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Developing Differentiated Reading Instruction Online for Gifted Third Graders: A Design Experiment

Beth E. Jordan
University of South Florida, beth.elaine.jordan@gmail.com

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Developing Differentiated Reading Instruction Online

for Gifted Third Graders: A Design Experiment

by

Beth Jordan

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
in Curriculum and Instruction with an emphasis in
Instructional Technology
Department of Educational and Psychological Studies
College of Education
University of South Florida

Major Professor: Glenn G. Smith, Ph.D.
Danielle Dennis, Ph.D.
Jeffrey Kromrey, Ph.D.
Elizabeth Shaunessy-Dedrick, Ph.D.

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Dedication

To the One who orders my steps
and lights my way;

To my husband, Sweet Baby,
who always believes I can do anything,
and makes me believe it too.
Acknowledgments

I would like to acknowledge the invaluable input from my esteemed committee. Their guidance and encouragement was invaluable. When I would tell people who is on my committee, they usually responded that I had picked the cream of the crop—I did! You shared your expertise with the heart of an educator and the respect of a colleague. I am humbled by your faith in me.

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Abstract

The high stakes on standardized testing in the United States of America’s education system pressures teachers to ensure every child meets minimum standards. Teachers report this pressure motivates them to focus the majority of their time on struggling students. Combined with lack of training and resources, intellectually gifted students may remain under-challenged in a regular elementary classroom. To address the problem, the researcher continued the development of an online instructional environment, which teachers may use to extend and enrich the regular language arts curriculum for intellectually gifted students. The researcher conducted a formative design experiment “to create a viable theory-driven intervention for achieving a pedagogical goal” (Reinking & Bradley, 2008, p. 12). The pedagogical goal is to develop an appropriately differentiated instructional tool for intellectually gifted third graders, which classroom teachers can easily incorporate into their literacy instruction. The purposes of this iterative design experiment are (1) to develop an instructional intervention aligned with current theory and practice; (2) to test, modify, and retest the intervention in a regular classroom while simultaneously measuring its effectiveness in achieving the literacy objectives and pedagogical goals to determine whether the intervention works; and (3) to describe the reactions of teachers and their third grade gifted students to answer why and in what context the intervention works. In iteration one, experts reviewed the intervention. Three areas of moderate concern guiding modifications at this stage were level of difficulty, engagement/enjoyability, and support in achieving objectives. Evaluations of the pre-/post-test indicated the questions were a good fit to
the objectives. Matched halves were well-matched, readable, and only one minor concern of bias. There was not a statistically significant (p=0.1438) difference between the pre-test (m=19.5, s=5.44) and post-test scores (m=21.1, s=6.082) in iteration 2 with only 10 completers. These results, along with student and teacher questionnaires, guided modifications. In iteration 3 with 16 completers, there was a statistically significant difference (p=0.0026) between the pre- and post-test. The qualitative and quantitative data analyses revealed a positive affective response by both students and teachers. Particular features need further development to improve the effectiveness on achieving mastery of the skills. In conducting the study, the researcher faced a number of obstacles. This document also reports those challenges in an effort to advise researchers who wish to conduct formative design experiments within public school classrooms.
Chapter 1: Introduction

“Why aren’t you working?”
“I’m done….Do centipedes really have 100 legs?”
“Yes. Go get another book to read.”
“I’ve read them all.”
“Go down to Mrs. Jones in fourth grade and borrow some of hers.”
Sigh.

As a child, I experienced many moments like these. I had read every book in every kindergarten and first grade classroom in the school before leaving kindergarten. By third grade, the thought of “reading for pleasure” made my head spin from boredom. While I have done my best to avoid inflicting this same tragedy on my students, I could not help but sigh once again watching my son and daughter go through the same cycle. With today’s technology and push for differentiated instruction, it is not surprising to find this scene play out a little differently.

“Why aren’t you working?”
“I’m done….Do centipedes really have 100 legs?”
“Why don’t you go research centipedes online and do a project. You can present it to the class when you’re done.”
“Cool! What kind of project? When is it due? Where do I go online...”
Sigh.
Sigh.

Although technology offers more options to challenge a gifted young mind, designing the instruction and assessing the final product present challenges too. Teachers feel pressured to bring everyone to a level of minimum competency, and have little time to design challenging and engaging instruction for their gifted students (Law & Kaufhold, 2009; Loveless, Parkas, & Duffet, 2008). Accessing and evaluating resources to use and designing appropriate curriculum
are time-consuming, complex tasks that require an understanding of the nature and needs of gifted children.

**Statement of the Problem**

Educators have been advocating for differentiated instruction, which entails giving students “equally challenging” work, not “equal” work. Tailoring instruction to individual strengths and needs is a worthwhile effort, but can tax teachers with diverse classrooms and limited time and resources. With the emphasis on high-stakes testing and teacher accountability systems, when it comes to choosing who gets the bulk of the teachers’ time, often it goes to the struggling student. As the world becomes more global, the United States of America needs to tap into the great American ingenuity to stay competitive. The brightest and most talented have always led the way. When we do not differentiate for our students, we do so at our own peril. Yet, taking time away from the struggling student cannot be the answer either. How to provide appropriately challenging instruction for gifted students, then, is a serious problem teachers often face. Finding a solution is crucial.

“Gifted” is an elusive label. School officials use various measures to determine giftedness. While the gifted population is quite heterogeneous and cannot be reduced to a definitive list (Reis & Renzulli, 2009, 2010; Sternberg & Zhang, 1995), those identified as gifted by schools tend to be intellectually or academically gifted. In general, it is a label for people significantly advanced in cognitive development exhibited in high levels of ability in various areas such as academic, artistic, and interpersonal skills (Reis & Renzulli, 2009, 2010). Among the intellectually gifted, there are variations in skills and attributes; however, there are some attributes somewhat common among them. The literature review will provide a more detailed look at various definitions and identification processes. Because this study examines
differentiation of instruction for gifted students in school, and most states’ identification policies focus on intellectually gifted, I chose to design my intervention for the intellectually gifted student. Unless otherwise indicated, the term “gifted” in this document refers to those students who have been identified by a school district in accordance with a state’s definition of gifted.

Among the diverse characteristics, some generalities exist frequently among gifted students: ability to learn quickly, capacity to comprehend abstract and complex concepts, and advanced problem-solving skills (Reis & Renzulli, 2009, 2010). Gifted children typically think divergently, process information in unique ways, learn basic skills quickly, comprehend abstract ideas, enjoy figuring out relationships, like complexity, show intense curiosity, use advanced vocabularies, and seek fairness (NAGC, 2008b). These characteristics are vital to innovation, invention, effective leadership, and solving today’s problems to better the world for tomorrow. To ensure a better future for America and the world, these students need instruction that helps them reach their potential. Unfortunately, current differentiation practices in American elementary education do not adequately rise to the challenge; although regular classroom teachers recognize this shortcoming, they report a lack of time, training, and/or resources to remedy the situation (Loveless, Parkas, & Duffet, 2008; VanTassel-Baska & Brown, 2007).

While pull-out programs designed to meet the needs of gifted students are an excellent place for growth and achievement, they are not used sufficiently according to teachers. In a national survey (Loveless, Parkas, & Duffet, 2008), 96% of the 900 responding teachers favored increasing enrichment experiences for the gifted child outside the school. The National Association for Gifted Children (NAGC) reported that in 2013, 32 of the 44 states that responded to the survey require school districts to identify and/or serve highly able students, but only 4 states provide full funding and 14 states had not allocated any money for gifted education.
(NAGC, 2013). These sought-after pull-out programs are not being implemented on a broad scale. The reality is that even in school systems that have pull-out programs, gifted students are only in these rich and challenging environments two to three hours a day or less (NAGC, 2013). Because they spend so much time in the regular elementary school classroom, improved differentiation in this setting could truly help gifted students reach their potential.

Evidence from the literature indicates that regular classroom curriculum is not meeting gifted students’ needs. There is much pressure for teachers to meet minimum scores on standardized tests by reaching the low performers (Law & Kaufhold, 2009; Loveless et al., 2008; VanTassel-Baska & Brown, 2007). In the quest to help the struggling student, the gifted are often unheeded. The belief is that they will score high anyway, so school districts focus money and time on the struggling student instead (Clarenbach, 2007; VanTassel-Baska, 2013). What many people who value the test score more than authentic achievement do not realize is that the overlooked, under-challenged, bored gifted student is also a struggling student and requires targeted instruction as well. Gifted students increasingly appear lethargic and bored during normal classroom activities (Caraisco, 2007; Colangelo, Assouline, & Gross, 2004). The gifted students’ boredom and underachievement is in part due to false assumptions made about the needs of these students (Colangelo, Assouline, & Gross, 2004; VanTassel-Baska, 2013; Wood, 2008), and the political policy movement to incorporate all students in similar learning experiences despite ability level (Wood, 2008).

Our nation’s long-standing emphasis on “academic adequacy, not academic excellence” (Loveless et al., 2008; U.S. ED Office of Educational Research and Improvement, 1993, p. 21; VanTassel-Baska & Brown, 2007) has created a situation where regular classroom teachers are neither trained nor encouraged to provide high-level instruction, and students are praised for
meeting low-level competencies. The teachers surveyed for the national report voiced a desire to be better prepared and have more support from their school systems to meet the needs of all students. Fifteen years after the national study by the United States Department of Education (U.S. ED) Office of Educational Research and Improvement (1993), teachers still report they lack training, time, and resources to meet the needs of gifted students. In another national survey, approximately 65% of responding teachers state teacher preparation programs they completed had very little or no focus on teaching gifted students and 84% report that differentiating instruction for all students is somewhat to very difficult to implement daily. An overwhelming 90% of the teachers surveyed would welcome increased professional development in this area (Loveless et al., 2008).

In conclusion, current instructional practices in regular classrooms focus on adequacy, not excellence. Teachers need more training, time, and resources to be more effective instructors of gifted students. None of these teacher needs appears on the horizon. Today’s technological tools can provide teachers with the support they need. The question is not if we can afford to invest in developing technology-integrated programs for the gifted learner in a regular classroom, but rather if we can afford not to invest in them.

**Purpose**

As documented in decades of literature, the ongoing challenges teachers face have resulted in instructional practices typically lacking in differentiation (Loveless et al., 2008; U.S. ED Office of Educational Research and Improvement, 1993; VanTassel-Baska & Brown, 2007). Reading is one required area of instruction that has an effect on all other disciplines. Teachers must address reading skills regardless of the wide range of reading abilities among students. One persistent problem facing teachers in regular elementary classrooms is how to differentiate
instruction appropriately to meet the needs of gifted students in reading instruction with limited
time, training, and resources. One strategy teachers may find helpful and possibly more
accessible is a specialized online intervention which teachers can incorporate into their
curriculum with very little time and effort. The self-contained online intervention may include
tracking and opportunities to provide individualized feedback to students. Student participants
experience a self-paced, non-linear way to explore literature and language on a different level,
creating unique connections to text, self, and the world. They can also connect and collaborate
with their like-minded peers in response to literature. The regular classroom teacher could
employ an online instructional environment to both extend and enrich the regular language arts
curriculum as a way of differentiating instruction for their gifted students. The purposes of this
study is (1) to use an iterative design process to develop an instructional intervention aligned
with current theory; (2) to test, modify and retest the intervention in a regular classroom while
simultaneously measuring its effectiveness in achieving the literacy objectives and pedagogical
goals to determine whether the intervention works, and (3) to describe the reactions of the
regular classroom teachers and their third grade gifted students in order to answer why and in
what context the intervention works. I selected the purposes, methods, and research questions
based on the six questions that provide the framework of formative and design experiments (see

Research Questions

The specialized reading intervention for this study addresses selected literacy skills
(vocabulary, mood/tone, and characterization with added depth and complexity; and higher-order
literature responses) in an appropriately differentiated way with the unique characteristics and
needs of gifted students in mind. Teacher support features include access to student results and to
the student discussion forum. The intervention also provides tutorials on enrolling students and reading the reports. In developing and implementing this online tool for third graders within a regular classroom, the main research questions (RQ) that guided the design experiment, are as follows:

RQ1. What factors support or inhibit the effectiveness of the intervention (online, differentiated learning environment) and how may it be modified accordingly?

RQ2. What effect, if any, do the modifications have on the outcomes in the next iteration?

RQ3. To what extent does the intervention achieve the literacy objectives for which it was designed?

RQ4. What are the students’ reactions to the overall experience?

RQ5. What are the students’ and teachers’ reactions to the particular features?

**Importance of the Study**

While there already are research-based effective strategies for differentiation (e.g., curriculum compacting and independent study), few regular classroom teachers implement them daily (Loveless, Parkas, & Duffet, 2008). Some of the greatest obstacles are time, training, and resources (e.g., curriculum, materials, and computers). The intervention developed in this study is intended to overcome these obstacles. Based on the results, the researcher may choose to assemble a team to expand the site to include more levels related to the current novel and activities related to a whole collection of novels until the site becomes a year-long engaging, challenging, and exciting “place” to learn. Ideally, others who develop gifted curriculum will follow suit and provide teachers with online instructional environments that allow them to lead their gifted students to success both now and in their futures.
Operational Definition of Terms

The operational definitions of terms for this study are provided below:

**Intellectually gifted** are students who have been identified by a district school system, in accordance with Florida State Rule 6A-6.03019, using multiple data points including which includes aptitude and achievement screenings as well as teacher and parent surveys indicating a need for special program, and the presence of a majority of characteristics on a standardized scale; or have received outside psychological testing which the school psychologist then validated.

**Differentiation** is the modification of instruction (content, process, delivery, measures, and expectations) according to the unique needs of individual students in order to provide appropriately challenging and engaging learning experiences.

**Technology** means a combination of hardware and software typically, but not limited to, applications accessed on a computer via the Internet.

**Differentiated online reading intervention** refers to a website designed with the needs and nature of gifted students to explore literature in new and interesting ways. (A detailed description of the particular intervention used in this proposed study follows.)

Limitations

The study was conducted at schools in a large suburban school district (referred to as the “participating school district”) located in the Southeast United States. Schools were purposefully selected where implementation may meet with some challenges, but are generally conducive to implementation of technology-based interventions. Only gifted students officially identified and receiving reading instruction in gifted pull-out or within the regular third grade classroom
participated. Given the limited number of participants and the purposes of the study, the results are not generalizable; nevertheless, results are expected to be sufficient to inform the development of the intervention and instruments through the course of the study and for future development.

**Approaching the Literature**

In this chapter, I have described the problem and my purposes for this study. I opened with the passion behind this project--my personal experiences and frustrations as a student and teacher; however, the literature detailed in the next chapter indicates this same frustration for most regular classroom teachers tasked with educating gifted students in the U.S. dating back nearly 100 years starting with Terman’s studies in the 1920s and continuing today. In the next chapter, I will describe the historical view of gifted education and its effect on the regular classroom teacher. Further, in order to establish the need I am addressing, I will evaluate and compile findings of some landmark studies to demonstrate the continuing struggles when a regular classroom teacher attempts to differentiate instruction for all students without proper training, resources, and time. I also address a more recent definition of literacy and some misconceptions about differentiation and higher-order thinking. My review of the literature will demonstrate the urgent need to develop an appropriately differentiated online literacy-learning environment for gifted third graders that teachers can easily incorporate into their current curriculum.
Chapter 2: Review of Relevant Literature

Gifted children in general learn faster, deeper and with more complexity, and have greater problem-solving skills, task-commitment, and ability than their age-peers (NAGC, 2008a; Renzulli, 2005; Renzulli et al., 2002; Reis & Renzulli, 2009, 2010). Most definitions of giftedness include the students’ need for instruction that differs from their same age peers (Florida State Rule 6A-6.03019, 2006; Marland, 1972; Sternberg, Ferrari, Clinkenbeard, & Grigorenko, 1996). An appropriately differentiated curriculum for gifted students requires modification of instruction (content, process, delivery, measures, and expectations) aligned with the unique needs of individual gifted students. There are a number of obstacles for general education teachers to implementing such adjustments within the regular classroom setting; technology may hold the key to overcoming them.

This chapter begins with the background and rationale for the topic of this dissertation starting with an historical summary of gifted education followed by a description of teachers’ differentiation within regular classrooms from 1920s into the first decade of the 21st century. Grounded in the literature, the rationale section sheds light on the following questions: What is the big problem? Why focus on gifted students? Why provide the intervention online? Why focus on literacy? Why select third graders? A look at the relevant literature on related topics that guided the research and development of the intervention follows the background and rationale. These topics include the changing definition of literacy, specifically New Literacy Theory, which has significant effect on literacy instruction. The rationale section then looks at the ways
technology bridges the gap for teachers within various content areas along with some ground
technology leaves uncovered. Finally, a review of research on technology-based solutions for
reading, the content area of focus for the study, will point to possibilities and challenges.

**Background and Rationale**

Interest in gifted education rose in the 1920s with Terman’s *Genetic Studies of Genius*
(1925). He predicted that, along with others, his work on individual differences “promise to
become national issues on such problems as…special training for the gifted, and the economic
reward of creative talent” (Terman, 1925, p. v). This prediction came true upon Russia’s launch
of Sputnik in 1957, which renewed the nation’s fervor toward educating excellence so America
could compete globally. In 1970, the federal government recognized the need for education of
gifted and talented students by adding a section in the 1965 *Elementary and Secondary Act*
(ESEA) (P.L. 91-230, Section 806) without mandating services. Finally, in 1978, the *Gifted and
Talented Children’s Act* (P.L. 95-561) provided for gifted programs and financial assistance.
President Reagan replaced P.L. 95-561 with the *Education Consolidation and Improvement Act*
(P.L. 97-35) consolidating funds for gifted education with other programs for the states to
disperse at their discretion. Interest again rose in 1988 with the passage of the Jacob K. Javits
Gifted and Talented Students Education Act (P.L. 100-297), which created a program for
supporting projects and research in gifted education. Unfortunately, with the urgency spurred by
Sputnik so far behind and standards-based accountability prominent in current educational
policy, a focus on gifted education continues to wane. In 2002, with the passage of No Child Left
Behind (NCLB), the reauthorized Elementary and Secondary Act (ESEA) (P.L. 91-230, Section
806), policymakers in education shifted focus even further away from preparing our best and
brightest for tomorrow to ensuring all students can meet minimum basic requirements.
Learning crisis: A problem of global consequence

The intense focus on standards-based education along with the high stakes accountability put in place with NCLB has led to an education system of adequacy, not excellence (Loveless et al., 2008; U.S. ED, 1993; VanTassel-Baska & Brown, 2007). The push to have all students meet minimum requirements has pressured schools to focus time, money, and attention on low-achievers (Reback, 2008; Shaffer & Gee, 2005). Originally, NCLB mandated all students meet minimum grade-level standards in math and reading by 2014. Failure to meet these requirements was to come with a heavy price (Chiang, 2009). Since there is no looming administrative consequence for ignoring the needs of the gifted, it has become common practice to design curriculum for at least minimal success on standardized tests rather than successfully challenging all students (Loveless et al., 2008; VanTassel-Baska & Brown, 2007). Shaffer and Gee (2005) in “Before Every Child Is Left Behind, warn of a quiet crisis of global consequences that must be averted through major reforms in the American educational system. This quiet crisis is not just about the old story of outsourcing jobs to other countries. Outsourcing has grown beyond manufacturing and skill-based jobs to include higher-level professional jobs, such as reading X-rays, computer programming, and even preparing taxes. In The World Is Flat, Thomas Friedman (2007) shares examples of how skill-based jobs are outsourced and warns that it is no longer enough to be skilled or even have a large store of knowledge. He proposes that in order to compete successfully in the 21st century, our country needs to look toward creating workers who are innovative, problem-solvers, communicators, and collaborators (Friedman, 2007). This “new capitalism,” should be an impetus for drastic change in our pedagogy of teaching and learning. A look at the defining characteristics of gifted children reveals their potential for meeting the
challenge faced with ever-increasing competition in the new global workforce (Archambault et al., 1993; NAGC, 2008b; U.S. ED Office of Educational Research and Improvement, 1993).

Gifted students: Defining a diverse group

Although gifted children vary considerably in a number of ways, some common characteristics lie at the heart of their potential. These commonalities have been used to create definitions of gifted children. A national definition, located in the Elementary and Secondary Education Act (ESEA), came from a report to Congress from the U.S. Commissioner of Education (Marland, 1972). Upon the reauthorization of the Jacob K. Javits Gifted and Talented Students Education Act (P.L. 100-297) in 2002, the accepted national definition became the following:

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 [Title IX, Part A, Section 910 (22)].

The National Association for Gifted Children (NAGC) and many states use the 2002 definition (NAGC, 2008a). In reviewing the literature, some basic commonalities guiding these and other definitions emerge from the research of gifted children regardless of background, socioeconomic conditions, type of giftedness, and school experiences. In this section, I will discuss some of the commonly held tendencies among this very heterogeneous group.

Renzulli’s three-ring conception of giftedness focuses on the interaction of behaviors among three basic clusters: above average ability, high levels of task commitment, and high levels of creativity (Renzulli, 2005). Some of the identified characteristics among these clusters include the ability to learn more rapidly than other students learn, understanding of complex or abstract topics, and advanced verbal ability and problem-solving skills (Reis & Renzulli, 2010). A comprehensive set of possible characteristics is listed on the Scales for Rating the Behavioral
Characteristics of Superior Students (SRBCSS) developed by Renzulli, Reis, and colleagues (Renzulli et al., 2002; Reis, 2007). The SRBCSS is highly regarded and widely used. Like the national definition, it includes the previously mentioned characteristics along with traits from areas other than academics and cognition, such as creativity and leadership. Additionally, the SRBCSS point out motivation and advanced communication skills as evidence of giftedness. Of these commonalities, the online tool in this design experiment is being developed with the following three common characteristics of gifted students in mind: the understanding of complex topics, advanced verbal abilities and communication skills, and motivation to learn.

Many school districts across America start with the aforementioned basic defining characteristics. However, some may include or exclude types of giftedness other than academic or cognitive giftedness. Gifted frameworks and program goals also vary widely. Some children may remain unidentified for various reasons such as restrictive identification processes, parents’ refusal for testing for identification purposes, lack of teacher knowledge, and time to complete the process. Attempting to include all gifted children (identified or unidentified) would exceed the scope of this study and would introduce confounding variables. The participating school district has an identification process that uses IQ measuring two standard deviations above the mean, achievement tests, as well as observations and checklists to demonstrate characteristics of giftedness and a need for a specialized program (Identifying Reference, 2010). The district’s eligibility requirements are in accord with Florida State Rule 6A-6.03019. Paragraph b makes allowances to ensure identification of traditionally underrepresented populations.

Criteria for eligibility. A student is eligible for special instructional programs for the gifted if the student meets the criteria under paragraph (2) (a) or (b) of this rule. (a) The student demonstrates: 1. Need for a special program, 2. A majority of characteristics of
gifted students according to a standard scale or checklist, and 3. Superior intellectual development as measured by an intelligence quotient of two (2) standard deviations or more above the mean on an individually administered standardized test of intelligence.

