and programs have been developed to facilitate the development of students’ creative productivity, the following three models are included in this review of literature, due to their usage in the curriculum and instruction at The Renaissance Academy: Enrichment Triad Model, Schoolwide Enrichment Model, and Parallel Curriculum Model.
**Enrichment Triad Model.** Problem-based service-learning has been widely implemented in the field of gifted education for many years, as a result of Renzulli’s (1978, 1982, 1986) theories and instructional models based on the concept of creative productivity. Deeply rooted in Dewey’s pragmatic philosophies, Renzulli’s (1976) Enrichment Triad Model provides a more structured approach to PBL, as students participate in three levels of instruction, moving from general exposure (Type I activities), to acquisition of “how to” process skills (Type II activities), with the end goal of selecting a real problem to investigate and solve through project development (Type III activities). Renzulli (1982) defined a real problem as having the following four characteristics: (1) Personally relevant and “involves an emotional or affective commitment, as well as an intellectual or cognitive one,” (2) Has no existent solution, (3) Considered a problem for the group or individual investigating it, and (4) Has a distinctive purpose related to evoking “some form of change and/or . . . contribut[ing] something new to the sciences, the arts, or the humanities” (p. 149). While Renzulli’s Enrichment Triad Model was originally developed as a programming model to primarily serve students identified as gifted/talented on the basis of their advanced intellectual and/or creative abilities, application of this model through Renzulli and Reis’ (1997) larger Schoolwide Enrichment Model has been shown to be effective in developing the talents and creative potential of students of all abilities, as evidenced in the following section.

**Schoolwide Enrichment Model.** The Enrichment Triad Model is a part of the larger Schoolwide Enrichment Model (SEM; Renzulli & Reis, 1985, 1997), a self-described model for educational reform through total school improvement. Renzulli and Reis (1997) stated, “Rewarding lives are a function of ways people use individual potentials in productive ways.
Accordingly, the SEM is a practical plan for making our vision of schools for talent development a reality” (p. 1). While the SEM includes a multifaceted array of services, high expectations for all and appropriate differentiated services for gifted and high ability learners are at its core. Rooted deeply in constructivist theory and pedagogy, the SEM contains three major service delivery elements: (1) The Total Talent Portfolio--a compilation of each student’s individual learning profile (i.e., learning styles, academic strengths and needs, interests, and talents); (2) Curriculum modification strategies--techniques to adequately challenge all students, increase depth of learning, and enhance opportunities for enrichment; and (3) Enrichment teaching and learning--authentic enriched tasks based upon student interest and real-world experiences and skills, applied through the structure of the Enrichment Triad Model (Renzulli & Reis, 1997). These three interventions may be applied across three levels of school structures, including the regular curriculum, enrichment clusters, and a continuum of special services for students at the highest levels of ability. Regular curriculum includes the existing standards and structures that serve to guide a school (i.e., goals, organization; Renzulli & Reis, 1997, p. 22). Enrichment cluster refers to a small group of students of mixed ability who desire to pursue a particular topic of interest and come together during a specific period of time during the school day (Renzulli & Reis, 1997, p. 23). The continuum of special services covers a wide range of services, including enrichment within the general classroom, curriculum compacting, counseling, magnet and special schools, ability grouping in the form of cluster grouping and pull-out groups, beyond-school enrichment options (i.e., summer programs, academic competitions), individual options (i.e., internship, mentorship), and acceleration options (Renzulli & Reis, 1997, p. 25).

Research from the past 20 years supports attainment of the SEM’s stated purpose as a tool for school improvement. To date, the National Research Center on the Gifted and Talented
reports implementation of the SEM in over 2,500 schools across the United States, as well as in additional international settings (Reis, n.d.). Reis (n.d.) stated that numerous studies across schools of widely ranging socioeconomic status have confirmed the model’s effectiveness with students across ability levels, including those with high potential, in regard to increasing creative productivity (Baum, 1988; Burns, 1987; Delcourt, 1993; Hebert, 1993; Newman, 1991; Reis, 1981; Schack, 1986; Starko, 1986), responding to social and emotional needs (Emerick, 1988; Taylor, 1992), increasing the quality and frequency of curricular modifications (Imbeau, 1991; Kettle, Renzulli, & Rizza, 1998), and affecting school change (Cooper, 1983; Reis, Gentry, & Maxfield, 1998). Moreover, multiple studies boast positive effects of the SEM on academic achievement and content area performance (Eleck, 2006; Reis, Eckert, Schreiber, Jacobs, Briggs, Gubbins, Coyne, & Muller, 2005; Reis, Westberg, Kulikowich, & Purcell, 1998). This substantial body of research promotes application of the SEM across grade levels and subject areas and with students from various backgrounds and of various abilities (Reis, n.d.).

Parallel Curriculum Model. Karnes and Bean (2005) describde the Parallel Curriculum Model (PCM; Tomlinson, Kaplan, Renzulli, Purcell, Leppien, & Burns, 2002) as an effective framework for “guiding the design of curricula that develop potential and provide challenge for all students, including the gifted and talented” (p. 600). Developed by a number of leading researchers in the field of gifted education and based upon the belief that good advanced curricula begins with good general curricula, the PCM is composed of four strands, which may be employed either independently or in conjunction: (1) Core Curriculum, (2) Curriculum of Connections, (3) Curriculum of Practice, and (4) Curriculum of Identity (Tomlinson et al., 2002). The Curriculum of Practice shares many goals with the Enrichment Triad Model (Renzulli,
1976), Schoolwide Enrichment Model (Renzulli & Reis, 1985), and Framework for 21st Century Skills (Partnership for 21st Century Skills, 2004), as its ultimate goal is on developing students’ real-world, practitioner-based knowledge and skills to a level commensurate with those of practicing professionals. The other three strands support this goal through a differentiated, concept-based, interdisciplinary approach to core content, with an added emphasis on personal reflection.

In addition, the PCM outlines 10 essential components within a quality curriculum unit: content, assessment, introductory activities, teaching activities, teaching strategies, grouping strategies, products, resources, extension activities, and adaptations for individual student needs (Hockett, 2009; Tomlinson et al., 2002). Differentiated levels of challenge are addressed through the PCM’s ascending intellectual demand, based upon Tomlinson’s (1999) concept of differentiated instruction and Vygotsky’s (1978) theory of the zone of proximal development, as students progress toward the goal of becoming creative producers at increasing levels of challenge from novice to expert, in accordance with their readiness.

Although little research has been conducted on the PCM’s applied practice in educational settings, it was listed as one of three “gifted education curriculum models to contribute quality curriculum for general education and to address the needs of highly able learners” (Hockett, 2009, p. 401). Furthermore, the conceptual framework for the PCM is grounded in research-established models and theories, including Erickson’s (2002) concept-based curriculum model and Bruner’s (1961) discovery learning theory, among others. One evaluation of a Javits grant project investigated the implementation of teacher-developed PCM science and social studies units in general education classrooms across multiple states, employing both an experimental and control group (Callahan, 2005, as cited in Hockett, 2009). In this study, researchers found the
experimental group made significant gains on a posttest measure in one science unit, but no significant posttest differences existed across groups for the other three units (Hockett, 2009). While the PCM warrants additional research to establish its effectiveness, Hockett (2009) lauds the model’s focus on creative productivity and resultant efficacy in responding to gifted and high ability learners’ strengths and weaknesses, “because expert-like performance, behaviors, and products are the benchmark rather than a higher grade-level’s curriculum” (p. 402).

Research on Student Development of Creative Products

In the gifted education literature, there is a wide research base on the benefits of a product development approach for serving advanced students, as well as students of all levels of ability with demonstrated interest, through combined application of the Schoolwide Enrichment Model (SEM) and Enrichment Triad Model (ETM). Several early studies on the SEM and ETM investigated personal factors related to participation in structured development of creative products (Newman, 1991). Starko (1986) and Schack (1986) both conducted quasi-experimental studies to investigate factors affecting students’ initiative to undertake development of a Type III project, and both researchers identified increased self-efficacy in students who demonstrated creative productivity through product development in a school setting. In addition, Starko (1986) found that SEM participating students who developed Type III investigations were significantly more likely than a comparison group to take initiative for creating future products both within and beyond school settings. Schack (1986) also identified numerous factors as significant predictors in students’ choice to embark on development of a creative product, including gender, grade level, past school experiences with product development, and duration of participation in an ETM-based gifted program.
In addition, researchers have explored elements related to the quality of students’ creative products. Reis (1981) conducted a study of two groups of advanced students, those in the top 5% and in the top 20% of their classes, in 20 elementary schools participating in the Type III investigations, and although no significant difference was found between the two groups in product quality, she found age and gender were significant predictors in students’ initiative to pursue projects. In a later study, Newman (1991) conducted a mixed-methods, quasi-experimental study investigating 147 elementary students participating in gifted programs across three school systems. Students in a treatment group used a manual integrating the Talents Unlimited model (Schlichter, 1986) with steps in the process of investigating a real problem, to aid in development of a Type III project, while control group students followed the general structure of the SEM. Results indicated the treatment group displayed a significantly higher completion rate and higher levels of project quality, as measured by the Student Product Assessment Form (Reis, 1981), in comparison to the control group, and qualitative analyses indicated that students and teachers in the treatment group benefited from a guided approach to product development.

While some educators are apprehensive that the large amount of time required for development of authentic projects may shortchange the academic development of advanced students, research serves to alleviate these concerns. In two studies on students participating in the SEM strategy of curriculum compacting--condensing content to eliminate that which students previously showed mastery in order to obtain more time for Type III investigations--results documented no declines in achievement scores (Reis & Purcell, 1993), as well as scores on grade level standardized tests commensurate to, and above, those of nonparticipating peers (Reis, Westberg, Kulikowich, & Purcell, 1998). Long-term effects of students’ development of
creative productivity through participation in the SEM are also positive, as results of two longitudinal studies, one of 18 students and one of 9 students, “showed that students in the sample maintained similar or identical career goals from their plans in high school, remained in major fields of study in college, and were satisfied in current project work” (VanTassel-Baska & Brown, 2007).

Special Schools and Programs for Advanced Learners

Gifted students display many developmental characteristics that set them apart from their same age peers, in regard to intellectual and creative ability, social and emotional needs, and interests (Crowder, 2011; Davis & Rimm, 2004; Renzulli, 1978; Shaver, 1994). Subsequently, development and implementation of specialized services and programs are necessary to respond to the strengths and needs of advanced learners in educational settings. This portion of the literature review includes an overview of characteristics and needs of gifted students, including gifted adolescents, ability grouping, characteristics of and research on special schools and programs, and an overview of The Renaissance Academy.

Characteristics and Needs of Gifted Students

General characteristics of gifted students. In a review of the vast collection of literature on cognitive characteristics of gifted individuals, Hoh (2008) identified the following common characteristics: “Precocity,” “perceptual sensitivity,” “persistent concentration,” “obsessive fascination,” “superior memory,” “dynamic imaging,” “abstraction and generalization,” “efficient coordination” of mental processes, “curtailed learning and reasoning,” “flexible
thinking,” and “metacognitive awareness,” “speedy processing,” and “philosophical thinking” (pp. 59-73).

According to Reis and Small (2005),

Characteristics of high intellectual ability or potential and high creative ability or potential must be considered separately because existing research and discussion has identified two broad categories, which Renzulli (1986) referred to as ‘schoolhouse giftedness’ and “creative/productive giftedness.” (p. 8)

As compared with non-identified peers, intellectually gifted students are verbally precocious, demonstrate ability to learn information and gain skills at a quicker pace, easily comprehend concepts of an abstract nature, exhibit superior problem-solving ability, and exert intensive focus in regard to both interests and work tasks (Clark, 1988; Feldhusen, 1989; Renzulli, 1986). Creatively gifted students also display a unique set of skills and behaviors, including superior problem-solving skills, in-depth domain knowledge, preferences for global thinking, propensity for creating and planning ideas, resistance to closure, willingness to take risks, perseverance, self-confidence, and strong focus on tasks (Davis & Rimm, 2004; Sternberg & Lubart, 1993).

Due to their accelerated intellectual and emotional development, many gifted children do not relate to peers of their same age, instead they desire interaction with adults, older students, or other high ability learners with similar abilities and interests (Davis & Rimm, 2004).

Furthermore, research indicates that gifted individuals also possess a set of unique social and emotional needs. The National Association of Gifted Children (NAGC, 1995) listed the following common affective characteristics of gifted children: “emotional and moral intensity, sensitivity to expectations and feelings, perfectionism, lofty goals and standards for themselves and others, and deep concerns about societal problems at an early age” (p. 1).
Specific characteristics of gifted adolescents. The literature suggests that gifted adolescents exhibit a unique set of characteristics and needs, as compared with peers of average ability (Karnes & McGinnis, 1996). In Talented Teenagers: The Roots of Success and Failure, a longitudinal study which investigated 200 gifted and talented adolescents, Csikszentmihalyi, Rathunde, and Whalen (1993) found that their participants demonstrated numerous characteristics that differentiated them from their peers, in regard to the means by which they acquire information, their desire for superior achievement, goal-oriented personality traits (i.e., perseverance, leadership), and strong sense of self-worth. The researchers described the collective personality style of this group of adolescents as being “well-suited to the difficult struggle of establishing their mastery over a domain: a desire to achieve, persistence, and a curiosity and openness to experience” (Csikszentmihalyi et al., 1993, as cited in Karnes & Bean, 2005).

The development of gifted children may be asynchronous to their same-age peers (Davis & Rimm, 2004). In regard to social attributes, gifted adolescents may appear introverted, with preference for times of solitude to focus on talent development; however, like typical adolescents, they also strongly value and desire relationships with peers (Csikszentmihalyi et al., 1993; Robinson, Shore, & Enersen, 2007). In regard to school-based relationships with peers, Robinson, Shore, and Enersen (2007) summarized research that “observed enhanced self-concept and the discovery of true peers in children who take part in special programs for those with similar abilities and interests” (p. 17; Enersen, 1993; Feldhusen, Sayler, Nielsen, & Kolloff, 1990; Olszewski-Kubilius, 1997).
Unique characteristics and affective needs of gifted students require appropriate educational interventions (NAGC, 1995), and a theme across the literature on gifted adolescents deems time with peers of similar ability as an essential component of both academic and socio-emotional well-being (Csikszentmihalyi et al., 1993; Enersen, 1993; Feldhusen et al., 1990; Olszewski-Kubilius, 1997; Robinson et al., 2007). While some researchers and educators have argued that students optimally benefit from participation in a heterogeneous environment, a substantial body of research has indicated grouping advanced students together benefits their achievement, as well as the achievement of their peers with average and below-average intellectual abilities (Allan, 1991; Coleman, 1995; Feldhusen, 1989; Fiedler, Lange, & Winebrenner, 1993; Gentry, 1999; Gentry & Keilty, 2004; Gentry & Owen, 1999; Kulik, 1992; Kulik & Kulik, 1991; Parpart, 1995; Rogers, 1993; Teno, 2000; Winebrenner, 2001).

Advantages of ability grouping. Research supports ability grouping for several reasons related to the achievement and affective well-being of gifted students. First, a significant body of research has demonstrated the importance of gifted students spending time at school with peers of a similar high ability level, for academic, intellectual, and affective reasons (Allan, 1991; Hoover, Sayler, & Feldhusen, 1993; Kulik & Kulik, 1991; Renzulli & Reis, 1997; Rogers, 1993; Schuler, 1996; Winebrenner & Devlin, 1996). Gifted students display many developmental characteristics that set them apart from their same age peers, in regard to intelligence, emotions, and interests (Davis & Rimm, 2004; Renzulli, 1978). Due to their accelerated intellectual and emotional development, many gifted children do not relate to peers of their same age, instead they desire interaction with adults or other high ability learners with
similar abilities and interests. Winebrenner (2001) pointed out that cluster grouping, in which a small group (normally 3-5) of gifted students are purposefully placed within a larger general classroom, creates opportunities for gifted students to pursue more challenging activities and projects, due to their close proximity to students of a similar high level of ability, whereas these opportunities might not exist in a classroom with only one gifted child. Thus, a typical heterogeneous classroom often is not the most appropriate placement, or least restrictive environment in special education terminology, for most gifted students, and ability grouping serves to place these students in a setting more appropriate to their intellectual, social, and emotional needs.

Removing the highest achieving students from a classroom also may positively affect students of other ability levels. Gentry and Owen (1999) and Winebrenner (2001) indicated that when gifted students are taken out of a classroom, other students’ abilities often emerge, as these students are given opportunities to lead and excel academically and socially, and Schunk (1987) suggested that students of low ability levels typically find role models in students of similar abilities instead of gifted students. Additionally, ability grouping has been shown to positively affect student achievement in gifted learners, as well as students at other ability levels. Researchers found that students of all ability levels boast gains in academic achievement, when gifted students are cluster grouped (Gentry, 1996; Gentry & Owen, 1999). During Gentry’s (1996) initial 3-year study of students in a school cluster grouping program, in which a cluster of high achieving students comprised one classroom, students across two grade levels showed a statistically significant increase in achievement levels, as compared with students not placed in a cluster grouping situation. This study also reported the number of students identified as high achieving increased, and the number of students identified as low achieving decreased each year.
In a subsequent longitudinal study by Gentry and Owen (1999), these results were replicated, as statistically significant increases in student achievement in the areas of reading and math and teacher perceptions of student ability were documented. Thus, research has demonstrated that when gifted students are appropriately placed with similar ability peers through deliberate full-time grouping, all students benefit through both academic gains and teacher recognition.

Ability grouping also serves to increase the frequency and effectiveness of curricular differentiation implemented by teachers. Gifted and high ability learners require differentiation of both the layout and depth and complexity of instruction, in response to their unique abilities, interests, and learning styles (Karnes, 2005; Tomlinson, 1999). General education teachers often experience difficulty and express concerns regarding the amount of time and effort required to effectively meet the needs of all students in a class, including providing appropriate accommodations for students with special needs as well as those identified as gifted (Coleman, 1995). In response, ability grouping serves to narrow the wide range of abilities present within a general education classroom. Palpart (1995) indicated that ability grouping serves a dual purpose to decrease the burden on general education teachers as well as meet the needs of gifted students in the general education setting. In addition, research suggests that gifted students greatly benefit when placed with a teacher who shows a desire for working with gifted students and has received direct training in differentiation methods. Numerous studies have shown that when teachers are provided with appropriate training in strategies to meet the needs of gifted and high ability learners, the frequency and quality of differentiation of instruction for these students drastically increases (Gentry & Keilty, 2004; Gentry & Owen, 1999; Kulik, 1992; Rogers, 1993; Teno, 2000).
Finally, research has shown ability grouping is an effective strategy in reducing costs for school districts seeking to provide comprehensive services for gifted students. Winebrenner and Devlin (1996) referred to various forms of ability grouping as “provid[ing] full-time services on a part-time budget” (p. 1), and other researchers and educators have echoed this sentiment (Parpart, 1995; Teno, 2000; Winebrenner, 2001). As with any type of grouping strategy, ability grouping requires no additional funds above and beyond the general school budget, nor does it require acquisition of additional staff members or administrators. Many forms of ability grouping, such as cluster grouping and full-time special programs, are feasible for all types of school systems, including schools in both rural and suburban settings, as well as those with and without additional gifted programs for students. Multiple researchers have noted the use of ability grouping as a cost effective method for providing services to gifted students, especially in schools in which other programming options are not affordable (Gentry, 1996; Hoover et al., 1993; Rogers, 1993; Winebrenner & Devlin, 1996).

**Arguments against ability grouping.** Conversely, while the literature indicates many advantages of ability grouping, the strategy has earned many opponents in the world of educational research and practice. Several negative opinions toward ability grouping exist, including confusion of ability grouping with tracking, lack of proper selection and training of cluster teachers, increased workload for cluster teachers, and perceptions of negative impacts on non-participating students and teachers. This section addresses each argument and provides research-based refutation for each counterclaim.

A major limitation of ability grouping is its confusion with the method of tracking students (Schuler, 1996; Teno, 2000). Tracking involves assigning students to an inflexible
group, or “track,” with other students of similar ability. In contrast, grouping is a method of placing students into flexible groups based on achievement levels in specific curricular areas, and students can move between groups as a result of ongoing assessment. Kulik (1992) defined ability grouping as “the separation of same-grade school children into groups or classes that differ markedly in school aptitude” (p. ix). Gifted students exhibit many characteristics that differentiate them from peers of lower ability levels, including aptitude, interests, and specific social and emotional traits, and subsequently are excellent candidates for ability grouping (Davis & Rimm, 2004). Winebrenner (2001) provided clear differentiation between tracking and cluster grouping, one form of ability grouping:

In a tracking system, all students are grouped by ability for much of the school day, and students tend to remain in the same track throughout their years in school. In cluster grouping, only the gifted are grouped together in their areas of strength, because they learn better that way. Students of all other ability levels are grouped heterogeneously, because present research indicates that this is the best arrangement for them. (p. 178)

In accordance, Winebrenner and Devlin (1996) indicated that ability grouping benefits the learning process for gifted students, while allowing all other students to remain in a non-permanent heterogeneous setting.

Another barrier toward ability grouping relates to the issue of effective selection and training of teachers. In the results of a study piloting an ability grouping program with no teacher training, Blanksby (1999) noted that teacher competency was a major concern, because teachers reported feelings of incompetence toward designing and providing appropriate services to meet students’ needs and thus desired in-service training. Furthermore, Parpart (1995) and Rogers (1993) stated the importance of teacher training and motivation as well as the presence of appropriate curricular differentiation for gifted students in order for a grouping situation to be effective. In response to these concerns, researchers have agreed that teachers of purposeful
groups of gifted and high ability students should demonstrate both desire and qualification in working with this population, instead of being assigned to the position by an administrator (Hoover et al., 1993; Teno, 2000; Winebrenner & Devlin, 1996). The use of a checklist, survey, interview, or other evaluation method is recommended for use in selecting teachers who possess interest and motivation for working with gifted students (Winebrenner & Brulles, 2008). Additionally, Gentry and Owen (1999) and Gentry and Keilty (2004) affirmed the significance of providing teachers of groups of advanced students with appropriate and ongoing opportunities for staff development as a major component for program effectiveness, as well as outlining a detailed plan for implementation, growth, and success.

A final argument toward ability grouping is the belief that other students and teachers are negatively impacted when gifted students are removed from classrooms (Hoover et al., 1993; Teno, 2000). On the contrary, Gentry and Owen (1999) found that in classes from which the highest achieving students were removed, other students demonstrated increased achievement and confidence and were more likely to be identified by teachers as high achieving. In addition, other researchers have indicated a correlation between cluster grouping and increases in academic achievement among students at all ability levels (Gentry, 1996; Gentry & Keilty, 2004; Gentry & Owen, 1999; Winebrenner, 2001).

Conclusions and considerations about ability grouping. While many opponents of ability grouping hold a narrow view of the current educational policies on inclusion and have attempted to limit the scope of least restrictive environment to the sole confines of a heterogeneously grouped general education classroom, research simply does not support this stance. Because of its unparalleled value in regard to student achievement across all ability levels, quality of teacher
implementation of differentiated instruction, and cost effectiveness, numerous researchers and educators in the realm of gifted education have lauded cluster grouping as an essential component of successful programming for gifted students (Coleman, 1995; Gentry, 1999; Gentry & Keilty, 2004; Gentry & Owen, 1999; Parpart, 1995; Rogers, 1993; Teno, 2000; Winebrenner, 2001).

Educators “must find and use ways that will eliminate the short-shifting of public education for gifted students” (Winebrenner, 2001, p. 175). Ability grouping presents great potential to bring forth the type of cost-effective, total school reform that researchers, educators, administrators, and parents are desperately seeking in this age of leaving no child, including the gifted, behind; thus, its implementation should be seriously considered by all schools in these difficult economic times as a viable means for servicing gifted and high ability learners.

An Overview of Special Schools and Programs

Special schools and programs are a term used to describe a service option for gifted and talented learners in which students are grouped with peers of similar ability on a full-time basis. Though not as widespread as in-class differentiation or pull-out services for advanced learners, full-time programs are implemented primarily at the secondary level, with sparser representation in the middle and lower grades. This section outlines the existent research on general characteristics, participants, and outcomes of full-time special schools and programs, in addition to a description of The Renaissance Academy.

Characteristics of special schools and programs. Most programs for gifted and high ability students take the form of part-time services offered in addition to, or conjunction with,
placement within a general education classroom setting. However, a small number of specialized schools and programs for advanced learners exist in the form of publicly and privately sponsored schools, magnet programs, and weekend or summer programs (NAGC, 2008). These various special schools and programs are sponsored by private institutions, public school districts, and higher education institutions. NAGC (2008) has a Special Schools and Programs Network that described these differentiated settings as being “vital to the ongoing research and comprehensive delivery of services addressing the needs of gifted individuals” (p. 1).

Some research has been conducted on residential schools for gifted and high ability learners (Boothe, Selga, Stanley, & Colgate, 1999; Cox & Daniel, 1983; Feldhusen & Boggess, 2000; Stanley, 1987), although very little research has investigated full-time nonresidential programs and schools. The majority of the existent studies on special schools and programs are of a descriptive nature, and limited research has been conducted on academic effects (Rapp, 2008). NAGC reported, as of 2008, 13 states housed secondary schools or academies for students of high potential in the areas of math, science, the arts, and humanities, with the majority of these schools focusing on math and science. Rapp (2008) summarized the literature on residential specialized schools for advanced learners, in regard to commonalities across student population, faculty, admissions process, and curriculum.

According to Rapp (2008), in a study of 11 specialized math and science schools, student population ranged from 125 to 631 (Stephens, 1998), and the mean SAT score for students in Grades 8 through 10 who participated in residential advanced schools was 1200 (Green, 1993). While males and females were equally represented in these schools, students of culturally and linguistically diverse backgrounds were significantly underrepresented (Green, 1993; Stephens,
A major strength of special schools is the opportunity they provide for students to communicate and collaborate with same-age peers of similar abilities, which benefits both their academic and social-emotional development (Rapp, 2008). Both public and college-sponsored schools and programs boast a wide variety of extracurricular activities in which students may participate alongside peers (Rapp, 2008). According to Rapp (2008), admissions procedures for most advanced schools are highly competitive; thus, consideration of multiple criteria is used to select students, with an emphasis on applicants with advanced academic potential (Green, 1993). Commonly requested application materials include transcripts, standardized test scores, grade point averages, essays, awards, letters or recommendation, portfolios, interviews, and measures of social and emotional maturity (Boothe et al., 1999; Green, 1993; Stephens, 1998).