Because the setting for iterations two and three of the study is the regular classroom, the operational definition of intellectually gifted children, for purposes of this study, is limited to those children who have already been identified as “gifted” by the school district where the study was conducted.

**Appropriate differentiation: A defining need**

The current federal definition of giftedness includes the student’s need for instruction that is “not ordinarily provided by the school” (as cited in NAGC, 2008a, para. 7). The definition from the Marland report (1972) states that gifted students need “differentiated educational programs and services beyond those normally provided by the regular school program in order to realize their contributions to self and society” (p. 2). The participating school district currently includes the need for differentiated instruction in its identification process as well. School districts who espouse these definitions and program goals are poised to tap into the immense potential of the gifted. However, political pressure has reduced concern for gifted education; some critics of gifted education have been touting the perceived benefits of leaving gifted students in the regular classroom. The belief that equality in education means every child receives the same opportunity has been the support for keeping gifted students in the regular classroom rather than providing separate services for the gifted child. Those not supporting gifted education quickly point out that, after all, these students are already intelligent; they do not really need the extra help (Clarenbach, 2007). What these policymakers fail to realize is if all
people were alike, they would all thrive in the same environment. It is widely accepted that
students with disabilities require specialized instruction, which negates the very idea that all
people are alike in skills and needs. *Equal* does not mean *same*; equity means providing learning
experiences appropriate for each student. Based on the literature, it is unlikely gifted children
within the regular classroom as it exists today will receive appropriately differentiated
instruction.

Some studies suggest that close to one-half of what goes on in a traditional classroom
may waste the gifted child’s time (NAGC, 2013; Reis et al., 2005; Reis, 2007; U.S. ED, 1993).
The findings of these studies support the practice of curriculum compacting. Curriculum
compacting involves pre-testing to determine what students already know and moving them
more quickly through the curriculum by eliminating instruction on content already mastered
(VanTassel-Baska & Wood, 2010). While this practice reduces boredom and redundancy, it is up
to the teacher to design additional activities that do not just “fill the time” but capitalize on it.

Another widely recognized strategy is to implement independent studies. Too often, however,
teachers ineffectively assign students large projects on a topic of their choice due at the end of a
term with little guidance or feedback along the way. The key to successful implementation of
independent study is the teacher (Riley, 2009). Parents and students struggle through the process
with little or no instruction and may or may not receive instructive feedback at the end. These are
just two examples of how good differentiation strategies can fall short. Appropriate
differentiation means a qualitatively different approach, not just more of the same (Riley, 2009;

Effective differentiation strategies include changes to the content, processes, and products
(Riley, 2009; VanTassel-Baska & Stambaugh, 2005, 2009). To implement appropriate strategies
such as curriculum compacting and independent study, the teacher needs an understanding of the nature and needs of gifted children along with theories of differentiation and how to put those into practice (Riley, 2009; VanTassel-Baska & Stambaugh, 2005, 2009). Unfortunately, research for nearly a century indicates a lack of implementation of appropriate differentiation.

**Differentiation then and now**

Since research on gifted students began in the early 1920s, teachers have struggled with how to differentiate instruction for the gifted child in the regular classroom. In *Children above 180 IQ*, Hollingworth (1942) details case studies involving 19 highly gifted students along with her interpretations. The participants in her study comprised 12 girls and 7 boys from New York City. It is important to note that the children she described are highly gifted. Therefore, the characteristics of this subgroup of “gifted” students may not necessarily generalize to all gifted students. However, a look at differentiation practices in their school settings is worthwhile.

When reviewing the school histories, several similarities arose (Hollingworth, 1942):

- The schools had trouble with the students and the students had trouble with the schools;
- The solution the schools chose made a great impact on the students’ development;
- Students identified early tended to have more positive experiences (perhaps due to earlier access to support services); and
- The students with the most positive outcomes had a variety of adults who paid careful attention to their development and made efforts to meet their needs.

In the 1920’s, Lewis Terman conducted numerous studies, gathering vast amounts of data on highly gifted children as well. By early 1921, Terman had considerable data on 121 cases with above 140 IQ. In his *Genetic Studies of Genius, Volume 1* (1925) he concluded that the gifted students he studied were accelerated about 1.5 years on average, but still about two grades below
their mental development, and very few had been pushed in their development. With the help of a grant, Terman expanded his work. By May 1924, he had enrolled 1,444 gifted subjects (831 boys and 613 girls). In the area of school experience, he reported little to no accommodations other than an occasional promotion of a grade level.

Despite these seminal studies and extensive research-based suggestions, decades later, studies indicate little change. Archambault et al. (1993) conducted a study to measure the use of strategies. Additionally, the U.S. ED, Office of Educational Research and Improvement published the “National excellence: A case for developing America's talent” (1993) which also measured the extent to which teachers at that time differentiated for the gifted student within the regular classroom. Fortunately, we have improved somewhat since then. Terman (1925) noted “it is evidently a rare experience for a gifted child to be given work of a grade of difficulty commensurate with his intellectual abilities” (p. 636) and Hollingworth (1942) stated that “these exceptional pupils are running errands, idling, engaging in ‘busy work,’ or devising childish tasks” (p. 288) to fill the time.

The results from two major 1993 documents reveal classroom practice in the decades following the discoveries of Hollingworth and Terman. The 1993 Classroom Practices Study (Archambault et al.) was conducted to determine whether teachers made modifications for gifted students, what strategies they used (if any), and to what extent. Additionally, it compared these practices between different types of communities around America. Market Data Retrieval used stratified random sampling procedures to sample over 7,300 third and fourth grade teachers from various types of communities, schools, and ethnicities. Only 50% responded. The researchers analyzed the demographics of the still large pool of 3,888 classroom teachers (approximately 1% of teachers in the U.S. who have contact with third and fourth grade). They concluded the sample
was representative of the teacher population across America. According to the report, almost 50% of the respondents held Master of Education degrees and over 70% had taught for more than 10 years (Archambault et al., 1993). Given the 1988 passage of the Javitz Act (which provided funding for gifted education), the introduction of computers in the classroom in 1977 (which expanded the list of possible strategies teachers could employ), and the high level of education and experience of the respondents, one would expect the differentiation to be significant. Unfortunately, the findings were rather dismal. The 39 strategies listed (only one of which specified technological tools) were sorted into categories. The categories are as follows: Questioning and thinking skills, Providing challenges and choices, Reading and written assignments, Curriculum modification, Enrichment centers, and Seatwork. Among the 1018 public school classrooms with formally identified gifted students, Questioning and thinking skills were most frequently used; however, the difference in frequency of use between gifted and average students was very small (Archambault et al., 1993). Calculating Cohen’s effect size, only two items (allowing advanced reading levels and repeating difficult concepts) had a medium-sized effect; the rest were small to negligible. With all the funding for and information on the importance of meeting the needs of gifted students, why would such an educated and experienced selection of teachers not be implementing more strategies? One hypothesis purported in the Archambault report is that “61% of the responding teachers had received no staff development in the area of gifted education” (1993, p. 107). The report concludes that teachers made only minor adjustments to educate gifted students, and teachers needed some training to change this.

Three months later, the U.S. ED Office of Educational Research and Improvement published “National Excellence: A Case for Developing America’s Talent” (1993). In this document,
results from quite a few rigorous studies are discussed, including The Classroom Practices study. Part II of the report focuses on the status of gifted education. Not surprisingly, other studies cited in the document echo the concerns from the findings of the national classroom practices survey, which adds credibility to Arcahambault’s study and increases the generalizability of the findings. This document mentions a follow-up study to the national survey that additionally included classroom visits. Findings indicated that “84 percent of assignments for gifted students were the same as those made to the whole class in the five subjects surveyed” (U.S. ED Office of Educational Research and Improvement, 1993, p. 27) and most modifications were made in math where a modest 11% of assignments for gifted students were advanced. Another study discussed gave a pre-test on five content areas. Selected students who showed mastery of 35–50% of the material were divided into two groups. The treatment group had the mastered material eliminated from their instruction. When released to do other activities, the remaining gifted and average students continued with the regular curriculum. The control group continued with the regular instruction. The treatment group outperformed the control group (both gifted and average) on math and science tests when retested at the end of the year. In the other subjects, they scored even with the control group. All the studies discussed support a call to change. Their combined list of things that schools must do includes the following:

- Expand programs and add advanced materials;
- Have students problem-solve, analyze, and learn from real-life situations;
- Serve students in a variety of places, such as regular classrooms, pull out programs, museums, and in front of computers; and
- Be flexible according to student needs and interests.
Despite the overwhelming data calling for change, more recent studies report similar results. Several large-scale studies point to some contributing factors. One major factor is increased accountability systems such as NCLB. In a 2008 publication, the Fordham Institute presented the findings of two studies (Loveless et al., 2008). One study analyzed high-achieving students’ performance on the National Assessment of Educational Progress (NAEP) from the early 1990s to 2008. The second part involved a survey of teachers on how schools are addressing the needs of high achievers. Results on the first study indicate that high achievers have made minimal gains, while low achievers show strong progress. The authors state that the same trends occur in states that had accountability systems prior to NCLB. Some likely reasons for this negative impact of accountability systems come from the results of the survey in the second part. In the second study, 6,000 questionnaires were sent by mail and online to randomly selected third through twelfth grade public school teachers across America. The response rate, only 15%, reduces some of the ability to generalize the results to the whole population (Loveless et al., 2008); however, the results are echoed in similar studies (Chiang, 2009; Reback, 2008; Shaffer & Gee, 2005; VanTassel-Baska & Stambaugh, 2005) which lend credibility to the conclusions. The findings give insight into why low achievers are making great gains and high achievers are not. For example, 60% of the respondents feel pressured to give top priority to low achievers (Loveless et al., 2008) and 84% state that it is difficult to “implement differentiated instruction on a daily basis in the classroom” (p. 76). Teachers also responded 90% in favor of more professional development to help them develop skills for teaching advanced kids, and 96% favored more enrichment experiences outside the school to develop their unique talents (Loveless et al., 2008). Although a lot has been discovered about the need to differentiate
instruction within the regular classroom setting to challenge and develop America’s brightest students, teachers need to know how to do just that.

**Empowering teachers: Key to change**

Some educators and parents believe that a better answer is to remove children from the regular classroom or at least increase their time with pull-out or enrichment programs (Loveless et al., 2008). Cramond and Brodsky (1996) compare training academically talented students in the heterogeneous classroom to training Olympic athletes on a mixed abilities team. While these proponents of removing gifted students from the regular classroom have valid points, the unfortunate fact, as Hollingworth found out firsthand, is that gifted education programs are always in danger of elimination. An alternative is to improve practices within the regular classroom.

To empower teachers to change our schools and our world, they need more training, resources, and support. The most commonly purported solution of providing more training takes time. Cashion and Sullenger (2000) studied teachers’ use of strategies following a summer training workshop. Small changes were noted in the first year and further progress in the second year. Reinventing oneself is a slow process, but the qualitative data from the focus groups showed most teachers were dedicated to doing just that. Miraca Gross, president of Gifted and Talented Children’s Association of South Australia, conducted a 20-year study of 60 exceptionally gifted children. One of the findings of her study is that apart from family support, the greatest determinant of exceptional children’s ability to reach their potential is whether the school allows them to be with intellectual peers and to progress at their own pace and level (Gross, 2006). In an article published by the Davidson Institute, parents report teachers’ negative attitudes and behaviors toward gifted children. Her own research shows “significant attitudinal
change can occur after one six hour in-service day” (Gross, 2006, p.8). When shown their students’ needs, teachers exhibited an attitudinal shift; the process for consistent application of new strategies, however, is slow.

As the research indicates, gifted students need appropriate education and spend the majority of their time in the regular classroom; teachers need training on effective strategies, and resources and support to ensure attitudinal and practical changes gained from such training will last. In these troubled economic times with budget cuts lurking around every corner, how do teachers get what they need? Teachers could use some resources and support readily available and easy to use. Technology has potential to fill that need and lead us forward.

**Technology’s role: A powerful bridge**

 Appropriately, differentiated instruction can motivate and engage students. The ideal classroom for gifted students provides open-ended and stimulating opportunities balanced with meaningful and practical activities. VanTassel-Baska and Stambaugh (2005) and Riley (2009) offer some effective strategies for differentiation seen throughout many resources for gifted curriculum models. They recommend adaptations to content, process, and products. Adjusting content includes adding depth, exploring topics as they connect across content areas, and substituting higher level texts, just to name a few. Adapting processes can be accomplished by tailoring how content is presented, offering a menu of activities from which the student chooses, and using real-world problem-based instruction rather than rote skill and drill. Products can also be tailored to the child’s strengths and interests. A construct-validation of Sternberg’s Triarchic model, conducted during a Yale Summer Psychology Program, included 200 ethnically diverse students with varying areas of giftedness. One statistically significant result (p<.01) showed that matching instruction and assessment to students’ ability pattern resulted in better performance on
course outcomes (Sternberg, et al., 1996). Allowing various means of expressing learning for an authentic assessment is just one example. When implemented well, these curriculum adaptation strategies can ensure the gifted are not left behind (Riley, 2009; Sternberg et al., 1996; VanTassel-Baska & Stambaugh, 2005).

Achieving this level of curriculum adaptation within the regular classroom has barriers. As previously discussed, technology may help overcome some of these barriers more easily and efficiently. Some barriers to effective differentiation center on needs of the teacher. Lack of sufficient subject matter knowledge, limited project management skills, difficulty finding and utilizing resources, and lack of planning time all affect a teacher’s ability to be effective with flexible instruction (VanTassel-Baska & Stambaugh, 2005). “The work of teaching and the nature of the Internet interact both to support and to inhibit innovative teaching and learning” (Wallace, 2004, p. 448). Wallace notes that teaching with the Internet varies widely and the biggest issues teachers face are time, energy, and knowledge (2004). Some other ways that the Internet can undermine teaching are lack of training on effective use and being thrust into the role of curriculum designer rather than following the prescriptive plan provided to the teacher (Wallace, 2004). These are very similar to the obstacles general education teachers face with teaching gifted students in heterogeneous elementary classrooms.

Using the Internet to teach gifted students is one potential way to overcome many of the obstacles teachers face (Roblyer & Doering, 2010; Wallace, 2004). The Internet provides teachers with access to in-depth information, field experts, alternative methods of assessment, and time-saving tools for planning, tracking student progress and assignments, and much more (Roblyer & Doering, 2010). Roblyer and Doering describe some specific uses in their textbook. They recommend teachers use materials generators to create customized tests, activities, and
rubrics; use word processing and desktop publishing software to be more efficient in creating documents; use data collection and analysis tools for efficient and effective ways to understand student data for driving instruction. A few examples for adapting content include computer-assisted instruction and distance learning; for adjustments to process, the students can use telementoring, discussion boards, virtual field trips, and simulations; tailoring products can be achieved by utilizing software for word processing and presentations (2010). In essence, providing teachers with easy-to-use online tools can better fit them for the task of teaching the gifted appropriately.

Internet usage, distance learning, and multimedia presentations are all common practices that can support addressing the unique characteristics of the gifted. While these are excellent tools for providing what a teacher cannot easily provide, they still require time and energy to locate the sources online (Wallace, 2004). Ironically, the Internet can ease the use of the Internet. Teachers can use discussion boards or teacher networking sites to assist in their search (Roblyer & Doering, 2010). Some textbook publishers offer a link to their companion websites. Publisher websites, however, tend to be merely the same general education delivered through a different medium. A differentiated online reading intervention, on the other hand, could provide a significantly more effective tool than those offered through the publisher. An appropriately differentiated online experience would allow for self-pacing, non-linear, engaging, and complex learning experiences. The site should also allow access to like-minded peers. More importantly, the intervention should include tracking and analysis tools for teachers to view students’ performance and behaviors (reducing their grading time) and provide individualized feedback.
**Reading and the gifted child: A gap in the curriculum**

Providing interventions tailored to the unique needs of the gifted child in all content areas is imperative. In this study, I have selected to focus on specific literacy skills in reading for two main reasons: literacy skills were not being covered in the pull-out program of the participating school district, and technology interventions for reading are not prevalent in published research.

The Institute for Educational Sciences (IES) and the National Science Teachers Association (NSTA) have been advocating for more real-world, hands-on approaches to science. The IES provides considerable funding for numerous studies and product development for increasing science, math, and technology achievement in the United States. The NSTA advocates that schools reform teaching methods, content, process, and products to ensure scientific literacy (NSTA, 2010) which fits well with the NAGC standards for gifted education (Chandler, 2001). The National Council for Teachers of Mathematics (NCTM) developed the widely accepted national math standards (NCTM, 2000). They have made great gains in the movement in math education toward more conceptual learning and real-world application of mathematics. Like the science standards, the current national standards for math instruction are well suited to the gifted learner’s needs.

However, the regular classroom reading teacher could benefit from additional support. The textbook publishers provide above-level reading materials and suggestions for guided reading activities for students reading above their level. The publisher of the reading series in use at the participating school district (at the time of this writing) provides an online component ([http://www.mhschool.com/reading/techtour/](http://www.mhschool.com/reading/techtour/)) that teachers may have students interact with after they complete their work. While this component allows students to move at a faster pace, the content is much like the traditional instruction and there is no place for students to develop
product. The website and the “above level” work provided with the reading curriculum lack depth and complexity. It is up to the teacher to make these curriculum design decisions. As stated before, technology can help teachers overcome some obstacles in this differentiation process.

Only a few regular classroom curriculum programs employ technology to look at reading instruction for the gifted child. One program, Schoolwide Enrichment Model-Reading (SEM-R), includes opportunities for student-directed projects that provide a great avenue for challenging gifted students. This reading instructional model will “challenge talented readers who are systemically denied the opportunity to read at increasingly advanced levels of achievement, while simultaneously addressing the issues of an absence of challenge in reading programs that may contribute to declining achievement in all students” (Reis et al., 2005, p. 3). Renzulli Learning, another online program (available at www.renzullilearning.com), provides teachers a way to search a database of lessons and assign them to the individual. Both teachers and parents can access this source. While both of these are considered effective (Reis, 2007; Shaunessy-Dedrick, Evans, Ferron, & Lindo, 2015) and accessible to teachers, some limitations need to be addressed. SEM-R requires schoolwide buy-in, teacher training, and an investment in classroom libraries. Renzulli Learning requires teachers to spend time selecting and assigning tasks online to each student individually, although learning profiles help teachers filter some of the numerous lessons based on students’ interest and learning styles. With teachers already pressed for time and resources, these excellent and highly regarded programs are not ideal for immediate application by a regular classroom teacher without training on gifted curriculum.

A self-contained, differentiated intervention that requires no additional preparation for the teacher could be implemented immediately. After students read a selected text, the website should provide them with a self-directed way to explore literature and language on a different
level and thus create unique connections to text, self, and the world. Students should also be able
to use one of the Internet’s greatest affordances—overcoming space and time—to connect and
collaborate with their like-minded peers, a key to reaching potential (Gross, 2006). Additionally,
it should provide built-in assessment of students’ ability to apply the complex literacy skills they
developed through the engaging interactions to novel situations. The teacher can then review
timesaving computer-generated scores of student work and writing samples to assign grades,
appropriately assessing students’ development. I hypothesized that such an online, differentiated
environment would provide the regular classroom teacher with an effective way to develop
appropriately targeted literacy skills for gifted students in a way that requires little cost, training,
and time.

The write stuff: Vocabulary, tone/mood, and characters

Literacy instruction covers a wide range of skills and objectives in reading and writing.
Technology and social media have added new literacy skills, expanding an already large content
area. The instructional website under development in the study addresses a small selection of
these skills and objectives. To decide where to begin, the development team asked third grade
teachers to identify skills or topics in language arts they wished they had time to go into more
depthly. From that list, the initial development team brainstormed activities and narrowed it to
vocabulary, tone/mood, and characterization. Developing skills in these areas and then applying
them in their own writing will raise their writing to a new level. The development team reviewed
methods of reading comprehension instruction, such as writing for reading, predictive exercises,
this study, I added a section of the online discussion board for word games. These games were
based on activity ideas from Beck, McKeown, & Kucan (2013) for robust vocabulary instruction.
Through the activities in the website, students will understand how writers can leverage the nuances of language to make their writing more powerful.

Vocabulary is strongly correlated with reading comprehension (Blachowicz, Fisher, Ogle, & Watts-Taffe, 2006; Sternberg, 1987). Yet, in general, vocabulary instruction within the classroom is less than robust (Beck, McKeown, & Kucan, 2013; Blachowicz et al., 2006; Duke & Pearson, 2008/2009). Some common practices involve matching and cloze activities. Given the importance of a strong vocabulary, robust instruction is a must. Word knowledge, however, is a very complex construct. There are various levels and ways of “knowing” a word. Based on years of research and review of decades of research, Beck, McKeown and Kucan state, “a robust approach to vocabulary involves directly explaining the meaning of words along with thought-provoking, playful, and interactive follow-up” (2013, p. 3). Nagy and Scott also point out the “incrementality” of word learning evident in incidental learning as well as learning with context; incidental learning works, but adding robust instruction increases learning (2000). Thus, exposure to words in various ways can not only increase students’ vocabulary, but also cultivate an interest in self-directed word study.

Teaching tone or mood in language arts is challenging. Literature is one of the arts most often used in literacy instruction, “sometimes at the expense of aesthetic understanding” even though when treated as an art, literature has the “power to engage deep thinking and emotional understanding beyond that of any worksheet” (Cornett, 2011, p. 69). One effective approach to learning tone or mood in literature is to integrate the visual and aural arts. Artists communicate through visual and aural media to convey meaning. Where authors use words, artists use elements such as line, color, texture, shape, patterns, rhythm, beat, pitch, and the like to communicate tone and mood in art and music. Explicit instruction in visual literacy can enhance
reading comprehension (Gullat, 2008). If students learn to “comprehend” visual art by recognizing the elements and the meanings they convey, students can then apply this technique to reading and writing. They can recognize author’s techniques of word choice and style to create nuances of meaning. Then they can use their expanded vocabulary from rigorous word experiences to become more effective writers and communicators in response to reading.

Typical instruction for characterization is to have students identify and possibly describe the characters in a book (Roser & Martinez, 2005). This low-level instruction amounts to matching characters with adjectives or writing descriptions. Understanding characters in text is a complex process, much like understanding people in the real world. Unfortunately, readers rarely are privy to the body language and facial expressions of the characters. Mature readers come to realize that characters, like people in real life, expose their essence through their words and actions. In text, authors can also reveal characters via thoughts and what others think and say about them (Cornett, 2011). Another important point is that characters may change over time, especially after a significant event in their lives. If a reader truly “gets” a character, they can recognize and predict how the character would behave outside of the context of that particular book. Character studies improve reading comprehension (Dymock, 2007) and connect students to literature in a powerful way (Roser & Martinez, 2005). To add a layer of complexity, students should investigate characters as one would discover a person. As Roser and Martinez point out, characters draw students into literature and provide an avenue for students to expand perspectives and grapple with complex issues at a safe distance (2005). Even though people (and book characters) change over time, one can predict how they would likely act in new situations if one knows them well enough—traits, motives, relationships, and goals. Discovering a well-developed character would be similar to discovering, interacting, and observing another human
in various settings. Although these particular literacy skills—vocabulary, tone/mood, and characterization—are only a small part of a language arts curriculum, they were selected as focus areas for this study because students and teachers from the pilot study reported needing/wanting more instruction. The literature reviewed supports the importance of these areas as well.

**Gifted third graders: A great place to start**

Reflecting on the current lack of challenge for gifted students, I believe change is a must; the next is where to start. I decided to begin with gifted third graders for several important reasons. Third graders begin the transition from learning to read in the early grades to reading to learn in fourth grade and beyond (Gee, 2008). Many students who appear to be learning to read well in the early years of school cannot read to learn by the fourth grade (Gee, 2008). In another paper, Shaffer and Gee refer to the 30 years of research that shows this phenomenon, commonly known as the fourth grade slump, indicates children have not been prepared for the “increasing linguistic and cognitive demands of the complex forms of language, symbolic representations, and thinking demanded by academic content areas” (2005, p. 22). The third grade is a gateway year in reading because of the accountability measure of NCLB. This means that students must show mastery of third grade reading on a standardized assessment test. Those who do not pass face possible retention and students who do pass face the new, daunting challenges of reading to learn.

A major impetus for this research is my personal experience and observations. Even as a teacher sensitive to this crisis for our gifted third graders, I also struggle to differentiate instruction in my elementary classroom. Given the significance of mastering literacy skills before falling into the fourth grade slump, the study purposefully hones in on literacy skills for gifted third graders. The literature shows a definite lack of appropriate differentiation for gifted
students within the regular classroom; as focus and funding for ways to develop innovators and
global communicators wanes, gifted students are spending more time in less than challenging
environments. Regular classroom teachers desire to overcome the obstacles of time and training
to appropriately differentiate instruction for all children. I set out to end this frustrating situation
and empower teachers by giving them the proper support to become the kind of teacher who
develops the next generations’ innovators, explorers, leaders, and problem-solvers to make our
world a better place.

Review of the Literature: Related Topics

The previous section laid out evidence of the problem and the literature supporting the
research design decisions for the study. The following review of the literature on related topics
describe technology’s role in several content areas, explain the new definition of literacy, layout
evaluation criteria for gifted curriculum, and shed light on higher-order thinking. Understanding
these concepts will provide further insight into the design of the intervention and the design
experiment conducted to develop it.

Technology’s role: Impact in content areas

The launch of the Internet in the early 1990s gave teachers new opportunities to
differentiate instruction. Many took this opportunity and introduced new strategies such as
Internet research for independent study, which could be one option for self-selection activities of
the highly regarded SEM-R (Reis, 2007). Unfortunately, many classrooms today lack access to
the technology needed to leverage its benefits. Restricted access to computers during testing, as
demonstrated in this study, is an obstacle for teachers wanting to use technology for
differentiation. In the survey used for the 1993 Classroom Practice Study, technology is only
specifically mentioned once (item 39); that item was not included in the factor analysis due to
low loading (Archambault, et al., 1993, p. 39). Even though the other strategies did not mention the use of technology, it is easy to see how a number of them could be carried out on a computer when available. Research-based online websites designed for gifted students (such as www.renzullilearning.com) and tools (such as online encyclopedias, WebQuests, writing support, and much more) are opportunities for students that take little training on the part of the teacher. These may provide the key to establishing the environment gifted students need without waiting for the slow process of professional development. Roblyer and Doering (2010) describe online sources that can provide training and support attitudinal changes for teachers to implement effective research-based strategies that help all students, gifted or not, to reach their fullest potential. Online lesson collaboration, blogs, and discussion boards can give teachers the encouragement they need from fellow teachers and gifted experts. Email, online courses, and links to sources are efficient ways to disseminate training information. Technology-integrated practices in a number of content areas have already been studied with positive results. Science offers a number of technology-enhanced programs. One study conducted by M. Dove of Youngstown State University and J. Zitkovich of Boardman Local Schools found that integrating technology increased the effectiveness of Group Investigations Model for science instruction in fourth through sixth grade students. The Group Investigation Model provides a complex topic of investigation that includes tasks that require student coordination, varying viewpoints, and various possible solutions (Dove & Zitkovich, 2003). Although there are some disadvantages of the Group Investigation Model with elementary school students (lack of mentors and resources and the dependence on pre-requisite skills), the researchers found that adding technology overcame these obstacles by granting access to field experts, extensive information sources, and providing methods of effectively demonstrating learning through multimedia presentations.
(Dove & Zitkovich, 2003). The real-world problems and complexity of the task are ideal models for gifted students. In 1990, the Ford Partnership for Advanced Studies created the Ford Academy of Manufacturing Sciences (FAMS) which consisted of four one-semester high school courses (later, five courses). The curriculum integrates technology learning and academics in a constructivist style while still meeting national learning objectives in the sciences (Zinser & Poledink, 2005). “Kids as Global Scientists” is another promising program integrating technology and science. Mistler-Jackson and Songer (2000) found that sixth graders gained significant knowledge of weather content and exhibited a high level of student motivation. As previously discussed, the student-centered, engaging, and motivating nature of these three programs are ideal for the gifted learner.

Science is not the only content area where one will find technology-integration supporting programs well suited for gifted students. With the increasing use of online communications, it is only natural that writing instruction would tap into digital devices. Typewriters offered some advantages (legibility and increased speed), but not nearly as many as the computer has introduced. Writers can use the Internet to do background research for novels, online publishing, writer’s forums for editing and feedback, as well as the flexibility of word processing software. Several studies have examined the effects of technology on writing. There have been some mixed yet intriguing results. One study by Cassady, Cross, Dixon, and Williams (2005) involving adolescent gifted students compared the quality and length of critical thinking essays. They found that in handwritten essays, girls provided more content than boys. Using the computer had more effect on the boys who matched the girls in quantity using computers. The quality of the boys’ essays improved with the use of computers as well. The researchers surmise that computers allow the boys’ composing to keep up with their thinking (Cassady et al., 2005).
Dybdahl, Shaw, and Blahouse conducted a study comparing two fifth-grade classrooms’ expository writing. The researchers believe that the most important factor in a successful writing program is the teacher. Both groups had highly qualified writing instructors. The study found that technology had no significant impact on the quality of the students’ writing. However, they pointed to the under-studied benefits of technology in revisions and aid of technology in tracking the writing process. So, despite the findings in regards to writing quality, the researchers still see positive possibilities integrating technology in the writing process (Dybdahl, Shaw, & Blahouse, 1997). Today, online publishing sites, discussion boards, Internet information sources, multimedia presentation software, and access to writing experts have added to the possibilities for the self-motivated gifted writer that goes well beyond the addition of word-processing to the classroom. In fact, technology and its impact on teaching have redefined literacy, increasingly referred to as New Literacy (Cazden et al., 1996).

**New Literacy: Emerging definition and theory**

With the introduction of computers, a slow shift began from books and magazines to electronic text, hypertext, and multimodal communication. This shift brought on more than just a change in the delivery media; how people read changed too. With a traditional book, students learn to read left to right, top to bottom. Online reading allows a much less linear approach. Students must now learn how to navigate back and forth through hyperlinks, and “reading” visual displays that may even be interactive. Even with these challenges, interacting with text via technological devices can have significant relative advantages too. Relative advantage describes the benefits of a new method or practice over the old one (Roblyer & Doerring, 2010). Online text with hyperlinks provides access to background knowledge or avenues for self-directed study beyond the text. Another relative advantage would be an online dictionary accessible while
reading the text. Unlike a hardcopy of a dictionary students may have beside them while reading, online dictionaries can also offer an audio recording to teach the pronunciation and links to etymological information about the word.

In 1996, with the Internet spreading rapidly, 10 eminent academics leading the way in the field of New Literacy Studies met in New London, Connecticut to discuss the future of literacy pedagogy. The New London Group coined the term “multiliteracies” to describe “the multiplicity of communications channels and media, and the increasing saliency of cultural and linguistic diversity” (Cazden et al., 1996, p. 63). Simply introducing technology into literacy does not qualify as new literacies. Digitizing text requires little change in pedagogy or literacy skills for decoding and creating text. On the other hand, the definitions for multiliteracies and New Literacy Studies do include technology. The need for a technology component in the definition of multiliteracies or new literacies is due to the way the technology “enables people to build and participate in literacy practices that involve different kinds of values, sensibilities, norms and procedures and so on from those that characterize conventional literacies” (Lankshear & Knobel, 2007, p. 7). According to the New Media Consortium (2005), 21st century literacy is “the set of abilities and skills where aural, visual, and digital literacy overlap. These abilities and skills include the ability to understand the power of images and sounds, to recognize and use that power, to manipulate and transform digital media, to distribute them pervasively, and to easily adapt them to new forms” (p. 8). Jenkins, Clinton, Purushotma, Robison, and Weigel (2005) would modify the definition by adding that “these skills build on the foundation of traditional literacy, research skills, technical skills, and critical analysis skills taught in the classroom” and “new media literacies should be considered a social skill” (p.19).
The importance of interaction across cultural boundaries to collectively construct understanding of text and participate in the collaborative creation of text is the heart of the new definition of literacy. New literacy involves more than just mental processes. According to sociocultural theory, Reading, writing, and language are intertwined social and cultural practices with implications beyond the individual (Gee, 2007). This sociocultural approach to literacy means that “language (words, literacy, texts) gives meaning to contexts and, dialectically, contexts give meaning to language. Hence, there is no reading or writing in any meaningful sense of each term outside social practices” (Lankshear & Knobel, 2007, p. 2). This emphasis on social practice for literacy is a fundamental aspect of the emerging definition of literacy.

Naturally, with new literacies comes new pedagogy. Members of the International Reading Association (IRA) put forth a position statement in regards to the expanded concept of literacy (2002). In their statement, they emphasize the teacher’s role in supporting students in developing new literacies such as Information and Communication Technologies (ICT). They state that students “have the right to a literacy curriculum that integrates the new literacies of ICT into instructional programs” among other things (IRA, 2002, p. 3). Some critics of new literacy pedagogy simply feel there is no need to teach digital skills since today’s youth already know it. This unfounded assumption overlooks the digital divide by socioeconomic class in access to multimedia resources (Jenkins et al., 2005). Additionally, Jenkins et al. point out students are not likely to reflect spontaneously on their learning in a participatory setting nor will they naturally develop understanding of ethical norms in such a complex and diverse environment (2005). In a multiliterate classroom, the teacher’s role is to integrate thoughtfully the Internet into literacy instruction. Modeling the appropriate use of the Internet and discussing ethical practices as well as ways to evaluate the credibility of online sources are the first steps. Having students write for
a real-world audience that extends beyond the classroom is one sociocultural strategy commonly adopted in the new literacy classroom. Students are able to connect more easily with people who have similar cultures and affinities in order to collaborate effectively from a perspective of shared experience. Students can access affinity groups to which they belong more easily when they can go beyond their classroom via the Internet (Gee, 2007). Teaching multiliteracies and how to convey meaning through social interaction and technology requires a whole new mindset; thus, from new literacy and new pedagogy, dawns ever-increasing possibility for new depths.

Technology and reading: Successful foundation building

Reading instruction for the gifted child is just as necessary as instruction in other content areas. The gifted child tends to have an advanced vocabulary and advanced language abilities (Levande, 1999; Reis & Renzulli, 2009). Gifted students may find that the regular classroom does not provide a reading curriculum that acknowledges their advanced skills and finds ways to develop them (Reis et al., 2005; Reis, 2007; U.S. ED, 1993). “More of the same” (MOTS) approach is all too common. This occurs when a teacher gives a gifted child more of the same kind of work rather than expanding the curriculum. In reading, many teachers allow the gifted child to read more or perhaps do the same type of activities with books of higher reading levels. A search for programs to address the unique reading abilities of the elementary gifted reader yielded few results. Junior Great Books®, literature circles, readers’ theater, and literature centers represent some of the differentiation options available. The inquiry reading and the Socratic Seminar with Junior Great Books Reading and Discussion Program are used in many American classrooms with positive results (Levande, 1993). The Center for Gifted Education at the College of William and Mary has spent 20 years developing some award-winning, research-based curriculum for gifted students K-12 using the Integrated Curriculum Model. For language
arts instruction in third grade, the Center has developed *Journeys and Explorations* as well as *Navigator Novel Studies*. While the Center’s research shows significant results in student achievement and teacher effectiveness (VanTassel-Baska & Stambaugh, 2009), the curriculum is intended to be implemented in the classroom for all students by the teacher after two- to four-day trainings. In their lessons learned, VanTassel-Baska and Stambaugh state that fidelity of implementation requires monitoring “to ensure teachers are using strategies both frequently and effectively” (2009, p. 29). Implementation of these outstanding programs requires district buy-in for purchasing inventory, continued training, and monitoring teachers.

Twelve years after the U.S. ED made the case for change in addressing the needs of gifted students (1993), one educator and researcher, Sally Reis, has been leading the charge in reading. Sally Reis and Joseph Renzulli spent years developing and testing a reading model for the inclusive classroom that will “challenge talented readers who are systemically denied the opportunity to read at increasingly advanced levels of achievement, while simultaneously addressing the issues of an absence of challenge in reading programs that may contribute to declining achievement in all students” (Reis et al., 2005, p. 3). Her Schoolwide Enrichment Model Reading Study produced significantly positive results in reading comprehension, reading fluency, and attitudes toward reading. The Schoolwide Enrichment Reading Model (SEM-R) supplements reading instruction with enrichment activities based on students’ needs, skills, and interests. There are three types of enrichment activities: general exploratory, group training activities, and individual or small group investigations of real problems. The first two types are expected to take place within a regular classroom. The third is expected to be conducted in a pull-out classroom with a gifted educator. The self-selected activity phase includes a variety of technology-integrated activities that her research indicates is very effective for both gifted and
non-gifted students within the regular classroom. In her 2005 report of a two-year study, she refers to her previous studies in 1989 and 1993, along with other studies, that found talented readers often spend time working on skills they have already mastered, find reading instruction too easy, and need differentiated instruction (Reis et al., 2005). SEM-R addresses these issues, gives talented readers the challenge they lack, and improves reading instruction for all (Shaunessy-Dedrick et al., 2015). This new approach, which utilizes all the strategies proven effective with the help of computer software and the Internet, is a turn in the right direction. While the programs in these studies along with other widely used models for gifted instruction have shown evidence of effectiveness (VanTassel-Baska & Brown, 2007), they may not be feasible to implement in all schools or classrooms, whether gifted or regular. One common thread through all of them is the use of technology to enhance the differentiated instruction for gifted children. Appropriate differentiation with the help of technology promises a path to success for gifted and non-gifted alike. The effectiveness of any tool, even technology tools, depends on the materials and the user. An appropriate curriculum is necessary for any technology integration to be effective.

**Gifted curriculum: Evaluation criteria**

In order to differentiate appropriately, teachers must understand what makes effective curriculum for gifted students. Several of the highly regarded names in gifted education have published analyses or reviews of various models in gifted education (VanTassel-Baska & Brown, 2007 & 2009; VanTassel-Baska & Stambaugh, 2005). Rather than repeat a similar analysis, this section reports a synthesis of findings from the literature in order to compile a comprehensive description of effective differentiation for gifted students based on research.
Numerous instructional models for gifted students have emerged over the years. Currently, the National Association for Gifted Children (NAGC) provides links to overviews of 10 of them (2008). VanTassel-Baska and Brown (2007, 2009) evaluated 11 models; Rash and Miller (2000) listed 13 models in a survey of teacher practices; and all other studies examined here each evaluated one to three models. One article by Watters and Deizmann (1997) proposed developing a new model that merges two already widely used models. Other, less publicized models undoubtedly exist, and others that have come and gone. How does a teacher evaluate these? Although no two studies reviewed for this study used the same evaluation criteria, overlaps occur. A look at the most commonly used criteria for evaluation as well as some notable additions by various studies can serve as a tool for teachers to evaluate various models, as well as guide educators in their own curriculum design efforts.

Effective curriculum is at the heart of effective instruction (Tomlinson, 2005). A model that may conceptually be comprehensive and effective will not produce positive results if the curriculum implemented within the model is lacking. Therefore, evaluating the curricular aspect of a model is the first step in identifying effective teaching models. One of the most systematically developed evaluation tools for assessing gifted course of study is the rubric created for the NAGC Curriculum Division’s Curriculum Competition. In developing the rubric, key features gleaned from the literature provided a starting point. Combining the selected features with rubrics from the Jacob K. Javits Program and the National Association of Education Progress (NAEP), the NAGC developed this comprehensive rubric with a four-point scale for each of the 12 key features used in the 1996 competition (Purcell, Burns, Tomlinson, Imbeau, & Martin, 2002). Interrater agreement for 1997–1999 was 100% for the majority of the units evaluated with a mean agreement of 98.25% in 1997, 99.6% in 1998, and 99.24% in 1999.
Given the high level of agreement from experts in the field of gifted education, the areas assessed on the NAGC rubric (Table 1) are a very reliable place to start in evaluating curriculum within a model (Purcell et al., 2002).

Table 1: *Curriculum Evaluation Criteria*

<table>
<thead>
<tr>
<th>Area Assessed</th>
<th>Exemplary Descriptors</th>
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<tbody>
<tr>
<td>Clarity of objectives</td>
<td>Unambiguous</td>
</tr>
<tr>
<td>Nature of objectives</td>
<td>Include concepts, principles, skills, and methodologies across disciplines</td>
</tr>
<tr>
<td>Evaluation components</td>
<td>Assessment methods are varied and authentic</td>
</tr>
<tr>
<td>Learning activities</td>
<td>Varied and include problem-solving, critical thinking, hands-on, and constructivist</td>
</tr>
<tr>
<td>Instructional strategies</td>
<td>Varied and include Socratic questioning, inductive teaching and teacher as facilitator/mentor</td>
</tr>
<tr>
<td>Assignments and student products</td>
<td>Varied and include open-ended assignments, creative products, real-world applications, etc. closely aligned with objectives</td>
</tr>
<tr>
<td>Resources</td>
<td>Varied and include primary sources, real-world objects, print and non-print sources</td>
</tr>
<tr>
<td>Alignment of curricular components</td>
<td>Appropriately sequenced and interrelated</td>
</tr>
<tr>
<td>Nature of differentiation</td>
<td>employs at least three of the following: pacing, depth, breadth, level of abstraction, level of complexity, degree of generalizability, talent development</td>
</tr>
<tr>
<td>Opportunities for talent development</td>
<td>Various opportunities to display talent, leadership, authentic products, real-world investigations and more</td>
</tr>
<tr>
<td>Evidence of effectiveness</td>
<td>Curricular unit has been used more than once and developers gathered data to assess growth</td>
</tr>
<tr>
<td>Ease of use by other educators</td>
<td>Clear, easy to follow directions; includes reviews/comments from field testing</td>
</tr>
</tbody>
</table>

Items in the right column are the descriptions within each key feature that would receive the high score of 4 on the rubric. These evidences of effective curricular units are echoed in other studies of instructional models and differentiation strategies (Briggs, Reis, & Sullivan, 2008; VanTassel-Baska & Brown, 2009).
The interconnectedness of quality curriculum and effective instructional models is evident in the criteria used to evaluate both content and delivery of instruction. In VanTassel-Baska and Brown’s study of existing research on various instructional models, the 15 criteria used to evaluate each of the 11 models includes several of the same criteria used in the NAGC rubric for evaluating curricular units. Those that appear in both include research evidence, application to actual curriculum, quality curriculum products (the focus of the entire NAGC rubric), ease of implementation, evidence of model in practice, alignment to standards (specifically, alignment to national standards), and relation to school curricula (VanTassel-Baska & Brown, 2007, 2009). The features examined in VanTassel-Baska and Brown’s review that differ from the NAGC rubric for evaluating curricular units are mostly due to the nature of a model versus the nature of units utilized within a model. These additional features to consider in evaluating models are (a) teacher training package; (b) sustainability; (c) systemic (operates as a model—having elements, input, output, interactions and boundaries); (d) comprehensive (covering multiple disciplines and applicable to a diverse gifted population); (e) more than three years of longitudinal evidence; and (f) evidence of model being used by teachers to develop curricula (VanTassel-Baska & Brown, 2007, 2009).

As mentioned, a key feature of an effective model is quality curriculum. From a review of six resources and her own expertise, Tomlinson (2005) compiled a list of eight descriptors of effective curriculum and instruction. The NAGC rubric for assessing curricular units includes many of Tomlinson’s descriptors. Addressing the affective domain and developing autonomy are important features Tomlinson adds to those already compiled in this section. To sum up, evaluating a model involves looking at the criteria used by VanTassel-Baska and Brown (2007, 2009), adding an evaluation of the models’ focus on the affective domain and focus on creating
independent learners. The curriculum implemented within the model should also be evaluated using the NAGC rubric. The NAGC website is careful to point out that “there is not one definitive model that best serves the entire population of gifted students” (NAGC, 2008). The dynamic nature of the majority of the accepted models of gifted instruction coupled with a classroom’s diverse student population leads to a deliberate, and acceptable, lack of fidelity in model implementation.

Even when provided with an easy-to-use, self-contained differentiated instructional environment online, a teacher still needs to determine when and how to incorporate it within the regular classroom. While it may be simplest to accept what one is handed, it is the responsibility of the teacher to see that all students develop their talents despite district policy and practice. In order to be effective, the teacher must implement what fits the criteria selected and analyze student outcomes for effectiveness. When students fail to meet learning goals, the teacher should consider adapting or changing the implementation of available resources. Being knowledgeable about various strategies provides any educator with a well-balanced toolbox from which to draw the appropriate tool to shape the gifted child’s future.

**Higher level reading instruction: Dispelling myths**

In 1978, Dolores Durkin published results of an eye-opening study that indicated explicit instruction of reading comprehension was noticeably lacking in classrooms (Durkin, 1978). Durkin had read three assumptions in the National Institute of Education’s request for proposals that caught her eye. One in particular was the assumption that instructors teach reading comprehension. Her personal impression from years of classroom observations was that this was not the case. She set out to confirm or refute her impression with a methodical approach. An observational study (1978) confirmed her fears. Similar studies such as Pressley and Wharton-
McDonald 20 years later found similar results (as cited in Duke & Pearson, 2008/2009). In the last few decades, however, much research has gone into understanding what good readers do and how to teach their strategies to all students. Unlike research regarding teaching decoding and reading readiness, research on reading comprehension has not been fraught with debate.