In Stephens’ (1998) study of residential high schools, the majority of faculty held degrees at the master’s or doctoral level, and a major focus of most schools was recruitment of content experts. However, in many public and private academies, faculty salaries are not commensurate with credentials, as the majority of teachers earn less than their counterparts in typical public school environments (Green, 1993). In regard to curriculum, advanced special schools employ a combination of acceleration and enrichment to respond to the characteristics and needs of their gifted and high ability learners (Green, 1993; Rapp, 2008). Although the majority of specialized schools emphasize math and science, most take an interdisciplinary approach to curriculum, into which all subject areas are delivered through an integrated fashion (Green, 1993; NAGC, 2008). In addition, the curriculum and organization of these settings closely mirror postsecondary institutions, as many special schools offer students an opportunity to take advanced courses for college credit and offer a flexible schedule focused around student interest (Boothe et al., 1999; Rapp, 2008).
Research on special schools and programs. According to Rapp (2008), few empirical studies on residential gifted programs have been conducted, and the majority of those in existence center on one academy, with very few considering data across settings. While some states and individual schools and programs have conducted program evaluations, these results often are not publicly available (Rapp, 2008). The limited research on special schools can be divided into two broad areas, due to focus upon academic outcomes, as well as psychosocial effects on participating students (Rapp, 2008).

Academic outcomes. In reference to academic outcomes demonstrated by student participants in advanced schools and programs, the literature is overwhelmingly positive. In a meta-analysis of 13 research syntheses on various forms of ability grouping, supported by the National Research Center on the Gifted and Talented (NRC/GT), Rogers (1991) declared ability grouping “produce[s] substantial academic gains for gifted students enrolled full-time in special programs for the gifted and talented” (p. x), as evidenced by an effect size of .33, as compared to traditional heterogeneous grouping practices. This conclusion is supported by previous research by Kulik and Kulik (1982, 1984, 1991) and Vaughan (1990). To elaborate, Rogers (1991) explained, “It is unlikely that the grouping itself causes academic gains; rather, what goes on in the group does” (p. x), in reference to the accelerated and enriched curricular modifications present in special schools for talented learners.

Rapp (2008) reported that only one longitudinal study has been conducted by the National Consortium for Specialized Secondary Schools of Mathematics, Science, and Technology (NCSSSMST), during a 3-year period from 1999 to 2001 (Thomas & Love, 2002).
This study analyzed college freshmen and seniors who had formerly participated in a specialized advanced school, and findings indicated that students had a high level of satisfaction with high school experiences, pursued and/or completed degrees in the areas of math and science, participated in a variety of extracurricular and leadership activities, and earned a number of academic awards (Thomas & Love, 2002). Limitations of this study include lack of a control group and potential conflict of interest, as the residential schools collected data from their own graduates (Rapp, 2008).

**Social and emotional outcomes.** Multiple studies have investigated various aspects of psychological, social, and emotional development and adjustment of student participants in advanced special schools, using a variety of quantitative, qualitative, and mixed methodologies (Rapp, 2008). In a study of 966 gifted secondary students in a public secondary residential magnet school, Hawkins (1997) found that a majority of participants shared a common personality type, according to results of the Myers-Briggs Type Indicator, different from a sample of traditional high school students, and they consequently enjoyed being with peers of similar personalities and interests. Contrastingly, in a similar study of secondary gifted students in a residential academy, Cross, Adams, Dixon, and Holland (2004) found that participants’ personality types, as measured by the Minnesota Multiphasic Personality Inventory for Adolescents, were similar to personality types of a comparison group of adolescents of mixed abilities.

In an ethnographic study, Coleman (2002, 2005) documented student perceptions at a residential public high school for advanced learners, and she described students’ feelings of distress and lack of preparation toward increased academic rigor and workload demands (i.e.,
homework). In a similar study of one residential high school, Dunn, Putallaz, Sheppard, and Lindstrom (1987) discovered an interaction among the factors of students’ gender, support sources, and adjustment, concluding that numerous factors may aid or inhibit the adjustment of advanced students at residential settings (Rapp, 2008). In a study investigating reasons gifted students chose not to apply to a math and science academy featuring early college entry, researchers found that students displayed a hesitancy to leave their homes, schools, and extracurricular activities at an earlier date than their peers (Jones et al., 2002).

Overview of The Renaissance Academy

The Renaissance Academy (RA) represents one district’s approach to providing comprehensive programming for advanced learners through application of innovative perspectives to existent resources. By all appearances, RA is a special school for gifted middle school students; however, it is designated as neither a magnet nor charter school, nor is its enrollment limited to students formally identified as gifted according to state special education guidelines. Renaissance Academy is described as “a program of choice that uses student interest in the arts and/or sciences as the foundation for advanced learning in all content areas” (Hall County Schools, 2008, p. 1), and it has been depicted as “the 21st century equivalent of a one-room schoolhouse” (Page, 2010, p. 1). Operating under the administration of a local public middle school but housed in a separate building on a different campus, the optimal term to describe RA’s organization is “special school.”

Renaissance Academy was conceptualized in 2008, when three Hall County teachers developed a plan detailing their dream school and piloted it to administration. Currently in its third year of operation, RA opened its doors in Fall 2009, with 120 students and six teachers. As
evidenced by both its mission statement and application process, RA’s philosophy embraces a broad definition of giftedness similar to Renzulli’s (1978) three-ring conception, which asserts gifted behaviors result when a student’s above average ability, creativity, and task commitment intersect within an area of interest (Crowder, 2011). As such, although the school’s high standards and curricula draw many identified gifted and advanced learners, any interested fifth grade student within the district may apply.

The academy operates in a modest facility with a minimal budget, as RA’s average spending per student is approximately $2,900 less than the district average, and students are responsible for bringing their own lunches and maintaining day-to-day cleaning tasks to assist a one-person janitorial staff (Jordan, 2009). The program is housed in an older school building that became free after a new middle school was constructed a few years ago. In lieu of an on-campus administrator, a “Lead Teacher” performs basic administrative duties in addition to her teaching responsibilities without administrative pay, and all other teachers take on a high level of responsibility for the school’s day-to-day operations. The principal from a neighboring middle school makes periodic site visits and maintains close communication with teachers, students, and parents to assist with the school’s organization and oversight. In addition, parental support plays a large role, as students located outside the school zone must be transported to and from school, and parents are required to log at least 20 volunteer hours per year at the school.

Students. In alignment with its philosophy, RA teachers consider multiple criteria in the application and selection procedure, including review of transcripts (including grades and test scores), recommendations, applications (including a student writing sample and parent questionnaire), interviews, and performance tasks. Any interested student district-wide is eligible to apply, and criteria include “advanced levels of knowledge, interest, and aptitude in
science, the arts, and/or technology;” “outstanding communication skills;” “qualities associated with creativity, including curiosity, resourcefulness, and a problem-solving disposition;” “motivation to excel in his or her studies;” and “maturity to work well independently and in small group settings” (Hall County Schools, 2011a, p. 2). The current application states,

The Renaissance Academy (RA) is a program designed for students who have a passion for learning, primarily focused in the arts, sciences, and technology. Students who are open to discovering their gifts in a creative educational setting are prime candidates for this program. Intrinsic motivation, creativity, and self-discipline are characteristics that RA students should possess. (Hall County Schools, 2011a, p. 2)

Although gifted eligibility documentation and standardized test performance are considered as one component of the evaluation for admission, there are no specific cut-off scores (Crowder, 2011), and about 40% of students are not formally identified as gifted. Application packets from interested rising sixth grade students are due in January, and the RA Selection Committee, consisting of teachers and district administrators, follows a blind review process to screen application packets, in which students’ names and ethnicities are concealed, and these analyses are considered in conjunction with data from observations of applicants as they complete a variety of structured performance tasks during a site visit to the school. Accepted students and parents are notified by the end of the school year before admission, and a waiting list is maintained for non-accepted applicants (Hall County Schools, 2011a).

In its initial year of operation (2009-2010), only sixth and seventh grade students were invited to apply, and 120 were accepted. The following year (2010-2011), eighth graders were added, and enrollment climbed to approximately 200. During the current school year (2011-2012), the student population is 240. According to Crowder’s (2011) ethnicity analysis of the 2010-2011 student population, 79% were White and 21% were of minority races. Analysis of
the current 2011-2012 student population revealed that 83.9% were White and 16.1% were of minority races.

**Faculty.** According to Crowder (2011), teachers at RA are “carefully selected based on individuals’ fit with the school’s mission and curriculum and programming” (p. 31). Creativity, content knowledge, and development and implementation of integrated curricula are all qualities RA teachers are expected to exhibit (Hall County Schools, 2011a). Prior to RA’s opening in 2009, district administrators recruited teachers to apply through a web-based announcement to all current faculty, and personal communications with selected teachers deemed highly effective in working with advanced learners (Crowder, 2011). Interested teachers submitted a written description of their desire to work in a setting such as RA, as well as a sample unit featuring interdisciplinary curriculum and creative thinking skills (Crowder, 2011). Surprisingly, for various reasons, all three teachers with the original idea for RA chose not to apply (Crowder, 2011). Administrators carefully selected six highly effective, qualified core teachers for the first year, and a few positions were added and replaced before the second year, for a total of 11 core teachers. Currently, 12 teachers and one administrative assistant compose RA’s faculty. All of the RA teachers either possess or are working toward acquisition of official Georgia state gifted endorsement, enabling them to be highly prepared in working with advanced students (Crowder, 2011). Innovation also is evident in teacher programming, as some teachers from partner school, South Hall Middle, travel to RA for a portion of their day or videoconference to teach specialized courses (i.e., foreign languages). Furthermore, a paleontologist from a local college partners with the teachers and students to aid in planning and operating the Museum of Inspired Learning, spending part of his time on-site.
Local administrators include a principal and assistant principal at neighboring Elm Middle, and district overseer is the Assistant Director of Teaching and Learning in the area of Academic Rigor. The district’s motto is “Character, Competency, and Rigor . . . for All” (Hall County Schools, 2011b). In a letter to district parents, the director stated,

Commitment to rigorous curriculum means that we envision each learner on an “escalator of development” and we envision ourselves . . . as seeing to that each escalator moves steadily upward in all those areas required for persistent intellectual, emotional, and moral growth in all students. (Krisel, 2012, p. 1)

This vision inspires high standards for teaching and learning, from the top down, as well as fosters a spirit of innovation that allows nontraditional settings such as RA to thrive.

Curriculum and instruction. Students’ interests in the arts and sciences serve as a basis for interconnected, challenging, technology infused teaching and learning across all subject areas (Jordan, 2009). While all RA teachers follow the grade level standards located in the Georgia State Course of Study, they set high standards for students and collaborate both to plan and implement instruction in a truly integrated manner. Thematic, concept-based interdisciplinary units are implemented over a 9-week period, and the Parallel Curriculum model (Tomlinson, Kaplan, Renzulli, Purcell, Leppien, & Burns, 2002) serves to guide the creation of these units. Sample units include “Elements of Change,” encompassing topics related to chemistry and early Georgia history, and “Out of Africa,” featuring geography and the human body. While most unit themes relate to science or social studies, all content areas are interwoven in learning activities, process skills, and product development. Though higher order critical and creative thinking skills are emphasized in aspects of curriculum and instruction, the RA faculty follow Leonardo da Vinci’s belief that learning should be engaging, and most of all, student-centered.
Although all students participate in these interdisciplinary units, learning is extremely individualized, and aspects of differentiated instruction are present in content, process, and products (Tomlinson, 1999). All RA students share a common interest in the arts and sciences, and many have similar intellectual and creative abilities, but their specific learning styles, academic strengths and needs, talents, and interests vary widely. Implementation of the Schoolwide Enrichment Model (Renzulli & Reis, 1985, 1997) provides students with numerous opportunities to remain adequately challenged to meet their own potential and pursue areas of interest through opportunities such as curriculum compacting, enrichment clusters, and participation in advanced courses for high school credit. Students’ affective needs are met through strategies such as counseling, mentorships, and internships, arranged on an individual, as needed basis (Crowder, 2011).

As described in the application, “RA provides a technology-rich learning environment that features a project-based integrated curriculum” (Hall County Schools, 2011, p. 2). Technology is a key component of curriculum and instruction at RA, and because the Museum of Inspired Learning is housed in the former computer lab, students utilize cloud computing technology through one-to-one Internet-connected laptops, allowing them remain “plugged in” to 21st century learning opportunities such as multimedia presentations, interactive instructional activities, distance communication, virtual field trips, and online research. The 21st century skills of creativity, critical thinking, communication, and collaboration (Partnership for 21st Century Skills, 2009) are present throughout RA’s curriculum, as students are constantly interacting with one another and their teachers to learn, problem solve, and create.

Moreover, students are given opportunities to participate in various elective classes and extracurricular activities both within and beyond their building. In addition to the traditional
content classes, RA features courses in art, band, drama, technology, physical education, and a literary magazine. Students who wish to be a part of team sports or other group activities may participate with students at neighboring South Hall Middle School.

*Museum of Inspired Learning.* RA’s Museum of Inspired Learning is central to the program’s focus upon 21st century learning and its student-centric approach. According to Crowder (2011), “one teacher described the museum as ‘the heart of the school’” (p. 33). Conceptualized and managed by an impassioned teacher with an extensive background in working with gifted students, the Museum of Inspired Learning “offers opportunities for students to research and create exhibits in a museum setting” (Hall County Schools, 2011c, p. 2). In lieu of a media center, the museum is housed in a central location within the school building, and students create exhibits based upon their interests and research conducted during units of study, as well as serve as docents to the numerous school groups and community members who visit. The authentic, quality projects created by students to showcase in the museum meet the criteria for being Type III projects in Renzulli’s Enrichment Triad Model (1977), part of the Schoolwide Enrichment Model (Renzulli & Reis, 1985, 1997), as they are student-driven, solve a real problem, and have an authentic audience. In addition, the projects constitute a high quality service-learning experience, as they exemplify all eight quality standards for K-12 service-learning (National Youth Leadership Council, 2008).

The museum’s mission statement is as follows: “The mission of the Museum of Inspired Learning is to provide an environment of excitement and passion about the wonders of our world for students, teachers, the community, and beyond” (Hall County Schools, 2011c, p. 1). The museum has four stated “arms” to guide attainment of its mission statement: (1) Facilitate
students’ creation of quality, standards-based exhibits (projects), and increase their depth of knowledge through the experience of being docents; (2) Provide quality educational programming for K-12 students who visit the museum and/or participate in its programs; (3) Inspire practicing and prospective teachers to incite passion for learning in their own students; and (4) Provide the local community with a quality museum and information on science, history, technology, and art (Hall County Schools, 2011c, p. 2).

Over the past 2 years, the museum has established an impressive record of productivity, in regard to meeting its stated goals. Although it operates under a meager budget in minimalist facilities, the museum has received over $28,000 in grants and donations, as a result of intense dedication and hard work on the part of the teacher who founded and manages it. Renaissance Academy students have created six sets of exhibits on a wide variety of topics (i.e., human body, outer space), which are displayed on a rotating basis, as new exhibits are in progress. In addition, with assistance from their partnering paleontologist, they have created a permanent paleontology exhibit which includes actual historical artifacts and replicas gathered and processed with assistance from a professor of paleontology at a local college who also has an office at the school. In regard to community outreach, they have hosted more than 2,000 students and teachers, who have viewed student-created exhibits on student-led tours. The museum continues to grow and expand, and new components in the works for the current school year include creation of portable museum boxes, creation of a store and survey for visitors, and a mobile media center powered by iPods (Hall County Schools, 2011). In addition, the director currently is in the process of working with administration to develop a strategic plan, in order to articulate short- and long-term goals and secure future support to ensure the museum’s continued success.
Research and outcomes. Due to its young age, little research has been conducted on RA. Review of the literature uncovered one descriptive article featured in *Teaching for High Potential*, a practitioner-based newsletter style publication in gifted education (Troester, 2010), two newspaper articles, and multiple web-based descriptive publications. To date, the only empirical research conducted on RA is a dissertation study, which utilized a sequential mixed methods case study design to investigate instructional delivery components of the program, in regard to teachers’ perceptions and practices in the use of differentiated instruction (Crowder, 2011). Measures included researcher-created surveys for teachers and students, classroom observations guided by the Classroom Observation Scale-Revised (COS-R; VanTassel-Baska et al., 2003), and interviews with teachers. Six teachers and 88 students at RA were involved in the study, and a comparison group of three teachers and 85 students at a similar school within the same district was also examined.

Crowder (2011) stated one goal of her dissertation study was “to address needs identified at both a program (MA) and discipline (gifted education) level” (p. 8). Educators from multiple schools across and outside the state of Georgia have visited RA with the goal of learning about their curriculum and organization, and two elementary schools have replicated the model at their own sites. Findings from Crowder’s study helped to lend support to the practices and structures of RA, in regard to determining its potential for consideration as a model site for gifted education and future replication. In addition, these findings provide a basis for the study proposed in this dissertation; as Crowder (2011) evaluated teacher-centered instructional outcomes, this study sought to investigate effects upon participating students.
Summary

Schools today are faced with the overwhelming challenge of equipping students with 21st century skills necessary for productivity in a highly technological global society. Experts in the field of gifted education agree that broadened conceptions of giftedness and a focus on demonstration of creative productivity in the learning process are essential to attainment of success for advanced learners, yet this ideal is practiced in very few modern educational settings. The Renaissance Academy (RA) represents one school district’s attempt at providing quality, comprehensive full-time programming for gifted and high ability learners by facilitating their development of creative productivity through an advanced, integrated, interest-based curriculum in the arts, sciences, and technology.

The literature indicated that evaluation of gifted programs is a necessary yet often neglected practice in ensuring the efficacy of services in developing participants’ potential, as well as pinpointing areas for improvement (VanTassel-Baska & Feng, 2004). Little research has been conducted on full-time nonresidential programs for high ability learners (Rapp, 2008), and no research has investigated student outcomes of RA (Crowder, 2011). This study sought to fill a gap in the literature on special schools and programs for advanced learners by exploring effects of participation in RA on students’ project quality, academic engagement, and investment in academic learning.
CHAPTER 3
RESEARCH METHODS

Whereas the previous chapter discussed the various issues and topics related to this study, this chapter outlines the proposed research methods and analyses applied to the three research questions under investigation. This study sought to examine how participation in a full-time special program influences gifted middle school students’ project quality, academic engagement, and investment in academic learning, as compared with peers in a traditional part-time gifted program. The overarching goal of this study was to evaluate student outcomes of the Renaissance Academy (RA) on two levels: (1) Provide feedback to stakeholders in RA to identify current strengths, needs, and suggestions for further development, and (2) Create a research base for other schools and programs that desire to replicate RA’s model. In accordance, the researcher selected methods and modes of analysis based upon existent best practices guiding gifted and special education research and evaluation (Callahan, 2004; Mertens & McLaughlin, 2004; VanTassel-Baska & Feng, 2004).

Research Design

In order to accomplish the stated purpose, the following research questions served to guide this study:

1. Do middle school students of high ability in a special school setting and traditional gifted/advanced classes exhibit differences in project quality, as measured by the Student Product Assessment Form (SPAF), observations, and interviews?
2. Do middle school students of high ability in a special school setting and traditional
gifted/advanced classes exhibit differences in academic engagement, as measured by
observations and interviews?

3. Do middle school students of high ability in a special school setting and traditional
gifted/advanced classes exhibit differences in investment in academic learning, regarding
interest, challenge, choice, and enjoyment, as measured by the *My Class Activities* survey,
observations, and interviews?

This study followed a mixed methods design, including both quantitative and qualitative
measures, in response to the stated purposes of the study and nature of the outcomes under
investigation. Researchers have recommended the use of mixed methods in special education
research when the problem under investigation is complex in nature (Mertens & McLaughlin,
2004; Teddlie & Tasharkkori, 2002). Mertens and McLaughlin (2004) noted that, in the area of
special education research, “mixed methods have the potential to contribute to addressing
multiple purposes, and thus to meeting the needs of multiple audiences for the results” (p. 113).
Due to the complexity of the nature of programming in gifted education, as well as the separate
purposes of the study in measuring academic and attitudinal results, a combined quantitative and
qualitative approach was used to collect different types of data and provide data triangulation
across sources.

Quantitative instrumentation in the form of surveys and rating scales investigated
students’ demonstrated levels of project quality, academic engagement, and investment in
academic learning. Qualitative measures in the form of observations, anecdotal notes, and
interviews were applied to further investigate these outcomes, as well as explain resultant trends
and themes that emerged from the data. During the analysis phase, quantitative and qualitative data were considered both independently and in conjunction.

Participants

This study was conducted in two middle school (Grades 6-8) programs for high ability learners, located in two separate buildings within the same school district in a Southeastern state. According to data from the 2010 U.S. Census, the total population of Elm City is 33,804, with 30% of residents under the age of 18. Median income per household is $39,835. Fifty-four percent of residents identified themselves as White, 42% as Hispanic/Latino, and the remaining 4% as Black, Asian, American Indian, Alaskan Native, or Pacific Islander.

Renaissance Academy currently has a total student population of 230 students in Grades 6 through 8. Student demographics are as follows: White--83.9%, Hispanic--7.8%, Black--2.6%, Asian--2.6%, Multi-racial--2.6%, and American Indian--0.4% (Hall County Schools, 2012). Socioeconomic data, calculated on the basis of free/reduced lunch eligibility, is not available for RA, because the school currently does not offer cafeteria services. Students are served by 12 full-time teachers, each of whom possesses a gifted endorsement or certificate, in addition to multiple rotating part-time faculty from the neighboring middle and high schools (i.e., band, Spanish, Chinese, physical education). Across grade levels (6-8), students take all required academic courses, and each student is allowed to choose two electives per grade level (i.e., band, art, drama, museum, etc.). Eighth grade students are offered the opportunity to earn ninth grade high school credit for each academic course.

Elm Middle (EM), the school in which the comparison gifted/advanced program is located, has 986 total students in Grades 6 through 8, of which 63.5% are Hispanic, 27.4% are
White, 4.8% are Black, 2.8% are Asian, and 1.4% are Multi-Racial (Hall County Schools, 2012). Of the total study body, 85% is designated as economically disadvantaged, on the status of students who qualify for free or reduced lunch, as compared to the state average of 50%. In addition, 25% of students are designated as having limited English proficiency. Teachers at the school have an average 13 years of experience and 70% hold graduate degrees. The total number of formally identified students as gifted/talented, according to guidelines set forth by the state department’s special education code, is 64, and these students are provided services through one or more classes per grade level designated as gifted or advanced. The targeted subject area in which a gifted course is offered differs by grade level in accordance with teachers’ certification or endorsement in the area of gifted education and specialization in a subject area. In sixth grade, the targeted gifted courses are language arts, social studies, and science, and an advanced math class is also offered. In seventh grade, gifted courses exist in the areas of social studies, language arts, math, and science. In eighth grade, students are offered the opportunity to take academic courses for ninth grade high school credit, including social studies, language arts, science, and math, and of those, language arts and social studies are designated as gifted. Students at each grade level also take elective courses (i.e., band, art).

Student Participants

All students attending RA, as well as all participants in the gifted/advanced program at the comparison school, were invited to take part in the study, and those who returned informed consent and assent forms indicating both parental and personal permission to participate were included. A total of 165 RA students were in the study sample, including 77 in sixth grade, 40 in seventh grade, and 48 in eighth grade. A total of 61 students from EM were in the study
population, including 23 in sixth grade, 16 in seventh grade, and 22 in eighth grade. All of these participants took surveys and were observed during class observations. In addition, some seventh grade students’ projects were examined for project quality, and four eighth grade students from each program were selected for participation in separate focus group interviews.

Teacher Participants

All teachers at both RA and in the gifted/advanced program at the comparison school were invited to partake in the study, and those who returned informed consent forms indicating consent to participate were included. Eight RA teachers and six EM teachers consented to participate in the study. Five teachers in each program, 10 total, were selected for participation in the study, due to matching between the subject areas of classes across grade levels, including two sixth grade classes, one seventh grade class, and two eighth grade classes. These 10 teachers were asked to have their classroom instruction observed during two observations conducted by the researcher and an associate. In addition, three teacher participants in each program, one per grade level, participated in an interview.

Measures

This section details each quantitative and qualitative measure utilized in this study. An overview of all outcomes, measures, and methods of analysis for each research question are contained in Figure 2.
<table>
<thead>
<tr>
<th>Research Question</th>
<th>Outcome</th>
<th>Measures</th>
<th>Analysis</th>
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| 1                 | Project quality | • *Student Product Assessment Form* (SPAF)  
• Anecdotal notes taken during observations.  
• Interviews with students and teachers | Independent t-tests on means of subtotal, and total scores to compare two groups; coding for qualitative data. |
| 2                 | Academic engagement | • Observations using the *William and Mary Classroom Observation Scale-Revised* (COS-R)  
• Anecdotal notes taken during observations.  
• Interviews with students and teachers | Descriptive statistics on means of subscale and total scores to compare two groups; coding for qualitative data. |
| 3                 | Investment in academic learning, regarding interest, challenge, choice, and enjoyment | • *My Class Activities* (MCA) survey  
• Anecdotal notes taken during observations.  
• Interviews with students and teachers | MANOVA on means of subscale scores to compare two groups; coding for qualitative data. |

*Figure 2. Study overview.*

*Student Product Assessment Form*

To assess students’ project quality, the *Student Product Assessment Form* (SPAF; Reis, 1981; Appendix A) was used to score projects developed by students from each of the two groups. Created with the specific purpose of objectively evaluating creative products created by advanced students, the SPAF form includes the following 15 indicators: early statement of purpose; problem focusing; level, diversity, and appropriateness of resources; logic, sequence,
and transition; action orientation; audience; and overall assessment (i.e., originality of idea, attention to detail, etc.; Reis, 1981). A 5-point Likert-type scale, ranging from to a great extent (5) to to a limited extent (1) was used to measure each of the 15 indicators, divided into nine subscale categories, on the SPAF form. Subtotal scores for items 1-8 and 9A-9G and a cumulative “Overall Assessment” score were calculated by averaging each of the subscale indicator scores.