Despite the smooth road of research to provide classroom teachers with effective teaching strategies, accountability systems have had the unfortunate outcome of emphasizing lower-level instruction (Law & Kaufhold, 2009; Loveless, Parkas, & Duffet, 2008). Even questions on high-stakes tests portrayed as higher level are not as challenging as the test writers have purported, leading teachers to believe they are already teaching higher-order comprehension skills. In 1956, Benjamin Bloom designed a hierarchical representation of thinking that moves from lower-level thinking to higher-level thinking. His taxonomy has been used extensively in designing curriculum and instructional activities. A readily available resource for teachers is a chart of verbs organized by Bloom’s levels to formulate a question or task. An online search for “Bloom’s Taxonomy Verbs” provides a myriad of charts similar to this:

<table>
<thead>
<tr>
<th>Bloom’s (original) levels</th>
<th>Key verbs</th>
</tr>
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<tbody>
<tr>
<td>Knowledge</td>
<td>name, define, list, match, count</td>
</tr>
<tr>
<td>Comprehension</td>
<td>explain, review, illustrate</td>
</tr>
<tr>
<td>Application</td>
<td>apply, use, produce</td>
</tr>
<tr>
<td>Analysis</td>
<td>analyze, compare/contrast, debate</td>
</tr>
<tr>
<td>Synthesis</td>
<td>create, construct, make</td>
</tr>
<tr>
<td>Evaluation</td>
<td>evaluate, prove, critique</td>
</tr>
</tbody>
</table>

In an attempt to make the taxonomy user-friendly for teachers, however, the model has become oversimplified leading teachers and their evaluators to the misperception they are teaching higher-level reading comprehension by using verbs in the top three levels to generate
questions and activities (Parks, 2009). With this simplistic approach, the assignment to compare and contrast two characters from a story is commonly categorized as an analysis activity. However, Bloom’s intention was to include abstract inferences, distinguishing cause and effect from sequence, and processes such as “recognizing unstated assumptions, distinguishing fact from hypothesis, and distinguishing a conclusion from statements that support it” (Parks, 2009, p. 264). Based on this description of analysis, a typical compare/contrast question where students list descriptors for similarities and differences does not fit in this category.

VanTassel-Baska and Stambaugh’s textbook, Comprehensive Curriculum for Gifted Learners (2006), provides several suggestions for adapting regular classroom activities to fit Bloom’s description of analysis. The authors provide suggestions for critical discussion topics for regular instruction and a correlating challenge discussion topic for gifted readers. For example, a lower-level question might ask, “Have any of the characters changed over the course of your readings? Explain your answer.” The higher-level question might ask, “Which of the generalizations about change most reflects your reading? Justify your answer with examples.” The higher-level question requires understanding the criteria of the generalizations for the concept of change and providing support.

Similar errors arise with evaluation tasks. Parks (2009) states that some issues “in using the Bloom model has been lack of clarity about critical thinking processes, lack of explicitness in teaching them, and underdeveloped standards for evaluating how adequately one is thinking through a complex issue” (p. 264). Educators often believe that asking students to evaluate a text requires higher-level thinking. However, if students do not already know the criteria, methods of analysis, and elements and organizational principles commonly used by experts within the related field for evaluation, they are simply demonstrating comprehension of the passage. Parks
accentuates the need for a solid foundation in the lower-level skills (knowledge, comprehension, and application) within the discipline in order to perform the higher-level skills (analysis, synthesis, and evaluation) in accordance with the hierarchical depiction in Bloom’s model (Parks, 2009).

A look at one test publisher’s documents reveals that test writers have fallen into erroneous classification of questions as well. According to the 2006 Released FCAT Reading for third grade, question 11 asks how one character differs from another. The creators categorized the question as having a “moderate” level of difficulty with a content focus of “contrast.” The correct answer is that the one character lives in Japan. According to the FCAT Design Summary, “Low complexity items rely heavily on recall and recognition. Moderate complexity items require more flexible thinking and may require informal reasoning or problem solving. High complexity items are written to elicit analysis and abstract reasoning” (FLDOE, 2009, p. 4). Recognizing that a fact explicitly stated about where one character lives is not true of the other character barely requires informal reasoning, except perhaps on a very basic level. It would hardly be considered a contrast or analysis level question by Bloom as Parks has described (2009). According to the FCAT Design Summary, “The primary purpose of the FCAT, a criterion-referenced test, is to assess student achievement of the high-order thinking skills represented in the Sunshine State Standards (SSS)” (2009, p. 1). It is interesting to see that not one question in the 2006 third grade reading test is classified as high level of difficulty and all the standards to which the questions are aligned are first and second grade state standards.

Classroom teachers receive simplified charts of verbs (Table 2) without an in-depth understanding of what higher-level thinking truly is. To add to the lack of foundational knowledge, the tests for which teachers are held accountable claim to include higher-order
thinking skills which are in reality lower-level questions—a poor model for understanding high-level comprehension skills. To press instruction into even higher levels of thinking, one can turn to literature in gifted education. The regular classroom teacher may never have seen these instructional models or ignored them due to the misconception that these strategies are only useful for gifted children. Studying to dispel the myths of higher-level comprehension takes time and a lot of effort. Providing teachers with ready-made, truly higher-order literacy instruction would ensure gifted students receive literacy instruction pushing them to their potential as well as provide a model for teachers.

Summary

In this chapter, I set forth the background and rationale behind my research design decisions. Next, I provided a review of relevant literature related to the main concepts affecting my research. Chapter 3 describes the methods and procedures of the study.
Chapter 3: Method

In this chapter, I describe the procedures, instruments, data collection methods, and analyses for achieving the purpose of the study. The purpose of this study is (1) to develop an instructional intervention aligned with current theory using an iterative design process, (2) to test, modify, and retest it in a regular classroom while simultaneously measuring its effectiveness in achieving the literacy objectives and pedagogical goals to determine whether it works, and (3) to describe the reactions of regular classroom teachers and their third grade gifted students in order to answer why and in what context the intervention works. To answer the research questions, a variety of data collection instruments and analyses are necessary. The instruments used in iterations two and three were developed in iteration one of the study. Other available data (e.g., attempts until correct and continued student activity after success) were perused for information that might add insight as to why and in what context the intervention works. The questions guiding the research are as follows:

RQ1. What factors support or inhibit the effectiveness of the intervention (online, differentiated learning environment) and how may it be modified accordingly?

RQ2. What effect, if any, do the modifications have on the outcomes in the next iteration?

RQ3. To what extent does the intervention achieve the literacy objectives for which it was designed?

RQ4. What are the students’ reactions to the overall experience?

RQ5. What are the students’ and teachers’ reactions to the particular features?
Research Design

Over the last several decades a new type of experiment has developed. The formative and design experiment was born out of concern about the weak link between research and practice (Reinking & Bradley, 2008; Bradley & Reinking, 2011). Much educational research has historically been done in a laboratory setting or an unnaturally contrived setting within the classroom. Unfortunately, the positive results seen in such a controlled environment are often not replicated when the intervention moves from the lab to the real world. The naturalistic setting of the classroom is very complex with many interrelated variables. Design research (a.k.a., formative design experiments, design-based research) and action research are both situated in naturalistic settings (Reinking & Bradley, 2008; Bradley & Reinking, 2011). Anderson and Shattuck (2012) point out that teachers conduct action research alone in order to improve practice within their classrooms, usually without the benefit of a design team’s expertise and energy. While action research and design experiments both fall under the umbrella of pragmatism, or focusing on how practical application is used to reveal theory, and often have similar procedures, design-based research is typically conducted as a collaboration and seeks to have a broader impact on practice and theory (Anderson & Shattuck, 2012; Bradley & Reinking, 2011; Reinking & Bradley, 2008). If a researcher desires to develop an intervention rooted in current theory and pedagogy that works in the real world and to understand why it works, then a design experiment is the answer. As Reinking and Bradley state, design experiments are “focused on less controlled, authentic environments” and “they entail innovative and speculative experimentation” (2008, pp. 10–11). The term “experiment” creates an image of control groups, isolated variables, and the like. This is not the case with a design experiment. Although design experiments vary significantly, even in terminology, there are common characteristics that define
research as a design experiment. According to the editors of Educational Design Research, five characteristics apply to most design studies: interventionist, iterative, process oriented, utility oriented, and theory oriented (Van den Akker, Gravemeijer, McKenney, & Nieveen, 2006). They also point out that design researchers focus on specific objects and processes in context; “design researchers do not emphasize isolated variables” (p. 5). Similarly, Reinking and Bradley (2008) summarize six defining characteristics of formative and design experiments based on published works: intervention-centered in authentic instructional contexts, theoretical, goal-oriented, adaptive and iterative, transformative, methodologically inclusive and flexible and pragmatic.

There are various approaches and flexible procedures within this methodology. My study took one such approach within the realm of design experiments, which is “to create a viable theory-driven intervention for achieving a pedagogical goal” (Reinking & Bradley, 2008, p. 12). The pedagogical goal of the design experiment is to develop an instructional tool appropriately differentiated for gifted third graders that regular classroom teachers can easily incorporate into their literacy instruction. To meet the criteria for “appropriately differentiated,” the self-contained, online, literacy instructional website is aligned with current theory and practice in literacy and gifted education. It was designed with some of the unique needs of gifted students in mind: autonomy, advanced vocabulary, and a need to interact with like-minded peers.

**Background**

The problem I chose to address was identified through my own experiences as a gifted student, as a regular classroom teacher for over a decade, and as a mother of gifted children. Nationwide, landmark studies mirror my own perceptions. Years of classroom experience and on-going professional development in teaching reading along with research-based instructional models for gifted students and teaching higher-level literacy skills informed the creation of level
one of the intervention developed in the design experiment. I followed the accepted iterative process for instructional software development, which includes alpha testing to identify areas that need improvement, making appropriate modifications, and then beta testing. Appendix B contains a description of the initial development. It started with a limited literature search, then continued with identifying learning objectives, storyboarding, programming, and testing. Some modifications were made based on feedback from the small-scale pilot. At this point, the intervention was in a minimally viable stage where a design experiment was appropriate in order to assure the intervention aligned with pedagogical theory and achieved the learning objectives in a way students find engaging. The design experiment also aimed to achieve the overarching goal of providing teachers with a practical tool for differentiating literacy instruction for their gifted students within the naturalistic setting of a regular third grade classroom.

By their very nature, procedures for design experiments vary greatly depending on the type of design experiment being conducted. This variance can prompt some to question the results. The researcher, therefore, must take steps beyond traditional research expectations to ensure rigor. Reinking and Bradley (2008) list several strategies for ensuring rigor in a design experiment. They are as follows: verification that the intervention is aligned with current theory and pedagogical goals; incorporation of multiple factors and sources of data; triangulation from corroborating sources; adequate time; openness to multiple theories and perspectives; careful selection of an appropriate site; and adopting skepticism—avoiding the bent to finding positive results, but rather anticipate failures which will lead to improvements in the next cycle (Reinking & Bradley, 2008). Alignment with theory, incorporation of various sources of data, adequate time, and careful site selection were the strategies used in this study. Openness to multiple perspectives and skepticism are also evident in the data description and analysis.
Procedures

To fit a timeframe both reasonable and extensive enough to allow sufficient development, the study was limited to three iterations. The purpose of the first iteration was to assess the intervention’s alignment with pedagogical theories from both gifted education and literacy instruction. Additionally, the instruments used in iterations two and three were developed in the first iteration. The instruments developed in iteration one include (1) expert reviewer questionnaire to assess appropriateness of the instructional software content and strategies based upon current theory and pedagogy in the experts’ respective fields and provide any helpful insights; (2) teacher pre-questionnaire to gather descriptive data about the teacher participants; (3) teacher post-questionnaire to describe teachers’ perceptions of the website implementation, effectiveness, and overall experience; (4) student literacy assessment to measure students’ level of mastery of the objectives covered in the site; and (5) student post-questionnaire to gather the affective responses of the students to the overall experience and individual features. The last two iterations focused on further development of the intervention (an instructional website) and took place in the naturalistic setting of regular third grade classrooms. Figure 1 shows the iterative process for the study followed by a description of each iteration.
Figure 1. Iterative process

**Iteration one**

*Questionnaire development.* After receiving approval from the university’s Internal Review Board (IRB), the three questionnaires (described later in the “instruments” section) were developed and analyzed according to survey methodology, or survey research, which refers to the collection of data through questionnaires or interviews (Gall, Gall, & Borg, 2007; Groves, Fowler, Couper, Lepkowski, Singer, & Tourangeau, 2009). Groves and colleagues (2009)
provide the guiding principles for creating, disseminating, and analyzing survey questionnaires. They offer five different strategies for evaluating survey questions to ensure they meet content, cognitive, and usability standards. I used two of the five strategies as described in their text: (1) cognitive interviews to develop the questionnaires and (2) expert reviews of the intervention.

The three questionnaires for content area expert reviewer, teacher, and student were developed using cognitive interviewing based on protocol analysis. First, I asked a doctoral student in a measurement department evaluate the drafts of all the content area expert, teacher, and student questionnaires to determine whether the questions met questionnaire standards. Second, I solicited feedback from individuals with expertise in gifted education and literacy education to review the content area expert questionnaire and make suggestions for revisions to ensure it elicited responses focused on alignment to theory and strategies accepted in their fields. Third, to develop the teacher and student questionnaires, I conducted a concurrent think-aloud where respondents are asked to restate the question in their own words and verbalize their thinking as they select an answer (Groves et al., 2009). The teacher respondent for the cognitive interview is a third grade regular classroom teacher who is not teaching in the participating county, but had implemented the website within her classroom during beta testing. I also asked a teacher very familiar with gifted third grade students to review the student questionnaire and point out any areas she anticipated students may misunderstand. When the feedback indicated a question was vague or did not elicit the type of information requested, I made revisions accordingly.

**Website development: Expert reviews.** The questionnaires developed in the first part of iteration one (see Appendices F-I) were then used to collect data in the next step: expert reviews of the intervention. The goal of iteration one was to ensure the intervention aligned with current
theory and practice in both gifted and literacy education. In the initial development pilot (Appendices B and C), the limited literature review before designing the instructional activities included reviews of literature on the nature and needs of gifted students, differentiation strategies, effective strategies for reading comprehension, and language arts curriculum for gifted students. A more extensive review included motivation theory, multimedia design theories, and website style and usability research. Although this was not an in-depth, extensive literature review in regards to literacy education, the guidance gleaned from it coupled with my decade of teaching experience, professional development in reading instruction, and the design skills of the original team were sufficient for creating a minimally viable product (level 1) to be tested in a naturalistic setting. With positive responses from teachers and students in the pilot, along with some indicators of learning, I felt confident the instrument was consistent with theories in instructional technology, gifted education, and literacy instruction. Later coursework in literacy and gifted education further supported the instructional design as a beginning level, differentiated curriculum extension tool; however, a more extensive review would be necessary to ensure future development indeed aligned with theory and practice.

To develop a research-based, effective literacy intervention, ideally the development team would include someone with extensive knowledge and experience in teaching literacy in K12 classrooms. For an enrichment resource designed for gifted students, the team should include a member with experience teaching language arts differentiated for gifted students. The original team that began the development of the intervention used in this study was limited to graduate students enrolled in a course. As stated, I was the only team member with experience teaching language arts to gifted third graders. Therefore, to improve upon the site appropriately before moving forward for this study, I started by gaining the insight of such experts even though
they were not involved in the initial planning. To start, the content area experts and various stakeholders reviewed the site. The experts (one in gifted language arts curriculum, and two in literacy) provided feedback via the expert reviewer questionnaire developed in the first stage of iteration one as to the alignment of the website with current pedagogical theory in each of their fields. The questionnaire also includes open-ended questions for any additional feedback guided by their vast experience. The experts in gifted education and literacy each have at least 10 years of experience with curriculum, have published in peer-reviewed journals, and served on notable boards/committees in their fields. Once the individuals meeting these criteria indicated their willingness to conduct a review of the website, I set up a time to meet online to conduct a brief overview (guided tour) of the site and provide each of them with a link to the questionnaire. After confirming they were able to access the site and the expert reviewer questionnaire, they explored and commented independently to avoid interjecting any researcher bias. Following the same procedure, a representative from the various stakeholder groups (students and teachers) also reviewed the website and provided feedback via the teacher or student questionnaire developed in the first part of iteration one as to the practical implementation, ease of use, and level of engagement. The data from this iteration was then used to revise the site as needed prior to the second iteration. The modifications were then made to align with the recommended strategies and the expert was invited to revisit the site to review the changes.

*Student literacy assessment development.* Before and after the students completed the areas of the website, they took an objectives-based assessment to measure their mastery of the literacy objectives addressed in the website (see Appendix A). The development of the literacy assessment began with the 10-item version used in the pilot study in 2009 (see Appendix J). Appendix B details the process for developing the original version and item analysis of student
responses. The original assessment used appears in Appendix J. This version was further revised in iteration one according to accepted test construction processes (Crocker & Algina, 2008) and in keeping with the Standards for Educational and Psychological Testing (AERA, APA, & NCME, 1999).

My test construction plan was to create items that did the following:

- defined terms from each area of the website that are necessary to know in order to answer the higher level questions (e.g., mood, suspense, tempo) [Knowledge level]
- required the same skill for each area, but not too similar to those in the game; three questions for each area [Comprehension Level]
- required applying skills from an area plus one other area; total 12 questions [Application Level]

The next step in the test construction process, according to Crocker and Algina, is “to ask qualified colleagues to review them informally for accuracy, wording, grammar, ambiguity, and other technical flaws” (2008, p. 81). The authors recommend having reviewers with different types of expertise including subject matter, measurement and test construction, and target population. Readability level was also examined. The experts who reviewed the literacy assessment collectively represent all suggested areas of expertise; therefore, for content validation, they used an item matching approach to review the objectives-based test as well (Crocker & Algina, 2008). For each question, the reviewer rated the match to the objective on a scale of 1 (poor fit) to 5 (excellent fit). Reviewers who assigned a fit score of 3 or lower were asked to comment. The average rating across reviewers was computed. Items with an average fit score of 3 or 4 were reviewed for possible revision. Reviewers also checked the stimulus format...
and response format for consistency with the item specifications. The reviewers were also asked to report any concerns about readability or bias.

There are several accepted methods for establishing reliability of an objectives-based assessment. One very common approach is test-retest. In this study, however, the extra time required does not respect a classroom teacher’s time. Also, it is beyond the scope of this study to develop yet another alternate form of the test. Instead, to establish reliability, a split-halves test was used. The total number of items is large enough to create matched halves for a split-halves test in iterations two and three. Each half-test includes the same number of items for each objective (approximately 4–6 depending on the scope of the objective) according to the test plan. The expert reviewers assessed how well items designated as matching actually match. They were directed to consider content, level of difficulty, and thinking process. Further analysis of student responses was conducted in iterations two and three to provide additional evidence of internal consistency.

Iteration two

The second iteration took place in a naturalistic setting—third grade regular classroom in a public school. After receiving permission from the school district, the district’s accountability department provided a list of some schools matching the selection criteria. The schools were purposefully selected using criterion sampling (Gall, Gall, & Borg, 2007). This process is described later in the sampling procedures. Permission from the principal of the school where teacher volunteer participants are located was sought. After recruitment, described later in Sampling Procedures, the third-grade teacher volunteers from that school signed an informed letter of consent (Appendix D) and completed the pre-questionnaire developed in iteration one (see Appendix G) to report (a) their current differentiation practices, (b) challenges they face, (c)
their years of experience, and (d) amount of training in gifted education for the purpose of understanding the context of the implementation. Teacher volunteers were given an orientation to include a guided tour of the site, how to register their students, and how to access the tracking and discussion board. They then received access to the intervention they were to implement in whatever way fit best in their instruction. The intervention is an online environment designed to develop selected literacy skills (vocabulary, characterization, tone/mood, and literature responses via Web 2.0 tools) for gifted third graders through appropriately differentiated activities to be incorporated with ease into their regular classroom instruction. The software includes teacher support features such as tracking and the ability to provide individual feedback to students in the discussion board section. After teachers used the software in their classroom for at least three weeks (or longer when needed for students to complete all the tasks) and viewed the student reports, they completed the teacher questionnaire. In keeping with the characteristics of a design experiment, the questionnaire asked teachers to describe their overall reaction, to identify the features they believed supported or inhibited student achievement, and to provide suggestions for improvement. Teachers also rated the importance of each teacher support feature (record keeping of student scores, tracking of student behaviors, and feedback opportunities online). They were asked to describe in what way they implemented the intervention and why they did so that way. At the end of the survey, teachers had the opportunity to indicate whether they would like to be interviewed to add anything further or to clarify any of their responses. None requested an interview.

Parents of the intellectually gifted students within the volunteer teachers’ classrooms signed a letter of consent (Appendix E). The students with signed permission from their parents read the selected text I provided, Escaping the Giant Wave by Peg Kehret, while the teacher
registered the students and received her orientation. An online pre-test of the literacy skills specific to the intervention was given. Then students interacted with the intervention according to the teacher’s instructions. This self-contained, self-paced learning space intends to guide students through an exploration of the complexities of literacy in a fun and engaging way. Within the site, students complete three game-like activities: (1) vocabulary, (2) characterization, and (3) tone/mood. Then they go through a module on digital citizenship (Internet safety, cyberbullying, netiquette, etc.) before entering a discussion forum. The intellectually gifted students registered in the website by their teachers had access to like-minded peers through a discussion forum where they can apply their interconnected and complex understanding of reading and writing gained in the activities using Web 2.0 tools. After students completed all the tasks, they took the online post-test to determine to what extent the intervention achieved the literacy objectives for which it was designed. Students also completed a student questionnaire to ascertain their reactions to specific features of the intervention and their affective responses.

Since the tasks the students complete within the website are rarely seen in today’s classroom, students may do very poorly on a pre-test; however, since gifted students typically are adept at solving problems, a pre-test was still given to assess how well they would perform without exposure to the novel tasks. Performing significantly better on the comparable post-test, would support the effectiveness of the intervention. Since gifted children tend to pick things up easily and recognize patterns, there is a possibility of pre-test sensitization where a pretest will raise their awareness adding to their success on the post-test that may not have occurred without the pretest (Gall, Gall, & Borg, 2007). The complexity of the interactions a student experiences in an educational setting makes it impossible to isolate one particular variable as the sole success factor. Given the purpose of the intervention is to engage students in novel experiences to
interact with literature in meaningful ways, any knowledge gleaned from the pre-test is valuable as well. Although gifted students may have the ability to learn faster, Sternberg (1982) points out that processing time for students can sometimes be longer for gifted students. The tests are untimed, in accord with his warning, “blind imposition of a strict time limit for a test, or even a not-so-strict one, is theoretically indefensible, and practically self-defeating” (Sternberg, 1982, p. 158).

Setting an exact timeline for student completion was not possible since students direct their own progression and pace. Additionally, in order to maintain the naturalistic setting vital to effective design research, teachers were given leeway on implementation to accommodate their schedules and curriculum needs. For purposes of this study, teachers were asked to encourage students to complete all the tasks without much delay. Time on task may include both in and out of class access. A suggested pacing is as follows:

- Week 1–read the book (provided by the researcher), take the pre-test, and play the games in the site;
- Week 2–complete the Internet Safety and Netiquette module, participate in online discussion (book chat) with peers, and continue playing games; and
- Week 3–continue discussion and playing games (optional), take the post-test and post-survey

To maintain the naturalistic environment, however, teachers were allowed to take more time or adjust the pacing according to their own discretion and the students’ needs. Teachers could also choose to suggest students work at home. Teachers were asked to encourage students to complete all activities and the assessment within the three-week period or with as little delay as possible while still taking into consideration the teacher’s plans and other responsibilities. Most
took much longer due to obstacles beyond our control (access to computers, mandatory test preparations, etc.). The tracking features include number of attempts before responding correctly and the number of attempts students made after successful completion of an activity, presumably “just for fun.” The time of day the students logged in is provided to contextualize the students’ experience. The total amount of time spent logged in was not recorded as this data are not guaranteed to be accurate. Students may log in and then get distracted, go to the bathroom, go back in the book to respond, then get lost in their reading. Fire drills and other activities may also interfere. Any inferences made based on the amount of time logged in, therefore, could not be substantiated without extensive field observations or teacher reports. The time and effort to add this data in a valid and reliable manner would be quite extensive to add minimally useful information to inform modifications. Likewise, the amount of time between responses within a particular activity was not tracked for similar reasons. The data from this iteration were used to revise the site and instruments as needed prior to the third iteration.

Modification procedures

In the iterative development process, the information from one iterative cycle is used to determine modifications to make before the next iteration. There is no way to plan for every potential decision; however, instructional software designers (Allen, 2006; Alessi & Trollip, 2001) offer some helpful guiding principles and warnings when considering which modifications to make:

- Always make changes for content accuracy, glitches/bugs, and obstacles to user interface.
- Do not carry revisions too far. If your product is meeting the goals and learners are producing positive outcomes, perfection is not necessary.
A lean or “agile” development approach is becoming more and more prevalent in Business and Engineering. In these fields, lean startups and Agile Software Development (ASD) refer to a constant iterative process where a minimal product is tested on a small scale with real users. Then the data are reviewed and modification decisions are made (Durdu, Yalabik, & Cagiltay, 2009; Ries, 2011). These approaches, like the design experiment in Instructional Design, are more user-focused, but the modification decisions are up to the designer. When a user shares a criticism, the designer must decide whether a modification to address the concern raised would align with the goals and assumptions guiding product development. The designer must also decide whether potential changes in the outcome are worth the time, effort, and cost involved. Ries (2011) points out a recurring criticism among users may reveal that an assumption made by the developer is actually false. At this point, the developer may need to go beyond modifying the design to actually pivoting the trajectory by changing the goals and guiding assumptions of the project (Ries, 2011). While I had received positive feedback from alpha and beta testing, I had to remain open to a significant pivot if data revealed issues indicating the intervention did not support the pedagogical goals of the project. As Reinking and Bradley (2008) recommend, openness to multiple perspectives and adopting skepticism are crucial for the researcher in order to ensure rigor in a design experiment.

Although the exact nature of the modifications cannot be foreseen, in keeping with the literature from Instructional Technology, Engineering, and Business, some decision criteria I used are as follows:

- All technical issues will be debugged;
- Any indication of confusion from any stakeholder will be examined carefully for ways to clarify;
• Any challenge to the accuracy of the content from any stakeholder will be examined carefully to ensure accuracy; and

• Maintaining a balance between student engagement and acceptable levels of challenge will be paramount. Reports from teachers may override requests from students for reducing the level of difficulty, although such requests are unlikely in a game-like environment.

Chapter 4 provides a detailed record of the data driving each particular modification. A similar record, the data-driven design document, showing the data and the design decisions made from the pilot study is located in Appendix C.

**Iteration three**

Iteration three added to the data collected in iteration two regarding research questions one, three, four, and five. One unique function of design experiments, however, is to modify and retest the intervention. The crucial role of the third iteration, therefore, is to answer research question two: What effect, if any, do the modifications have on the outcomes in the next iteration. The third iteration was a replication of the second iteration using the modified intervention and instruments. The same procedures were followed and the revised versions of the same instruments were used, but in different schools. One school in iteration two asked to participate again. Given the difficulty recruiting participants, this one school was used again, with different students. Implementation of the intervention varied because the conditions of the implementation were still at each teacher’s discretion and at a different time of year. For practical reasons, the proposed modifications based on the new data will be described, but not implemented, in a fourth iteration. Those planned changes will become the starting point for
future research along with continuing literature reviews to expand the current activities and
develop more complex activities for level 2 grounded in theory and practice.

Population and Sample

Participants

The teacher participants included both regular classroom teachers and gifted educators
with gifted third graders receiving reading instruction within their classrooms. In iterations two
and three, the gifted teacher at two schools took a leading role in collaboration with regular
classroom teachers. According to the accountability department of the participating county, in
SY2012-13, there were 1,051 third grade reading classes with a unique instructor assigned to
each class. The teachers who volunteered to implement the intervention in their classrooms for
their gifted third graders assigned their students an unidentifiable username and password. No
student identities are accessible to the researcher or any reviewers at any point in time. If a
student were to post something such as threats or suicidal thoughts, the researcher would have
notified the teacher immediately to allow the teacher to view the student comment and take
appropriate action. For this purpose, the teacher alone retained the list of participant identity for
the duration of the study.

Student participants are the gifted third graders within the teacher participants’
classrooms. The accountability department of the participating county reported that
approximately 9.6% of their third graders in Sy2012-13 were designated as gifted. Only those
students whom the county has officially designated as intellectually gifted were included.

Sampling procedures

The researcher sought permission from the university’s IRB. Then, permission was
obtained from the school district where the research was conducted. Careful selection of a site is
vitally important in ensuring the rigor of a design experiment. Reinking and Bradley (2008) suggest selecting a site where “the intervention’s success will face some barriers and challenges but where conditions are not so overwhelmingly challenging as to doom the intervention to failure” (p.59). The sample, therefore, was purposefully selected along with the assistance of the school district based on the following selection criteria: considered by the district to be technology-friendly, has ready access to technical support, and has at least 5% of their third graders identified as gifted. The county also informed me of a state regulation that participating schools must have no fewer than 10 potential participants. This limited my options considerably to only schools that have at least ten third graders identified as gifted. A combined total of 20 student participants from several schools is an acceptable size for each of the two iterations. The county sent an official letter stating it had approved the study. At this point, I attempted to contact the principal(s) to set up meetings to discuss the study requirements and benefits. To achieve my goal of 20 students per iteration after dropouts, withdrawals, and lack of permission, I hoped to have 30 students for each iteration registered with signed parent permission to take the pre-test. Iteration two had only 19 participants combined from two schools; iteration three had 26 participants combined from three schools.

Ideally, three or four schools would have been available for both iteration two and three. Unfortunately, I had difficulty gaining access to schools so only two schools were used in iteration two and three schools in iteration three, although in School C, no students proceeded beyond the games. In the schools that agreed to participate, all the gifted third graders were instructed to do the pre/post-test, read the book, and complete the website activities per the teacher’s discretion regardless of parental permission. The parent permission is to allow them to complete the questionnaire about the site and allow me to use their data in my research.
Teachers who agreed to participate signed a letter of consent (Appendix D), then attended a one-hour workshop introducing the project, the procedures and expectations, as well as some do’s and don’ts to control for threats to internal validity. Some examples of these warnings included not giving special attention to the research aspect of the student’s work. This would increase the possibility of the Hawthorne effect where students and teachers perform better simply because they are aware they are in a study; the special attention bolsters their performance. Teachers were asked to assign the work as they would any differentiated tasks given to their students. All permission slips and informational handouts were printed and placed in a folder for each teacher.

**Instruments**

The development of the intervention, The Reader’s Treasure, was the focus of the design experiment. The first iteration also included development of the instruments. Therefore, the descriptions in this section are based on the state of the intervention at the start of the study and anticipated state of the instruments. Because formative design experiments include changes to interventions and instruments during the study, the final products changed depending on the data collected during each cycle. The final products are located in the appendices.

**Intervention**

*Differentiated online learning environment.* The online intervention being developed in this study, The Reader’s Treasure, addresses three areas of literacy (vocabulary, characterization, tone/mood) through game-like interactions and has a social forum where students can apply their literacy skills in book chats and word games. This online, self-contained, game-like literacy instructional website was designed according to the unique needs of gifted students: autonomy, advanced vocabulary, and a need to interact with like-minded peers. While gifted students may
vary widely, there are some characteristics that are very common. Table 3 shows some common characteristics of gifted students and recommendations for quality differentiated curriculum from widely accepted models of gifted education. The last column shows the websites’ features aligned with these needs and strategies.

**Table 3: Intervention Features Aligned with Gifted Characteristics**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Quality Curriculum</th>
<th>Website Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to generate ideas and solutions Reis &amp; Renzulli, 2009, 2010</td>
<td>Open-ended questions; persuasive writing</td>
<td>Creative response, blogging;</td>
</tr>
<tr>
<td>Flexible thought processes</td>
<td>Students transfer, apply, extend learning across disciplines</td>
<td>Art/music connection; characters in new setting; creative response; blogging</td>
</tr>
<tr>
<td>Accelerated pace of thought processes; persistent goal-directed behavior; rapid memory</td>
<td>Engages affectively and cognitively</td>
<td>Game features (rules, scoring, “win” state, levels, etc...)</td>
</tr>
<tr>
<td>Unusually varied interests and curiosity</td>
<td>More in-depth, abstract, and complex; choices of learning activities and topics</td>
<td>Links to informational sites for independent research/exploration; self-directed</td>
</tr>
<tr>
<td>Insight, reasoning and high levels of creativity</td>
<td>Discipline-specific methodologies; synthesize forms and meaning across</td>
<td>Connecting techniques for tone/mood in literature, art &amp; music</td>
</tr>
<tr>
<td>High level language development and verbal ability</td>
<td>Content more in-depth, abstract; linguistic competency</td>
<td>Explore nuances of vocabulary related to tone/mood</td>
</tr>
<tr>
<td>Strongly motivated; commitment to goals</td>
<td>Flexible pacing; student-centered</td>
<td>Non-linear; self-directed, self-paced</td>
</tr>
<tr>
<td>Evaluative approach to self and others; comprehensive synthesis; communication skills; creativity/imagination</td>
<td>Student products authentic, varied, to real-world audiences; students transfer, apply, extend learning</td>
<td>Creative response, blogging; characterization activity</td>
</tr>
</tbody>
</table>
(See Appendix B for detailed description and development data from the pilot study, Spring 2009.)

There are three game-like activities within the website: “What a Character,” “Art Appeal,” and “Novel Games.” In “What a Character,” students explore characterizations by being put in the role of one of the book characters without knowing which character they are. They conduct a text-only conversation with a fictional character created for the game in a context completely different from the book. Students are urged to think about the word choice and tone of the conversation to infer which book character they are. In Art Appeal, students interact with both art and music pieces. They first receive information about how musicians and artists convey different moods and then match the mood of the piece to a segment of the book. To gain an understanding of the nuances of meaning and the affect word choice has on the mood of a sentence, students spin a wheel which lands on a mood word (happy, sad, angry, suspense). Then a sentence from the book appears with one word having a drop-down selection. The student must choose a similar meaning word that shifts the tone of the sentence to match the wheel. Table 4 shows the four focus areas of the website, some traditional instructional strategies, higher-order processes, and finally the way in which the website goes beyond the traditional strategies to differentiate for gifted students.
Table 4: *Differentiation of Literacy Strategies*

<table>
<thead>
<tr>
<th>Focus</th>
<th>Traditional</th>
<th>Higher Order</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vocabulary</strong></td>
<td>Cloze, matching, definitions</td>
<td>Explore nuance of meaning</td>
<td>The nuance in meanings explored here is related to how words with very similar meanings or objects that appear can impact the mood of the passage. An online dictionary/thesaurus is provided for self-directed exploration.</td>
</tr>
<tr>
<td><strong>Characterization</strong></td>
<td>Adjectives or descriptions, recall actions and words</td>
<td>Recognize character words and actions in new situations</td>
<td>The student must understand the character on a deeper level to recognize them through interactions in a different situation.</td>
</tr>
<tr>
<td><strong>Tone/Mood</strong></td>
<td>Match term to passage</td>
<td>Connect tone/mood of passage across curriculum</td>
<td>This activity adds complexity by connecting literature to art and music. Students recognize creators have strategies to achieve tone/mood.</td>
</tr>
<tr>
<td><strong>Reader Response</strong></td>
<td>Comprehension questions, opinion or summary essays</td>
<td>Pose questions; apply knowledge from multiple objectives to written response</td>
<td>Students will apply what they learned in the other activities by using effective word choice and text features to convey meaning and evoke a tone/mood/feeling. Understanding a person’s character is revealed through their communications with others, students will write posts that demonstrate their good digital citizenship.</td>
</tr>
</tbody>
</table>

After completing these three activities, students complete a Digital Citizenship module on Internet safety (keeping personal information private), cyberbullying (what it is and how to deal with it), and forum decorum (appropriate content and use of discussion board features to communicate effectively and safely). After demonstrating comprehension, students will gain access to the final section of the intervention, “Get Connected.” Here students may select from various topics in the book chat or start their own. They may also play the word games based on
activities in *Bringing Words to Life: Robust Vocabulary Instruction* (Beck, McKeown, & Kucan, 2013, pp.183–193). A chart with the relevant Common Core Standards for each section is located in Appendix A.

**Instruments**

*Expert reviewer questionnaire (Appendix F).* This questionnaire was developed in the first stage of iteration one. It draws on the work of Stufflebeam’s CIPP Evaluation Model and Kirkpatrick’s Four Level Model. The purpose of the instrument is to assess the alignment of the website with current pedagogical theory in each of the experts’ fields. The questionnaire includes open-ended questions for any feedback guided by their vast experience as well as more specific directions aimed at particular features and activities.

*Teacher pre-questionnaire (Appendix G).* At the beginning of iteration two and three, teacher participants completed a pre-questionnaire. This questionnaire is intended to yield a description of level of training/experience in gifted education and the teachers’ perceptions about the needs of the gifted students within a regular classroom. The questionnaire was developed using expert reviews and cognitive interviews according to survey methodology as explained in the procedures for iteration one.

*Teacher post-questionnaire (Appendix H).* Following the implementation of the intervention, teachers completed another questionnaire to ascertain their perceptions of the effectiveness for their students, ease of use, and feedback on particular features. They were also asked to react to the particular features (self-pacing, peer collaboration, etc.). This questionnaire underwent the same development process as the pre-questionnaire with expert reviews and cognitive interviews.
Interview (optional upon request). Teacher participants were given the option of being interviewed. The purpose of the interview is to corroborate the results from the post-survey and allow the teachers to add to the data collected, providing a richer description of the teachers’ lived experiences. None requested the interview.

Student post-questionnaire (Appendix I). Students were given a questionnaire, upon completion of all the activities and assessment, to ascertain their affective responses to this instructional tool. It included a list of the features specifically tied to differentiation strategies for gifted students (self-paced, non-linear, game features, access to like-minded peers, divergent and creative product creation, etc.). Students rated the importance of each feature and their overall reaction to the intervention. They also rated the level of difficulty and their perceived effect of the new skills on their performance in classroom writing assignments. This questionnaire was built upon the reaction questions in the post-test and focus group questions used in the pilot study in 2009. Adjustments were made as described earlier in the procedures section.

Student objectives-based literacy assessment (Appendix J). Pre- and post-tests control for threats to internal validity of the study from history and maturation. Tests were equivalent forms to guard against the threat of instrumentation. The assessment was used in a pilot study in 2009, then adapted based on data from that study. Additionally, after playing the games, experts in literacy and gifted education reviewed the questions and provided feedback. Upon completion of each activity, students were given a score indicating their level of success mastering the objective. Before moving on to the next level, students will have to pass the post-assessment, which includes both knowledge and application questions. The knowledge-level items measure students’ understanding of terms presented in the activity (e.g., identifying features in artwork that correspond with a tone/mood or selecting an appropriate adjective to describe a person based
on behaviors and dialogue). The application questions measure their ability to apply learning from two activities to a new situation presented in the test item. For example, one stem says, “You are reading a book and the main characters each describe their favorite paintings. From their descriptions of the painting, choose the one who is angry.” This question requires students to connect what they learned about tone/mood in artwork to characterization and apply that to match new characters to their words as they would relate to artwork that matches their mood. The questions were all multiple choice.

**Data Collection**

As described in the procedures, all student assessments and surveys were intended for online delivery within the website at the appropriate time. In iteration two, however, teachers requested printed copies of the pre- and post-test due to limited access to the computers at the end of the school year. In iteration three, the pre-tests were administered online at all three schools. A link to the pre-test on the home page required students to login. Teachers did not give students their login information until they read the majority of the book. To gain access to the link to the post-test on the discussion board, students had to complete all the tasks, pass the Internet Safety and Netiquette module, and log in to the discussion board. School B_Oct completed the post-tests online. No students at School C progressed beyond the games. After a long period of inactivity, I offered a paper-version of the post-test, which she eagerly accepted due to lingering frustrations with computer access. Teacher surveys and student post-surveys were online through Survey Monkey for both iterations.

**Data Analysis**

Table 5 summarizes the data collection and analysis for the variables measured in response to the five research questions. More details of the analysis plan follow.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Data collection</th>
<th>Data analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>RQ1 factors supporting or inhibiting the effectiveness of the intervention and proposed modifications</td>
<td>Iteration 1: questionnaire responses Iterations 2 and 3: teacher and student questionnaires and teacher interviews (optional)</td>
<td>Inductive coding for themes Quantified for frequency Changes will be made prior to next iteration to address the concerns</td>
</tr>
<tr>
<td>RQ2 effect, if any, of modifications on the outcomes in the next iteration</td>
<td>Questionnaires</td>
<td>Inductive coding for themes Quantified for frequency then compared to results in previous iteration</td>
</tr>
<tr>
<td>RQ3 students’ mastery of skills</td>
<td>Pre- and Post-skills assessment</td>
<td>Matched pairs t-test Effect size indices Spearman correlation on split-halves Item analysis</td>
</tr>
<tr>
<td>RQ4 students’ reactions</td>
<td>Survey</td>
<td>Inductive coding for themes Selection of representative quotes</td>
</tr>
<tr>
<td>RQ5 students’ reaction to particular features AND teachers’ reaction to particular features</td>
<td>Survey</td>
<td>Inductive coding for themes Selection of representative quotes</td>
</tr>
</tbody>
</table>

For questions one and two, talk-alouds, interviews, and open-ended responses on the surveys were analyzed. After summarizing and member checking, responses were analyzed through inductive coding. Inductive coding did not occur in iteration two given the limited number of surveys (three student surveys, one teacher survey). All the responses were included. No interviews were conducted. A colleague with a Ph.D. in Instructional Technology with a cognate in measurement was the second coder. To develop the themes for coding, the researcher and second coder coded 25% of the responses for a question. Then they compared codes to
further delineate and clarify the criteria for each theme, as well as the label for each theme. At this point, the coders recoded according to the refined category labels and definitions. They compared again. When the raters felt confident that they were in agreement on the codes, they each independently coded a different set of responses and compared their codes. When the inter-rater reliability exceeded 90%, they set the themes. Once the themes were determined with 100% agreement via this process of constant comparison, they each coded the remaining responses independently and compared. This process was repeated for each open-ended response, as suggested by Gall, Gall, and Borg (2007). Results were quantified by categories and compiled to provide descriptions. Results from each iteration guided modifications before the next implementation. For question two, results from iteration three were compared to results from iteration two to identify changes.

For question three, regardless of whether the intervention supported students’ mastery of targeted literacy skills, a one tailed, matched pairs t-test of the results of the pre- and post-assessment was conducted. To establish the internal consistency of the objective assessment, a Spearman Rank Correlation Coefficient was computed on the split halves. I then applied the Spearman-Brown prophecy formula to correct the reliability estimate. I chose to calculate the split-halves correlation on the pre-test, rather than the post-test, to have as large a sample as possible. A Cohen’s d was calculated to determine effect size.

Students’ responses on their post-survey were inductively coded in iteration three to recognize emerging themes indicating students’ affective responses to the interaction to answer questions four and five. The same procedure for coding the interview responses was used here as well. Responses aligned with the defined categories were quantified to indicate prevalence of similar responses. For question five, a cursory look at the differences between the features
students regarded highly and the features teachers regarded highly were perused for interesting observations. These observations could prompt a follow-up study regarding the difference between teacher and student perceptions of effective technology-enhanced differentiated instruction.

Summary

In this chapter, I provided the rationale for, and the benefits and challenges of conducting design research. Next, I described the procedures for developing the instruments and each of the three iterations in the study. Then I detailed the data collection and analysis process. The appendices provide detailed descriptions of the intervention itself and the development process prior to this study. In the next chapter, I describe the results from the three iterations.
Chapter 4: Results

In this chapter, I provide the results from the implementation of each iteration as described in the previous chapter. For each iteration, I restate the purpose followed by the results. Lastly, I provide a list of the modifications I made at each stage. Chapter 5 presents the interpretation of the results along with implications for future research.

As discussed in Chapter 2 and 3, a design experiment is inherently flexible with procedures. While the basic idea is to test, modify, and retest, other steps may be taken along the way as the need arises. The purpose of this design experiment is “to create a viable theory-driven intervention for achieving a pedagogical goal” (Reinking & Bradley, 2008, p. 12). The pedagogical goal of this design experiment is to develop an instructional tool that regular classroom teachers can easily incorporate into their literacy instruction to differentiate appropriately for gifted third graders.

Iteration One

To differentiate appropriately, the website must align with current theory and practice in literacy and gifted education. The purpose of the first iteration was to develop the instruments and to assess the intervention’s alignment with pedagogical theories from both gifted education and literacy instruction and develop the instruments used in iterations two and three. The instruments developed in iteration one include (1) teacher pre-questionnaire to gather descriptive data about the teacher participants; (2) teacher post-questionnaire to describe teachers’ perceptions; (3) student post-questionnaire to gather the affective responses of the students; (4)
expert reviewer questionnaire to review the website; and (5) student literacy assessment. Data from the expert reviews informed some modifications of the intervention—the website.

**Questionnaire development.** The first step was to develop the three questionnaires and the form the expert reviewers used for website development. For each, I received specific feedback from two reviewers, then used a revised version for a cognitive interview with a third grade teacher. The purpose for each and subsequent revisions based on their data are described here. The final versions are located in the Appendix.