The SPAF boasts high content validity, as determined by its review by a number of notable experts in the fields of gifted education and educational research, as well as 20 classroom teachers with experience in facilitating student product development (Reis, 1981). The test-retest reliability of the SPAF is considerably high (.96), as determined by consensus of scores among a group of raters who used the instrument to evaluate two sets of student products across two time periods. This process also resulted in similarly high interrater reliability (.96). In addition, the SPAF has been effective in its use across multiple research studies to analyze various aspects of student creative product development (Newman, 1991, 2005; Olenchak, 1988; Olenchak & Renzulli, 1989; Reis, 1981, 1991). In other studies that used the SPAF to assess project quality, raters were trained in use of the SPAF to score projects, and interrater reliability was established by having all scorers repeatedly score the same project using the SPAF, with discussions conducted after each scoring session, until scores reached a level of .80 consistency among raters (Newman, 1991; Olenchak & Renzulli, 1989).

Classroom Observation Scales-Revised (COS-R)

The William and Mary Classroom Observations Scales-Revised (COS-R; VanTassel-Baska et al., 2003; Appendix B) was used to measure student academic engagement across both
programs. The COS-R is a rubric designed to evaluate general and differentiated teaching behaviors as well as student responses in gifted education settings, in order to determine the extent to which advanced students are receiving and responding to established best practices (Crowder, 2011). The full instrument contains four different parts, three which relate to teacher observation and one of which relates to student observation. The portion of the COS-R dedicated to student observation contains a rubric measuring student engagement in 25 specific teaching behaviors divided into six subscale areas: general classroom behaviors (GCB), diverse self-selected or self-paced activities (DSA), problem-solving strategies (PSS), critical thinking strategies (CRI), creative thinking strategies (CRE), and research strategies (RS; VanTassel-Baska et al., 2003). For each teaching behavior, observers assign a rating based on what they observed during an instructional period. The 5-point rating scale ranges from most (>75%) to none, including an N/A option to indicate teaching strategies not applicable in a particular lesson. The guidelines for usage of the COS-R recommend that observations take between 30 and 50 minutes; thus, it is well suited for observation of a typical class period, as in this study. Observers are encouraged to complete the form within the same day as an observation occurs, preferably during or soon after the observation, in order to record accurate perceptions. In addition to the rating scale for each of the 25 items, the rubric also includes spaces for an observer to record anecdotal comments under each of the six subscale areas.

The COS-R has high reliability, as determined by 23 pairs of observers who each conducted two observations in each of 73 classrooms, with an established interrater reliability of .87 and .89 (VanTassel-Baska, Quek, & Fang, 2005). For overall internal reliability of the instrument, alpha coefficients were high (.91 and .93.), and for the six subscale areas, reliability was moderately high (.70). Content validity was determined on the basis of four expert raters’
review of the COS-R for accuracy and clarity of all items. According to results of this review, content validity was very high, with an alpha coefficient of .98, and clarity of items received a similar high alpha coefficient of .99 (VanTassel-Baska, Quek, & Fang, 2005). Thus, the instrument is deemed a valid measure of the outcomes of interest, teacher behaviors, and student responses in educational settings for gifted and advanced learners.

For the purposes of this study, the researcher created two ancillary forms to the COS-R student rating scale to aid in organization of data and promote the depth and breadth of qualitative data collected: (1) a cover sheet titled, “Overview of Classroom Observation,” containing large text blocks in which the observers could record the date, time, grade level, subject area, lesson topic, general description of lesson/activity, and other notes; and (2) a separate page for comments titled, “Comment Form for Class Observations,” including each of the five areas from the rating scale with the addition of a category titled, Engaged in Meaningful Technology Usage. This category was added to promote the collection of more specific data on student engagement in technology related to 21st century skills.

My Class Activities (MCA) Survey

My Class Activities (MCA; Gentry & Gable, 2001; Appendix C) is a survey specifically developed to gauge perceptions of gifted and high ability learners about their instructional activities in regard to four subscale areas: interest, challenge, choice, and enjoyment. In this study, the MCA was used to measure differences across the two groups in student investment in academic learning. The developers of MCA state one of its intended purposes is to measure “whether a difference exists among various groups in attitude toward school” (Gentry & Gable, 2001, p. 1), thus relating to the third research question under investigation in this study. The four
dimensions of interest, challenge, choice, and enjoyment were selected on the basis of current literature on best practices in gifted programming and student performance and attitudes, with a focus on creative productivity. The instrument has effectively been employed in multiple research studies in gifted education, including the middle school level, to inform researchers about advanced students’ perceptions toward learning and suggest areas for subsequent improvements to current forms of identification and programming (Gentry & Gable, 2001; Gentry, Gable, & Rizza, 2001; Gentry, Gable, & Springer, 2000; Maxfield, Gentry, & Gable, 1998).

The instrument contains 31 statements written in first person about aspects of in-class activities, to which students respond using a Likert-type 5-point rating scale ranging from never to always. A sample item reads, “What I do in my class fits my interests” (Gentry & Gable, 2001). The instrument was determined to have a high content validity, as determined by a review of the literature, as well as distribution of a preliminary version of the survey to two panels of 16 experts including educators, administrators, researchers, and graduate students in the field of gifted education, in order to review items and assign them to the appropriate dimensions. Items deemed to have 90% or greater agreement across respondents were included in the pilot survey, which consisted of 40 total items.

A confirmatory pilot study was conducted with 1,523 students in Grades 6 through 8, in order to establish alpha reliability estimates for internal consistency of the four constructs, which range from .75 to .92. Specifically, the alpha coefficients for each dimension are as follows: interest = .89, challenge = .78, choice = .75, and enjoyment = .92 (Gentry & Gable, 2001). The reliabilities for the middle school group fall near the top of the acceptable range (Gall, Borg, & Gall, 2008), indicating that this survey has high reliability for use with middle school students.
In addition, test-retest stability reliability coefficients were calculated with a separate group of students in Grades 5 through 7, and these coefficients range from .66 to .74 for the four subscales, “suggest[ing] adequate stability of responses for this type of affective survey instrument” (Gentry & Gable, 2001, p. 31).

**Interviews**

To further assess students’ academic engagement and investment, semi-structured interviews were conducted separately with a purposeful sample of participating students and teachers from each program. Kvale and Brinkman (2009) stated the purpose of a semi-structured interview is “obtaining descriptions of the life world of the interviewee in order to interpret the meaning of the described phenomena” (p. 3). In this study, interviewing was used as an ancillary tool to provide an added depth and breadth of understanding of the outcomes under investigation--project quality, academic engagement, and investment in academic learning. The researcher’s main goal in interviewing students and teachers was to uncover possible motives and factors influencing demonstrated behaviors and performance. Interview scripts (see Appendix D) were developed on the basis of categories within the MCA survey and COS-R observation form, literature on gifted education instructional practices and student characteristics, and the *Framework for 21st Century Skills* (Partnership for 21st Century Skills, 2009).

A focus group format was used for student interviews. Advantages of focus groups include their social orientation and more relaxed nature, making them a positive match for the traits of many adolescents, who may feel more comfortable in a setting with their peers (Marshall & Rossman, 2006). Feng and Brown (2004) recommend focus groups as a promising practice
for evaluation of gifted programs and note their strength in helping an investigator to confirm or further explain survey findings. Student interview questions inquired about students’ engagement in and perceptions toward their instructional activities and school in general, usage of 21st century skills, and usage of instructional technology in the creative productivity process. Teacher interviews were conducted in a one-on-one format. Teacher interview questions inquired about teachers’ experience and attitudes toward teaching an advanced student population, preparation for and reflection upon instruction, and perceptions about student engagement and the strengths and weaknesses of their school and program.

Procedures

This section details all procedures followed by the researcher and associates during the data collection phase of this study, including obtaining consent, sampling, and administering each instrument, in order to obtain quantitative and qualitative data to answer the three research questions under investigation.

Organization of Site Visits

The researcher and two associates made three total on-site visits to the programs included in this study over a time period of 3 months, in order to recruit and obtain consent from participants, select a sample, and conduct all data collection procedures. Site visits were strategically planned to allow for observation of the Museum of Inspired Learning in two stages—student preparation and hosting of exhibits. During the first visit, the researcher recruited and met participants; identified the sample; gained information about the programs’ structures, climates, and nuances; and conducted informal observations of students and teachers in their
natural environment, in the form of field notes. During the second visit, the researcher and an external observer conducted the first set of class observations across 10 classrooms and observed the RA museum during a student-led field trip, and the researcher gave the surveys and directions for the teachers to administer. During the third and final visit, the researcher and an external observer conducted the second set of class observations across nine classrooms, and the researcher collected completed student surveys, conducted student and teacher interviews, and collected student projects from both programs.

Consent

Prior to beginning this study, the researcher prepared and submitted all necessary application materials to obtain consent from both The University of Alabama’s Internal Review Board (IRB) and the superintendent of the school district in which the two programs under investigation were located. Once permission was obtained from both the IRB and school district, the researcher contacted the principal and teachers at both schools to schedule a date for an initial on-site visit. Teachers at each site were recruited to participate in the study through an initial email sent in advance of the on-site visit, as well as in person at a meeting during the researcher’s first visit, during which the study’s purpose, duration, and other pertinent details were explained. Teachers who signed consent forms during the researcher’s first visit were included in a pool, and the researcher categorized by grade level the teachers at each site who consented to be observed during classroom instruction, and two classrooms from each grade level were purposefully selected to participate in the study, on the basis of matching between grade level and subject areas across programs. The researcher then asked these teachers to
distribute consent forms inviting their students to participate in the study. These consent forms were sent home with students, signed by parents and students, and returned to the teachers.

**Sampling**

Once all student consent forms were returned, the researcher identified consenting participants by grade level, and all participants were included in the study sample. Whereas the researcher originally had planned to use stratified random sampling to select a purposeful sample, student numbers from the comparison group were too low to allow for this procedure; thus, convenience sampling was used.

**Project Evaluation**

Students in both programs included in this study displayed creative productivity through creation of a variety of products related to course of study standards in science and social studies over the duration of the school year. In order to objectively assess project quality, as well as determine whether significant differences existed among the groups, the *Student Product Assessment Form* (SPAF; Reis, 1981) was utilized. To elicit student projects from both programs, the researcher asked teachers in both programs to submit student projects that reflected the highest level of student learning. Teachers from each program submitted various projects; however, only the seventh grade student projects contained the thoroughness of description necessary for raters to score them. Seventh grade teachers submitted a total of 56 projects, including 34 projects from the experimental group (RA) and 22 projects from the comparison group (EM). All projects related to seventh grade social studies standards in the state course of study.
All projects were scored by four external raters not involved in the study. These raters were all current gifted specialists with 7 to 30 years of experience in working with advanced students on development and assessment of creative products in a K-12 school setting. To ensure validity of scores and inter-rater reliability, all raters participated in a training session on use of the SPAF, and the scorers repeatedly scored projects multiple times, with discussions held in-between each scoring, until 80% agreement was evidenced among scores. After initial inter-rater reliability was calculated, the raters worked independently and in pairs to score the remaining projects. Projects were scored over four separate sessions during the duration of one week. The researcher was present during all scoring sessions to answer questions posed by the raters but otherwise did not participate in the scoring process.

In addition to quantitative data collected by use of the SPAF, the researcher also recorded anecdotal field notes about student project development and presentation during the class observations across both programs and observation of student development and presentation of the museum exhibits at RA. Furthermore, during the project scoring sessions, the researcher recorded field notes based on discussions between the raters.

Observations

To investigate student academic engagement, the student portion of the COS-R (VanTassel-Baska et al., 2003) was used in conjunction with the two researcher created open-ended forms to guide two formal observations of students during a typical class period (50 minutes) in five selected classrooms at each grade level in each program. Nineteen separate observations of class periods were conducted. All classes but one were observed twice; the remaining class was viewing a video during the scheduled time of the second observation.
Participating teachers were contacted in advance of all observations to schedule dates and times that worked best with their schedules. Crowder (2011), who used the teacher portion of the COS-R to observe instructional activities in a similar manner, remarked that a minimum of two observations is recommended by numerous studies that have employed the COS-R to guide observations of classroom instruction.

The COS-R creators suggested that two individuals work together to conduct observations within a new research situation (Crowder, 2011). In order to comply with this guideline and minimize the threat of any unintended researcher bias, two raters, the researcher and one gifted specialist trained in teaching and assessment of gifted education strategies, but not participating in the study, simultaneously conducted each observation. A different external observer, two total, accompanied the researcher on each site visit to assist with observations. Prior to conducting these formal observations, the researcher met with each external observer to conduct a thorough review of the COS-R student form and corresponding open-ended forms, in order to promote familiarity with each of the targeted student behaviors under investigation. To ensure inter-rater reliability and determine final scores, after each observation the researcher and external rater met to compare ratings and discuss any discrepancy between scores. For the first two observations with each rater, a percentage of agreement was calculated to determine the extent of agreement across rating scales and was determined to be at least 85%.

In addition to the quantitative portion of the COS-R, observers simultaneously recorded qualitative observations about the general lesson context and each sub-category of the COS-R in addition to meaningful technology usage. Each day, during and after observations, the researcher used the process of journaling to make additional narrative commentary related to
observations, as a recommended practice to add depth to both quantitative and qualitative data collected and aid in the reflexivity of the researcher (Glesne, 2011).

**Surveys**

To gain data on students’ investment in academic learning, all student participants in each program completed the *My Class Activities* (MCA; Gentry & Gable, 2001). A total of 226 students across both programs completed surveys, including 165 from RA and 61 in the comparison group. During the researcher’s second and third site visits, surveys were administered to students at the beginning of each class period. Each survey had a unique student number written at the top, in correspondence with a list the researcher previously had compiled, and sticky note with the student’s name was placed on the survey. The students were given directions to discard this sticky note before submitting the completed surveys, in order to promote student confidentiality and honesty in responses. Before completing the survey, students were read aloud a standardized paragraph of directions from the MCA manual. Surveys were administered and completed by students one time within a single class period, over a time period of 3 weeks.

**Interviews**

Following collection of observational and survey data, the researcher conducted semi-structured interviews with a purposeful sample of participating students from each group. All interviews were held in the school setting, during school hours, with the exception of one teacher interview, which was conducted by phone, at a mutually agreed upon time during the teacher’s planning period.
The researcher held two focus group interviews, one in each program, with a group of four eighth grade students selected on the basis of their gender, ethnicity, and verbal communication ability, as evidenced during class observations. Two males and two females participated in each focus group. These interviews were conducted in a non-classroom setting—the café (RA) and library (EM)—and each lasted about 20 minutes. The researcher asked questions based on a prewritten script but varied wording to match the students’ rapport and asked several follow-up questions in accordance with student responses.

In addition, individual interviews were conducted with three teachers, one per grade level, from each group. The teacher interviews initially were intended to be a focus group format, but a one-on-one format better suited the teachers’ schedules. The researcher contacted the teachers a week before the final site visit to schedule a time for the interviews. Teacher interviews lasted an average of 30 minutes each and were conducted in the teacher’s classroom either before school or during a planning period, with the exception of the one phone interview. As with the student interviews, a pre-written script was used to guide questioning, but the researcher also asked multiple follow-up questions to invite teachers to elaborate upon responses and often varied the order of questions based upon the direction of the conversation.

All interviews were audio taped and transcribed verbatim by the researcher and one transcription specialist hired by the researcher, and not connected with this study, using a computer word processor. The researcher made anecdotal notes during both the actual interviews and throughout the transcription process, in order to note contextual cues and identify key phrases and potential themes.
Analysis

Quantitative data were analyzed by use of a variety of statistical tests to measure significance of differences in results between the two groups, including independent t tests, MANOVA, and descriptive measures conducted by the SPSS computer software program. Qualitative data were explored through application of established qualitative research procedures for grounded theory (Charmaz, 2006; Glesne, 2011). Results of all quantitative and qualitative analyses were considered both independently and in conjunction, in order to more fully understand the data, provide for triangulation, and identify subsequent trends and themes that emerged. Specific analyses for each type of data are described in the following sections.

Quantitative Analyses

Data from all quantitative measures used in this study (SPAF, COS-R, and MCA) were analyzed using the SPSS statistical software package, and the resulting quantitative data analyses were used to answer Research Questions 1, 2, and 3. To answer question 1, which addressed project quality, a series of independent t tests was conducted to determine whether significant differences existed between both groups’ SPAF scores in each of the following means: subtotal for items 1-8, subtotal for items 9A-9G, and total score.

To answer question 2, which addressed academic engagement, quantitative data from the COS-R were examined. Descriptive statistics and frequencies were calculated for each group and compared across groups, by both total group and grade level, for each of the five subscale areas of the rating scale and the overall sum. Due to the small number of observations (N = 19), more advanced statistical comparisons (i.e., ANOVA) could not be applied, so mean scores and percentages were determined for each grade level in order to discuss differences across both
groups in meaningful terms. These quantitative data are discussed in conjunction with the accompanying qualitative data generated from observations in the following chapter.

In response to question 3, which addressed investment in academic learning, multivariate analysis of variance (MANOVA) was used to determine whether the variance between groups was significantly different than the variance within groups for mean results of each survey subscale and the overall score. Comparisons were made between the experimental and comparison group for each grade level and total group survey results.

**Qualitative Analyses**

Qualitative data collected in this study included the open-ended portion of the COS-R observation forms, interviews with students and teachers, and the researcher’s field notes. Data, in the form of anecdotal notes and interview transcriptions were analyzed through a combination of procedures commonly used in the processes of open coding and axial coding, based upon grounded theory (Charmaz, 2006; Kvale & Brinkmann, 2009). Initial categories were determined as a result of synthesizing a critical review of the literature with firsthand observations of and interactions with teachers and students within the programs in this study. Next, the researcher engaged in journaling before, during, and after the observations and interviews, including during the transcription process. Finally, the researcher created a key of categories/codes and coded my data transcripts in accordance. As recommended in axial coding, the researcher sought to “[relate] categories to subcategories, [specify] the properties and dimensions of a category, and [reassemble] the data . . . fractured during initial coding to give coherence to the emerging analysis” (Charmaz, 2006, p. 60). Emergent themes, relationships, and patterns were determined as a final step in the process. Qualitative findings were considered
in conjunction with quantitative results in order to attain data triangulation to assess fully the student outcomes of project quality, academic engagement, and investment in academic learning.

Summary

This chapter presented an overview of all components of the research process, including descriptions of the research design, participants, and measures. Procedures for conducting the study also were outlined. Finally, data analysis procedures for both quantitative and qualitative data sources were detailed. Results of a synthesis of these analyses are presented in the following chapter.
CHAPTER 4

RESULTS

The purpose of this study was to determine whether there were differences in student project quality, academic engagement, and investment in academic learning between students in Grades 6, 7, and 8 in The Renaissance Academy (RA), the experimental group, and students in Elm Middle (EM), the comparison group. This chapter presents the results obtained during the data analysis phase of the research study. Findings are presented in order of research questions; quantitative findings are presented first, followed by qualitative outcomes.

Quantitative Results

Research Question 1

The first research question asked about differences in project quality between students in RA and those in the comparison group. In response to this question, results from the Student Product Assessment Form (SPAF; Reis, 1981) were assessed by SPSS (Version 19) using independent samples $t$ tests, in order to determine whether significant differences existed in the indicators of project quality between students in the experimental and comparison groups. A mean was obtained for each item on the SPAF, for the subtotal of items 1-8, for the subtotal of items 9A-9G, and for the overall total score (1-9G), and $t$ tests compared differences in the means for each subtotal area between groups. The $t$ statistic was used as the test statistic, and the level of significance was set at .05. Table 1 presents the mean scores, standard deviations, and $p$-values for both groups’ SPAF results.
Table 1

**Group Differences in Quality of Projects Completed by Seventh Grade Students**

<table>
<thead>
<tr>
<th>SPAF items</th>
<th>RA students (N = 34)</th>
<th>Comparison group (N = 22)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>1</td>
<td>4.94</td>
<td>.239</td>
<td>3.55</td>
</tr>
<tr>
<td>2</td>
<td>4.77</td>
<td>.496</td>
<td>3.52</td>
</tr>
<tr>
<td>3</td>
<td>4.44</td>
<td>.705</td>
<td>2.27</td>
</tr>
<tr>
<td>4</td>
<td>4.65</td>
<td>.597</td>
<td>2.14</td>
</tr>
<tr>
<td>5</td>
<td>5.00</td>
<td>.000</td>
<td>2.43</td>
</tr>
<tr>
<td>6</td>
<td>4.68</td>
<td>.638</td>
<td>3.30</td>
</tr>
<tr>
<td>7</td>
<td>4.18</td>
<td>.869</td>
<td>2.39</td>
</tr>
<tr>
<td>8</td>
<td>4.97</td>
<td>.172</td>
<td>3.43</td>
</tr>
<tr>
<td>9A</td>
<td>4.71</td>
<td>.579</td>
<td>3.36</td>
</tr>
<tr>
<td>9B</td>
<td>4.91</td>
<td>.288</td>
<td>3.32</td>
</tr>
<tr>
<td>9C</td>
<td>4.74</td>
<td>.511</td>
<td>3.30</td>
</tr>
<tr>
<td>9D</td>
<td>4.47</td>
<td>.662</td>
<td>3.25</td>
</tr>
<tr>
<td>9E</td>
<td>4.91</td>
<td>.288</td>
<td>3.23</td>
</tr>
<tr>
<td>9F</td>
<td>4.74</td>
<td>.511</td>
<td>3.21</td>
</tr>
<tr>
<td>9G</td>
<td>4.59</td>
<td>.609</td>
<td>3.07</td>
</tr>
<tr>
<td>Sub. 1-8</td>
<td>37.62</td>
<td>2.686</td>
<td>23.02</td>
</tr>
<tr>
<td>Sub. 9A-9G</td>
<td>33.06</td>
<td>2.828</td>
<td>22.73</td>
</tr>
<tr>
<td>Total score</td>
<td>70.68</td>
<td>5.238</td>
<td>45.75</td>
</tr>
</tbody>
</table>

*Indicates significance at the .05 level

Table 1 shows the mean comparisons for the two groups’ SPAF scores on individual items, subtotals for items 1-8 and 9A-9G, and total score. There were statistically significant differences in mean scores between groups for each of the three comparisons at the .05 level of significance. The data indicated the mean scores of the experimental group were higher than those of the comparison group for each of the subtotals and for the total scores. For the subtotal of SPAF items 1-8, there was a statistically significant difference, \( t (54) = 14.739, p = .000, r_{Y1} = .885 \), in the mean score of RA students \( (M = 37.6176, SD = 2.6857) \) and the mean score of comparison group students \( (M = 23.0227, SD = 4.7270) \). For the subtotal of SPAF items 9A-9G, there also was a statistically significant difference, \( t (54) = 11.005, p = .000, r_{Y1} = .821 \), in the mean score of RA students \( (M = 33.0588, SD = 2.8278) \) and the mean score of comparison group
students ($M = 22.7273$, $SD = 4.2081$). In addition, for the overall score, there was a significant difference, $t (54) = 13.925$, $p = .000$, $r_{Y1} = .876$, in the mean score for RA students ($M = 70.6765$, $SD = 5.2381$) and the mean score of comparison group students ($M = 45.7500$, $SD = 8.1821$). Effect sizes were rather large for all three comparisons.

**Research Question 2**

The second research question inquired about differences in academic engagement demonstrated by students in RA and those in the comparison group. Table 2 presents an overview of observations by grade level and subject area for each group. Results from the *Classroom Observation Scales-Revised* (COS-R; VanTassel-Baska et al., 2003) were analyzed using SPSS (Version 19).

**Table 2**

*Distribution of Classroom Observations by Grade and Subject Area*

<table>
<thead>
<tr>
<th>Group</th>
<th>Grade</th>
<th>Subject area</th>
<th>Total observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA</td>
<td>6</td>
<td>Science</td>
<td>2</td>
</tr>
<tr>
<td>RA</td>
<td>6</td>
<td>Social Studies</td>
<td>2</td>
</tr>
<tr>
<td>RA</td>
<td>7</td>
<td>Social Studies</td>
<td>2</td>
</tr>
<tr>
<td>RA</td>
<td>8</td>
<td>Science</td>
<td>2</td>
</tr>
<tr>
<td>RA</td>
<td>8</td>
<td>Language Arts</td>
<td>1</td>
</tr>
<tr>
<td>EM</td>
<td>6</td>
<td>Science</td>
<td>2</td>
</tr>
<tr>
<td>EM</td>
<td>6</td>
<td>Social Studies</td>
<td>2</td>
</tr>
<tr>
<td>EM</td>
<td>7</td>
<td>Social Studies</td>
<td>2</td>
</tr>
<tr>
<td>EM</td>
<td>8</td>
<td>Social Studies</td>
<td>2</td>
</tr>
<tr>
<td>EM</td>
<td>8</td>
<td>Language Arts</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>19</td>
</tr>
</tbody>
</table>

SPSS was used to generate descriptive statistics for the COS-R data, including means, standard deviations, and frequencies for each of the six subscales: General Classroom Behaviors (GCB), Diverse Self-Selected or Self-Paced Activities (DSA), Problem-Solving Strategies (PSS),
Critical Thinking Strategies (CRI), Creative Thinking Strategies (CRE), and Research Strategies (RS). Mean scores and standard deviations for each subscale are presented by groups in Table 3. The frequencies of behaviors in each subscale observed by group and grade level are presented as percentages in Table 4. These percentages were calculated by dividing the number of observed behaviors by the total number (25) of possible behaviors.

Table 3

*COS-R Scores for Student Academic Engagement During Class Observations*

<table>
<thead>
<tr>
<th>COS-R subscale</th>
<th>RA students (N = 9)</th>
<th>Comparison group (N = 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>General Classroom Behaviors</td>
<td>4.93</td>
<td>.200</td>
</tr>
<tr>
<td>Diverse Self-Selected/Self-Paced Activities</td>
<td>5.00</td>
<td>.000</td>
</tr>
<tr>
<td>Problem-Solving Strategies</td>
<td>5.00</td>
<td>.000</td>
</tr>
<tr>
<td>Critical Thinking Strategies</td>
<td>5.00</td>
<td>.000</td>
</tr>
<tr>
<td>Creative Thinking Strategies</td>
<td>4.81</td>
<td>.372</td>
</tr>
<tr>
<td>Research Strategies</td>
<td>5.00</td>
<td>.000</td>
</tr>
</tbody>
</table>

Table 4

*Frequencies and Percentages of COS-R Summative Behaviors Observed During Class Observations*

<table>
<thead>
<tr>
<th>Observation</th>
<th>Group</th>
<th>Grade</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RA</td>
<td>6</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>2</td>
<td>RA</td>
<td>6</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>3</td>
<td>RA</td>
<td>6</td>
<td>24</td>
<td>96</td>
</tr>
<tr>
<td>4</td>
<td>RA</td>
<td>6</td>
<td>19</td>
<td>76</td>
</tr>
<tr>
<td>5</td>
<td>RA</td>
<td>7</td>
<td>22</td>
<td>88</td>
</tr>
<tr>
<td>6</td>
<td>RA</td>
<td>7</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>7</td>
<td>RA</td>
<td>8</td>
<td>14</td>
<td>56</td>
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<tr>
<td>8</td>
<td>RA</td>
<td>8</td>
<td>24</td>
<td>96</td>
</tr>
<tr>
<td>9</td>
<td>RA</td>
<td>8</td>
<td>22</td>
<td>88</td>
</tr>
<tr>
<td>10</td>
<td>EM</td>
<td>6</td>
<td>23</td>
<td>92</td>
</tr>
<tr>
<td>11</td>
<td>EM</td>
<td>6</td>
<td>15</td>
<td>60</td>
</tr>
<tr>
<td>12</td>
<td>EM</td>
<td>6</td>
<td>15</td>
<td>60</td>
</tr>
</tbody>
</table>

*(table continues)*
Table 5  

Frequencies and Percentages of COS-R Subscale Behaviors Observed

<table>
<thead>
<tr>
<th>COS-R subscale</th>
<th>RA students (N = 9)</th>
<th>Comparison group (N = 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Classroom Behaviors</td>
<td>45/45</td>
<td>42/50</td>
</tr>
<tr>
<td>Diverse Self-Selected/Self-Paced Activities</td>
<td>33/36</td>
<td>34/40</td>
</tr>
<tr>
<td>Problem-Solving Strategies</td>
<td>21/27</td>
<td>14/30</td>
</tr>
<tr>
<td>Critical Thinking Strategies</td>
<td>33/36</td>
<td>34/40</td>
</tr>
<tr>
<td>Creative Thinking Strategies</td>
<td>24/36</td>
<td>24/40</td>
</tr>
<tr>
<td>Research Strategies</td>
<td>36/45</td>
<td>35/50</td>
</tr>
</tbody>
</table>

Table 4 shows differences between the groups in the frequency of behaviors exhibited across all subscales during class observations, with RA students displaying engagement in the targeted behaviors more frequently (82%) than EM students (73%). Furthermore, frequency counts and percentages were calculated for each group’s COS-R subscale behaviors. Table 5 offers further explanation into the differences between groups. Across both groups, the three areas in which students displayed targeted behaviors for academic engagement most often were General Classroom Behaviors, Diverse Self-Selected or Self-Paced Activities, and Critical Thinking Strategies. Students in both groups also demonstrated behaviors least often in the same two areas: Creative Thinking Strategies and Problem Solving. Across all subscale areas, RA
students displayed behaviors more often than EM students, with the most noticeable differences in the areas of General Classroom Behaviors (100% to 84%), Problem Solving Strategies (78% to 47%), and Research Strategies (80% to 70%).

**Research Question 3**

The third research question asked about differences between groups in student investment in academic learning, as measured by the *My Class Activities* survey (MCA; Gentry & Gable, 2001). To address this question, results from MCA were assessed by SPSS (Version 19) using multivariate analysis of variance (MANOVA) procedures, in order to determine whether significant differences existed in the indicators of student investment in academic learning between students in the experimental and comparison groups.

Descriptive statistics were calculated on overall group scores (combined Grades 6, 7, 8) and scores for each individual grade level to determine mean scores, standard deviations, and confidence intervals for each of the following MCA subscales: Interest (Items 1-8), Challenge (Items 9-17), Choice (Items 18-24), and Enjoyment (Items 25-31). MANOVA comparisons were used to determine differences between overall groups (combined Grades 6, 7, 8) and between groups at each individual grade level. The $F$ statistic was used as the test statistic, and the level of significance was set at .05. Table 6 presents the means, standard deviations, $F$ statistics, and $p$-values for the MCA results on each subscale across grade levels for both groups. Tables 7 through 9 display the means, standard deviations, $F$ statistics, and $p$-values for the MCA results on each subscale by sixth grade, seventh grade, and eighth grade students in both groups.
Table 6

*Group Differences in MCA Survey Results across Grade Levels*

<table>
<thead>
<tr>
<th>Subscale</th>
<th>RA students (N = 165)</th>
<th>Comparison group (N = 61)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Interest</td>
<td>3.67</td>
<td>.696</td>
<td>3.34</td>
<td>.887</td>
</tr>
<tr>
<td>Challenge</td>
<td>3.39</td>
<td>.596</td>
<td>3.47</td>
<td>.722</td>
</tr>
<tr>
<td>Choice</td>
<td>3.33</td>
<td>.709</td>
<td>3.21</td>
<td>.723</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>3.71</td>
<td>.836</td>
<td>3.29</td>
<td>.988</td>
</tr>
</tbody>
</table>

*Indicates significance at the .05 level

Table 7

*Group Differences in MCA Survey Results for Sixth Grade Students*

<table>
<thead>
<tr>
<th>Subscale</th>
<th>RA students (N = 77)</th>
<th>Comparison group (N = 23)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Interest</td>
<td>3.76</td>
<td>.736</td>
<td>3.85</td>
<td>.768</td>
</tr>
<tr>
<td>Challenge</td>
<td>3.30</td>
<td>.557</td>
<td>3.92</td>
<td>.481</td>
</tr>
<tr>
<td>Choice</td>
<td>3.15</td>
<td>.737</td>
<td>3.45</td>
<td>.565</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>3.89</td>
<td>.803</td>
<td>3.69</td>
<td>.948</td>
</tr>
</tbody>
</table>

*Indicates significance at the .05 level

Table 8

*Group Differences in MCA Survey Results for Seventh Grade Students*

<table>
<thead>
<tr>
<th>Subscale</th>
<th>RA students (N = 40)</th>
<th>Comparison group (N = 16)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Interest</td>
<td>3.77</td>
<td>.618</td>
<td>2.87</td>
<td>.861</td>
</tr>
<tr>
<td>Challenge</td>
<td>3.50</td>
<td>.575</td>
<td>2.95</td>
<td>.882</td>
</tr>
<tr>
<td>Choice</td>
<td>3.85</td>
<td>.491</td>
<td>3.11</td>
<td>.812</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>3.87</td>
<td>.883</td>
<td>2.25</td>
<td>.880</td>
</tr>
</tbody>
</table>

*Indicates significance at the .05 level
Table 9

*Group Differences in MCA Survey Results for Eighth Grade Students*

<table>
<thead>
<tr>
<th>Subscale</th>
<th>RA students (N = 48)</th>
<th>Comparison group (N = 22)</th>
<th></th>
<th></th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest</td>
<td>3.45</td>
<td>.652</td>
<td>3.16</td>
<td>.785</td>
<td>2.487</td>
<td>.116</td>
</tr>
<tr>
<td>Challenge</td>
<td>3.44</td>
<td>.661</td>
<td>3.37</td>
<td>.508</td>
<td>.193</td>
<td>.661</td>
</tr>
<tr>
<td>Choice</td>
<td>3.18</td>
<td>.608</td>
<td>3.04</td>
<td>.765</td>
<td>.670</td>
<td>.414</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>3.29</td>
<td>.706</td>
<td>3.18</td>
<td>.979</td>
<td>.274</td>
<td>.601</td>
</tr>
</tbody>
</table>

Table 6 displays results of MANOVA comparisons of overall group results (combined Grades 6, 7, 8) on each of the four MCA subscales between experimental and comparison groups. Results show there was a statistically significant difference between groups as determined by multivariate ANOVA for two MCA subscales: Interest ($F(1,220) = 11.341, p = .001, \eta^2 = .049$) and Enjoyment ($F(1,220) = 12.141, p = .001, \eta^2 = .052$). For both of these differences, there were medium effect sizes. For the Interest subscale, simple effects revealed that the experimental group’s mean score ($M = 3.67, SD = .696$) was statistically significantly higher than the comparison group’s mean score ($M = 3.34, SD = .887$). For the Enjoyment subscale, the experimental group’s mean score ($M = 3.71, SD = .836$) also was higher than the comparison group’s mean score ($M = 3.29, SD = .988$). For results of the remaining two subscales, there were not significant differences between group mean scores. In addition, though not at a level of statistical significance, the overall comparison group had a slightly higher mean on the Challenge subscale, and the overall experimental group had a slightly higher mean on the Choice subscale.

A MANOVA comparison was conducted to compare student MCA results across each individual grade level (6, 7, 8) on each of the four subscales between the experimental and comparison groups. The results showed a significant group by grade interaction ($F(8, 434) =$
4.81, p = .000, partial η² = .081). As shown in Tables 7, 8, and 9, univariate test results revealed statistically significant differences on subscale scores between groups at the sixth and seventh grade levels but not at the eighth grade level.

Table 7 shows that, for sixth grade students, the only significant difference between groups was on the subscale of Challenge ($F(1,220) = 18.668$, $p = .000$, partial η² = .078). The effect size was relatively large. Pairwise comparisons revealed that the comparison group’s mean score ($M = 3.92$, $SD = .481$) was statistically significantly higher than the experimental group’s mean score ($M = 3.34$, $SD = .557$).

Table 8 displays results for seventh grade students. Across all four subscales, results were statistically significant in favor of the experimental group: Interest ($F(1,220) = 18.034$, $p = .000$, partial η² = .076), Challenge ($F(1,220) = 9.584$, $p = .002$, partial η² = .042), Choice ($F(1,220) = 14.289$, $p = .000$, partial η² = .061), and Enjoyment ($F(1,220) = 17.106$, $p = .000$, partial η² = .072). For all of these differences, there were medium effect sizes. All means and standard deviations are presented in Table 8, with the experimental group outperforming the comparison group on results for each subscale.

Results for eighth grade students are shown in Table 9. Across all four subscales, no differences between groups were statistically significant. However, it is notable that experimental group means were slightly higher for each subscale than comparison group means.

Qualitative Results

Qualitative data in the form of observations and interviews were also collected to answer questions 1, 2, and 3. During the initial site visit and throughout the second and third visits, the researcher recorded recurrent codes across the data in field notes; the data were coded according
to these categories, and during the coding process, additional codes emerged. The final list of main coding categories applied across qualitative sources is contained in Table 10. Manual color-coding, note-taking, and a computerized spreadsheet program were utilized by the researcher to code the data line by line, separate it into pieces by code, and compose lists of key quotes and phrases providing evidence of each code (Glesne, 2011; Marshall & Rossman, 2006). Synthesis across qualitative data analysis resulted in themes that further describe and explain quantitative differences in project quality, academic engagement, and investment in academic learning between students in The Renaissance Academy (RA) and those in the comparison program at Elm Middle (EM), and these emergent themes are presented with supporting evidence in order of research question.

Table 10

*Coding Categories for Qualitative Data Sources: Interviews, Observations, and Field Notes*

<table>
<thead>
<tr>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project development</td>
</tr>
<tr>
<td>Student initiative</td>
</tr>
<tr>
<td>Interest</td>
</tr>
<tr>
<td>Choice</td>
</tr>
<tr>
<td>Challenge</td>
</tr>
<tr>
<td>Enjoyment</td>
</tr>
<tr>
<td>Differentiation of instruction</td>
</tr>
<tr>
<td>Experiential learning</td>
</tr>
<tr>
<td>Freedom/independence</td>
</tr>
<tr>
<td>Teacher as guide</td>
</tr>
<tr>
<td>Communication/collaboration</td>
</tr>
<tr>
<td>High expectations</td>
</tr>
<tr>
<td>Technology access/usage</td>
</tr>
</tbody>
</table>
Research Question 1

To further explain quantitative data collected on project quality across both groups, qualitative data in the form of observations and interviews with students and teachers were collected and analyzed. Qualitative analysis of these data sources by use of coding categories yielded the following themes related to project quality: (a) student choice, (b) depth and complexity of projects, and (c) authenticity of audience. Qualitative evidence of each theme is presented following a description of the projects observed for scoring.

Project descriptions. Students in both programs create multiple projects to demonstrate academic learning and exercise critical and creative thinking skills during and at the culmination of curriculum units of study, often as a means of performance assessment. Projects are related to academic content contained in grade level standards specified in the state course of study. At RA, students at each grade level create museum projects in addition to more typical class projects. These projects serve as temporary exhibits in the school’s museum space, which acts as a functional children’s hands-on museum for local classes to attend. Three different museums, one per grade level, are set up over the course of a school year, and each exhibit is featured for a time period of about two months. Teachers identify the main theme for the museum based upon current academic concepts and themes across all content areas, and students have a high level of choice in all aspects of their museum projects, including the topic and related academic subject area(s), the format of the project, the materials and methods by which they conduct research, and whether they work individually or in pairs or small groups to complete their project. Each student works either alone or with a partner or small group (up to four total members) to create one museum project each year, in addition to other ongoing in-class projects.
To elicit projects for the purpose of gathering data to answer the first research question in this study, the researcher asked teachers in each program to submit student projects that reflect the highest level of academic learning. Seventh grade projects were selected for scoring due to the number of projects submitted and the match between academic content areas across programs. Thirty-four projects from RA and 22 projects from EM were observed and scored. Topics for each of these projects are described in Tables 11 and 12.

Table 11

*Topics for Seventh Grade Student Projects from The Renaissance Academy*

<table>
<thead>
<tr>
<th>Number</th>
<th>Topic</th>
<th>Project format</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>King Tut</td>
<td>E</td>
</tr>
<tr>
<td>2</td>
<td>Pyramid and Sphinx</td>
<td>E</td>
</tr>
<tr>
<td>3</td>
<td>Hieroglyphics</td>
<td>E</td>
</tr>
<tr>
<td>4</td>
<td>Mummification</td>
<td>E</td>
</tr>
<tr>
<td>5</td>
<td>Archaeology</td>
<td>E</td>
</tr>
<tr>
<td>6</td>
<td>Weather</td>
<td>E</td>
</tr>
<tr>
<td>7</td>
<td>African Music</td>
<td>E</td>
</tr>
<tr>
<td>8</td>
<td>African Jewelry</td>
<td>E</td>
</tr>
<tr>
<td>9</td>
<td>African Dance</td>
<td>E</td>
</tr>
<tr>
<td>10</td>
<td>African Storytelling</td>
<td>E</td>
</tr>
<tr>
<td>11</td>
<td>Water Purification</td>
<td>E</td>
</tr>
<tr>
<td>12</td>
<td>African Clothing/Pottery</td>
<td>E</td>
</tr>
<tr>
<td>13</td>
<td>Swahili Time/Celestial Clock</td>
<td>E</td>
</tr>
<tr>
<td>14</td>
<td>South Africa and Soccer</td>
<td>E</td>
</tr>
<tr>
<td>15</td>
<td>Peace Corps</td>
<td>E</td>
</tr>
<tr>
<td>16</td>
<td>Immunizations</td>
<td>E</td>
</tr>
<tr>
<td>17</td>
<td>Malaria</td>
<td>E</td>
</tr>
<tr>
<td>18</td>
<td>Polio</td>
<td>E</td>
</tr>
<tr>
<td>19</td>
<td>Malnutrition</td>
<td>E</td>
</tr>
<tr>
<td>20</td>
<td>Foot Disease</td>
<td>E</td>
</tr>
<tr>
<td>21</td>
<td>Surgery</td>
<td>E</td>
</tr>
<tr>
<td>22</td>
<td>Natural Medicine</td>
<td>E</td>
</tr>
<tr>
<td>23</td>
<td>African Geography/Culture</td>
<td>E</td>
</tr>
<tr>
<td>24</td>
<td>The Rain Forest</td>
<td>E</td>
</tr>
<tr>
<td>25</td>
<td>Deforestation</td>
<td>E</td>
</tr>
<tr>
<td>26</td>
<td>Giraffes</td>
<td>E</td>
</tr>
<tr>
<td>27</td>
<td>Lions and Safari</td>
<td>E</td>
</tr>
<tr>
<td>28</td>
<td>Prehistoric Times/Fossils</td>
<td>E</td>
</tr>
<tr>
<td>29</td>
<td>Currency</td>
<td>B</td>
</tr>
</tbody>
</table>

*(table continues)*
<table>
<thead>
<tr>
<th>Number</th>
<th>Topic</th>
<th>Project format</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Frog Life Cycle</td>
<td>B</td>
</tr>
<tr>
<td>31</td>
<td>White Tiger</td>
<td>B</td>
</tr>
<tr>
<td>32</td>
<td>Taj Mahal</td>
<td>B</td>
</tr>
<tr>
<td>33</td>
<td>Giant Panda</td>
<td>B</td>
</tr>
<tr>
<td>34</td>
<td>Human Brain</td>
<td>B</td>
</tr>
<tr>
<td>35</td>
<td>Space Travel</td>
<td>B</td>
</tr>
<tr>
<td>36</td>
<td>Fossils</td>
<td>B</td>
</tr>
</tbody>
</table>

*Note. E = Exhibit, B = Box.*

Table 12

**Topics for seventh Grade Student Projects From Elm Middle**

<table>
<thead>
<tr>
<th>Number</th>
<th>Topic</th>
<th>Project format</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Geography of Africa</td>
<td>V</td>
</tr>
<tr>
<td>2</td>
<td>Geography of Africa</td>
<td>V</td>
</tr>
<tr>
<td>3</td>
<td>Geography of Africa</td>
<td>V</td>
</tr>
<tr>
<td>4</td>
<td>Geography of Africa</td>
<td>V</td>
</tr>
<tr>
<td>5</td>
<td>Geography of Africa</td>
<td>V</td>
</tr>
<tr>
<td>6</td>
<td>Geography of Africa</td>
<td>V</td>
</tr>
<tr>
<td>7</td>
<td>Geography of Africa</td>
<td>V</td>
</tr>
<tr>
<td>8</td>
<td>History of Hip Hop</td>
<td>W</td>
</tr>
<tr>
<td>9</td>
<td>History of Flight</td>
<td>W</td>
</tr>
<tr>
<td>10</td>
<td>History of Computers</td>
<td>W</td>
</tr>
<tr>
<td>11</td>
<td>Airplanes in Warfare</td>
<td>W</td>
</tr>
<tr>
<td>12</td>
<td>History of Child Labor</td>
<td>W</td>
</tr>
<tr>
<td>13</td>
<td>AIDS in Africa</td>
<td>W</td>
</tr>
<tr>
<td>14</td>
<td>Child Soldiers</td>
<td>W</td>
</tr>
<tr>
<td>15</td>
<td>Global Warming</td>
<td>W</td>
</tr>
<tr>
<td>16</td>
<td>Poverty in Mexico</td>
<td>W</td>
</tr>
<tr>
<td>17</td>
<td>TOMs Shoes</td>
<td>W</td>
</tr>
<tr>
<td>18</td>
<td>Child Soldiers</td>
<td>W</td>
</tr>
<tr>
<td>19</td>
<td>Helping Animals</td>
<td>W</td>
</tr>
<tr>
<td>20</td>
<td>Against Abortion</td>
<td>W</td>
</tr>
<tr>
<td>21</td>
<td>Corporal Punishment</td>
<td>W</td>
</tr>
<tr>
<td>22</td>
<td>Universal Education</td>
<td>W</td>
</tr>
</tbody>
</table>

*Note. V = Visual, W = Website.*

The majority of projects from both programs related to the overall theme of Africa, part of the seventh grade state course of study for social studies. Museum exhibit projects from RA
were focused on the museum theme “Out of Africa” and related back to the grade level theme of “The Outer Limits.” Of the 34 RA projects, 26 were multidimensional separate museum exhibits, displayed in the current museum, and 8 were museum boxes, which had been distributed to and rotated among classrooms at neighboring elementary schools earlier in the school year. For example, one museum project was based upon the topic of surgery. It was linked to the theme of Africa through the subtopic of disease education and prevention. The exhibit was housed in a three-dimensional space of approximately 4 by 6 feet and contained a hospital gurney holding a dissected frog underneath a surgical blanket, various surgical tools, and numerous posters, diagrams, student created text sources, and 3-D models. The student who designed the exhibit organized a live surgical simulation (with the frog) in an attempt to teach museum visitors about the purpose and mechanics of surgery, as well as organs and anatomy that would be operated upon as a result of certain diseases affecting people in Africa. The various visual and text sources were used to further explain effects and prevention of these diseases. In addition, technology was incorporated by use of a QR code, a graphic resembling a barcode that museum visitors could scan using a tablet or smart phone to visit a student created website containing additional information about surgery and disease in Africa. The remaining projects were in the form of museum boxes, a miniature portable version of museum exhibits, and each contained various visual and hands-on resources both created and located by students with the purpose of teaching their audience about a topic of interest related to academic content standards. All museum boxes related science, social studies, or math with language arts.

Of the 22 EM projects, 6 were visual geography projects, and the remaining 16 projects were websites in the form of a blog or wiki. For the geography projects, also related to the topic of Africa, students were given the task of displaying the various regions of Africa through a
choice of seven options: poster, salt dough map, Glogster (online poster/collage), Google Earth tour, Prezi presentation, PowerPoint presentation, or Word document. Each student was given the option of working in a group (no number specified) or individually. All students elected to work in groups ranging from two to five members. Completed projects were presented orally to the teacher and classmates during class time. The remaining 16 projects also related to social studies standards, and some included science topics as well. Six websites were in the format of a wiki, a collaborative website with various web pages incorporating pictures, video, and text. Twelve projects were in the format of a blog containing a persuasive essay on a topic related to global issues of social justice. All of the website projects were featured in an online showcase located on the teacher’s web page.

**Student choice.** A recurrent theme across observations and interviews with both students and teachers was the high level of choice given to students at RA in the project development process, as compared with those at the comparison site. The second subscale on the COS-R observation form is titled “Engagement in Diverse Self-Selected or Self-Paced Activities” and deals directly with student choice across learning activities, including projects. Data from the comment portion of the observation forms further revealed evidence of student freedom and choice in project selection and development. In five of nine observations of RA classes, the researcher observed students in the project development process. Across 100% of these observations, students were given choice in the format of their project, the pace at which they worked, and the research materials they used. In 50% of observations, students also were allowed to select a topic for their projects. Whenever RA students were given a choice of topic or format for their projects through a menu listing various options, a “student choice” option was
always present, through which a student could propose a topic or format not listed.

Comparatively, at EM, students were observed working to develop projects in 8 of 10 observations. Across these observations, students had a choice of the pace at which they worked on projects in 87% of observations, and 30% of observations indicated choice in the format of their projects. In 20% of observations, students could also select the research materials used, and they were allowed a choice in project topic in only 10% of observations. For the remaining 90% of observations, the topic was specified by the teacher.

During the focus group interview, RA students elaborated upon the extent of choice they had across school projects and their related feelings. The first interview question inquired about activities at school that were fun or enjoyable. One student noted his preference for hands-on activities, and another girl stated, “Yeah, that’s one of the big things in our museum. [The school] wouldn’t be so amazing if we didn’t have the museum.” Later in the interview, when asked about the topic she chose for her museum project related to the theme of change, the student described how she and a partner selected chemical and physical changes as the focus of their project because of their love for science, and they demonstrated these scientific changes within their exhibit by “putting on a magic show for the little kids with science experiments.” Another student passionately shared how he chose to work alone on a project about how Stone Mountain has changed over time, integrating his enjoyment of history and science, and yet another student discussed how his project topic on changes within the character of Dr. Jekyll and Mr. Hyde expressed his love for literature and desire to share that enjoyment with other students.

When asked about specific ways they have “a say in the projects they do,” students shared further examples of choice in the topic and format of their projects, as well as the grouping method by which they work to create projects. One girl (A) remarked, “We pretty
much get to choose what groups we want to be in by the same topics, or by the people.” In accordance, another student (D) shared an example:

Last year in science, we were learning about the biomes, and we were studying China at the time, so it was China in all the classes. And [the teacher] said, “Do something about a biome in China,” and so we all thought about it, and this group said, “Oh, we’ll do the desert,” and so we did the desert, and we talked about the Chinese desert and the Gobi, and other people talked about the Arctic.

Interviews with RA teachers further confirmed these statements, as teachers discussed the types of choices they give to students. One teacher stated,

They have a lot of choice on products. I’ve never limited and said, “No, you can’t do that. . . .” I try to get kids out of a rut; they are real comfortable with their PowerPoint [presentations]. Try something different! Usually there’s, “Here’s what we have to do, but here are some areas . . . if this is your interest, you could go deeper into it,” even though it’s not standards related.

Another teacher described how curriculum planning contributed to the high level of choice at RA:

The C level [of curriculum] is the core knowledge, and the B layer, “Beyond the Basics,” is where I try to give them choices, whether it’s through interest or learning style, artistic or technology, even just writing. . . . But yeah, any time I can, I will give them opportunities—1, 2, 3 different ways of learning—and they really seem to react to that in a favorable way.

In contrast, on focus group interview questions related to choice in projects, students in the comparison group all agreed that they were given few choices in projects or learning activities across most classes, but the degree of choice varied greatly across classes. When asked directly about whether they get to choose their projects, Abby commented,

They ask us what we want to do, like sometimes they’ll give us performance tasks and we can choose . . . sometimes . . . like extra credit tasks or whatever. But most of the time, it’s just like, “Do this”—do what they tell you—and they just tell you what to do.

Chad added, “Sometimes, some teachers--they give you a list to choose from. Other times, other teachers just tell you, ‘You’re going to do this, or you’re going to do that.’” In a follow-up question, when asked if the amount of choice depended on the class and teacher, they all agreed
that it did, and later in the interview some students shared about a specific teacher who gave more choices in projects than in their other classes. Chad stated, “Last year . . . back then we did get to choose what we wanted to do, but now we really don’t get a say. They just tell us what to do.”