**Teacher pre-questionnaire.** This questionnaire was intended to yield a description of the teachers’ level of training/experience in gifted education and their perceptions about the needs of gifted students within a regular classroom. The responses were used to describe participants in iterations two and three, to see whether a teacher’s training and experience might have an effect on their perceptions of the website. The questions ask for various levels and degree of training in gifted education, level of interaction with gifted students in a classroom, and the extent to which they believe their training prepared them. The last three open-ended questions asked what struggles they have seen their gifted students face, what challenges they face in differentiating, and ideas they may have for support(s) that would benefit them. These questions were asked to ascertain whether these participants’ perceptions are similar to what I described in Chapter 2 from the literature. One reviewer thought two of the original four open-ended questions were too broad. I combined the questions and revised to elicit a more focused response. For the question about workshops attended, originally the follow up asked who provided it. A reviewer commented that teachers who have attended multiple workshops might find the question difficult to answer. To address this concern, I added “Select all that apply” and included an option for “Other” with a text box to describe.
During the cognitive think-aloud, the interviewee had two minor suggestions. One was to change the term “gifted specialist” to “gifted educator” and to add “Professional Learning Communities” and “Collaborations with gifted educator” as options for the question on informal training. Some questions had multiple branching where the interviewee had not replied. When I asked why she had not answered those questions, she said she had overlooked them so I divided these into separately branched questions to simplify the process for the respondent.

**Teacher post-questionnaire.** The purpose of this questionnaire was to ascertain teachers’ perceptions of the effectiveness of the website for their students and ease of use. Teachers were also asked to react to particular features (self-pacing, peer collaboration, etc.). The reviewers recommended ways to keep the respondents’ answers focused on what I actually wanted to ascertain. For example, one question directed teachers to “briefly describe your overall reaction to the instructional website.” To garner more specific responses, I added, “Include what you liked/disliked and why.” Other minor phrases, such as “for each of the following” or “within your classroom,” were added in a few places for the same reason. There were no questions needing clarification during the talk-aloud. The interviewee did mention a technical glitch from the website, which was then fixed before iteration two.

**Student post-questionnaire.** The purpose of this questionnaire is for students to share their affective responses and reactions to particular features. The reviewers pointed out some verb tense inconsistencies and answer choice construction. One reviewer commented on several places where I needed to add phrases to improve specificity. For example, one question asked, “When writing to other students, how likely were you to consider the quality of your writing?” I revised it to say, “When writing to other students in the online book talks in The Reader’s Treasure…..” I also made sure I used the terminology “online book talks” consistently. One
reviewer suggested asking the students how the “online book talks” affected their comprehension of the book, which I did.

**Expert reviewer form.** Because I did not have access to literacy and gifted education experts during the initial project development, I designed iteration one to garner insight from such experts before moving on. To gain information from the experts regarding the website, I first developed an Expert Reviewer Form. On the form, I began with an introductory letter to the reviewers explaining the project, the intervention, and their role. Then I added a table for each portion of the website with a description of the activity and criterion to be rated. Several graduate students from the Instructional Technology and Assessment programs reviewed it. I modified it slightly, then a professor in Instructional Technology and one from the field of Statistics reviewed it. One of the pre-reviewers posited a query about my scale and labels. After some research and discussion, I went with a Likert-type scale. It has 6 points, not 5, and no neutral option. The labels are not packed in either direction (positive or negative), but are distributed evenly. According to Lam and Klockars (1982), I should expect similar responses if I were to label only the endpoints. Labeling only the endpoints leave the participants to divide the points evenly and mentally create their own labels; I have no way to know whether they mentally assigned one box a neutral label. Since every statement needs a decision for improving the site, I did not include a neutral option. Labeling them all removes ambiguity. Additionally, the pre-reviewers all indicated the form (with each box labeled) was easy to complete and contained clear questions. Based on their advice and research on Likert scale surveys, I removed the neutral option and further emphasized through font size, bold face, and indentations the stem of each criterion.
The first expert reviewer of the form had to ask questions several times about how to complete the form, which I explained via email and phone. Once I communicated more clearly how to complete the form, in order to give informed feedback on the form, she completed it as my experts would be required to do—going through each activity carefully and responding to each item in the tables. In doing so, she assigned low marks on several criterion. Her comments indicated she believed I was proposing this website to replace in-class curriculum. Since my directions had not been explicit enough regarding the site’s intended use, I proposed that we meet in person so I could clarify for her and further ascertain how I might improve my directions before sending the materials to the other reviewers. We met in person and walked through each of her comments to clarify what aspects of the website required modifications and what concerns merely needed more up-front information. Once I expressed clearly that I intended the website as an additional resource teachers can use to extend/enrich their curriculum, she was much more satisfied with it. Fortunately, our discussion provided invaluable guidance that I used to modify the directions to avoid the same misconceptions from the next two experts. I added an orientation video that walked them through the form and included reminders of my expectations for the site. The video was then tested on multiple computers to ensure it would function on many operating systems. I also added the following comment in the email to the next two experts: “Remember this is only level 1 of the website. Each future level will increase in rigor and complexity.” I repeated the directions at the top of each section, and made a step-by-step task list on the introduction page. Consequently, the next two experts did not have any questions or responses about the expectations of the website. Their scores and comments were much more positive and consistent with each other. One of the six questions that comprise the framework of formative and design experiments addresses unanticipated effects of the intervention (Reinking & Bradley,
2008; Bradley & Reinking, 2011). In this case, the unanticipated event during the review of the intervention was an important step in the development process. When conducting a design experiment, the researcher must be transparent about the positive and negative interactions especially because negative results provide a wealth of information for improving instruments and interventions.

**Website development.** I originally solicited “Expert reviewer 1” to be a pilot reviewer of the form. Fortunately, in doing so she provided a very thorough completion of the form including specific feedback and advice for each area of the site. As stated above, it led to several emails and a two-hour detailed discussion walking through each concern or comment. This individual, whom I had asked to pilot the form, had taught grades two through five for six years, then became a reading coach. While earning her doctorate in Childhood Education and Literacy Studies, she supervised pre-service teachers in language arts instruction. Given her responses led to important modifications of the form and she met the criteria I outlined for my selection of expert reviewers, she became the first expert reviewer. Our interaction led to significant development of the review form, as detailed in the previous section. Once the expert reviewer form was ready, I sent it to the next experts who had agreed to review my website. I provided a username and password to access the site along with the answer key so they could move more quickly through it. The reviewers were instructed to view the orientation video, then answer a few of the questions without the key to reflect on the thinking involved in answering. They then could continue with the key to reduce the time commitment. While attending the language arts workshop at a prestigious Center for Gifted Education summer institute, I had recruited three experts in gifted education and gifted language arts curriculum development. One was the instructor of the language arts sessions. She had been the language arts curriculum specialist for
a state’s gifted committee in the northeastern United States. She continues to consult and teach workshops for gifted language arts differentiation. At the workshop, I walked her through the activities in the website, and we commented how similar my activities were to the strategies she taught in her session. She agreed to be a reviewer. In my efforts to recruit another reviewer, several professors volunteered, then chose to withdraw. Understandably, the common rationales for their withdrawal were “not enough time,” “too much on my plate,” and “unexpected responsibilities.” Finally, a professor of English education with 12 years K12 experience in language arts agreed and completed the review. This professor teaches professional development courses in teaching language arts and reviews for several journals. In the end, I had two pilot reviewers and three highly qualified expert reviewers—two in literacy and one in gifted language arts.

To analyze the expert reviewers’ data, an average response for each item was computed. First, I quantified each response category (strongly agree=6, Moderately agree=5, Slightly agree=4, Slightly disagree=3, Moderately disagree=2, and Strongly disagree=1). For each item, the three scores were averaged. One reviewer could not access the discussion board and did not have time to attempt it later, leaving only two responses for the discussion board. Table 6 shows the results of this analysis. There were no response averages below 2.5. In the table below, average levels between 2.5 and 4.5 are in bold and underlined. Below the average are the minimum and maximum responses. Discussion of these values follows.
Table 6: Average Levels of Response from Expert Reviewers of the Website

<table>
<thead>
<tr>
<th>For intellectually gifted 3rd graders:</th>
<th>NG n=3</th>
<th>WAC n=3</th>
<th>Art/Music n=3</th>
<th>Net n=3</th>
<th>DB n=2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td>min</td>
<td>max</td>
<td>min</td>
<td>max</td>
<td>max</td>
</tr>
<tr>
<td>this activity is appropriately challenging, but not too difficult.</td>
<td>4.67</td>
<td><strong>4.33</strong></td>
<td>5.00</td>
<td>5.67</td>
<td>5.00</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>this activity will likely be engaging.</td>
<td>4.67</td>
<td><strong>4.33</strong></td>
<td>5.33</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>the appearance of this section is appealing.</td>
<td>5.33</td>
<td>5.00</td>
<td>5.33</td>
<td><strong>4.33</strong></td>
<td>5.50</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>6</td>
<td>4</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>this activity will likely be enjoyable.</td>
<td>4.67</td>
<td><strong>4.33</strong></td>
<td>5.67</td>
<td><strong>4.33</strong></td>
<td>5.00</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>the directions are clear.</td>
<td>5.67</td>
<td>5.00</td>
<td>5.67</td>
<td>5.33</td>
<td>6.00</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>6</td>
<td>4</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>navigation within the game is easy.</td>
<td>5.67</td>
<td>5.67</td>
<td>6.00</td>
<td><strong>4.33</strong></td>
<td>6.00</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>navigation into and out of the game is easy.</td>
<td>5.67</td>
<td>5.67</td>
<td>6.00</td>
<td>5.33</td>
<td>6.00</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>a the content is accurate.</td>
<td><strong>4.33</strong></td>
<td><strong>4.00</strong></td>
<td>6.00&lt;sup&gt;b&lt;/sup&gt;</td>
<td><strong>4.33</strong></td>
<td>5.00</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>6</td>
<td>1</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>a this activity provides instruction that likely will support students’ understanding of ____ (game specific objective)</td>
<td><strong>4.00</strong></td>
<td><strong>4.00</strong></td>
<td><strong>4.33</strong></td>
<td>4.67</td>
<td>5.00</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>a there are a sufficient number of practice opportunities to support mastery of the objectives.</td>
<td><strong>4.33</strong></td>
<td>3.67</td>
<td>4.67</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>6</td>
<td>1</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>a this activity provides instruction that likely will support students’ ____ (game specific objective)</td>
<td><strong>4.00</strong></td>
<td><strong>4.00</strong></td>
<td><strong>4.33</strong></td>
<td>4.67</td>
<td>5.00</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>this activity provides instruction that likely will support students’ ____ (game specific objective)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>4.67</td>
<td>5.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>the feedback supports student success.</td>
<td>5.00</td>
<td>4.67</td>
<td>5.33</td>
<td><strong>4.00</strong></td>
<td>5.00</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>the online dictionary is an appropriate support for student success.</td>
<td>5.33</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. NG=Novel Games; WAC=What a Character; Art/Music=Art Appeal; Net=Internet Safety & Netiquette module; DB=discussion board. Average levels of response appear in bold and underlined.

<sup>a</sup> These items were affected by Reviewer 1’s misunderstanding.

<sup>b</sup> Reviewer 1 did not respond to this one.
As mentioned, Expert Reviewer 1 initially believed the website was intended to replace in-class instruction and generously spent hours with me to provide vital feedback. After our conversation, she agreed that based on my clarifications and minor modifications I entailed, she would increase the level of her responses to several criterion (indicated by an asterisk in the chart above) if she were to conduct a second review. For “content is accurate,” I clarified that this descriptor referred to whether the content in the questions and corresponding answers were accurate; this had been another point of misinterpretation. She then replied, “They mostly are.” In regards to the extent to which the activities would likely support students’ progress toward mastery of the objectives and sufficient numbers of opportunities, I emphasized “likely support progress” not “total mastery” of the objectives. Out of respect for her time, I did not ask her to modify her responses. The table above includes her artificially low scores. The majority of the moderate average responses (2.5–4.5) are due to misconceptions. As such, one must interpret these levels with caution.

Modifications to the website based on the noted criterion (and to avoid future misunderstandings) included adding a Teacher Tip page to ensure teachers grasped the intent and appropriate integration strategies for their classrooms. I then added information pages for students prior to some of the activities. Additionally, in the discussion board, I added examples of completed discussions and word games, as well as a video guided tour that walks students through the software. The discussion board includes reminders about rigorous discussions and transference of what they learned in the games to their writing.

The remaining seven moderate average levels required further investigation as well. For “What a Character,” the moderate levels were for level of difficulty, engagement, enjoyment, and sufficient practice opportunities. Based on comments and my own critique, I decided that for
the first three concerns, the results in iteration two would shed valuable light. Because those items relate to the affective domain, students would provide accurate data to affirm or reject the reviewers’ opinions. As for the number of practice opportunities, given the design of the activity, it would require significant effort to add multiple levels and alternative scenarios. Tracking the scores would require significant additional programming. Since the goal was to develop a strong level 1 of the game, I decided these major changes would wait for future development after this research concludes.

**Student literacy assessment development.** The purpose of the pre- and post-assessment was to measure students’ mastery of the literacy objectives addressed in the website. It contains 36 multiple-choice questions. The post-test has the same questions as the pre-test in a different order and the same answer choices shuffled. The knowledge and comprehension-level items (#1-24 in the chart below) measure students’ understanding of terms presented in the activity. The application questions (#25-36 in the chart below) measure their ability to apply learning from two activities to a new situation presented in the test item. I started with the short version (10 questions) used in a pilot study in 2009 and followed the test construction plan outlined in Chapter 3. Crocker and Algina state the reviewers should collectively have expertise in subject matter, measurement and test construction, and target population (2008). The qualified reviewers rated the match of each question to the objective on a scale of 1 (poor fit) to 5 (excellent fit). I instructed reviewers to comment if they assigned a fit score of 3 or lower on any item. They were also asked to report any concerns about readability or bias, and to consider content, level of difficulty, and thinking process. Finally, for each section, they responded yes/no as to whether they considered the two questions equivalent for the split halves test actually match.
There were three reviewers of the literacy assessment review form and three pre-reviewers of the test to pilot the form. The pre-reviewers noted more females than males in the questions, inconsistencies in tense, and unclear wording in the directions. Once the final version of the review form was established, three new expert reviewers completed the form to evaluate the literacy assessment. Table 7 shows the average fit scores from the three expert reviewers and their comments.

Table 7: Average Fit Scores from Expert Reviewers of the Literacy Assessment

<table>
<thead>
<tr>
<th>Q #</th>
<th>Avg fit score</th>
<th>Comments</th>
<th>Q #</th>
<th>Avg fit score</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td></td>
<td>19</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td></td>
<td>20</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4.67</td>
<td>The similarity in meaning between these two words is a bit farther than letter B.</td>
<td>21</td>
<td>3.67</td>
<td>Change “all that apply” to only one option; I’m not sure of the purpose of these two questions based on the standards.</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td></td>
<td>22</td>
<td>3.67</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td></td>
<td>23</td>
<td>4.67</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td></td>
<td>24</td>
<td>4.33</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td></td>
<td>25</td>
<td>4.67</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>5</td>
<td></td>
<td>26</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>4.67</td>
<td></td>
<td>27</td>
<td>5</td>
<td>“ethereal” would be more accurate typo</td>
</tr>
<tr>
<td>10</td>
<td>4.67</td>
<td>change her to him</td>
<td>28</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>5</td>
<td>which is related/which is NOT related; different processes</td>
<td>29</td>
<td>4.67</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>5</td>
<td></td>
<td>30</td>
<td>4.33</td>
<td>choices too close in meaning</td>
</tr>
<tr>
<td>13</td>
<td>5</td>
<td>Be sure the terms here are consistent with the games</td>
<td>31</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>5</td>
<td></td>
<td>32</td>
<td>5</td>
<td>Correct answer for both is C; change “other authors” to “readers”</td>
</tr>
<tr>
<td>15</td>
<td>4.33</td>
<td>reduce some description of home so that mood doesn’t overshadow</td>
<td>33</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>4.67</td>
<td></td>
<td>34</td>
<td>4.67</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>4.67</td>
<td></td>
<td>35</td>
<td>4.33</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>4.67</td>
<td>B and D seem very similar</td>
<td>36</td>
<td>4.67</td>
<td></td>
</tr>
</tbody>
</table>

Note. Items #1-24 are knowledge and comprehension-level questions. Items #25-36 are application-level questions.

No reviewer gave a score below a 3 to any question. Based on some helpful comments, shown in Table 7, I modified several questions before I used the assessment in iteration two. In addition to the fit scores indicating the extent to which the questions matched the objectives, the expert reviewers were asked to state yes or no whether they believed the matched questions for
the split-halves test are equivalent, have an appropriate reading level, or raise concerns of bias.

Table 8 shows their responses to those questions for each area.

Table 8: Expert Reviewers’ Responses About Literacy Assessment

<table>
<thead>
<tr>
<th>Section</th>
<th>Are halves matching</th>
<th>Is reading level appropriate?</th>
<th>Any concerns of bias?</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novel Games</td>
<td>Y       Y       Y</td>
<td>Y       Y       Y</td>
<td>N       N       N</td>
<td></td>
</tr>
<tr>
<td>What a Character</td>
<td>Y       Y       Y</td>
<td>Y       Y       Y</td>
<td>N       N       N</td>
<td></td>
</tr>
<tr>
<td>Art Appeal</td>
<td>Y       Y       Y</td>
<td>Y       Y       Y</td>
<td>N       N       Y</td>
<td>The socio-economic level of the student’s family and their experiences with art forms could impact the student’s ability to respond to these questions.</td>
</tr>
<tr>
<td>Get Connected</td>
<td>Y       Y       Y</td>
<td>Y       Y       Y</td>
<td>N       N       N</td>
<td></td>
</tr>
<tr>
<td>Cross-section questions</td>
<td>Y       Y       Y</td>
<td>Y       Y       Y</td>
<td>N       N       N</td>
<td></td>
</tr>
</tbody>
</table>

All three reviewers were in 100% agreement the halves matched well and reflected an appropriate reading level. There was only one concern in regards to bias. To address the reviewer’s concern regarding students from low socioeconomic households being at a disadvantage in the art and music games, I added an informational page to teach students about the different art and music forms before they played those games. These added informational pages were then reviewed by a veteran teacher, a specialist in gifted education, and an artist. I also had a veteran teacher who is an accomplished musician review the music information page. These pages included links to further support materials for students needing the extra support. Adding the informational pages also addressed concerns from earlier reviewers who thought the games might be too difficult without instruction since few third graders would have any experience with some of the terminology. The reviewers’ summative comments were as follows:

The readability would seem to be appropriate for most gifted third graders. The level of difficulty appears to increase with items that require inference on the part of the student,
which is to be expected. The section on Art Appeal, as indicated earlier, may be impacted by the student’s SES, and could reflect some bias. Items developed and selected appear to be well matched for equivalency.

I think the overall assessment is an interesting tool that would engage gifted learners with questions and scenarios that are ‘outside the box’, particularly those that have a gift for language. There are a number of difficult questions, but not too difficult with some time spent thinking about the questions. I think the assessment measure progress based on the skills presented. They align with the goals and objectives listed with the questions presented.

I believe this is thought-provoking, yet reasonable. The assessment is an excellent measure of the activities. I particularly love the art and music section and am really delighted to see the arts incorporated into this instructional piece.

Iteration one was a complex process of multiple steps to prepare instruments according to questionnaire and assessment development procedures. A recurring struggle was recruiting reviewers who would follow through. Once all the data were in, the positive comments—from the pre-reviewers through the expert reviewers—indicated that the intervention (the website) was ready for classroom testing. Use of the intervention in a naturalistic setting took place in iterations two and three.

**Iteration Two**

The purpose of this design experiment was to develop an intervention rooted in current theory and pedagogy, that works in the real world and to understand why it works. In iteration one, the instruments were developed using questionnaire, survey, and assessment development procedures. Additionally, expert reviewers provided an evaluation of the intervention to determine if it is rooted in current theory and pedagogy for instructional design in the fields of gifted and literacy education. Modifications were made as described in the previous section. Then it was time to implement it in the classroom.
Participants and obstacles

In a meeting with the head of assessment for the participating school district, we reviewed the selection criterion. He provided me with a list of potential schools and agreed on an email to send to the principals. Unfortunately, only one of the principals replied to my email and documents I dropped off at the schools. One principal immediately called me to say he did not want to add anything else to his teacher’s already overburdened workload at this time of the year (spring). Apparently, the recruitment challenge I faced in iteration one would continue in iteration two. At this point, I changed my recruiting methods and sought help. A professor who works with multiple schools for the university agreed to meet with me. After seeing my website and expectations for the teachers, she emailed several principals on my behalf. The principal at one school (School B) told me I could meet with the third grade teachers. As I was giving the regular classroom teacher an overview, the gifted educator joined us. After a few minutes, she interjected, “I’m sorry, but were you under the impression we were going to do this? I thought we made it clear to the principal that we do not have the time to participate.” I explained that the principal had told me they would meet to hear about my project and then let me know their decision. They allowed me to continue presenting my information. The regular classroom teacher agreed to participate and even reassured the gifted educator that she would take responsibility for it and would keep her apprised. Surprisingly, despite her initial reluctance, she was the only teacher in this iteration that got her students through the activities and the post-test before the school year ended. Only three of those students, however, completed the post-questionnaire. I gained access to the other participating school (School A) via a family member who worked there and petitioned the principal to meet with me. I met with her and the assistant principal. They granted me permission to work in the school if the teacher chose to participate. I met with a
third grade teacher and the gifted teacher to get them started. The gifted teacher took over the task of facilitating the students’ use of the intervention. She tried to have students complete everything with her during their pull-out time which was limited by reduced access to computers and interruptions for various end-of-year activities. None of her students completed all the tasks before the summer break. This left me with only 10 students’ pre- and post-test data and 3 students’ post-questionnaire, all from the same school. Analysis of this limited data and the teacher questionnaires follow.

**Pre/post literacy assessment**

A total of 19 students from two schools took the pre-test. Only 10 students, all from School B, completed the post-test. A one-tailed matched pairs t-test was conducted on the pre- and post-test scores (n=10). A one-tailed t-test looks for evidence to reject the null hypothesis—either no change or no change in the wrong direction—indicating a change in the desired direction. In this case, the alternative hypothesis (rejecting the null) is that the post-test scores are larger than the pre-test scores indicating that learning has taken place. In a two-tailed t-test, significance can be reached by change in the positive or negative direction. Significant change in the negative direction would indicate loss of knowledge. The purpose of implementing this intervention is to improve student learning, I chose to do a one-tailed matched pairs t-test to focus on whether there was evidence of this desired outcome. Table 9 shows results of the t-test.