**Depth and complexity of projects.** From a synthesis of observational data and anecdotal notes taken during project scoring meetings, a second area of noticeable difference between the RA and EM student projects was in their overall depth and complexity. Common words used by raters to describe RA projects included “interactive,” “interdisciplinary,” and “student ownership.” RA museum projects demonstrated interconnectivity on multiple levels, including connections between key concepts and themes, academic content areas, and topics. All observed RA projects were related to the overarching theme “Out of Africa” and related to the interdisciplinary grade level theme, “The Outer Limits.” Each project incorporated content and/or skills from at least two subject areas and often more. For example, all projects were primarily based in either science or social studies, and language arts was purposefully integrated. Many projects displayed elements from both science and social studies, and several also integrated math content. Students worked to create museum projects across multiple classes, and teachers from different content areas shared responsibility for facilitating development of different aspects of the projects. Furthermore, projects were linked together according to subtopics, as the museum space was physically divided into five main areas, with exhibits located in each area in accordance to subtopic: Ancient Egypt, African Village, Medical Center, African Safari, and Museum Annex. Students worked collaboratively to plan creative elements to link projects together across subtopic areas. For example, in the Medical Center area, students
first visited a booth where they learned about the Peace Corps and obtained a baby doll diagnosed with a specific disease. From there, they took the doll to an exhibit on the topic of that disease to learn about its origin and prevention, next to immunizations, and finally to surgery and natural medicine to receive treatment. A comment made by an RA student during the focus group interview further described the depth of projects: “We spend a lot of time on that one thing that we learn a lot about it.”

Conversely, projects completed by EM students were more basic and less connected. All observed EM projects incorporated only one subject area, social studies or science. Overarching concepts and essential understandings were displayed in the classroom and on the teacher’s lesson plans, but the projects were not related to them. The geography-based visual projects and historical wiki websites reflected lower-level thinking skills, including recall and summarization of information. Students displayed creativity in their selection of materials and design of the projects, but they mostly presented the same information in slightly different ways. As one rater commented, “They’re just informing us.” The persuasive blogs contained more of an action orientation, as they related to issues of social justice, but most simply presented an issue, but fell short of including information about how readers could tangibly contribute toward a solution.

**Authenticity of audience.** While the audience for projects in the comparison program is mainly a teacher and classmates, the audience for RA museum projects includes elementary, middle, and high school students from neighboring elementary, middle, and high schools both within and outside of the school district who visit the museum for field trips, as well as college students and other adults who attend the museum for various reasons. During observations, students in both programs were observed presenting projects to their respective audiences. On
the researcher’s second site visit, after viewing RA seventh grade students leading a group of elementary students through their museum exhibits and viewing a class of seventh grade students at EM presenting their projects to their teacher and classmates, differences were noted in field notes and in comments on observation forms.

For RA presentations, the researcher remarked about the “very professional tone” used by students presenting their projects, and further commentary included phrases such as “high level of confidence” and “easy rapport with audience;” whereas, common phrases used to describe student presentations of projects in the comparison program included “monotone,” “lacking enthusiasm,” and “basic.” Overall, in field notes, the researcher remarked multiple times how RA students’ presentation skills were advanced for their age and grade level, as commensurate with high school or college students, in contrast with the performance observed at the comparison site being typical for the majority of seventh grade students’ age and skill level. In addition, while scoring projects, raters commented about the “audience appeal,” “authentic purpose,” and “student ownership” across RA projects. In contrast, while reviewing EM projects one rater remarked, “The persuasive blogs seem to have an authentic purpose, but the audience component is missing” in regard to the lack of comments posted on any of the websites.

Interview responses from students and teachers at RA provided further insight into the focus upon the audience during project development and presentation. When asked how they got students to target their audience, a seventh grade teacher explained, “We tell them, ‘Start with your audience. Remember when you were their age, and think about what you liked and how you learned best.’” A student further elaborated upon attention to audience in response to a question inquiring how she and her peers vary presentation and format of museum projects to fit such a wide audience:
We typed up [the project information] the smartest way we could and posted it, but we learned all the information. We memorized all of it, so if we have older people come, we’ll say exactly what’s on the board for them, and for high school students, we’ll base it on what they already know. We’ll say, ‘Do you know what this means?’ so then we’ll explain that, and we’ll kind of dumb it down . . . for the younger kids. But we try to be as smart as we can for the older ones. We’ve had some high school students who do not know things and learn new ones!

When asked how he taught kids about his museum topic, changes in the character Jekyll and Hyde, another student (D) remarked,

Well, with the younger kids, they don’t have as long of an attention span, so you have to make it simple and connect with them easily. So, we got examples like Spiderman, how he changed into another person in another movie, and we kind of connected that to what they knew. And it helped them to understand.

*Research Question 2*

The second question deals with academic engagement, which refers to students’ engagement during class activities, as measured by demonstration of the following behaviors included on the *William and Mary Classroom Observation Scales-Revised* (COS-R): General classroom behaviors, response to self-selected or self-paced activities, response to problem-solving strategies, response to critical thinking strategies, response to creative thinking strategies, and response to research strategies (VanTassel-Baska et al., 2003). Analysis of qualitative observational data and interviews sought to further describe and explain specific factors contributing to students’ demonstrated academic engagement, or lack thereof, and yielded the following themes: (a) student initiative for learning, (b) extent of instructional differentiation, (c) experiential nature of instruction and related teacher role, and (c) quality of technology access and usage.
**Student initiative for learning.** Across 100% of nine observations conducted in the experimental program, one or both raters commented on the unusually high degree of students’ engagement in “general classroom behaviors” as described on the COS-R form, as shown in a statement from the researcher’s field journal during her first site visit: “You really get the feeling students want to be here--I want to go back to school and be a student here! Learning is fun, learning is authentic, and instruction is engaging. The atmosphere is inviting and inspirational.” The following quotes taken from observational comments across various classes further substantiate student engagement:

“It’s striking how on-task and quiet students are while working – no off-task behavior, and students don’t even seem to be distracted by the loud music coming from the class next door.”

“Very evident that students want to be here and want to learn”

“Students are all on task – sometimes playful, but continuous learning is evident.”

“Students provide multiple answers to questions and seem anxious to show learning.”

“Large class size [of 29 students] but very orderly; students are engaged and hyper-focused on research, very self-directed.”

“Students immediately and fully engaged in the pre-writing process.”

“All students surprisingly paid attention to presentations [of projects] and appeared truly interested.”

One class was observed during an inner/outer Socratic circle, as students conducted a passionate, in-depth discussion on the topic of deforestation in Africa and its related global contributory factors and impact. An observer commented, “The level of engagement and content of student discussion was inspiring--led me to want to leave immediately to further research the issues at hand.”

In contrast, there was much greater diversity among observational comments toward student initiative for learning in the comparison program. On some observations, researchers
described a majority of students as being “on task and actively involved” or “engaged and working hard.” However, across several observations, one or both observers noted some students’ difficulty in staying on task, especially when given a great degree of freedom and choice in learning, as evidenced by the following comments:

“The teacher set high expectations for student responsibility, but some couldn’t handle it.”

“Students are given a high level of independence for learning, but many can’t handle it.”

“Students working on tasks of choice and appeared engaged, but at the end of class, some groups had produced much more work than others.”

In addition, at the comparison program, teachers spent more time redirecting students toward on-task behavior, as noted by more than 30% of observations; whereas, at RA, only one individual student across all observations was noted as being off-task to a level that required specific teacher redirection.

*Extent of instructional differentiation.* A second factor that was a substantial influence upon student academic engagement, especially in the areas on the COS-R form related to self-selected or self-paced activities, problem-solving strategies, and critical and creative thinking strategies, was the extent to which instructional differentiation was evident within a lesson. This finding aligns with claims made by Crowder (2011) who investigated the relationship between the experimental program’s teacher aspects of differentiated instruction. Tomlinson (1999) defined differentiation of instruction as a teacher’s modification of the content, process, and/or products in response to students’ abilities, interests, and/or learning styles. The researcher commented multiple times in field notes about differentiation and choice being pervasive themes across instructional delivery at RA, and one observer used the term “embedded differentiation”
to describe the high level of diversity and choice observed across RA classrooms. In numerous observations in RA, observers used the term “multiple interpretations” to describe presentation of academic content in various forms to appeal to differences in student learning styles. For instance, in a science lesson on the topic of the resonance of sound, the teacher used three science experiments, one of which involved fire, two videos, a demonstration of a musical instrument, and a student project to engage students in exploration of the concepts. In another social studies lesson, students investigated the topic of world governments by viewing visual and textual examples and a website, note taking, and participating in a kinesthetic simulation-style activity. In yet another class, students participated in a simulation activity involving role play and a follow-up discussion to gain understanding of the complex issue of apartheid in South Africa.

Across comparison classrooms, the extent of instructional differentiation ranged greatly from classroom to classroom. One particular teacher was noted as being “a master at differentiation of instruction;” accordingly, her students displayed a high frequency of academic engagement behaviors as recorded on the COS-R. Another teacher exercised many elements of differentiated instruction but with varying levels of student engagement. As noted by the researcher during one observation in this classroom, “Some students naturally demonstrated planful behavior; others needed a high level of teacher guidance. Many students had difficulty in handling the open-ended nature of the activity and responsibility for conducting research before focusing upon the project’s creative element.”

*Experiential nature of instruction and related teacher role.* Yet another theme that related to students’ academic engagement in regard to problem-solving, creative thinking, and
critical thinking was the impact of the teacher’s role as guide or facilitator of learning. Across eight of nine RA observations, the researcher and observers noted the role of the teacher as guide or facilitator and students as active participants in the learning process. Across seven lessons, the teacher provided a brief 10-15 minute introduction consisting of direct instruction, activation of prior knowledge, or review, followed by student engagement in research, a learning activity, or project development, as the teacher moved quietly among tables to oversee and conference with students individually or in pairs or small groups. Sample commentary includes the following:

“Activity is self-paced; students actively working and teacher as facilitator.”

“Brief teacher introduction to review prior learning and introduce project guidelines, with the majority of time dedication on students working to create projects.

“Teacher acts as facilitator--guide on the side.”

“Socratic discussion was a fully student-led conversation. Teacher only inserted an occasional guiding question; otherwise, students generated ideas, made connections across content, and identified problems and solutions.”

Within the one lesson that was more teacher directed, an observer noted, “Instruction was more teacher-centered but with frequent invitation of student participation through questioning/discussion and active involvement in experiments.”

Across observations in the comparison program, the nature of instruction was experiential, but inquiry was involved more through direct teacher questioning, in contrast to more constructivist instruction at RA delivered through simulation or experiment style activities through which students identify and solve problems, make interpretations, and come to conclusions based upon their own experience. Likewise, teacher involvement varied by classroom, but generally teachers maintained tighter control over instruction and student behavior, including selection of topics, materials, and format of learning activities and projects.
For instance, in a science classroom, the teacher set up a lab with a small group of students, but she controlled all aspects of the experiment, while the students only participated and answered questions when prompted to do so. In a social studies class at the comparison site, the majority of instruction was delivered through a combination of lecture and discussion based upon textbook content, with students recording comparisons on a graphic organizer template; whereas, similar content at RA was delivered through student participation in a simulation.

*Technology access and usage.* The final theme observed in relation to differences in academic engagement between groups was the frequency and quality of student technology access and usage. As both programs were part of the same school district, availability of technology resources was comparable. At RA, each student who attends is responsible for having a personal laptop, which is transported between school and home each day. For students whose parents cannot afford a laptop, a lease option and other forms of financial assistance are available. In addition, teachers had personal computers and an LCD projector in each classroom, and some had iPads. One classroom had a class set of Mac desktop computers with standard software (i.e., GarageBand, iMovie, etc.) and the full Adobe software package (i.e., InDesign, Photoshop, etc.) to facilitate product creation. During an interview, one teacher elaborated upon the range of technology available in the computer teacher’s classroom:

> Well, we have the technology room, and . . . everything is available to us. He’s got a big green screen that we can set up--they do public service announcements. Last year with the mythology unit, they did mythology commercials, travel commercials--oh, it was hilarious! They have flip cameras and a couple of incredible digital cameras--really, really nice quality cameras. We have a lot of general [cameras] that are still good. We have four or five Macs, Adobe Photoshop. . . . We’ve got quite a bit. It’s for their use.

At the comparison program, standing computer labs had been dismantled and set up in teachers’ classrooms, so various classrooms had between 5 and 12 desktop computers. In
addition, there were multiple netbook (mini laptops) labs that could be reserved and used by teachers during specific lessons. All computers contained basic software packages (i.e., Microsoft Office, MovieMaker, etc.). Some sixth and seventh grade classrooms also had handheld tablets with touch screens called Zooms with Internet accessibility through a wireless connection.

However, despite similarity in the presence of computers and other technology across programs, differences were observed in students’ engagement in technology use to facilitate and enhance the processes of learning, research, and product development. At RA, technology was noted across several observations as being a pervasive element of instruction, as laptops provided anytime, anywhere connectivity, teachers frequently allowed students to freely access their laptops during instructional activities at both assigned and non-assigned times, and students responded by demonstrating a high level of responsibility in their selected usage. To exemplify, during one observation, the researcher noted students’ “use of the Internet to select and apply information relevant to project creation, with individual usage guided by students.” Within this particular class and multiple other times, the laptops were actually used to facilitate differentiation of instruction, as students selected research materials that best suited their ability levels, interests, and learning styles. For example, within a science class, students pulled up multiple interpretations of the ocean floor in the form of diagrams, photos, and text to aid in development of a related project, and in a social studies class, students were given multiple websites on the same topic via the teacher’s web page but exercised freedom in selecting which passages to read. Further commentary on meaningful student technology use included the following:
“Some students used handheld technologies to immediately further explore new content during lesson; this allowed for exploration of personal interests and facilitated connection-making.”

“Students used individual laptops to conduct Internet research and compose papers.”

“There is a high degree of freedom in when and how students use technology to facilitate and enhance the research process.”

In addition, RA teachers integrated technology into instruction often and seamlessly, best described by one observer’s statement, “Wow! Complete technology integration!” Purposeful technology integration was observed in various forms across 100% of RA observations. During the interview, when asked to “describe some ways you integrate technology,” teacher responses were varied and elaborate, including uses of technology integration to deliver new academic content, teach process skills, and facilitate project development. For example, at the beginning of a social studies class, the teacher activated prior knowledge and introduced a new concept by asking students to identify and discuss current events via online news sources and view a series of historic political cartoons on a website related to the topic of study, European Control of Africa. At a different grade level, a teacher described in her interview how she likes to introduce the slave trade by having students lie head to toe on the classroom floor and project primary sources from websites onto the ceiling for students to view and discuss. In regard to process skills, one teacher elaborated upon the important role played by the computer basics class taken by all sixth grade students:

The sixth graders learn all the basics. So they’re learning their basic graphic design stuff, how to use whatever basic tools they need, and then they just build on that as they go. Mr. Jefferson’s wonderful. He really does give them a really strong grounding, and then in seventh and eighth [grade], they take connections--electives--and they can build [on these skills]. . . . Honestly, I wouldn’t know how to help them do a lot of the things they know how to do. They’re amazing with what they can come up with.

Another teacher discussed her usage of forms of technology beyond computers as tools to further aid differentiation: “As you see, I’ve got my overhead for technology trace maps. Some
kids need that—kinesthetic tracing and stuff—kids that struggle with geography and haven’t had it before.” The same teacher listed over 10 different online sources she frequently gives students for choices in project development, including website creators, Facebook page templates, and various presentation venues.

During interviews, multiple teachers expressed their own lack of skill or knowledge toward new and emerging technology tools but described a desire to learn along with their students and an openness toward allowing students to generate suggestions for technology integration. One teacher described how her students proposed a project choice integrating an online Lego building simulation program they had previously been introduced to in math class:

I had two or three groups to ask if they could use Minecraft . . . it’s like a game, and you take Legos and build villages and cities and all kinds of stuff. And I had a couple of groups of boys ask if they could do that for their deforestation of Africa project—to represent it. And I said, “Sure! As long as it’s ok with [math teacher].” But it blew me away, really, what they did. I mean, they built forests, they had the bulldozer come in and chop them down, and it was all created by then. Kids also use the iMovie to video themselves and slice and dice and put the pictures together. They know more about that than I do . . . but that’s how we implement technology.

Students’ enjoyment and engagement in technology were apparent both in observations and during the focus group interview. When asked about how they use technology at school, one RA student remarked, “Where do we begin?!” providing further evidence of the infusion of technology throughout the school. Another student elaborated upon the depth with which they use technology:

Well, I think we would all say PowerPoint. That’s where we kind of turn a lot of times, but the teachers really don’t like that. But if we do [use it], we try to make them better than just a black slide with white words on it—we try to make them really cool.

Other specific technology tools mentioned included Prezi, Mixbook, and iMovie, and students described how each was used to create various projects for the museum and across different
classes. Another student described how her technology skills have been improved by the teachers at RA:

They let us use technology for so many things. I have my iPad now, so . . . I’ll go to Mr. J and I’m like, “How do you do this? I’m trying to make something for this class--how do I use it?” and he’ll go and download some app and teach me how to use it. They really help us. And they want us to use the technology.

Other students elaborated further on differences in their use of technology at RA as compared to their past school experiences, noting “using the computer lab in the library” and “taking AR tests” as primary uses of technology in their pasts. One student, who came to RA in seventh grade after attending a traditional middle school for sixth grade, remarked,

In middle school, actually, the teachers [at my old school] admitted to us that they would fight over who had the computer lab one day, and it seems to be a nuisance. . . . I think it’s good to have the freedom and flexibility to have your own technology every day.

In contrast, students and teachers in the comparison school were observed using technology less often overall, although the degree of usage varied greatly by teacher. Whereas RA students’ laptops facilitated anytime, anywhere access and connectivity, the organization of and teacher attitude toward technology integration somewhat limited student utilization of technology in meaningful ways. Technology integration was observed in 70% of lessons, and in all of those, only some students were using technology at the same time due to availability of resources within each classroom. For instance, during one observation, four students were working on laptops to develop a PowerPoint presentation on the topic of air mass, while five others were working on tablets to do a different activity. When asked whether students had a choice in the technology tool or project topic, the teacher commented that those were all the laptops she had, so whoever got to them first could use them for that day. In another class with more technology resources--eight laptops and seven tablets--students were given choices in using the textbook or a laptop or tablet to conduct Internet research for their geography project;
surprisingly, a majority of students chose to use the textbook. When given four choices for the format of their project, two of which integrated technology, only two of six groups chose a technology-based project. However, the teacher later required all groups to integrate technology in some manner (i.e., Develop a PowerPoint as a supplemental resource to an artistic poster).

When asked to describe technology access and uses, EM teacher interview responses contained a great deal of variation. One teacher described numerous technology resources available for use, including GPS devices, InterWrite boards, and clickers, but did not describe any instructional uses. Another teacher, who integrated technology at a high level of frequency and meaningfulness, mentioned students’ access to and use of Renzulli Learning, an online system that guides a student through the process of creating an individualized learning profile and selecting differentiated activities, with the ultimate goal of creating a final project. This teacher further elaborated about Edmodo, an online system that students can use to discuss with one another and the teacher, submit assignments, and participate in a social networking environment. Use of Edmodo was seen across two observations, as students worked to create and submit written reflections related to language arts and social studies content. In other observations, students were viewed working to create PowerPoint and Prezi presentations, Google Earth Tours, and glogs (virtual collage posters) to demonstrate learning. The majority of student technology usage to conduct research and develop projects emphasized student recall and summarization of information, and few students reflected critical and creative thinking or problem solving behaviors.

In regard to student engagement, the teacher commented,

They really love the technology. . . . They like Prezi. I could just list off all the websites that they love. We use Edmodo. . . . They love that. They love to turn their stuff in on Edmodo.
In sharp contrast, a third teacher shared, “[Technology integration] is not a strength of mine. . . . Outside of computers for research and presentations like that, I don’t use it a lot.” This teacher further shared about an online social studies resource that he sometimes allowed students to use for researching topics, but he expressed concern over the appropriateness of the level of the text as compared to student content reading and research skills.

Research Question 3

To further explain quantitative data, in the form of MCA survey results, collected on student investment in academic learning across both groups, qualitative data in the form of observations and interviews with students and teachers were collected and analyzed. Analysis of these data sources by use of coding, including codes aligned with MCA survey subscales—interest, challenge, choice, and enjoyment—yielded the following themes related to student investment in academic learning: (a) student freedom and ownership, (b) a spirit of collaboration and unity, and (c) high expectations for academic learning and performance.

Student Freedom and Ownership

The most prevalent theme in regard to student investment in academic learning was students’ perceived sense of academic freedom as a function of the instructional elements “choice” and “interest” and a sense of shared respect and trust between students and teachers. This freedom, in turn, led to increased student ownership in all aspects of the instructional process. In field notes, the researcher noted the “loose structure” of RA,” as “students are given a great deal of choice and freedom in all activities, including where to sit during lunch, project
choices, whether to work in groups or independently for class activities/projects, topics for museum exhibits, etc.”

During the coding phase, although interest, choice, and freedom/independence were considered as separate indicators, analysis showed a great degree of overlap among the three individual codes, thus leading to emergence of this theme. Multiple instances across data sources reflected a high level of freedom given to RA students in the form of choice and interest. For example, during the first site visit the researcher stated, “Even if an activity was prescribed, there was some degree of choice in alignment with ability, interest, or learning styles,” and observers frequently used the terms “freedom” and “ownership” to denote engagement behaviors across RA observations. As one observer commented, “Students are allowed/given a great deal of autonomy and handle it well.” During the RA student interviews, when asked if what they learn about relates to their interests, one student elaborated upon choice in his response:

Well, I like how the teachers--they’ll teach us something, and . . . well, in Lit. right now, we just finished To Kill A Mockingbird, and we got to write a paper . . . and the teacher gave us a list of topics, but we could expand on those or make our own topics based on what we liked from the book. And in other classes, when we do the museum, teachers let us choose a topic based on what we like to do, but it still has to be connected. But we, in a way, get to pick our own thing.

Another student described how interest and choice were addressed through the various elective courses offered at RA and how this differed from his past experience at a different middle school: “Your enrichments aren’t assigned to you, so here it expands you. Like there [other school], they’re assigned to you, but here, you choose and it really helps you develop your interests, so you can take that to high school.” He proceeded to describe how his selected technology elective in Adobe Design related to and extended his interest in technology in meaningful ways, as he now has Adobe certification, which can be applied in future high school
and college courses as well as a future job, and how his drama elective led to a major role in the current school play.

Renaissance Academy teacher responses supported students’ assertions and also shared how narrow content standards often limit interest and choice. A sixth grade teacher discussed how she used choice to incorporate student interest within disinteresting social studies standards:

Usually there’s, “Here’s what we have to do,” but then here’s some areas—if it’s your interest—you could go deeper into, even though it’s not standards related. . . . Like Aztecs and Incas, our standards are purely for the conquests; they don’t care what accomplishments the Incas or the Aztecs have done. And that’s what the kids are all about. They don’t care how they were killed! Yeah, they were killed; who killed them?! But you know, that’s an area that they could do . . . digital cartoon books, movies, narrated newscasts, and narrated PowerPoints and stuff. . . . If there were interests [beyond the conquests], they could add that into [a project] as long as they have also met the standard.

In response to another interview question regarding students’ use of higher order thinking skills in class, a different teacher’s response also incorporated both choice and interest:

I try to give a lot of open-ended things. Even in the literary criticism parts, I try to give open-ended prompts. . . . Problem-solving—I try to give them options, but options that are equally challenging, because not everything has one answer, and there’s not always just one way to do something, even in English.

Students also elaborated upon the degree of freedom they feel they have at RA, as compared to their past school experiences. In discussing how RA was different from his past experience at a more traditional middle school, one student stated,

I’d say it’s almost a complete 180. It’s much less uniform. . . . At the [other] school, it was, “You do this, this, and this, and you don’t go here, here, and here, and you don’t do this then.” So here it’s more flexible. The teachers are more flexible with how they teach. There’s more technology integrated. The curriculum’s integrated. We have the museum

In accordance, another student added,

I just know it’s a lot more freedom. My sister—she’s in ninth grade now but also went here—before she moved here, she went to a normal sixth grade. And when she came
here, she was like, “In sixth grade, we had free time for like 30 minutes, but we have so much freedom here.”

She proceeded with a description of how teachers allow students to go to a different classroom to work on activities or projects of interest after finishing class work. She concluded with a memory from her first day at RA, almost three years ago: “I remember on my first day of sixth grade, my mom came back and asked what was it like, and I told her it felt like summer camp.”

In comparison, students in the traditional middle school shared about a lesser degree of academic freedom, as related to their perceived interest and choice in class activities. When asked whether what they are learning about relates to their interests, one student shared, “It’s interesting when you learn new things that are actually cool to learn,” and another student added, “Like in [state] history, it’s interesting when you’re trying to figure out what different people did different things, and how it worked and stuff.” A third student shared about his disinterest in academic content: “Ah, this doesn’t really match my interests--I’m not really interested in anything that has to do with language arts or history or anything like that.” When further questioned about what kinds of things he was interested in, he shared about his interest in “culinary arts.” A comment by this same student near the end of the interview best summarized the student’s overall sentiment. When asked if there was anything else they wanted to tell me about their school or themselves, he stated,

They need more . . . the teachers need to let people kind of . . . they should give them a topic and let them pick their own projects. They can use what they’re best at to do it, so they can get a better grade and do better on it, not just tell them, “Oh, you’re supposed to do this, and then . . . this, this.” They should give more freedom on that stuff.