<table>
<thead>
<tr>
<th>Diff of Scores</th>
<th>M</th>
<th>SD</th>
<th>95% C.I.</th>
<th>t(9)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>PostTest</td>
<td>21.1</td>
<td>6.082</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PreTest</td>
<td>19.5</td>
<td>5.442</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PostTest - PreTest</td>
<td>1.600</td>
<td>4.477</td>
<td>[-1.60, 4.80]</td>
<td>1.130</td>
<td>.144</td>
</tr>
</tbody>
</table>
There was not a statistically significant (p=0.1438) difference between the pre-test (m=19.5, s=5.44) and post-test scores (m=21.1, s=6.082). “Finding no statistically significant difference…does not necessarily mean there is no difference…in the population, especially for studies with small sample sizes” (American Statistical Association, 2005, p. 12). Statistical significance is not proof of practical importance (DeVeaux, Velleman, & Bock, 2006). Since the difference of the means was not statistically significant, no effect size was calculated.

To establish internal consistency of the literacy assessment, I calculated a Spearman Rank Correlation Coefficient on the split halves from the 19 completed pre-tests. The coefficient (0.7737) was statistically significant (Glass & Hopkins, 1996). The split-halves analysis, therefore, indicated internal consistency. Applying the Spearman-Brown prophecy formula, if the number of items were doubled, the estimated reliability would be greater (.87), which further supports the reliability of the test as a whole. Although there was statistically significant evidence of internal consistency, the average post-test score was only 54% correct (average of 21.1 out of 36). An item analysis was conducted to identify questions that needed to be modified to reduce vagueness that may have contributed to the low score. Any questions that had more than half of the ten students answered incorrectly were evaluated for possible points of confusion. The matched question was also examined. Revisions were made to maintain consistency of matched questions and also improve the quality of the question. The only other change planned at this time for iteration three was to move the test online.

**Student post-questionnaire**

Of the 10 students at School B who completed the post-test, none posted to the discussion board and only three answered the post-questionnaire. Their responses are shown in tables 10–13 below. For the questions shown in table 10, students rated each feature of the site to assess their
affective response to the features. One student only rated the fifth and seventh items. One student rated the first five items. The last student skipped the second and fifth items. The teacher gave no indication why they skipped some of the items. Neither of the two students who gave high marks for “Writing in Book Talks” had even participated in the Book Talks on the discussion board. To address this issue, I added the following message above the link to the survey, “If you have completed the games and participated in the discussion board, please take a few minutes to complete this 14-question survey.” I also added an option “N/A—I did not experience this.” In iteration three, I also reminded teachers to be sure students posted to the discussion board before taking the post-test and completing the survey. Not surprisingly, “playing games” was the most popular feature.

Table 10: Students’ Opinions of Various Features

<table>
<thead>
<tr>
<th>Mark the box on each row that best describes your opinion on each of the following features of the website.</th>
<th>No opinion</th>
<th>Not good</th>
<th>So-so</th>
<th>Okay</th>
<th>Cool!</th>
<th>Total responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working in any order I want</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Going at my own pace</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Playing games</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Using keys to open fun prizes</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Writing in Book Talks</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Getting feedback from my teacher</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Learning about being a good digital citizen in the module before entering the book talks</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

Students were then asked to rank the activities from least favorite (#6) to most favorite (#1). Their responses are shown below in Table 11. Each level was assigned points with most favorite earning 6 points and least favorite earning 1 point. The last column shows the average
score for each activity. All three students ranked the “Art Appeal-Art” and “Art Appeal-Music” games as either first or second with “What a Character” as their third choice. I expected the Book Talks in which they did not participate to be ranked lowest, but it was actually ranked fourth or fifth. “Novel Games” received the lowest scores.

The follow up question about their choices for most and least favorite (Table 12) reveals the two students who ranked “Novel Games” as their least favorite did so due to technical issues with the game. Those glitches were worked out prior to iteration three. The student who ranked the “Digital Citizenship” module as the least favorite said, “It was boring.” No modifications were made in response to this. As for their top two choices, the students thought listening to different types of music was “cool” and “fun.” Of course, “I like art” explained one student’s choice of “Art Appeal-Art” as the favorite.

Table 11: Students’ Ranking of Favorite Activities

<table>
<thead>
<tr>
<th>Order the activities listed below (#1 to #6) from your favorite to your least favorite. (#1=most favorite and #6=least favorite.)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Total # Responses</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novel Games (spinner and changing the mood of the sentences)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
<td>1.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Art Appeal-art (matching famous paintings to reading passages)</td>
<td>1</td>
<td>2</td>
<td></td>
<td>3</td>
<td></td>
<td>5.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Art Appeal-music (matching famous pieces of music to reading passages)</td>
<td></td>
<td>2</td>
<td>1</td>
<td></td>
<td>3</td>
<td>5.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What a Character (guessing the character based on conversations in new setting)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>3</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital Citizenship (learning about and showing what you know about internet safety and online communications)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Get connected-book talks (discussion forum with other students on topics from the book)</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td>3</td>
<td>2.33</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The follow up question about their choices for most and least favorite (Table 12) reveals the two students who ranked “Novel Games” as their least favorite did so due to technical issues with the game. Those glitches were worked out prior to iteration three. The student who ranked the “Digital Citizenship” module as the least favorite said, “It was boring.” No modifications were made in response to this. As for their top two choices, the students thought listening to different types of music was “cool” and “fun.” Of course, “I like art” explained one student’s choice of “Art Appeal-Art” as the favorite.
Students were also asked various multiple-choice questions to ascertain the potential impact on them in various ways. The questions related to the Book Talks in the discussion board are in bold. Curiously, they had positive comments about this experience even though none of them experienced it. The settings required these questions to be answered to complete the questionnaire since I anticipated they would have completed everything before taking the survey. I had not considered the possibility they would complete the survey without completing the activities. To allow for this case, before iteration three, I added an option for “N/A—I did not participate in the online book talks.”
Table 13: *Students' Perception of Impact of the Experience*

<table>
<thead>
<tr>
<th>Question</th>
<th>Student #1</th>
<th>Student #2</th>
<th>Student #3</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the Reader’s Treasure expanded to include activities for other books and was assigned in school on a regular basis, how would this affect your desire to read?</td>
<td>1. I would want to read a lot less.</td>
<td>3. It would have no effect on my desire to read.</td>
<td>3. It would have no effect on my desire to read.</td>
</tr>
<tr>
<td><strong>When writing to other students in the online book talks in The Reader’s Treasure, how likely were you to consider the quality of your writing?</strong></td>
<td>5. Very likely</td>
<td>5. Very likely</td>
<td>5. Very likely</td>
</tr>
<tr>
<td>After completing the Reader’s Treasure, how well do you feel you know the characters?</td>
<td>5. Extremely well, better than just reading</td>
<td>5. Extremely well, better than just reading</td>
<td>5. Extremely well, better than just reading</td>
</tr>
<tr>
<td><strong>In your opinion, how did participating in the online book talks in The Reader’s Treasure affect your understanding of the book?</strong></td>
<td>5. Very much</td>
<td>5. Very much</td>
<td>4. Somewhat</td>
</tr>
<tr>
<td>In your opinion, how did participating in the book talks online affect your understanding of things you learned in The Reader’s Treasure?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Have you ever experienced activities like these (either online or in class) after reading a book before?</td>
<td>5. A lot more effort than typical classroom activities</td>
<td>3. About the same as typical classroom activities</td>
<td>5. A lot more effort than typical classroom activities</td>
</tr>
<tr>
<td>In comparison with the typical class activities, how much thought and effort did you have to put in to successfully completing the activities in The Reader’s Treasure?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

The three student responses to questions in Table 13 are almost all positive. They all believed they knew the characters better after these activities than when they had only read the book. All three reported they had never experienced activities like these after reading a book, and two felt these activities required a lot more effort than typical classroom activities. One student believed the level of thought and effort was about the same as typical classroom activities. Sadly, when asked what effect it would have on their desire to read if The Reader’s Treasure expanded to cover other books, two said it would have no effect and one reported a negative effect. The
last question gave students an opportunity to share any comments or suggestions. The three responses (reported here verbatim with errors) were, “The spinner game did not work. the website was really not that good,” “besides the spinner game everything was fine,” and “I liked this program.” The technical glitches with “Novel Games” clearly had a negative impact on students’ perceptions. Per my modification plans described in Chapter 2, fixing technical glitches was a high priority.

Teacher post-questionnaire

Only the teacher from School B completed the pre- and post-questionnaires. In the pre-questionnaire, this regular classroom teacher rated her training and preparation for teaching gifted students as “minimal to none.” One class in her undergraduate course included some content on teaching gifted. Additionally, she had taken one workshop through the school district. Her informal preparation came from parenting a gifted child, participating in Professional Learning Communities (PLC) at school as well as reading relevant books and articles. The last two questions asked about school-related struggles her gifted students face and what challenges she faces in providing appropriately differentiated instruction for gifted students. In response, she stated, “Some of my gifted students are not interested in the regular classroom instruction. They become impatient with other students and would rather complete tasks independently. Some of my difficulties are finding appropriate and challenging activities for the gifted student.” Her experience, therefore, is consistent with teacher self-reports in national surveys (Archambault et al., 1993; Loveless et al., 2008; Shaffer & Gee, 2005; U.S. ED, 1993).

The teacher’s responses in the post-questionnaire shed some light on the students’ experience as well as her own. She indicated that she had used the website as enrichment during class time and as a homework assignment. When asked if she would use it again, she replied,
“Not at this time of the year. When we are able to go to the computer lab as a class, then I would be able to put all my gifted students on their own computer to complete the activities. But it is difficult to get all gifted students on the 2 computers I have in the classroom. Some games ‘froze up,’ which was very frustrating.” Teachers at School B and School A attributed their struggle to complete everything to the time in the school year. Teachers do not have the same access to computers in the final weeks as they do the rest of the year, which may already be limited. Limited computer access is due in part to testing, pressing work with struggling students, and completing inventories or packing up. Both schools had requested paper versions of the pre- and post-test due to limited computer access. Table 14 shows responses from the teacher participant (regular classroom teacher) at School B on other questions.

Table 14: Teacher’s Perception of Impact on Students

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>If The Reader’s Treasure expanded to include activities for other books, how do you think integrating it into your curriculum on a regular basis might affect your students’ desire to read?</td>
<td>4. They would want to read a little more.</td>
</tr>
<tr>
<td>Compared to traditional literature response assignments, how engaging was The Reader’s Treasure for your students?</td>
<td>4. Somewhat more engaging</td>
</tr>
<tr>
<td>In comparison with the typical class activities, how much thought and effort did your students have to put into successfully completing the activities in The Reader’s Treasure?</td>
<td>5. A lot more effort than typical classroom activities</td>
</tr>
<tr>
<td>Consider the quality of your students’ writing in the online book chats in The Reader’s Treasure. How does their input in the online book chats compare to other written responses to reading other books?</td>
<td>(skipped—no students participated in the book talks)</td>
</tr>
<tr>
<td>How effective do you feel the website was in leading students to mastery of the objectives?</td>
<td>4. Somewhat effective</td>
</tr>
<tr>
<td>Have you ever utilized activities in your classroom similar to those on the Reader’s Treasure before?</td>
<td>No</td>
</tr>
</tbody>
</table>

The regular classroom teacher reported positive perceptions (see Table 14). She believed the activities were somewhat more engaging and a lot more challenging than typical classroom
activities. She never used activities similar to these in her classroom and believed they were somewhat effective in leading students to mastery of the objectives. She also indicated that if the website expanded to include more books, her students would want to read more.

Although teacher participant (gifted educator) from School A did not complete the post-questionnaire, she communicated with me via email, text, and phone. Her reactions were similar to the teacher at School B. Originally, I thought this would be the best time of year for implementing the website. In my 13 years of experience as an elementary classroom teacher, I know the final weeks can be spent on review of the year’s learning to ensure a strong foundation for the following year. It is also a time for creative projects and student-directed learning. I believed my ready-made resource would be an easy-to-implement option for the gifted students at this time. In my initial meetings with the teachers, they agreed and looked forward to exploring it. Unfortunately, reduced access to computers and other pressing commitments presented unavoidable obstacles.

Given the limited data from students and the lack of an N/A option (which resulted in responses about the online Book Talks on the post-questionnaire), I needed more data to make informed modifications. Schools were already on summer break, so I recruited three students for talk-alouds.

Talkalouds

To locate participants for the talkalouds during summer break, I posted a plea on Facebook to my family and friends, many of whom are educators. One friend in another state put me in touch with the parents. I mailed the books to the students and arranged a day and time for our sessions. Two of the students just finished third grade and one was entering third grade. The two who completed third grade would be most like those in iteration two who had just completed
the tasks and the third student would be most like those who would participate in iteration three in the fall. Their local school districts (a district different from the one where I conducted iterations two and three) had formally identified all three as gifted. Students read the book prior to our sessions. Each student met with me individually at my friend’s house. I used Evernote to record the talkalouds and took notes while they worked. After some introductions and chitchat about the book and my research, their parents signed the permission form and either waited in another room or left for a while. Two of the students seemed a little shy at first, but then quickly opened up when they began the games. The third student, the youngest, immediately opened up and was very thorough in all his descriptions and thoughts. When I explained that he would go through each task and say his thoughts aloud, he said, “Oh, a talkaloud…cool.” So, we began.

**Procedures.** After allowing the students to select a username and password, I registered them for the site and opened the home page on a laptop. I told the students they should read the opening screen and then proceed. I instructed them to say what they were thinking aloud. “What you say will help me to understand what students like you think when you do the different activities. Say as much as you can, even if it is something negative. For example, if you say, ‘I’m not sure what to do here, or what that means,’ it tells me that I need to adjust the directions or add some kind of help.” Each of the students understood and did fairly well with this procedure. Occasionally, facial expressions or body language suggested the student was thinking and not talking, so I would ask, “What are you thinking?” to get them talking again. I gave as little direction as possible while they worked. If they asked, “What should I do now?” I would reply, “What do you think you should do next?” While the students spoke and interacted with the website, I took notes of any glitches, error messages, as well as their comments.
**Results.** Fortunately, all three students experienced glitches with “Novel Games” just like the students in iteration two. By witnessing the problem in real time, the team member who programmed the tracking feature was able to isolate the error and correct it. In “Novel Games,” we also discovered that if the student opened the dictionary, then went back to the game, it started them back at question one. There was some uncertainty in “Art Appeal” as to what to do. For one student, the feedback pop-ups did not appear. The students also wondered aloud how many questions they had to complete. They stated that some of the choices for the music clips did not seem to match exactly how they would describe the mood of the music. After earning three keys, students entered the Digital Citizenship module. One student did not notice the question. I observed that the answer choices were randomly shuffled, which meant that “all of the above” or “none of the above” were not always the last option. The first two students ran out of instructional content that is presented when they answer a question incorrectly. I assisted the third student a bit to ensure he could successfully get through the material so I could observe what would happen upon completion of the module. Upon entering the discussion board, the students viewed the guided tour and then all successfully posted to the Book Talks. They put time and effort into writing quality posts. In all, the talkalouds provided much more insight to the students’ experience, thoughts, and challenges. The data from the classroom integration in iteration two combined with the talkaloud data, led to modifications prior to iteration three.

**Website modifications**

In addition to revising the questionnaires as discussed earlier and fixing the technical glitch with “Novel Games,” other revisions were done. Since no students in iteration two participated in the discussion boards even if they passed the “Internet Safety” module prior to the talkalouds, I added more examples in the discussion board and created a guided tour video. After
the talkalouds, the following revisions were made based on the data from iteration two and the talkalouds:

**What a Character**
- Added an instructional page to be viewed before the game to be explicit about the link between a person’s character and words
- Modified default in score report that said “1 tries were taken without finding the correct character.” This looked like the student had made one incorrect guess.

**Novel Games**
- Added an indicator showing the students which questions were correct or incorrect in “Novel Games” to help them succeed. A cause of one of the glitches was when students missed a question but did not realize it, then when they got to the end, they did not know why they had not earned a key. Directions on navigating this game and understanding the indicator were added as well.
- Added a link to other sources about tsunamis so students who were interested in the topic could pursue it further and learn the scientific vocabulary in context.
- Replaced the eyeball question that all the students in the talkalouds found tricky.
- Updated SpuntoMuch.html to link back to the correct destination that also had interfered with the awarding of a completion key.
- Changed/revised link to dictionary to avoid interfering with the game in progress.

**Art Appeal-Music**
- Added directions and progress (Question 2 out of 5, etc.) so students could see where they were in the process, help them see the link between the questions designed to teach and the questions designed to assess.
- Revised some mood words based on previous student scores and talkaloud comments.

**Art Appeal-Art**
- Added directions and progress (Question 2 out of 5, etc.) as I did in the music game.

**Netiquette and Internet Safety Module**
- Added explanation on info pages about the instructional design based on cognitive research. I did this to help students and teachers understand the process for success.
• Added more instructional content (graphics, comic strips, videos, text, and images) and more questions to reduce the likelihood that students would run out of content and have to wait for me to reset the content for them then start over. This was a source of frustration for many students.

**Discussion board**
• Added an example of an entire conversation to include correct and incorrect replies, comments, and how to wrap up/end the “round.”

To test for technical issues, I went through the site as a new student would while my co-programmer viewed the tracking in real time. After countless hours replicating student behavior on various operating systems and editing the code and/or content, the next version of the site was ready for the classroom. A new school year was beginning and I continued recruiting as before.

**Iteration Three**

As with iteration two, this round of implementation in the classroom examines what factors supported or inhibited effectiveness of the intervention, what modifications needed to be made, to what extent the literacy objectives were achieved, what were the students’ overall reaction, and what were the students’ and teachers’ reactions to the particular features. To some extent, the data indicated modifications made to iteration one had a positive effect on the performance of students who experienced iteration two. As expected, the implementation in a naturalistic setting revealed more needed modifications. The unique contribution of iteration three, then, was to see what effect, if any, the modifications had on outcomes. Of note, iteration two took place in May and the implementation for iteration three began in the fall (though not completed until spring), and with all new students, some new schools and teachers. The effect, therefore, cannot be isolated to the modifications alone, but can provide evidence that the modifications should remain in place.
Participants and obstacles

With modifications implemented, I recruited participants. Fortunately, the teacher from School A had asked at the end of the year if she could do it again in the fall. She really liked the concept and felt badly she had not led her previous students through everything. We confirmed permission from her principal to do the study again in her school. She also agreed to contact some principals from nearby schools on my behalf. One of those schools agreed and I met with the gifted educator and a third grade teacher there. Despite my many reminders that the regular classroom teachers would likely benefit from allowing the gifted students access to the website in their classes, the gifted educators at both schools attempted to have the students complete all the tasks during their pull-out time with them. School B_Oct (formerly School A in iteration two) began in October and as late as January, I still had no completions. She emailed the following withdrawal notice:

The last time they were on the computer will probably be the last time for them to work on this. The computer lab will be closed for the next several weeks for testing, so they won't be able to get on. I'm sorry if this leaves you in the lurch, but I can't do anything about it.

This program was a really long one, and was much more involved than the one we did last year. Sorry I can't do more, but I have to concentrate on academics totally from now on.

I thanked her for her efforts and pondered my next steps. This was the school where my family member had worked, so I contacted her to see if she might be able to help. She contacted one of the regular third grade teachers who gladly agreed to participate. In about two weeks, 13 of the gifted students who had started with the gifted educator completed all tasks within their regular classrooms. When I commented on the students’ newfound motivation, she replied, “As far as motivating the kids...they really motivated each other. They were helpful for trouble
shooting and wanted to make sure we had 100% completion in our room. I think it’s important for the kids to finish what they start.”

The principal at School A/School B_Oct, had contacted some principals on my behalf. One of those schools responded and participated. In this school, yet again, the gifted educator agreed to participate. In February, one student had completed the Internet Safety and Netiquette Module, but never progressed beyond that. With annual testing fast approaching, I called a friend who had connected me with a teacher who was one of my pre-reviewers in iteration one. That teacher no longer worked in third grade, but my friend connected me with the gifted educator at this school. That gifted educator met with me in February and agreed to participate. I gave her multiple warnings that previous gifted educators who tried to do it all during their limited pull-out time had not been successful. She said she would include the regular classroom teachers to ensure success. Regrettably, there was not much activity at all outside of this teacher’s pull-out time. There were periods spanning weeks at a time with no activity. Testing started. All computers were pulled from all classrooms in the school. I offered to bring in a set of laptops, but the school was on internet lockdown for testing. Finally, in mid-May, three students completed all tasks. This gave me 16 students from two of the three schools who completed all tasks including the feedback survey.

**Pre/post literacy assessment**

A combined total of 26 gifted third graders with parent permission slips from three schools completed the pre-test. Only 16 of those completed all the activities and the post-test. In iteration two, the test was on paper. This time, the students took the online version. The three students from School D took the post-test on paper. I downloaded it from Survey Monkey in color so it would look the same as the colorful version online. A one-tailed t-test was conducted
on the pre- and post-test to determine whether the results showed evidence of improved student learning (Table 15).

**Table 15: Correlated Means t-test (Iteration 3)**

<table>
<thead>
<tr>
<th>Diff of Scores</th>
<th>M</th>
<th>SD</th>
<th>95% C.I.</th>
<th>t(15)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>PostTest</td>
<td>22.25</td>
<td>4.669</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PreTest</td>
<td>18.375</td>
<td>3.964</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PostTest - PreTest</td>
<td>3.875</td>
<td>4.731</td>
<td>[1.35, 6.40]</td>
<td>3.276</td>
<td>.003</td>
</tr>
</tbody>
</table>

In iteration two with only 10 sets of data, there was no statistically significant change (p=0.1438). This time, with 16 completers and implementation of modifications to improve the intervention, there was a statistically significant difference (p=0.0026). A large effect size (d=.819) would suggest modifications to the website likely had a positive effect on student achievement. The average score increased from 54% to 62%. Even though this increase indicated a move in the right direction, the low score warrants further investigation.

A Spearman Rank Correlation Coefficient was again calculated on the split halves in the 26 completed pre-tests. Previously, the correlation coefficient (0.7737) was significant. This time, however, the correlation (0.6427) was not statistically significant (Glass & Hopkins, 1996). After applying the Spearman-Brown Prophecy Formula to correct for the small size, however, the estimated reliability would increase to 0.7825 indicating that the reliability of the whole test is likely to be significant.

**Student post-questionnaire**

All 16 students who completed the post-test also completed the post-questionnaire. In this implementation, I added the option of “NA-I did not experience this,” which was not an option previously. Tables 16–19 provide a summary of student responses. A discussion of each response and the way each differed from iteration two follow the tables. Table 16 shows the
students’ responses to a question that asked them to select the option that best described their opinion on each of the website’s features listed. It is interesting to note that similar to students who participated in iteration two, all participants rated at least one feature in this question, but not all students rated every feature. One student reported not learning about being a good digital citizen; however, all the students completed the digital citizenship module. It is possible the student did not understand the term “good digital citizen.”