Responses from the comparison group teacher interviews further substantiated this claim and provided some insight into reasons why the majority of teachers give students less freedom. When asked about ways students are given choices, one teacher shared, “I’m not real good at
that. . . . That’s one of the things I have to--in the next year--learn to do better.” This teacher further described how the lack of choice within his classroom related directly to gaps in students’ thinking skills as a function of the lack of open-ended and direct instruction facilitated by other teachers whose classes his students attend. To exemplify, in a discussion of his prescribed use of a graphic organizer (thinking map) to record notes on academic content, he stated,

My assignment should be--all I should give out is the question. What should really happen is the kids should be choosing their own thinking map to respond to a question. That’s the way thinking maps are supposed to work. But it only works that way if everybody in the school is using thinking maps and is using thinking maps and is teaching the kids, particularly in [previous] grade, to use the thinking maps. And the reason I’m doing them [this way] is because we aren’t doing what we’re supposed to do, so the kids aren’t skilled enough in using the maps yet. . . . You see, you shouldn’t dictate which map to use. . . . So, if you give a sequencing task, they would choose the flow map, or if cause-effect, the bubble map, and so on.

This scenario stood in contrast to an observation of an RA class in which students were allowed to select the format for their notes and responded with a high level of performance. Likewise, another teacher described multiple methods used to integrate the elements of interest and choice into instruction, but shared frustration with how the students’ lack of basic technology skills inhibits academic freedom within her class:

Very often, when I give them a project to do, I will let them select. . . . In other words, within a topic, they’re allowed to select something that is interesting to them. Within a topic . . . if you want to present it to me in a Prezi, go for it, or if you want to present it with music, great. I would love to be at a place this year where I would say, “Hey, you want to create a little pop to it? Go for it! Let’s tape it, do whatever, give me an XtraNormal [cartoon] performance. . . .” But I’ve got kids I’m having to introduce to all this software.

A third EM teacher shared numerous ways students are given choice in his class and how technology integration aided in this process through student development of online learning profiles, through software programs such as Renzulli Learning and EdModo, which direct students toward online content-based activities related to individualized interests and learning.
styles. In turn, students commented on their appreciation of the higher level of freedom in this teacher’s class, as compared with other classes. However, it is notable that, across observations in the comparison program, student engagement behaviors within this class showed the greatest variance, with some students performing at very high levels, and others demonstrating a significantly lower level of on-task behavior.

*Spirit of collaboration and unity.* A second theme identified across data sources as influencing student academic investment was the degree of collaboration and unity among both students and teachers within each program. Across observations and interview data, the population at RA showed greater evidence of collaboration and unity than the comparison program, and this cohesive bond served to positively impact student investment in academic learning. Across the majority of RA observations, one or both observers commented on the “strong sense of camaraderie and collaboration among students and between students and teachers,” as evidenced by the following phrases:

“Excellent teacher/student rapport through quiet individual questions/discussions about extracurricular activities while checking prior work. Students are made to feel empowered and supported in their work both inside and outside of school.”

“[Class discussion was] fully student-led conversation, with teacher only inserting an occasional comment or guiding question.”

“Students work independently and in small groups at tables to select topics and begin the research and pre-writing processes, as teacher moves between groups to hold individual conferences.”

Across observations, teachers frequently were observed giving a brief 10-15 minute introduction to an activity, followed by students actively working individually or in collaboration with each other in pairs or groups and conferencing with the teacher for the remainder of the class period. During interviews, each teacher shared multiple ways they facilitate student communication and
collaboration during instruction, and one teacher commented that students often initiate collaboration by asking to work together on activities or projects.

Student interview responses provided further elaboration upon the collaborative, unified nature of RA. In reflection upon his past educational experiences, one student linked feelings of unity to the connectivity of content across subject areas at RA:

Well I didn’t go to a public middle school, but from elementary school, I know that everything didn’t normally connect. But here, the teachers plan so that everything connects. Like [at] the beginning of the school year, we did change. And so, everything—there’s like a center and everything goes out—so with the teachers, we’re learning the same thing. Like, we were learning change in science and were reading Dr. Jekyll and Mr. Hyde [in language arts]. And in math—well, math doesn’t really connect, but it kind of does—we were learning different changes and stuff.

Teacher interview responses to a question about how they plan for instruction further substantiated this claim, as each teacher shared about the importance of twice weekly grade level planning meetings across subject areas to determine overarching conceptual themes and plan interdisciplinary activities to forge connections. In regard to collaboration and shared vision among RA teachers, one teacher commented,

I love how everybody works together. I really think the unity [is a strength]—that we all have our pet projects and goals, like [Teacher A] does Odyssey of the Mind, and [Teacher B] has the museum, and [Teacher C] has her theater— but everybody really works together with the overall goal of the kids succeeding and really, the focus of the kids being better and the kids being the best that they can be . . . graduating these eighth graders to be the best quality kids and the most prepared they can be.

Two students shared how having choice in selection of group members positively impacted their learning. One stated,

If you’re placed in a group, there’s always some people you don’t get along with, and you just want to get it over fast and not pay attention to what you’re learning. But when I’m with my friends, we’ll do it together, and we’ll all pay attention and all understand the stuff that we’re learning. You know, we’ll talk more . . . but we’ll actually learn it.
Another remarked that in a recent class, “We studied as a group. . . . We played games and stuff as a group, so it helped us to learn more.”

In addition, students and teachers linked the united spirit of the school to its small size. In comparison to his former school, one student stated, “I think, overall, we’re just a closer school, because we’re so small, and we all get to know each other. So, we’re much closer, and we have a family feel.” When asked to describe the three biggest strengths of RA, one teacher commented on her son’s experience as a former RA student who is now in high school: “He misses the freedom and trust that the teachers allow the students to have, the hands-on opportunities, the collaboration among their peers, the sense of unity.” Later in the interview, this same teacher added,

We are a small school, compared to other schools, and we do have that sense of unity and camaraderie . . . we’re so small that if someone does have an issue, you may complain about it, but you get over it, just like with a brother or sister, and you just have to learn to get along.

Another teacher responded in like,

My favorite thing about it is the size . . . working with kids, I think there’s a real value to that. Then I think the whole integrated curriculum is hugely important. I think that just really makes things set with the kids.

Across observations in the comparison program, observers commented on the variance in the physical room arrangement as one factor influencing student collaboration. Two classrooms had tables, while the others had individual student desks, some of which were pushed together in groups of four and others that were lined up in more traditional rows; whereas, at RA, all classrooms had tables where students sat in small groups. Another difference was in the frequency of communication and collaboration between students. While teachers in some classes allowed students the opportunity for free discussion and collaboration as they worked on independent or group tasks, students in other classrooms were silent while working, with no
evidence of collaboration. Student interview responses supported this observation. When asked about the opportunities they had to talk and meet with other students during class, one student stated, “It depends on the teacher. Some--in math, you can’t really meet or talk with them or stuff like that, but if you’re in social studies or science, they allow you more freedom to talk and stuff.” Another student added,

Yeah, like language arts, if we have to do certain things on the computer, some of us will switch, and some of us will do other things, but we get to talk to our friends or talk to other people about what we’re doing or just socialize. And like he said, it depends on the teacher and how you get to.

In regard to the relationship between teachers and students, observers noted a greater presence of the traditional roles of teacher and student. In several observations, the teacher served as a guide or facilitator of instruction, but students were allowed a lesser degree of freedom overall, in regard to the requirement to ask permission before speaking or moving within the classroom. In two observations, the teacher was in almost complete control of student communication and did not encourage collaboration. A level of relationship similar to the ongoing, easy rapport between students and teachers at RA was only documented during a few observations in the comparison program.

Differences were also evident in the frequency and organization of collaboration among teachers. During interviews, teachers all shared about participation in weekly departmental subject area meetings across grades (i.e., social studies, science, language arts) but noted the paucity of grade level meetings across subject areas. Interestingly, two teachers’ classrooms were located almost directly across the hall from each other, but the teachers shared that they rarely had the opportunity to communicate about instructional planning due to scheduling differences. Also related to the theme of unity, when asked about the biggest weaknesses of or challenges facing the school, one teacher commented, “I don’t think we have total faculty buy-in,
and I think it holds us back. . . . We still have a lot of people who want to close their door and do their own thing, and those days are gone.” In responding to the same question, another teacher directly compared the lack of unity in vision at his school to the unified vision of RA:

Old mind sets about the way things once were and how they need to stay that way. . . . Race to the Top and other reform initiatives [are] hitting us head on, but people are still trying to interpret those through different lenses . . . they all have their agendas. . . . So, if we could get all on the same page and have a common vision and goal, I think this would be a better environment, which is what I think [RA] has done.

High expectations for academic learning and performance. Furthermore, high expectations for academic learning pervaded the school environment at RA, while expectations of a commensurate level were witnessed less frequently at the comparison program. To elaborate, in 89% of observations at RA, high expectations for student learning and/or performance were observed as being conveyed by teachers’ words and/or actions. In 40% of observations at the comparison site, one or both observers noted similarly high expectations conveyed by teachers; however, in one of these observations, an observer noted that the “teacher conveyed high expectations for writing but in a potentially demeaning way to students.” Through interview responses, RA students also referred to teachers’ expectations, as illustrated by one girl’s comment that “these teachers, they are hard, and they tell you what they want, and they expect you to do it . . . but they expect you to do it your way and the way you want to do it.” Another student added, “We have a lot more . . . trust, I guess, than at a regular middle school. The teachers can just tell us to do this, and then they’ll walk off and we’ll be doing it.”

RA teachers further expanded upon this theme in their interview responses. One teacher described how she conveyed high expectations for demonstration of learning within differentiated project choices:
Even with their choices, they can’t just make a cake and have the *To Kill a Mockingbird* symbol on it. They have to be able to explain their symbols. They have to be able to not just replicate; I want them to know. . . . It’s not enough for them to just replicate or represent. They have to bring more to the table to show me they understand. . . . I want the assessment to have a beautiful purpose, a meaningful purpose, rather than just, “I did this,” as a byproduct--I hate those projects.

Another teacher described how she conveys high expectations for student learning through the challenge level of instructional material. When asked about the challenge level of her class for the majority of her students, she replied, “High. Higher. . . . I go for as high as I can, and then I give the scaffolding needed to get the other kids up as high as they can go. I’ve always taught that way.” In accordance, the researcher’s field notes provided further evidence of a high level of academic challenge through description of a “concerted effort across classes for teachers to scaffold thinking skills to the next level--taking students from the facts to advanced and thoughtful analyses of information and being able to articulate reasoning behind ideas.”

One RA teacher described a link between teacher and parent involvement in setting high student expectations and holding them accountable for meeting these standards: “We work really hard here in sixth grade. We’ve got a whole system. . . . We have worked really hard . . . to train the parents, to help their children become independent learners, as much as the kids.” She proceeded to describe measures such as placement of all content on teacher webpages to increase student and parent accessibility, multiple parent meetings to explain procedures and discuss student progress, and initiation of a “working lunch” session to hold students accountable for completing unfinished assignments.

Interviews with teachers in the comparison program supported a higher variance in student expectations held by teachers, as a function of greater cultural diversity in the student population and overall lower student self-expectations and parental expectations. When asked about the challenge level of instruction for the majority of students, a teacher shared,
I have discovered that I have high expectations. I’d rather set the bar high and have them not make my bar but it be a higher bar than what other people are setting. I am just so against setting the bar too low, especially with gifted children.

In response to a follow-up question about whether her students met her expectations, she added, “Yes. They laugh and say, ‘She’s gonna rip it,’ because they know when they bring me a presentation or they bring me what they’ve written, I’m going to say, ‘Wait a second. . . .”

In contrast, another teacher related the expectations for academic investment and challenge level of instruction to student interest in and motivation for learning:

I don’t think the work is a real challenge. They’re perfectly capable of doing it. . . . To compare last year’s class to this year’s class, we went very, very deep in a lot of things, because you had kids who were interested . . . who were naturally inquisitive. But this year’s group, no. You’ve got one or two in there who might go a little deeper and ask some questions, but the rest of them are just sitting there chatting. They really don’t seem to make the connections. It’s more of an interest than an ability issue.

When asked about the motivation level of the majority of his students, the same teacher added, This year’s been a struggle. We seem be dealing with a lot of apathy. It’s more difficult in social studies than anything else--they don’t have a background, they don’t have an interest . . . it’s been a struggle.

Later in the interview, when asked about the biggest weaknesses or challenges facing the school, this teacher described parental expectations for many culturally diverse students who are first- and second-generation Americans:

The other challenge we have is our kids. My parents had more than my grandparents had, and my parents expected us to have more than they had. And it was never a question of whether or not you were going to college, but a question of what college you were going to go to. And I think an awful lot of our kids are early enough in the American experience that that’s not part of the ethic yet. A lot of our parents aren’t comfortable being in the school. . . . An awful lot of our very, very capable kids will be very happy in getting a better paying blue collar job instead of aspiring to everything they probably should be aspiring to.

In contrast, another teacher considered the high level of diversity from a different perspective, as evidenced in his comment, “I think the diversity is actually a strength, even though, with high
poverty numbers, it’s hard.” He proceeded to describe how the school’s ample resources, including the physical school building and technology resources, should serve to aid teachers in responding to student diversity and improving their level of motivation.

Additional Qualitative Findings

In addition to the previously listed emergent themes related to each research question, qualitative analysis of interview transcripts provided further insight into the perceived strengths and weaknesses or challenges of each program. In each interview, teachers were asked, “What do you think are the main strengths of this program/school?” and “What do you think are the biggest weaknesses/challenges of this program/school?” Whereas the previous findings were generally in favor of RA’s instructional practices and related student outcomes, responses to these two questions uncovered some areas in which RA could improve the quality and equity of its overall program.

Student diversity. The obvious difference between the student population between the two programs was the level of diversity, with RA student demographics demonstrating less cultural and ethnic diversity than comparison program students. Two comparison program teachers noted student diversity, in regard to ethnic and cultural identity, lower socioeconomic status, and transiency, as being the biggest challenge facing their program. One teacher commented, “We have a very large . . . group of students going in and out. And that is very difficult. . . . In the past three weeks, I just got in four new students.” Another teacher shared, We do more with what we have in students than I believe any school in this area possibly could. It’s pretty amazing. And if we had . . . the level of students to begin with--and this is primarily a [socioeconomic status] statement--that [RA] had, we’d be off the charts.
Two RA teachers readily acknowledged the issue of student diversity and described measures taken in response to this challenge. One teacher shared,

I think a lot of people think it’s kind of prima donna. We pick our kids. I think it’s a weakness of ours that we aren’t as diverse as we should be. We are really, really working hard; we recruited this year. We went out and recruited from the most diverse schools. It’s a problem that they have to provide their own transportation, and hopefully next year they don’t have to provide [their own] lunch.

This teacher proceeded to share about a student pantry provided by parents that students could freely access during snack or lunch if they forgot or are financially unable to provide meals. She also described how teachers have identified students of low socioeconomic status who regularly eat from the school pantry and work together to send food home with these students as well.

When directly asked about her perception of the level of diversity at RA, another teacher commented,

We try; we really try. I mean, with the application process, short of opening it up and asking for a picture of every kid. . . . Well, I’m not sure this is politically correct to say, but if we know that a kid’s racially diverse, we’ll pretty much go hunt them down. Honestly, we try; we literally go and almost recruit.

When asked if they had as many students from diverse backgrounds to apply, this same teacher answered, “Yeah, totally not. And you can only do what you can do.”

Further conversations with students and the program’s lead teacher uncovered two goals for the program that should serve to increase its general equity and diversity: (1) construction of a school cafeteria, scheduled to open at the beginning of the upcoming school year, and (2) plans for transportation of students between school/home for RA attendees located outside the school’s current zone. The lead teacher explained how diversity was an issue of which all faculty and district leadership are aware, and she stated, “We’re only in our third year; we’ve got lots of areas that need improvement.” She further described how creation of a strategic plan focused
upon issues such as increasing the program’s diversity and establishing a foundation to ensure its funding for future years.

Perceptions toward RA. Teachers in both programs were also asked about their perception of the various programs of choice in their district, including RA. One RA teacher described how programs of choice, including RA, serve to improve the quality of services across the district:

It is exciting! I know that I am currently in a class with another school that is pursuing—they may have already gotten—their charter status, but it’s neat to hear some of the things that they’re incorporating with inquiry learning. I think it’s really cool, and it would be nice to be able to feed off of what they’re doing. And teachers are learning from [RA], and we can all just make the district better with how we approach learning.

Teachers from both programs shared ways that RA was driving competition and change within the district. An RA teacher stated:

Now we have high schools that are saying, “Oh no, what do we do with these [RA] kids now, because they’re so prepared, and we don’t have anywhere to put them.” I think it’s a positive thing, because now we have three high schools that next year are doing new programs . . . to fill in that gap, so we can say, “These are high achieving kids that we need to basically meet the needs of.” Even in the elementary schools, they’re all saying, “Let’s all do something too.”

One teacher in the comparison program shared similar sentiments and also pointed out the direction of the district in guiding each school or program to establish an area of focus or specialization:

I think that [programs of choice] are . . . a first step, and I think that they’re pushing towards creating themes for schools and pulling them into having common missions and goals that go beyond just the traditional school. And so, my perception is that we’re in a flux, but people don’t have to choose it. . . .

Another EM teacher shared a different point of view related to her perceived effects of specialized programs upon the remaining population:
I know why [programs of choice] are developed. I understand their purpose. . . . If you focus on one specific thing, magnet schools or charter schools can actually have a financial benefit. . . . It all depends on how you do it . . . on if you take into account what you are creating when you create that. If you are going to go ahead and start a school that is going to be specifically for one talent, or one area of the population, you’ve got to understand that you’ve taken away from the other schools-- probably their star students, or the art students, or whoever you’ve taken out. And for the student, it’s wonderful-- hopefully they’re getting the interest . . . that’s going to motivate them through school. On the other standpoint, when you take--if you’re looking at dividing our school into four different levels of education--when you keep on taking off the top, you’re losing the factor that you want the others to model after.

The third EM teacher asked to be taken off the record in responding to this question but did, however, allow the researcher to manually record the following quote which best captured his general opinion toward special schools and programs: “I have no problem with choice, but let’s not get carried away. Don’t forget about the traditionalists. There’s no problem with traditionalism.”

All in all, teachers and other school personnel in the comparison program were positive and polite in their references to RA. However, the researcher and both observers noted a subtle attitude of resentment from EM teachers toward the special program for taking away some of their brightest students. In addition, several seemed to hold a utopian view of RA and expressed some misconceptions about its mission, organization, and resources, in accordance to the elitist view often held toward programs for students of high ability.

Summary

Both quantitative and qualitative analyses revealed notable differences between the experimental and comparison groups in regard to students’ project quality, academic engagement, and investment in academic learning. T tests indicated that the experimental group students scored significantly higher in indicators of project quality as compared to comparison
group students. Descriptive statistics in the form of mean scores, frequencies, and percentages signified that students in the experimental group demonstrated behaviors indicative of academic engagement more often and at a higher level than their counterparts in the comparison group. Multivariate analysis of variance revealed significant differences between groups in regard to survey subscale scores indicative of student investment in academic learning, both between the overall group (combined grades) and across individual grades (6,7,8). Overall group differences favored the experimental group, and cross-grade differences were variable, with the sixth grade comparison group students outperforming their experimental group peers in one subscale, and seventh grade experimental group students outperforming the comparison group across all four subscales. No significant differences between groups were revealed at the eighth grade level.

Results of qualitative analyses served to provide triangulation for and further explanation into qualitative findings, as emergent themes pointed to instructional and attitudinal factors that impact student outcomes in the areas of project quality and academic engagement and investment. Conclusions regarding these findings, instructional implications, and recommendations for future research are presented in chapter 5.
CHAPTER 5
DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS

This study investigated student outcomes of The Renaissance Academy (RA), a specialized, full-time middle school (Grades 6-8) program for gifted learners focused on interest in the arts, sciences, and technology to facilitate student demonstration of creative productivity, as compared to the student population of a gifted program following a more traditional part-time model within the same district. Specifically, effects upon student project quality, academic engagement, and investment in academic learning were examined. This chapter provides an overview of the study and a discussion of the findings within and across research questions. In addition, limitations of this study, implications for program design and improvement, recommendations for future research, and overall conclusions are presented.

Overview

Related literature pointed out the need for and challenge of equipping modern students with 21st century skills necessary for participation and success in a global society. Numerous studies document a recent decline in rigorous programming to meet needs of gifted and advanced learners in the United States and suggest the negative ramifications of these educational decisions upon our future economy. Specialized schools or programs present one solution to this issue, although there is a paucity of research on full-time nonresidential programs for students in middle grades. In response, this study sought to fill a gap in the literature by investigating one recently developed full-time special program targeted at cultivating the abilities of interested
middle school (Grades 6 – 8) students in the arts, sciences, and technology. Currently in its third year of inception, RA serves 240 students in Grades 6 through 8 through a full-time, special school format. Only one previous research study has been conducted on RA, and its focus was upon teacher outcomes in regard to coherence between attitudes and practices regarding differentiated instruction (Crowder, 2011). The design of the current study addressed some of the recommendations for future research set forth by that researcher.

The purpose of this study was to evaluate one component of RA’s effectiveness, student outcomes, by comparing RA students to student participants in a comparison program, Elm Middle (EM). In order to accomplish the stated purpose, a mixed methods design was employed to address the following guiding research questions:

1. Do middle school students of high ability in a special school setting and traditional gifted/advanced classes exhibit differences in project quality, as measured by the Student Product Assessment Form (SPAF), observations, and interviews?

2. Do middle school students of high ability in a special school setting and traditional gifted/advanced classes exhibit differences in academic engagement, as measured by observations and interviews?

3. Do middle school students of high ability in a special school setting and traditional gifted/advanced classes exhibit differences in investment in academic learning, regarding interest, challenge, choice, and enjoyment, as measured by the My Class Activities survey, observations, and interviews?

This study was conducted over the course of one semester (4 months). A total of 226 students in Grades 6 through 8 across two separate programs within one school district
participated in the study, including 165 RA students and 61 comparison group students. In addition, 10 total teachers, 5 from each program, were also included as participants.

Three quantitative instruments and three qualitative research methods were utilized to collect data on the outcomes of interest, in response to the research questions. The Student Product Assessment Form (SPAF; Reis, 1981) was used to assess project quality. Four external raters with established inter-rater reliability scored 56 total standards-based projects created by seventh grade students across both programs, including 34 from RA and 22 from the comparison group. Independent samples t tests were applied to determine whether significant differences existed in the indicators of project quality between students in the experimental and comparison groups. The Classroom Observation Scales-Revised (COS-R; VanTassel-Baska et al., 2003) was applied by the researcher and two external observers across 19 total class observations (9 at RA, 10 at EM) to determine differences in academic engagement demonstrated by students in each group. Results from the COS-R were assessed using descriptive statistics in the form of mean scores, frequencies, and percentages. The My Class Activities survey (MCA; Gentry & Gable, 2001) was utilized to evaluate student investment in academic learning. Participating students each completed this survey one time, and multivariate analysis of variance (MANOVA) was conducted on survey results, by subscale, to determine differences between the overall groups and for students at each grade level between groups. Qualitative data were collected in the form of observations, a focus group interview with students in each group, and individual interviews with three selected teachers from each group. In addition, the researcher kept a field journal in which she recorded notes and observations throughout the data collection and analysis phases.

Chapter 4 presented the findings obtained from data analyses for quantitative and qualitative measures separately, in response to each guiding research question. The preceding
Discussion of Findings

Research Question 1: Project Quality

For the purposes of this study, teachers were asked to submit completed standards-based student projects that reflected the highest level of learning, in accordance with Maker and Nielson’s (1996) definition of a project as “tangible evidence of student learning” (p. 186). Seventh grade student projects related to standards-based social studies and science topics were considered for scoring. Selected projects across both groups were multifaceted, including visual, written, and multimedia components, and created for the purpose of presentation to a specific audience. Differences in students’ project quality between groups were assessed using data from the SPAF, observations, and interviews. Independent t tests on SPAF results revealed that projects created by seventh grade students in the experimental group demonstrated a level of quality that was statistically significantly higher than seventh grade student projects from the comparison group. Significant differences were found at the .05 level between RA and the comparison group projects for the means of subtotal scores for two subsets of items (items 1-8 and 9A-9G), and for the means of the total score. The most sizable difference between means was in regard to the total score, as experimental group students earned a mean score of 70.68, as compared to a mean score of 45.75 earned by the comparison group. Qualitative data analysis and resultant themes identified the following factors that may have contributed to these differences: student choice, depth and complexity of projects, and authenticity of audience. These findings are consistent with previous research investigating influences upon quality of
products created by advanced students as measured by the SPAF (Boddie, 1996; Gubbins, 1982; Newman, 1991; Olenchak, 1988; Reis, 1981).

Data from observations, student interviews, and teacher interviews indicated that RA students exercised a greater extent of choice in the selection of the topics, format, and design of their projects, as compared to comparison group students. Coding revealed a great extent of overlap between the categories, “choice,” and “interest.” The elements of choice and interest relate directly to numerous SPAF indices of project quality. For example, the extent of student choice in selecting a project topic related to personal interest and knowledge would likely impact performance in developing a statement of purpose (Factor 1), focusing the problem (Factor 2), and structuring information in a logical, sequential manner (Factor 6), and choice in the format of a project could influence multiple SPAF indicators. During the focus group interview, RA students shared numerous examples of opportunities to make choices during development of museum and other various in-class products. This assertion contradicts Crowder’s (2011) finding that students do not perceive they have a great deal of power, as related to choice in instructional tasks or projects. One possible reason for this difference in findings may be the specificity of this research question to the area of student project quality and development; whereas, Crowder’s research questions related more to student power and choice within general instructional activities.

When asked about their reasons for selecting a particular topic for a project, the majority of RA students described a relation to their personal academic interests and corresponding future career goals; in contrast, EM student responses conveyed a greater disconnect between project topics and interest. Observation and teacher responses revealed a larger extent of student control and choice among learning activities and project development at RA, and an overall greater
teacher control of project content and format at EM. This finding is supported by Newman’s (1991) research, which documented elementary gifted and non-gifted students’ selection of and focus within a topic of interest as having a significant effect upon project completion and quality. Reis (1981) similarly noted the importance of teachers in gifted programs being aware of students’ expressed interests and allowing them to further pursue these interests through development of authentic products, and Gubbins (1982) identified students’ interest level as a contributory factor to their persistence in the project development process.

A second potential influence upon project quality was the difference in the depth and complexity of projects between groups, with experimental group projects reflecting greater levels of depth and complexity than those of the comparison group. This finding is consistent with a related study that documented school membership, resulting from related curricular differences between gifted programs, as one influencing factor upon differences in project quality of middle grades gifted students (Boddie, 1996). Kaplan (1994, 2005) described the importance of delivering differentiated instruction through layering of curriculum for students in gifted programs, in specific regard to modification of depth and complexity to differentiate core academic content. Depth refers to “focus[ing] the teacher’s and student’s attention on increasingly more difficult, divergent, and abstract qualities” within a topic of subject area, and complexity denotes “the means by which knowledge is extended or broadened,” including timespan, point of view, and connections within, between, and among disciplines (Kaplan, 1994; Kaplan, 2005, p. 116). Consideration of the organization of curricula and access to resources within the product development process across both programs may provide insight into apparent differences in depth and complexity of student projects (Billig, Root, & Jesse, 2005; Renzulli & Reis, 1997). Observations across both programs revealed depth in curricular organization and
delivery, as teachers frequently planned and linked academic topics back to more abstract, overarching concepts. However, in regard to complexity, RA curricula demonstrated greater coherence in concepts across classes, as instruction in individual classes was frequently interdisciplinary, tying together more than one subject area and guided by a theme at each grade level. For instance, within the current seventh grade theme, “The Outer Limits,” content across subject areas was tied to topics related to the theme and its key concepts and universal understandings. In science, topics included space and the ocean floor; in social studies, exploration of new lands was being studied; and in language arts, students were reading texts related to these topics and themes. Instruction in the observation program lacked this interdisciplinary degree of depth, as teachers selected their own class themes, concepts, and topics, due to a lack of grade level planning meetings. Related literature has indicated the effectiveness of the Enrichment Triad Model (Renzulli, 1977) and Parallel Curriculum Model (Tomlinson et al., 2002) in increasing the frequency and quality of curricular modifications related to student development of creative productivity (Hockett, 2009; Imbeau, 1991; Kettle, Renzulli, & Rizza, 1998), and both models are utilized by RA teachers to facilitate student development of quality authentic products.

In further discussion of depth and complexity, the most obvious differences in projects between groups were in regard to the resources both used to conduct research and included in the project’s content and presentation. Among the individual factors on the SPAF, the most notable differences existed between groups in regard to the level, diversity, and appropriateness of resources (Items 3-5). Qualitative analysis of RA project descriptions revealed a larger number of research materials used, including numerous web-based resources and beyond grade level resources (i.e., human resources) in addition to typical grade-level texts, as opposed to
comparison group research materials that more frequently included textbooks and a single online resource. A small number of projects used Wikipedia as the sole online resource. In addition, all RA projects employed multiple print, visual, and multimedia resources in order to convey understanding about a topic to their audience, while less than one-third of EM projects exhibited multiple resources to enhance presentation. Possible reasons for these differences in the depth and complexity exhibited in student selection of project resources may include variety between the two programs in regard to access to technology resources, student knowledge of research skills, and teacher expectations and student self-expectations toward projects.

Group differences in project quality could also be attributed to the role of the audience for student projects. Gifted education literature on product development emphasizes the importance of students having an authentic audience to whom projects may be presented, in order to promote student ownership and equip them with skills used by practicing professionals (Reis, 1981; Renzulli & Reis, 1997). On the SPAF item related to audience (Item 8), the score for RA student projects ($M = 4.971$) was higher than the comparison group score ($M = 3.432$), indicating RA students’ effectiveness in selecting and targeting their project to a specific audience. During interview responses, students expanded upon their serious consideration of their role in teaching museum visitors about their selected topics through presentation of their projects, as many referred to themselves as “teachers.” This finding corresponds with previous literature documenting student demonstration of higher order thinking skills within authentic problem-based situations (Newman & Bailis, 2008; Renzulli & Reis, 1986; Schlichter, 1986).

In addition, students were observed demonstrating a higher level of professionalism during the delivery of their presentations to an audience. As compared with observed EM student presentations, which consisted mostly of reading information from web-based or print
visual sources, RA students all delivered memorized information clearly and with a high degree of enthusiasm, and they engaged audience members in dialogue through asking and responding to questions related to the project. This level of communication meets numerous indicators within the Framework for 21st Century Skills’ (2009) objective, “Communicate Clearly,” as shown in Figure 3. In accordance, project development for, and presentation to, an authentic audience may be viewed as an instructional strategy to promote student acquisition and demonstration of 21st century skills.

Communicate Clearly
- Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts
- Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions
- Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade)
- Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact
- Communicate effectively in diverse environments (including multi-lingual)

This standard is part of the larger standard, “Communication and Collaboration” within the area of “Learning and Innovation (Framework for 21st Century Skills, 2009, p. 4).

Figure 3. Communicate clearly, objective within the Framework for 21st Century Skills.

Research Question 2: Academic Engagement

Observations using the COS-R rating and comment forms yielded both quantitative and qualitative data regarding student academic engagement in each of six subscale areas: General Classroom Behaviors, Diverse Self-Selected or Self-Paced Activities, Problem-Solving Strategies, Critical Thinking Strategies, Creative Thinking Strategies, and Research Strategies. Analyses showed that RA students were engaged in behaviors indicative of academic learning
more often and at a higher level than their comparison group peers. This confirmed Crowder’s (2011) finding that teachers perceived students as demonstrating a high level of engagement, and “across all of the observations students appeared very engaged in response to student discussion” (p. 88).

Across all COS-R subscales, data revealed that RA students demonstrated targeted engagement behaviors more frequently (82%) than EM students (73%), with the largest differences being in the areas of General Classroom Behaviors (RA = 100%, EM = 84%), Problem Solving (RA = 78%, EM = 47%), and Research Strategies (RA = 80%, EM = 70%), and the least differences being in the areas of Creative and Critical Thinking Strategies, which both differed by seven percentage points. In addition, mean ratings for RA student engagement were higher than EM students across all subscales, with the greatest differences in the areas of Creative Thinking (RA = 4.18, EM = 3.42) and Problem Solving (RA = 5.0, EM = 4.0), and the least differences in the areas of Diverse Self-Selected/Paced Activities (RA = 5.0, EM = 4.65) and Critical Thinking (RA = 5.0, EM = 4.51). These data revealed that both programs are effective in engaging students in utilizing creative and critical thinking skills to promote academic learning; however, students in the comparison program are not demonstrating creative thinking at as high a level as RA students. This finding is supported by research from gifted program evaluation that indicated “teachers of the gifted use significantly more critical thinking and problem-solving behaviors in their work than regular classroom teachers” (Avery, VanTassel-Baska, & O’Neill, 1996, as cited in VanTassel-Baska & Feng, 2004, p. 26).

Discussion of qualitative findings provides further insight into these differences. Analysis of qualitative data sources attributed RA students’ high level and frequency of engagement to their strong initiative for learning as a result of high self-expectations, strong self-
discipline, and the presence of a school climate that values intellectualism. As one observer remarked of RA, it was “very evident that students want to be [there] and want to learn,” and another commented on the “high nerdy level--it’s cool to be smart.” This finding supports a synthesis of research on special schools by Rapp (2008), who found a major strength of full-time schools and programs to be the frequent opportunities student participants have to interact with peers who possess similarly high abilities and goals for academic learning and engagement.

Qualitative findings also identified two instructional features of the RA program that influence student initiative and engagement: (1) the extent to which instruction is differentiated, and (2) the experiential nature of instruction and the teacher’s related role as guide or facilitator. Differentiation of instruction was noted as a pervasive component of the RA program’s culture, as described by one observer as “embedded differentiation” across all aspects of instruction; whereas, at the comparison program, some teachers differentiated instruction to a great extent, while in other classrooms there were few evidences of differentiation. This finding is consistent with Crowder’s (2011) assertion that RA teachers are generally effective in differentiating instruction for students. Increased differentiation of instruction in regard to student choice and individualization of content, process, and products (Tomlinson, 1999) could explain student performance on the COS-R subscale, Diverse Self-Selected/Paced Activities.

Moreover, Crowder (2011) documented teachers’ “perceptions of DI as being student centered” (p. 87), which relates to another qualitative theme from this study--the experiential nature of instruction and the related role of the teacher. Numerous times across observations, RA students were viewed as active participants in learning academic content through simulations, the museum, and other hands-on activities, such as experiments, and during interviews, both teachers and students expanded upon the meaningfulness of these activities to
student learning. This finding relates to literature linking inquiry-based instruction, in the form of problem-based learning and service-learning, to increased student motivation and engagement (Billig & Klute, 2003; Billig, Root, & Jesse, 2005; Furco, 2002), as well as academic performance (Ammon, Furco, Chi, & Middaugh, 2001; Bredderman, 1982; Billig & Klute, 2003). In addition, problem-based learning has been recommended as a best practice in gifted programs for facilitating student problem-solving behaviors and usage of thinking skills, due to alignment with students’ natural learning styles, preferences, and abilities (Gallagher, 2005). Accordingly, RA teachers’ widespread use of experiential learning strategies may explain students’ high scores on the Problem Solving and Critical and Creative Thinking areas of the COS-R.

The COS-R rating form did not examine engagement as specifically related to technology access and usage, so the researcher created an additional area on the observational comment form to denote engagement in technology. From a synthesis of this data and results of student and teacher interviews, the quality of student technology access and usage revealed further differences in academic engagement between groups. In regard to access, students across both programs appeared to have access to a similar variety and amount of technology tools within classrooms, with slightly greater variety among tools in the comparison program. However, the most noticeable difference was the one-to-one student laptop ratio within the experimental program, which allowed students ongoing Internet access during instruction and may explain RA students’ higher COS-R ratings regarding their level of engagement in Research Strategies. This finding supports Housand’s (2008) documentation of access to technology as a barrier to talented elementary students’ full implementation of technology to enhance learning and product development.
Additionally, RA students were observed using technology more frequently, in more differentiated ways, and for a greater variety of purposes than comparison group students. Examples of technology usage reflected numerous indicators of 21st century learning within the area of “Information, Media, and Technology Skills,” as listed in Figure 4 (Partnership for 21st Century Skills, 2009). During interviews, teachers described uses of technology to support differentiated and experiential academic learning, and students expressed their enjoyment in using technology to learn and create. The importance of framing technology integration within a meaningful, content-related context in relation to positively impacting student engagement and achievement has been established by previous research (Housand, 2008; Sandholtz, 1997; Schachter, 1999). This finding lends further support to this assertion. Furthermore, RA provides greater support in facilitating students’ acquisition of specific technology skills, as both students and teachers shared about the impact of a technology basic skills class taken by all sixth graders and technology elective courses offered in the higher grades, which equip students with necessary skills to use technology in advanced and meaningful ways. Contrastingly, comparison program teachers noted gaps in students’ skills in using specific technology tools to demonstrate learning as a limitation to students’ full engagement in technology during the learning and product development processes.

- Information Literacy
  - Access and evaluate information.
  - Use and manage information.
- Media Literacy
  - Analyze media.
  - Create media products.
- Information, Communications, Technology (ICT) Literacy
  - Apply technology effectively

This set of standards is part of the larger Framework for 21st Century Skills (Partnership for 21st Century Learning, 2009, pp. 5-6).

Figure 4. 21st Century Skills: Information, media, and technology skills.
Research Question 3: Investment in Academic Learning

In this study, academic engagement relates to demonstrated student behaviors, and investment in academic learning deals with student perceptions toward instruction; in other words, investment may be considered an underlying factor to engagement. Analyses of MCA survey data across all grade levels indicated that RA students demonstrated significantly higher levels of investment than the comparison group in the subscale areas of Interest and Enjoyment. This finding correlates with results of qualitative analyses, which identified a greater amount of freedom and choice given to RA students and the impact of this freedom upon feelings of ownership in, and enjoyment toward, academic learning (Crowder, 2011).

Analyses from results of MCA surveys by individual grade levels revealed some discrepancy across RA students’ perceptions toward the interest, choice, challenge, and enjoyment of academic instruction, as compared to EM peers. At the sixth grade level, differences in mean scores between the experimental group ($M = 3.30$) and the comparison group ($M = 3.92$) were significant ($p = .000$) for only the subscale of Challenge, in favor of the comparison group. Enjoyment was the only area in which sixth grade RA students scored slightly higher, though not at a significant level, than those students in the comparison group. At the seventh grade level, RA students’ MCA mean scores were significantly higher than comparison group students across every subscale area--Interest ($p = .000$), Challenge ($p = .002$), Choice ($p = .000$), and Enjoyment ($p = .000$)--indicating that RA students were significantly more invested in academic learning. This finding lends support to evidence of demonstrated student engagement, as discussed in response to the second research question. At the eighth grade level, there were no significant differences between survey results, although RA students’ mean subscale scores were slightly higher than their comparison group counterparts.
There are several explanations for these differences across survey data by grade level. First, the sample size was small for the comparison program, with less than 25 comparison group students completing surveys at each grade level. Also, surveys are a self-report measure and only serve to document an individual’s perceptions within a given time and situation (Gall, Gall, & Borg, 2007). The survey used was initially intended to measure student perceptions across all classes, but due to the wording of some questions, many students responded in consideration of the current class they were in while taking the survey. Therefore, to obtain a full range of perceptions indicative of academic investment, students in each program ideally would have taken a separate survey for each class attended, from which mean scores could have been calculated. However, this repetition might have led to test-retest bias. Furthermore, the content of eighth grade classes differs somewhat from content of the other grade levels, as students are taking advanced content for ninth grade credit. Thus, the standards may be more rigorous and less prone to differentiation across both programs, which could have attributed to the lack of difference in survey scores between the two groups at the eighth grade level.

In contrast to inconsistencies across survey data, qualitative analyses of observational and interview data resulted in three prevalent themes across all grade levels, which lend support to RA students being more invested in academic learning than those students in the comparison group. As previously stated, students in the RA program had noticeably more freedom than students in the comparison group, and student interview responses revealed their positive perceptions toward this freedom, as manifested in the level of choice they have and the relation of instruction to their interests. This finding is supported by results of a large-scale study on ability grouping that found the content and level of curricular modification within special schools to contribute to student academic investment and resultant achievement (Rogers, 1991). In
addition, results of seventh graders’ MCA surveys and RA students’ positive perceptions toward the level of choice they have in selecting instructional activities and making decisions in the product development process contradicts previous research findings that middle school gifted students generally do not perceive a high level of choice and freedom in academic instruction (Crowder, 2011; Gentry, Rizza, & Owen, 2002).

Also, both RA students and teachers have more opportunities than those in the comparison group to collaborate with each other, and this collaboration yields a greater sense of unity. During RA observations, students were given more frequent opportunities to engage in communication and collaboration with their peers to enhance the learning process. Students demonstrated numerous 21st century skills within the standard, “Collaborate with Others,” as listed in Figure 5, part of the larger standard “Communication and Collaboration” within the area “Learning and Innovation Skills” (Framework for 21st Century Skills, 2009). During interviews, students contrasted the level of collaboration and spirit of unity at RA with their previous educational experiences, and teachers contrasted it to their previous teaching jobs. Students also described multiple scenarios evidencing how opportunities for communication and collaboration within instruction specifically promoted their desire and ability to learn academic content. Three specific factors were noted as contributing to this sense of unity—the school’s small size, its shared mission and goals, and the interconnected nature of curricula across classes—and these findings are consistent among other research on special schools for advanced learners (Crowder, 2011; Rapp, 2008). Whereas RA teachers hold planning meetings by grade level, across subject areas, comparison program teachers only met with teachers within the same subject area; this discrepancy in planning resulted in a coherence among RA content and a general disconnect between content across classes in the comparison program.
Collaborate with Others

- Demonstrate ability to work effectively and respectfully with diverse teams.
- Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal.
- Assume shared responsibility for collaborative work, and value the individual contributions made by each team member.

This standard is part of the larger standard, “Communication and Collaboration” within the area of “Learning and Innovation (Framework for 21st Century Skill, 2009, p. 4).

Figure 5. Framework of 21st Century Skills: Collaborate with others.

In addition, high expectations for student investment and engagement conveyed by teachers were observed more frequently at RA (89% of observations) than in the comparison program (40%). Teacher interview responses provided further insight to reveal differences in parental expectations among students in each program, with more students and parents at RA promoting college preparation and attendance than those in the comparison program.

Additional Qualitative Findings

Analysis of teacher interview data revealed additional findings unrelated to the research questions but worth including in this discussion due to their potential to identify specific areas of strength for the RA program, as well as suggest areas for improvement. The most obvious weakness is that the RA student population is less diverse, in regard to ethnic and socioeconomic status, than the comparison program population. Lack of diversity in gifted program participants is a common issue documented in the literature on special schools and programs (Davis & Rimm, 2004; Rapp, 2008). Teachers shared that increasing student diversity is a shared future goal for the program and described multiple methods taken to recruit more culturally and linguistically diverse students. The two biggest obstacles to diversity in regard to socioeconomic status is the requirement of students located outside the school zone to provide their own
transportation to and from school, and the requirement to provide lunch, although a parent-
stocked food pantry is provided for students on an as-needed basis. In addition, multiple
teachers stated that a low number of culturally, linguistically, and economically diverse students
have applied for admission in past years, indicating a need for greater communication about RA
and other programs of choice between school and home.

Teachers across both programs shared that the program’s biggest strength is its success in
driving competition and change across and beyond the school district, as numerous other high
school and elementary school programs of choice have been and are being created in response to
the success of RA. In addition, the program’s lead teacher described two elementary programs
outside of the district that have been created based on RA’s model, as well as several other
districts who had sent teachers and/or administrators to visit the program with a desire to
replicate the museum or program model in their schools. However, as with many gifted
programs, some individuals held negative perceptions toward RA in regard to their practice of
selecting “the best” students and alleged attitudes of elitism (Davis & Rimm, 2004; Rapp, 2008).

Integration of Findings

Across research questions, recurrence of and relationship between findings led to
identification of overarching themes regarding RA’s effectiveness in promoting student
engagement and performance. First, student freedom as a function of differentiated instruction
was a pervasive theme across the RA program (Crowder, 2011). Students were allowed a great
extent of freedom in selecting the topic, format, and materials for projects, group members with
whom to collaborate, and technology tools to aid in research. Middle school is a unique
developmental phase, during which students are transitioning from childhood to adolescence,
and independence is highly valued by talented students; as such, gifted programs in the middle grades should reflect a high degree of student choice while maintaining an appropriate level of teacher support and direction (Crowder, 2011; Csikszentmihalyi, Rathunde, & Whalen, 1993).

Next, unity was a notable feature of RA in personal relationships between students, between teachers, and among students and teachers, in addition to curricular coherence through a shared mission statement and related concepts and themes across classes. This spirit of unity is attributed to the high level of collaboration among teachers and students and the program’s small size, in contrast to a traditional middle school. Furthermore, high expectations pervaded the RA program in the form of teacher expectations for the quality of instruction and for student success and initiative in learning and attainment of creative productivity. As one teacher noted, only about half of RA students are formally identified as gifted/talented, but all students equally demonstrated gifted behaviors in response to this high level of academic expectation.

Finally, authenticity in the purpose of instruction, as fulfilled through the structure of the museum and its role in facilitating student creative productivity, is a cornerstone to all instruction that occurs within the program. Each of these themes pervaded all aspects of the environment at RA and worked in combination to attribute to student demonstration of superior project quality and academic engagement and investment, as previously described. Figure 6 serves to illustrate the connection between these findings in supporting student outcomes.
There are multiple limitations regarding this study’s design and procedures that may impact internal and external validity. First, this study was limited to one school district and employed convenience sampling and included a small number in the sample of both students and teachers in the experimental and comparison groups. Subsequently, the extent to which findings may be generalized to a larger population is limited. In addition, participants in both groups included few students of low socioeconomic status, as compared to demographics for the larger school population, thus limiting the ability for findings to be generalized to other settings including a more diverse student population. Furthermore, the time period for data collection was of a short duration (1 semester) and only included two observations in selected classrooms in both groups. Although data saturation was attained (Glesne, 2008), the brevity of data collection may have somewhat limited observation of the full depth and breadth of the learning
process. Finally, although classes in both programs were guided by the same course of study standards, teacher differences in presentation of instruction and organization of guidelines for project development may have varied across groups, and this limitation may have inhibited measurement of student project quality.

In addition, characteristics of this study’s selected instrumentation may limit validity of findings. Two of the measures used, the Student Product Assessment Form (Reis, 1981) and the Classroom Observation Scales-Revised (VanTassel-Baska et al., 2003) generated data in the form of ratings assigned by observers. Although the researcher took careful measures to promote objectivity among raters, there is always a certain degree of subjectivity in results of rating scales, which may serve to limit findings. In addition, the My Class Activities (Gentry & Gable, 2001) survey was a self-report measure and subsequently served to measure student perceptions toward in-class activities toward a specific class during one point in time thus limiting the extent to which findings may be generalized across classes within each program.

Implications

Research has documented the general ineffectiveness of middle schools in engaging students at a high level of academic performance (Yecke, 2005), and especially those with advanced gifts and talents (Moon, Callahan, Tomlinson, & Miller, 2002). Literature on the topic of gifted education programs and services suggests specialized programs as an effective means for engaging and challenging students of advanced academic and creative potential at the middle grades. However, review of previous evaluation studies of gifted programs revealed a general lack of substantive research focused upon student outcome data (VanTassel-Baska & Feng, 2004), specifically at the middle school level (Rapp, 2008). This study identified factors
contributing to the effectiveness of The Renaissance Academy (RA), a recently developed full-time special program for students with advanced creative and academic abilities, in regard to student outcomes in the areas of project quality, academic engagement, and investment in academic learning. Findings identified several factors that influenced the program’s effectiveness, which may serve to substantiate existent practices and provide basic guidelines for new programs. In addition, results pointed out program weaknesses and challenges, which may be considered in construction of future plans for improvement. This section presents implications for theory and practice, in regard to program design and improvement.

First, it was notable that student participants in RA were not all formally identified as gifted/talented, according to state specified special education identification procedures. In fact, only about half of participants were labeled, but all shared an interest in the arts, science, and technology. In regard to demonstration of academic investment and engagement and resultant creative productivity, all students exhibited gifted behaviors at a commensurate level. Specifically, identification methods utilized by RA include a multidimensional application process, which includes a written application, test scores, teacher recommendations, and a writing sample, in addition to a series of performance-based tasks through which students are given opportunities to demonstrate creative and critical thinking abilities and collaboration skills as RA teachers observe. As such, a broad conception of giftedness and consideration of student interests, as assessed through a similar multidimensional identification process, might be considered by other schools and districts who seek to design specialized services for students of advanced ability and potential, in order to promote inclusivity (Moon et al., 2002; Renzulli, 1978; Renzulli & Reis, 1997).
Secondly, the researcher noted a lower level of diversity, in regard to racial, cultural/linguistic, and socioeconomic factors, among the student population at RA, in contrast to students in the comparison program. Issues of access were attributed to lack of public transportation for attending students who reside outside the school zone and the lack of a free and reduced school lunch program. Renaissance Academy teachers described measures taken to promote student diversity through targeted recruitment to the student and parent population at elementary schools of lower socioeconomic status within the district. In addition, plans for construction of a school cafeteria were in progress. One suggestion for RA administrators is to explore potential avenues for funding student transportation. Administrators and teachers in other specialized programs may prepare for similar challenges through development of advertisement procedures to recruit students from culturally and linguistically diverse populations and inclusion of program budget items related to providence of students’ basic needs, including transportation and meals.

Third, several lessons can be drawn from RA’s clear focus and its role in guiding instruction. The program is focused upon three specific academic areas--the arts, sciences, and technology--around which all instruction is centered. In addition, Crowder (2011) described how RA “hopes to instill the seven Da Vincian principles in its students through instructional programming and practices,” through integration of the following standards into instruction: “Concessione (interconnectedness), “Curiosita (an insatiably curious approach to life and continued learning),” “Dimonstrazione (a commitment to test knowledge through experience, persistence, and a willingness to learn from mistakes),” “Sensazione (the continual refinement of the senses to enliven experience),” “Sfumato (a willingness to embrace ambiguity, paradox, and uncertainty),” “Arte/Scienza (the development of the balance between science and art, logic and
imagination),” and “Corporalita (the cultivation of grace, ambidexterity, fitness, and poise”; pp. 84-85). Findings from this study linked the shared mission held by RA teachers and students, and evidenced through each of the above standards, to an increased sense of unity and collaboration. Other programs may benefit from delineating a similar curricular focus through identification of one or more key academic areas from which related program-specific instructional standards and themes could be developed.

Fourth, RA instruction reflected a high level of differentiation in regard to its depth and complexity as a direct result of teacher collaboration and integration of multiple research-based instructional models to nurture higher order thinking and facilitate interdisciplinary curricular connections. Specific models described by RA teachers, and observed in practice, included the Parallel Curriculum Model, Enrichment Triad Model, and Concept-based Curriculum Model. Additionally, teachers met twice weekly by grade level for shared planning. Multiple teachers indicated a desire to also meet within subject areas across grade levels during the upcoming school year, although time was denoted as a barrier to collaboration. Administrators and teachers across a variety of gifted program settings, including but not limited to special schools, may benefit from application of these or similar instructional models to promote student engagement in higher order thinking skills and problem-solving behaviors, and teachers should be provided with ample time for collaborative instructional planning.

Fifth, RA’s focus on experiential learning in the form of problem-based service-learning through its museum was the most unique aspect of the school, and findings linked its presence to increased student demonstration of creative productivity, investment, and engagement. Other gifted programs may benefit from establishment of a similar agenda to guide student authorship of authentic projects for a real audience beyond teachers and classmates. In addition, findings
indicated that student participation in the museum and related academic instruction served as a means for students to acquire and exhibit numerous 21st century skills, specifically within the areas of *Learning and Innovation* and *Information, Media, and Technology Skills* (Partnership for 21st Century Learning, 2009).

Sixth, the one-to-one student: laptop ratio at RA, in conjunction with the program’s thoughtful integration of instructional technology skills into coursework, facilitated development of students’ abilities in the areas of research, problem solving, and project creation. This finding gives credence to previous research emphasizing the equal importance of technology access and purpose in impacting students’ academic engagement and performance (Housand, 2008; Sandholtz, 1997; Schachter, 1999). As such, when designing the structure of and budget for gifted programs of all types, stakeholders should consider the importance of providing students with adequate technology tools and related skill-based instruction and providing teachers with appropriate training to facilitate the meaningful content-based application of technology.

Finally, findings from this study revealed that RA’s small size was an influence upon collaboration and unity among student and teacher participants, as well as parental involvement. Fostering a spirit of unity is an important consideration in development of programs for gifted adolescents in response to their unique social and emotional needs for independence within a supportive environment and positive socialization with peers. When attempting to build a new program or expand an existent one, stakeholders should explore ways to build and maintain community among participants through adoption of strategies focused on forging strong relationships between teachers, students, and parents and attendance to student social and emotional needs.
Recommendations for Future Research

Findings from this study led to numerous ideas for extending research of the issues under investigation. Recommendations for further research include the following:

1. This study used a mixed methods design to gather multiple data sources over the course of 1 semester, a relatively short time period. Longitudinal designs or individual case studies could be conducted within the same program to determine long-term effects upon participants.

2. This study used a comparison group that followed a traditional instructional model. In future studies, it would be interesting to compare RA student outcomes to other full-time special schools or programs, to determine and make comparisons between general areas of strength and weakness.

3. The current study focused only upon student outcomes regarding project quality, academic engagement, and academic investment. Further research needs to be conducted to determine effects of program participation upon additional student academic outcomes, such as acquisition of thinking skills and academic achievement, as well as effects upon student outcomes related to social and emotional domains.

4. Qualitative findings of this study delineated a beginning description of the ways technology is integrated into instruction and used by students. Future research could explore the quality of, and specific factors impacting, technology integration and student acquisition and demonstration of 21st century skills within RA and other special programs.

5. This study focused upon only one full-time special program for students in middle grades. To further substantiate the body of research supporting special schools for gifted students, high quality program evaluations employing multiple measures and using more than
one group should be conducted to determine the efficacy of special programming options at the elementary, middle, and secondary levels (Callahan, 2004; VanTassel-Baska & Feng, 2004).

Conclusion

This study fills a gap in the literature on special schools and programs for gifted learners at the middle school level by offering a beginning description of one special program and identifying influential factors regarding its effectiveness in engaging student participants in high levels of academic learning and facilitating development of creative productivity. Specifically, triangulation of findings across quantitative and qualitative data sources indicate that RA students demonstrate significantly higher levels of project quality, academic engagement, and investment in academic learning, as compared to students in a traditional gifted program.

Numerous federal agencies and educational advocacy groups have voiced a call for increased rigor across the United States educational system to engage students of all abilities, and especially those at the highest levels of intellectual and creative potential, in higher order thinking and acquisition of 21st century skills, with the ultimate goal of preparing a workforce able to maintain our nation’s economic and global leadership positions (National Association for Gifted Children, 2010; National Science Board, 2010; President’s Council of Advisors on Science and Technology, 2010). Recent research on the overall quality of middle grades education and effects upon gifted adolescents indicates its general ineffectiveness in responding to the needs of advanced learners (Crowder, 2011; Moon, Callahan, Tomlinson, & Miller, 2002; Tomlinson, 1995). Tomlinson (1995) described how middle schools historically have “[left] middle school students who are advanced in one or more dimensions of learning in a sort of educational no-man’s-land” (p. 1). Likewise, in response to assertions by previous research that
a majority of middle schools embrace instructional approaches that do little to promote students’ academic development, Yecke (2005) stated, “It is time for a thorough reform of middle grade education, including a new focus on high standards, discipline, and accountability for student achievement” (p. i).

In response, findings from this study supported the usage of full-time special programming for learners of advanced potential at the middle school level and delineated specific factors that may lead to program effectiveness in engaging and challenging gifted adolescents. Specifically, this study found that participation in a full-time specialized program positively impacted student project quality, academic engagement, and investment in academic learning. In addition, findings lend further support for consideration of a broadened conception of giftedness in regard to creation of gifted programs that promote inclusivity. This goal may be attained through adoption of identification policies targeted at student interest and sensitive to the needs and characteristics of culturally and linguistically diverse populations (Gentry, Rizza, & Owen, 2002; Moon et al., 2002; Renzulli, 1978; Renzulli & Reis, 1994; Tomlinson, 2002).

In a discussion of equity and excellence in modern gifted education, Fetterman (1988) shared, “The most serious obstacles include hostility and complacency toward the gifted, which result in neglect. Educational neglect is the silent time bomb of our generation that will explode into the next, threatening the quality of life for all of us” (p. 2). Twenty years later, educational researchers and practitioners, government officials, parents, and business owners are faced with an urgent task to examine and rethink current educational practices and their subsequent success in preparing today’s students for success in tomorrow’s world, in response to President Roosevelt’s (1940) message, “We cannot always build the future for our youth, but we can build our youth for the future.” Overall results of this study represent one step in what should be an
ongoing investigation of innovative gifted program options and their efficacy in furthering the short- and long-term academic and personal development of our country’s most able learners.
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APPENDIX A

STUDENT PRODUCT ASSESSMENT FORM (SPAF)
Student Product Assessment Form (SPAF)

Joseph S. Renzulli
Sally M. Reis

Rationale Underlying This Assessment Form

The purpose of this form is to guide your judgment in the qualitative assessment of various types of products developed by students in enrichment programs. In using the instrument three major considerations should always be kept in mind. First, the evaluation of more complex and creative types of products is always a function of human judgment. We do not think in terms of percentiles or standard scores when we evaluate paintings, architectural designs or the usefulness of a labor-saving device. We must consider these products in terms of our own values and certain characteristics that indicate the quality, esthetics, utility, and function of the overall contribution. In other words, we must trust our own judgment and learn to rely upon our guided subjective opinions when making assessments about complex products.

A second consideration relates to the individual worth of the product as a function of the student’s age/grade level and experiential background. For example, a research project that reflects an advanced level investigation and subsequent product by a first grader might not be considered an equally advanced level of involvement on the part of a sixth grader. Similarly, the work of a youngster from a disadvantaged background must be considered in light of the student’s overall educational experiences, opportunities and availability of advanced level resource persons, materials and equipment.

The third consideration relates to the most important purpose of any evaluation—student growth and improvement. This assessment instrument should be used to guide students toward excellence and therefore we strongly believe that it should be shared and discussed with students before the product is started. In other words, we believe the instrument should be reviewed with students during the early planning stages of the product. Students should have the opportunity to know and fully understand on what basis their final products will be assessed.

Instructions for Using the Assessment Form

Although most of the items included in the form relate directly to characteristics of the final product, it will be helpful if you also have access to any planning devices that have been used in the development of the product. Such planning devices might consist of logs, contracts, management plans, proposals or any other record keeping system. A planning device can help you to determine if pre-stated objectives have been met by comparing statements of objectives from the planning device with the final product. If such a planning device has not been utilized or is unavailable, you may want to request that the student complete a form that will provide you with the necessary background information. It is recommended that some type of planning device accompany all products that are submitted for rating. If it can be arranged, you may also want to interview the student who completed the product.
Student Product Assessment Form (SPAF)

In using the Student Product Assessment Form it will sometimes be necessary for you to do some detective work! For example, in determining the diversity of resources, you may need to examine footnotes, bibliographies or references and materials listed on the planning device. You may also want to have the student complete a self-evaluation form relating to the completed product. This form may help to assess task commitment and student interest.

The Student Product Assessment Form can be used in a variety of ways. Individual teachers, resource persons or subject matter specialists can evaluate products independently or collectively as members of a team. When two or more persons evaluate the same product independently, the average rating for each scale item can be calculated and entered on the Summary Form. When used in a research setting or formal evaluation situation, it is recommended that products be independently evaluated by three raters. One of these ratings should be completed by the teacher under whose direction the product was developed. A second form should be completed by a person who has familiarity with the subject matter area of the product. For example, a high school science teacher might be asked to rate the work of an elementary grade student who has completed a science-related product. The third rater might be someone who is independent of the school system or program in which the work was carried out.

Item Format

At first glance the items on the assessment form may seem to be long and complicated, but they are actually quite concise. Each item represents a single characteristic that is designed to focus your attention. The items are divided into the following three related parts:

1. The Key Concept. This concept is always present first and is printed in large type. It should serve to focus your attention on the main idea or characteristic being evaluated.
2. The Item Description. Following the Key Concept are one or more descriptive statements about how the characteristic might be reflected in the student’s product. These statements are listed under the Key Concept.
3. Examples. In order to help clarify the meanings of the items, an actual example of students’ work is provided. The examples are intended to elaborate upon the meaning of both the Key Concept and the Item Description. The examples are presented following each item description.

Important Note: The last item (No. 9) deals with an overall assessment of the product. In this case we have chosen a somewhat different format and examples have not been provided. When completing the ratings for Item No. 9 you should consider the product as a whole (globally) rather than evaluating its separate components in an analytic fashion.
Student Product Assessment Form (SPAF)

Some of the items may appear to be unusually long or "detailish" for a rating scale but our purpose here is to improve the clarity and thus inter-rater reliability for the respective items. After you have used the scales a few times, you will probably only need to read the Key Concepts and Item Descriptions in order to refresh your memory about the meaning of an item. Research has shown inter-rater reliability is improved when items are more descriptive and when brief examples are provided in order to help clarify any misunderstanding that may exist on the parts of different raters.

Non-Applicable Items

Because of the difficulty of developing a single instrument that will be universally applicable to all types of products, there will occasionally be instances when some of the items do not apply to specific products. For example, in a creative writing project (poem, play, story) either the Level of Resources (No. 3) or Diversity of Resources (No. 4) might not apply if the student is writing directly from his/her own experiences. It should be emphasized however, that the non-applicable category should be used very rarely in most rating situations.

How to Rate Student Products

1. Fill out the information requested at the top of the Summary Sheet that accompanies the Student Product Assessment Form. A separate Summary Sheet should be filled out for each product that is evaluated.
2. Review the nine items on the Student Product Assessment Form. This review will help to give you a "mind set" for the things you will be looking for as you examine each product.
3. Examine the product by first doing a "quick overview" of the entire piece of work. Then do a careful and detailed examination of the product. Check (✓) pages or places that you might want to reexamine and jot down brief notes and comments about any strengths, weaknesses or questions that occur as you review the product.
4. Turn to the first item on the Student Product Assessment Form. Read the Key Concept, Item Description and Example. Enter the number that best represents your assessment in the "Rating" column on the Summary Sheet. Enter only whole numbers. In other words, do not enter ratings of 3 1/2 or 2 1/4. On those rare occasions when you feel an item does not apply, please check the N/A column on the Summary Sheet. Please note that we have only included an N/A response option for Item 9a on the Overall Assessment.
5. Turn to the second item and repeat the above process. If you feel you cannot render a judgment immediately, skip the item and return to it at a later time. Upon completion of the assessment process, you should have entered a number (or a check in the N/A column) for all items on the Summary Sheet.
6. Any comments you would like to make about the product can be entered at the bottom of the Summary Sheet.
# Student Product Assessment Form

**Summary Sheet**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Rating*</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Early Statement of Purpose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Problem Focusing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Level of Resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Diversity of Resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Appropriateness of Resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Logic, Sequence and Transition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Action Orientation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Audience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Overall Assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Originality of the Idea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Achieved Objectives Stated in the Plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Advanced Familiarity with the Subject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Quality Beyond Age/Grade Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Care, Attention to Detail, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Time, Effort, Energy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. Original Contribution</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments:**

**Person completing this form:**

*Rating Scales:*

<table>
<thead>
<tr>
<th>Factors 1-8:</th>
<th>Factors 9A-9G:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-To a great extent</td>
<td>5-Outstanding</td>
</tr>
<tr>
<td>3-Somewhat</td>
<td>4-Above average</td>
</tr>
<tr>
<td>1-To a limited extent</td>
<td>3-Average</td>
</tr>
<tr>
<td>2-Below average</td>
<td>1-Poor</td>
</tr>
</tbody>
</table>

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# Student Product Assessment Form

Joseph S. Renzulli  
Sally M. Reis

1. **EARLY STATEMENT OF PURPOSE**  
   Is the purpose (theme, thesis, research question) readily apparent in the early stages of the student’s product? In other words, did the student define the topic or problem in such a manner that a clear understanding about the nature of the product emerges shortly after a review of the material?  
   For example, in a research project dealing with skunks of northwestern Connecticut completed by a first grade student, the overall purpose and scope of the product were readily apparent after reading the introductory paragraphs.

<table>
<thead>
<tr>
<th></th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>To a great extent</td>
<td>Somewhat</td>
<td>To a limited extent</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. **PROBLEM FOCUSING**  
   Did the student focus or clearly define the topic so that it represents a relatively specific problem within a larger area of study?  
   For example, a study of “Drama in Elizabethan England” would be more focused than “A Study of Drama.”

<table>
<thead>
<tr>
<th></th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>To a great extent</td>
<td>Somewhat</td>
<td>To a limited extent</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. **LEVEL OF RESOURCES**  
   Is there evidence that the student used resource materials or equipment that are more advanced, technical, or complex than materials ordinarily used by students at this age/grade level?  
   For example, a sixth grade student utilized a nearby university library to locate information about the history of clowns in the twelfth through sixteenth century in the major European countries.

<table>
<thead>
<tr>
<th></th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>To a great extent</td>
<td>Somewhat</td>
<td>To a limited extent</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Student Product Assessment Form**

4. **DIVERSITY OF RESOURCES**
   Has the student made an effort to use several different types of resource materials in the development of the product? Has the student used any of the following information sources in addition to the standard use of encyclopedias: textbooks, record/statistic books, biographies, how-to books, periodicals, films and filmstrips, letters, phone calls, personal interviews, surveys or polls, catalogs and/or others?

   For example, a fourth grade student interested in the weapons and vehicles used in World War II read several adult-level books on this subject which included biographies, autobiographies, periodicals, and record books. He also conducted oral history interviews with local veterans of World War II, previewed films and film strips about the period and collected letters from elderly citizens sent to them from their sons stationed overseas.

<table>
<thead>
<tr>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>To a great extent</td>
<td>Somewhat</td>
<td>To a limited extent</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. **APPROPRIATENESS OF RESOURCES**
   Did the student select appropriate reference materials, resource persons, or equipment for the topic or area of study?

   For example, a student who was interested in why so much food is thrown away in the school cafeteria had to contact state officials to learn about state requirements and regulations which govern what must and can be served in public school cafeterias.

   With the aid of her teacher, she also had to locate resource books on how to design, conduct and analyze a survey.

<table>
<thead>
<tr>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>To a great extent</td>
<td>Somewhat</td>
<td>To a limited extent</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. **LOGIC, SEQUENCE, AND TRANSITION**
   Does the product reflect a logical sequence of steps or events that ordinarily would be followed when carrying out an investigation in this area of study? Are the ideas presented clearly and logically and is there a smooth transition from one idea or subtopic to another?

   For example, a student decided to investigate whether or not a section of his city needs a new fire station with a salaried staff rather than the present volunteer staff. First the student needed to research different methods of investigative reporting such as appropriate interview skills. Next the student conducted interviews with both salaried and volunteer fire station staff. He then needed to learn about methods of survey design and reporting in order to analyze local resident opposition or support for the new fire station. After other logical steps in his research were completed, his accumulated findings led him to interviews with the Mayor and the Board of Safety in the city and then to several construction companies that specialized in bids on such buildings. His final product was an editorial in the local newspaper which reflected his research and conclusions.

<table>
<thead>
<tr>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>To a great extent</td>
<td>Somewhat</td>
<td>To a limited extent</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Student Product Assessment Form

7. ACTION ORIENTATION
   Is it clear that the major goal of this study was for purposes other than merely reporting on or reproducing existing information, ideas, or knowledge? In other words, the student's purpose is clearly directed toward some kind of action (e.g., teaching ways to improve bicycle safety, presenting a lecture on salt pond life); some type of literary or artistic product (e.g., poem, painting, costume design); a scientific device or research study (e.g., building a robot, measuring plant growth as a function of controlled heat, light and moisture); or some type of leadership or managerial endeavor (e.g., editing a newspaper, producing/directing a movie).

   For example, a student decided to study the history of his city. After an extensive investigation, the student realized that other history books had been written about the city. He found, instead, that no one had ever isolated specific spots of historical significance in the city which were easily located and accessible. He began this task and decided to focus his research on producing an original historical walking tour of the city.

<table>
<thead>
<tr>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>To a great extent</td>
<td>Somewhat</td>
<td>To a limited extent</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

8. AUDIENCE
   Is an appropriate audience specified or readily apparent in the product or Management Plan?

   For example, the student who researched the history of his city to produce an original walking tour presented his tour to the city council and the mayor. They, in turn, adopted it as the official walking tour of the city. It was reproduced in the city newspaper and distributed by the local historical society, library and given out to registered guests in the city’s hotels and motels.

<table>
<thead>
<tr>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>To a great extent</td>
<td>Somewhat</td>
<td>To a limited extent</td>
<td></td>
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</tbody>
</table>

9. OVERALL ASSESSMENT
   Considering the product as a whole, provide a general rating for each of the following factors and mark the space provided to the right of the item:

   **SCALE**
   
   5 = Outstanding  
   4 = Above Average  
   3 = Average  
   2 = Below Average  
   1 = Poor

   A. Originality of the idea.  
   B. Achieved objectives stated in plan.  
   C. Reflects advanced familiarity with the subject matter for a youngster of this age/grade level.  
   D. Reflects a level of quality beyond what is normally expected of a student of this age and grade.  
   E. Reflects care, attention to detail, and overall pride on the part of the student.  
   F. Reflects a commitment of time, effort and energy.  
   G. Reflects an original contribution for a youngster of this age/grade level.
APPENDIX B

WILLIAM AND MARY CLASSROOM OBSERVATION SCALES-REVISED (COS-R)
### Student Responses to General Classroom Teacher Behaviors

<table>
<thead>
<tr>
<th>Engaged in General Classroom Behaviors</th>
<th>Most &gt;75%</th>
<th>Many 50-75%</th>
<th>Some 25-50%</th>
<th>Few &lt;25%</th>
<th>None</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. demonstrated a high level of performance.</td>
<td></td>
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<tr>
<td>2. applied new learning.</td>
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<td>3. demonstrated planful, monitoring, or evaluating behavior.</td>
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<tr>
<td>4. articulated thinking process (e.g., verbal mediation).</td>
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<tr>
<td>5. reflected on learning</td>
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</tbody>
</table>

Comments:

### Student Responses to Differentiated Teaching Behaviors

<table>
<thead>
<tr>
<th>Engaged in Diverse Self-selected or Self-paced Activities</th>
<th>Most &gt;75%</th>
<th>Many 50-75%</th>
<th>Some 25-50%</th>
<th>Few &lt;25%</th>
<th>None</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students:</td>
<td></td>
<td></td>
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<tr>
<td>6. worked on projects individually or in pairs/groups.</td>
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<tr>
<td>7. worked on tiered assignments or tasks of choice.</td>
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<tr>
<td>8. explored multiple interpretations.</td>
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<tr>
<td>9. discovered central ideas through structured activities and/or questions asked.</td>
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</tbody>
</table>

Comments:

### Engaged in Problem-solving Strategies

<table>
<thead>
<tr>
<th>Engaged in Problem-solving Strategies</th>
<th>Most &gt;75%</th>
<th>Many 50-75%</th>
<th>Some 25-50%</th>
<th>Few &lt;25%</th>
<th>None</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students:</td>
<td></td>
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<tr>
<td>10. brainstormed ideas or alternative possibilities.</td>
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<tr>
<td>11. defined problems.</td>
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<tr>
<td>12. identified and implemented solutions to problems.</td>
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</tbody>
</table>

Comments:

### Engaged in Critical Thinking Strategies

<table>
<thead>
<tr>
<th>Engaged in Critical Thinking Strategies</th>
<th>Most &gt;75%</th>
<th>Many 50-75%</th>
<th>Some 25-50%</th>
<th>Few &lt;25%</th>
<th>None</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students:</td>
<td></td>
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<tr>
<td>13. made judgments about or evaluated situations, problems, or issues.</td>
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<tr>
<td>14. compared and contrasted ideas and concepts.</td>
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<tr>
<td>15. generalized from specific to abstract data or information.</td>
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<tr>
<td>16. synthesized or summarized information within or across disciplines.</td>
<td></td>
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</tbody>
</table>

Comments:

### Engaged in Creative Thinking Strategies

<table>
<thead>
<tr>
<th>Engaged in Creative Thinking Strategies</th>
<th>Most &gt;75%</th>
<th>Many 50-75%</th>
<th>Some 25-50%</th>
<th>Few &lt;25%</th>
<th>None</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students:</td>
<td></td>
<td></td>
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<tr>
<td>17. demonstrated ideational fluency.</td>
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<tr>
<td>18. explored diverse ways to think about a situation/object/event.</td>
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<tr>
<td>19. offered imaginative, sometimes playful, suggestions as solutions to problems.</td>
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<tr>
<td>20. provided examples and illustrations of ideas.</td>
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</tbody>
</table>

Comments:

### Engaged in Research Strategies

<table>
<thead>
<tr>
<th>Engaged in Research Strategies</th>
<th>Most &gt;75%</th>
<th>Many 50-75%</th>
<th>Some 25-50%</th>
<th>Few &lt;25%</th>
<th>None</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students:</td>
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<tr>
<td>21. gathered evidence through research techniques (e.g., surveys, interviews, analysis of primary and secondary source documents).</td>
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<tr>
<td>22. manipulated and transformed data to be interpreted.</td>
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<tr>
<td>23. made inferences from data and drew conclusions.</td>
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<tr>
<td>24. determined the implications and consequences of situations.</td>
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<tr>
<td>25. communicated findings (e.g., report, oral presentation).</td>
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</tbody>
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Comments:
## Overview of Classroom Observation

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
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<tbody>
<tr>
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<th>Grade Level</th>
<th>Subject Area</th>
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<tbody>
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<table>
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<tr>
<th>Lesson Topic(s):</th>
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</thead>
<tbody>
<tr>
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</table>

<table>
<thead>
<tr>
<th>General Description of Lesson/Activity:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Notes:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Comment Form for Class Observations</td>
</tr>
<tr>
<td>-------------------------------------</td>
</tr>
<tr>
<td>(Adapted from <em>William and Mary Classroom Observation Scales-Revised--Student Observation</em>)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Engaged in General Classroom Behaviors</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Engaged in Diverse Self-selected or Self-paced Activities</th>
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<table>
<thead>
<tr>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Engaged in Research Strategies</th>
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</table>

<table>
<thead>
<tr>
<th>Engaged in Meaningful Technology Usage</th>
</tr>
</thead>
</table>
APPENDIX C

MY CLASS ACTIVITIES (MCA) SURVEY
**Student Survey About...**

**My Class Activities**

Marcia Gentry Ph.D. and Robert K. Gable Ed.D.

We would like to know how you feel about your class activities. Read each sentence and indicate how often this happens for you in your class by coloring in the doughnut. There are no right or wrong answers. Your answers will be kept secret. Remember to color in a doughnut for each sentence.

1. What I do in my class fits my interests.

2. I have an opportunity to work on things in my class that interest me.

3. What I do in my class gives me interesting and new ideas.

4. I study interesting topics in my class.

5. The teacher involves me in interesting learning activities.

6. What I learn in my class is interesting to me.

7. What I do in my class is interesting.

8. My class has helped me explore my interests.

9. The activities I do in my class are challenging.

10. I have to think to solve problems in my class.

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Teacher Interview Protocol:

1. How many years have you been teaching? Gifted?

2. What made you interested in teaching gifted students? Middle school?

3. How do you plan for instruction? (Collaboration, resources, standards, pre-assessment?)

4. How do you reflect on your teaching? How does this affect your future instruction?

5. What is your perception of the motivation level of your students?

6. Describe some ways in which students display their enjoyment and/or dissatisfaction with your class.

7. Describe the challenge level of the majority of class work for your students.

8. In what ways do students use higher order thinking skills during class?

9. In what ways are students given choices in your class?

10. How does you incorporate student interests in instruction?

11. Can you give examples of some things students most enjoy doing in your class? Least enjoy?

12. In what ways do students communicate and collaborate with each other during your classes?

13. Describe some of the projects do in your class. (Audience, resources, choices?)

14. What technology is accessible to students in your class?

15. Describe some ways you integrate technology.

16. What do you think are the main strengths of this program/school?

17. What do you think are the biggest weaknesses of this program/school?

18. What is your perception of teacher morale at your school?

19. What is your perception of the various programs of choice in Hall Co., including DVA?
Student Interview Protocol:

1. What grade are you in?
2. In what ways is your time at school enjoyable? In what ways is it not enjoyable?
3. How does what you’re learning about at school relate to your interests?
4. How challenging would you say your schoolwork usually is? Can you give an example?
5. What choices do you have in what you get to learn about and do at school?
6. Can you give an example of some things you enjoy learning about and doing at school? Describe some things you don’t enjoy learning about/doing at school.
7. What opportunities do you have to talk and meet with others during your classes?
8. Can you describe some ways that you get to work together with other students during your classes? How often?
9. In what ways do you have a say in the projects you do at school?
10. Tell me about your museum projects.
11. Who is the audience for your projects?
12. What impact do your projects have?
13. In what ways do you use technology at school?
14. Describe some ways you have used technology in creating projects.
15. What have you learned about technology at school this year?
16. If you could give any advice to a new student coming into DVA, what would it be?
17. Is there anything else you want to tell me about your experience at school?
APPENDIX E

IRB APPROVAL
January 4, 2012

April N. Coleman
SPEMA
College of Education
The University of Alabama

Re: IRB # 12-OR-004 “Effects of One Special School on Gifted and High Ability Students’ Project Quality, Academic Engagement, and Academic Investment”

Dear Mrs. Coleman:

The University of Alabama Institutional Review Board has granted approval for your proposed research.

Your application has been given expedited approval according to 45 CFR part 46. Approval has been given under expedited review category 7 as outlined below:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Your application will expire on January 3, 2013. If your research will continue beyond this date, complete the relevant portions of the IRB Renewal Application. If you wish to modify the application, complete the Modification of an Approved Protocol Form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, complete the appropriate portions of the IRB Study Closure Form.

Please use reproductions of the IRB approved informed consent form to obtain consent from your participants.

Should you need to submit any further correspondence regarding this proposal, please include the above application number.

Good luck with your research.

Sincerely,

[Redacted]

Director & Research Compliance Officer
Office for Research Compliance
The University of Alabama