Table 16: Students’ Opinions of Various Features (Iteration 3)

<table>
<thead>
<tr>
<th>Mark the box on each row that best describes your opinion on each of the following features of the website.</th>
<th>No opinion</th>
<th>Not good</th>
<th>So-so</th>
<th>Okay</th>
<th>Cool!</th>
<th>Loved it!</th>
<th>NA-I didn't experience this.</th>
<th>Total Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working in any order I want</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Going at my own pace</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>6</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Playing games</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using keys to open fun prizes</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Writing in Book Talks</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Getting feedback from my teacher</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning about being a good digital citizen in the module before entering the book talks</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The most popular features were “going at my own pace” and “playing games.” Oddly enough, “going at my own pace” also received a rating of “not good” from one student. “Writing in book talks” was evenly spread out in the range of opinions. Several students marked “no opinion” for “Using keys to open fun prizes” and “Learning about being a good digital citizen,”
yet five students rated each of these features as “Loved it!” Iteration two also had very high marks for “playing games” and split opinions on “working in any order I want.”

Students were asked to rank the activities from #1 (most favorite) to #6 (least favorite). To calculate the score for each activity, each rank was assigned points (6pts for most favorite and 1 point for least favorite) and then averaged. The right-hand column in Table 17 shows scores from iteration two for comparison.

Table 17: Students' Ranking of Favorite Activities (Iteration 3)

<table>
<thead>
<tr>
<th>Activity</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Total Responses Iteration 3</th>
<th>Score Iteration 3</th>
<th>Total Responses Iteration 2</th>
<th>Score Iteration 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novel Games (spinner and changing the mood of the sentences)</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>16</td>
<td>3.13</td>
<td>3</td>
<td>1.67</td>
</tr>
<tr>
<td>Art Appeal-art (matching famous paintings to reading passages)</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>16</td>
<td>3.06</td>
<td>3</td>
<td>5.33</td>
</tr>
<tr>
<td>Art Appeal-music (matching famous pieces of music to reading passages)</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>16</td>
<td>3.00</td>
<td>3</td>
<td>5.67</td>
</tr>
<tr>
<td>What a Character (guessing the character based on conversations in new setting)</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>16</td>
<td>4.19</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Digital Citizenship (learning about and showing what you know about internet safety and online communications)</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>16</td>
<td>3.44</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Get connected-book talks (discussion forum with other students on topics from the book)</td>
<td>8</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>16</td>
<td>4.19</td>
<td>3</td>
<td>2.33</td>
</tr>
</tbody>
</table>

In iteration two, with only three students, the two highest scoring areas of the website were “Art Appeal-Music” and “Art Appeal-Art.” This time, the most popular activities were “What a Character” (which placed third previously) and “Get Connected” (which placed in
fourth place previously). Students then provided a reason for selecting their first choice. These were coded using constant-comparison with two coders. Some student responses had more than one rationale. Table 18 shows the categories and frequency of each response.

Table 18: Students' Rationale for Ranking Choices (Iteration 3)

<table>
<thead>
<tr>
<th>Rationale</th>
<th>Frequency</th>
<th>Rationale</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student interaction</td>
<td>8</td>
<td>Too difficult</td>
<td>4</td>
</tr>
<tr>
<td>Area of Interest</td>
<td>6</td>
<td>Not area of interest</td>
<td>4</td>
</tr>
<tr>
<td>Increased learning</td>
<td>3</td>
<td>Did not experience</td>
<td>2</td>
</tr>
<tr>
<td>Stimulates thinking</td>
<td>3</td>
<td>Uncomfortable</td>
<td>1</td>
</tr>
<tr>
<td>Enjoyed games</td>
<td>1</td>
<td>Confusing</td>
<td>1</td>
</tr>
<tr>
<td>Enjoyed computers</td>
<td>1</td>
<td>Too easy</td>
<td>1</td>
</tr>
<tr>
<td>Enjoyed design</td>
<td>1</td>
<td>Test too long</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Preferred others</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not fun</td>
<td>1</td>
</tr>
</tbody>
</table>

The most common reason given by the students was related to “Student interaction,” a reference to the interaction they experienced with other students on the discussion board. Some comments (reported here verbatim with errors) about the interaction included, “It was my favorite because you can chat with other students (with good manners) you can also learn from other students thinking to” and “I chose discussion board because I liked how you could discuss things like bullies and weather and you could see what opinions and see what they know.” One student comment, “I think music is the best because I love music,” reveals explicitly the student chose the game related to music because it is an area of interest. The most common explanations for selecting an activity as least favorite were “Too difficult” and “Not area of interest.” These include statements such as, “I’m not very good at art,” “…it was hard to get it right,” and “I am not that kind of person who is a art and crafty person.” These responses do not require
modifications, since every child will have different areas of interest and different levels of success. The student who reported being confused had selected Novel Games as the least favorite. No other students in this data set made similar comments.

In regards to the impact of the online activities, students were asked five questions about various perceived effects on them. Table 19 shows the percentage of respondents who selected each possible response for these questions.

Table 19: Students' Perception of Impact of the Experience (Iteration 3)

<table>
<thead>
<tr>
<th>If the Reader’s Treasure expanded to include activities for other books and was assigned in school on a regular basis, how would this affect your desire to read?</th>
<th>After completing the Reader’s Treasure, how well do you feel you know the characters?</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. I would want to read a lot more.</td>
<td>5. Extremely well, better than just reading</td>
</tr>
<tr>
<td>81.25%</td>
<td>62.50%</td>
</tr>
<tr>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>4. I would want to read a little more.</td>
<td>4. Somewhat better than just reading</td>
</tr>
<tr>
<td>12.50%</td>
<td>25.00%</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3. It would have no effect on my desire to read.</td>
<td>3. About the same as after I finished reading</td>
</tr>
<tr>
<td>6.25%</td>
<td>12.50%</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2. I would want to read a little less.</td>
<td>2. I am now confused by some things</td>
</tr>
<tr>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1. I would want to read a lot less.</td>
<td>1. I thought I understood; now I don’t.</td>
</tr>
<tr>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>When writing to other students in the online book talks in The Reader’s Treasure, how likely were you to consider the quality of your writing?</th>
<th>In your opinion, how did participating in the book talks online affect your understanding of things you learned in The Reader’s Treasure?</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Very likely</td>
<td>5. Very much</td>
</tr>
<tr>
<td>37.50%</td>
<td>37.50%</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>4. Fairly likely</td>
<td>4. Somewhat</td>
</tr>
<tr>
<td>31.25%</td>
<td>25.00%</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>3. As likely as if I was writing anything</td>
<td>3. A little</td>
</tr>
<tr>
<td>12.50%</td>
<td>12.50%</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2. Fairly unlikely</td>
<td>2. Not much</td>
</tr>
<tr>
<td>6.25%</td>
<td>6.25%</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1. Very unlikely</td>
<td>1. Not sure</td>
</tr>
<tr>
<td>0.00%</td>
<td>6.25%</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>N/A-- I did not participate in the online book talks.</td>
<td>N/A-- I did not participate in the online book talks.</td>
</tr>
<tr>
<td>12.50%</td>
<td>12.50%</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
Table 19 (continued)

<table>
<thead>
<tr>
<th>In your opinion, how did participating in the online book talks in The Reader’s Treasure affect your understanding of the book?</th>
<th>In comparison with the typical class activities, how much thought and effort did you have to put in to successfully completing the activities in The Reader’s Treasure?</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Very much</td>
<td>5. A lot more effort than typical classroom activities</td>
</tr>
<tr>
<td>43.75%</td>
<td>50.00%</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>18.75%</td>
<td>18.75%</td>
</tr>
<tr>
<td>4. Somewhat</td>
<td>4. Somewhat more effort than typical classroom activities</td>
</tr>
<tr>
<td>6.25%</td>
<td>31.25%</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>3. A little</td>
<td>3. About the same as typical classroom activities</td>
</tr>
<tr>
<td>12.50%</td>
<td>0.00%</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2. Not much</td>
<td>2. A bit less effort than typical classroom activities</td>
</tr>
<tr>
<td>6.25%</td>
<td>0.00%</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>1. Not sure</td>
<td>1. A lot less effort than typical classroom activities</td>
</tr>
<tr>
<td>12.50%</td>
<td>0.00%</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>N/A-- I did not participate in the online book talks.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

An overwhelming majority of students selected the two most positive answers to each question. These high percentages indicate that students believe the experience helped them to know the characters better and to improve the quality of their writing in the discussion boards. They also reported that the website, if expanded to include other books, would increase their desire to read. Students who participated in the online book talks reported that doing so improved their understanding of the book as well as their understanding of what they learned in the other website activities. Additionally, students were asked if they had ever before experienced activities like these (either online or in class) after reading a book. Thirteen said, “no” and three said, “yes.” The two titles given by students who replied “yes” were MyOn and Sunshine State.

The last question asked students for any additional comments or suggestions. Students in iteration two expressed their frustration with the technical glitches in “Novel Games.” After
fixing these, the responses from iteration three were much more positive. Student responses were dual-coded using constant comparison until the themes were applied with 100% agreement. Figure 2 illustrates student suggestions.

![Bar chart showing suggestions/comments to improve website]

Figure 2. Student reactions and suggestions

The students’ request for more games underscores the motivational nature of games for learning. Adding more content, which the reviewers also suggested in iteration one, included suggestions such as “add more books to read so people can do more things on the website” and “I wish there was more to do.” Overall, from both iterations, students reported very favorable reactions to their experience with the intervention.

**Teacher post-questionnaire**

The teacher participants included three gifted educators and one regular classroom teacher. The three gifted teachers have had five or more undergraduate courses in gifted education, have a gifted education certificate, but neither a degree nor a minor in gifted education. All three have attended relevant workshops provided by the school district. They
reported their informal training consisted of reading books and articles, observing gifted classrooms, participating in professional learning communities, and interviewing or collaborating with other gifted educators. None of them were parents of gifted children. All rated their training and preparation to teach gifted students as “above satisfactory.” The regular classroom teacher, on the other hand, has had no training—neither formal nor informal.

Table 20 shows questions about the school-related struggles gifted students face and the challenges teachers face along with the teachers’ comments. The left-hand column indicates whether the response came from the regular (R) classroom teacher or from one of the three gifted educators.

<table>
<thead>
<tr>
<th>R=Regular</th>
<th>G=Gifted</th>
<th>In your experience as a regular classroom teacher, what school-related struggles do your gifted students commonly face?</th>
<th>As a regular classroom teacher, what challenges do you often face in providing appropriately differentiated instruction for your gifted students?</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>Gifted</td>
<td>Gifted students are pulled out for services and can feel segregated from their homeroom classmates and the regular classroom activities that are completed by them. They can feel a lack of responsibility and a sense of disorganization because they must keep track of work for multiple classes. I am not a regular classroom teacher. However I have co-teach with regular education teachers and the biggest struggle I see is trying to make the content rigorous for those students that are higher in academically.</td>
<td>Enrichment Resources are limited for the content areas in which the gifted students remain in the regular classroom. n/a</td>
</tr>
</tbody>
</table>

Table 20: Teachers' Perception of School-related Struggles (Iteration 3)
Table 20 (continued)

<table>
<thead>
<tr>
<th>R=Regular</th>
<th>G=Gifted</th>
<th>In your experience as a regular classroom teacher, what school-related struggles do your gifted students commonly face?</th>
<th>As a regular classroom teacher, what challenges do you often face in providing appropriately differentiated instruction for your gifted students?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>G</td>
<td>When I taught in the regular classroom, students often did not feel challenged and were not able to work at the interests they had. They felt pressured to &quot;act like a gifted kid&quot; rather than to be themselves.</td>
<td>Even in my gifted classroom now, I need to differentiate. All students who qualify as gifted are put in my reading class so I need to work with the lower performing students while stimulating all of them to expand their horizons. Challenges I face include a severe lack of computer time (district/state testing has almost eliminated our class time in the computer lab) and the inability to deviate from the district curriculum schedule. Our district is in a &quot;one size fits all&quot; philosophy now, and that makes doing extra activities in the classroom very difficult.</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>They commonly face difficulties dealing with interpreting and understanding other students regardless of the other students' gifted status. Communication and social skills have to be overtly taught to most.</td>
<td>I have the hardest time providing the differentiation in math because I just want to teach them as many years ahead as they can process, but I am discouraged to do that.</td>
</tr>
</tbody>
</table>

Some recurring thoughts include a lack of rigor in the regular classroom curriculum, lack of resources, and the pressure to stick to the “one size fits all” philosophy. When asked to share any ideas for support(s) that might help teachers address gifted students’ needs more effectively, two of the gifted educators offered the following suggestions: “Teacher training in technology would be really helpful to help my kids. Our school has no tech classes at all, nor any tech teacher,” and “I would like to have a support model to challenge them in an online format where they can learn and select areas of study without a ceiling of grade level (college courses, if they wish) and then complete real-world activities and expression; be that academic or creative.” All
of this input from the teachers echoes the perspectives of many teachers throughout the literature reviewed in Chapter 2.

To gauge the teachers’ perception of the impact of the website on their students, they were asked several questions in the survey. In iteration two, the only regular classroom teacher who completed this survey had all positive responses. The remaining four teachers responded in iteration three, after modifications had been made to the site. Table 21 shows those questions and corresponding responses.

Table 21: Teachers’ Perception of Impact on Students (Iteration 3)

<table>
<thead>
<tr>
<th>If The Reader’s Treasure expanded to include activities for other books, how do you think integrating it into your curriculum on a regular basis might affect your students’ desire to read?</th>
<th>Compared to traditional literature response assignments, how engaging was The Reader’s Treasure for your students?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. They would want to read a lot less.</td>
<td>1. Much less engaging</td>
</tr>
<tr>
<td>2. They would want to read a little less.</td>
<td>2. Less engaging</td>
</tr>
<tr>
<td>3. It would have no effect on their desire to read.</td>
<td>3. About the same</td>
</tr>
<tr>
<td>4. They would want to read a little more.</td>
<td>4. Somewhat more engaging</td>
</tr>
<tr>
<td>5. They would want to read a lot more.</td>
<td>5. Much more engaging</td>
</tr>
</tbody>
</table>

116
<table>
<thead>
<tr>
<th>In comparison with the typical class activities, how much thought and effort did your students have to put in to successfully completing the activities in The Reader’s Treasure?</th>
<th>Consider the quality of your students’ writing in the online book chats in The Reader’s Treasure. How does their input in the online book chats compare to other written responses to reading other books?</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. A lot more effort than typical classroom activities</td>
<td>5. My students’ posts were much better than previous written responses.</td>
</tr>
<tr>
<td>4. Somewhat more effort than typical classroom activities</td>
<td>4. My students’ posts were somewhat better than previous written responses.</td>
</tr>
<tr>
<td>3. About the same as typical classroom activities</td>
<td>3. My students’ posts were about the same as previous written responses.</td>
</tr>
<tr>
<td>2. A bit less effort than typical classroom activities</td>
<td>2. My students’ posts were not as good as previous written responses.</td>
</tr>
<tr>
<td>1. A lot less effort than typical classroom activities</td>
<td>1. My students’ posts were of much poorer quality than previous written responses.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How effective do you feel the website was in leading students to mastery of the objectives?</th>
<th>Have you ever utilized activities in your classroom similar to those on the Reader’s Treasure before?</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Very effective</td>
<td>No</td>
</tr>
<tr>
<td>4. Somewhat effective</td>
<td>Yes</td>
</tr>
<tr>
<td>3. so-so</td>
<td>(Skipped)</td>
</tr>
<tr>
<td>2. Not very effective</td>
<td>2</td>
</tr>
<tr>
<td>1. Not effective at all</td>
<td>0</td>
</tr>
</tbody>
</table>
Three of the teachers reported all positive perceptions (scores of 3 or higher). The responses of 1 or 2 came from the two gifted educators who did not have any students move beyond the Internet Safety module. Given their students did not participate in the book talks while they were involved, they could not possibly accurately respond to the question comparing students’ writing in the book talks to regular reading response activities. It is possible the teacher at School B could have gone back and looked at the students’ writing submitted in the regular classroom. This data highlights the need for an “N/A—my students did not experience this” option for all questions that refer to a particular game or task. For the last question, one teacher skipped it and made a comment that she was not sure what I was asking.

Even with these low scores included, the overall reactions were positive: 75% believed the activities were somewhat or much more engaging and 75% believed they were equal to or more challenging than typical classroom activities. Two of the teachers believed the activities were “somewhat” to “very effective” in leading students to mastery of the objectives. The other two selected “not very effective,” although I have to wonder whether I should have included an option for those who did not feel their students had completed enough of the activity to make this judgement. As to the effect on the students’ desire to read given the website were expanded to include more books, they were evenly spread out from “A little less” to “A lot more.”

The iterative design process in this study was limited to only two iterations within classrooms. The results indicate an overall positive reaction and some useful data for further improvements before developing a more complex level 2. Undoubtedly, the modifications would undergo a similar iterative development process. Due to the positive reactions from students and teachers during this study, I predict future modifications would meet with similar approval.
Summary

In this chapter I reported the data collected while conducting the three iterations of this design experiment. The data came from a variety of participants including reviewers, teachers, and students via questionnaires and a pre- and post-tests. Some interpretations and inferences were included in order to describe the modified instruments and intervention for the next iteration. The next chapter includes further discussion of the results and implications for future research.
Chapter 5: Discussion

In the previous chapter, I presented the results of all three iterations of this formative design experiment. Because the results from each iteration informed modifications for the next, some interpretations of the findings were included. In this chapter, I review the purpose and the research questions and goals of this study. Then I summarize the findings, describe modification plans for future development, examine trends, and offer interpretations of the findings including connections to the literature. Before discussing the implications for classroom practice, I discuss the systemic challenges my participants and I (like many teachers and researchers) faced. Although this was not an initial purpose of the study, given the obstacles I faced and overcame to complete my study, I want to share this process to guide researchers who wish to conduct design experiments within classrooms.

The purpose of this design experiment was to (1) develop an instructional intervention aligned with current theory, (2) test, modify, and retest the intervention in a naturalistic setting while measuring its effectiveness in achieving the literacy objectives and pedagogical goals, and (3) to describe the reactions of the regular classroom teachers and their third grade gifted students. The pedagogical goal is to find out whether the intervention works, why or why not, and in what context. To do so, the study was designed around five research questions that examine the factors that support or inhibit the effectiveness to guide modifications, the effect of the modifications on the outcomes in the next iteration, effectiveness in achieving literacy objectives, students’ affective responses, and students and teachers reactions to particular
features of the intervention. The three main purposes of the design experiment provide the means to organize the discussion of results.

**Review of Procedures and Results**

**Purpose 1: Develop instructional intervention aligned with current theory.** The purpose of iteration one was to develop the instruments and to ensure the intervention aligned with current theory and practice in the fields of gifted and literacy education (Tables 6–8). The website activities were developed based on theory and practice in the fields of literacy and gifted education. To gauge this alignment, experts in the fields conducted thorough reviews of all the instruments and the intervention itself. Pre-reviewers with training and experience in survey development, measurement, and literacy instruction reviewed the instruments and provided excellent guidance. The expert reviewers then conducted additional thorough critiques. The two teacher questionnaires and the student post-questionnaire both required minor refinements of some questions to clarity and to focus respondents’ answers. Most of the changes, however, were related to formatting and response options that can affect the results. For example, if someone wants to respond “N/A” and that option is not there, that respondent is forced to select an inaccurate response that taints the data. Unfortunately, this happened for one question in the student post-questionnaire that went unnoticed until data analysis from iteration two. The option was added before iteration three; students selected it in iteration three demonstrating the need for it. Similarly, a few questions on the teacher post-questionnaire went unnoticed until the iteration three analysis.

The development of the expert reviewer form faced similar challenges leading to modifications during the pre-reviewer stage. Some questions were refined and reformatted for clarity and ease of use. The last pre-reviewer, however, was meticulous and completed the form
as if she were one of the experts in order to give thorough feedback on the form. Having someone from the target population (experts in the field of literacy, in her case) pilot the form is an important step in the instrument development process. As it turned out, this step highlighted a very crucial need for modification—clarification of the intent and context of the intervention itself. Once these were addressed to avoid future confusion, the next two expert reviewers completed the form and showed no evidence of any confusion. Their very similar responses graded higher than Expert Reviewer 1’s initial responses when she believed the intervention was intended as a substitute for interaction with a trained literacy teacher. When asked if she would have higher responses now that the purpose had been clarified, she said she would. The average responses for those items (see Table 6) would be higher if Reviewer 1 were to revise her scores for content accuracy, number of practice opportunities, and supporting mastery of the objectives. For future use, I will provide clear expectations for each level of the game. Level 1 (the current version) is only intended to provide games that will likely move students toward mastery of the objectives.

On the Expert Reviewer form, reviewers in iteration one rated various statements for each area of the website (level of challenge, engagement, clarity, ease of navigation, etc.) and their average scores were calculated (see Table 6). No area had a low average level of agreement (<2.5 out of 5) to the statements. Other than the moderate scores due to misunderstanding, the remaining items with moderate scores (average scores between 2.5 and 4.5) would be best evaluated in conjunction with the data from students in iterations two and three. The response from students related to those items was used to determine whether the experts’ responses in iteration one based on theory and practice were confirmed or rejected in iterations two and three.
Based on these scores and the artificially lower scores for items marked with * in Table 6, the following concerns required further data from the remainder of the study: level of difficulty, engagement/enjoyability, and support in achieving objectives. The experts’ concern for a shortage of practice opportunities for “Novel Games” and “What a Character” will be remedied in future development as adding more questions/scenarios to the level 1 activities is beyond the scope of this study to. The section addressing the second purpose of the study includes discussion of data related to achievement of objectives. A discussion of the student responses follows to confirm or refute the reviewer’s moderate concerns.

**Level of difficulty.** On the post-questionnaire, students were asked, “In comparison with typical class activities, how much thought and effort did you have to put into successfully completing the activities in The Reader’s Treasure?” In iteration two, two students responded “A lot more effort” and one responded “About the same.” The one teacher who completed the post-questionnaire in iteration two said, “A lot more.” Thus, the level of difficulty was not modified before iteration three. Of the 16 respondents this time, 68% reported either “Somewhat more” or “A lot more” and 32% replied, “About the same.” When teachers were asked to rate the level of thought and effort required of their students compared to typical classroom activities, the responses from the four teachers in iteration three were more moderate, yet still mostly positive. Two selected “Somewhat more,” one selected “About the same,” and one selected “A little less.” From a combined total of 19 students and 5 teachers, only one rating of “A bit less” showed a general perception that the site required “About the same” to “A lot more” effort than typical classroom activities. Given that the intervention currently has only a level 1, these findings would indicate that adding a level 2 with more challenging activities would be appropriate.
However, I need to avoid increasing the difficulty so much that the intervention becomes overwhelming.

**Engagement and enjoyability.** The experts gave moderate scores for engaging and enjoyable for “What a Character” and “Internet Safety.” When students ranked the activities from least to most favorite, in iteration two both respondents placed “What a Character” as third out of six. In iteration three, no students listed it as least favorite and six ranked it as third. Thus, the experts’ moderate concern of engagement and enjoyability with this game aligned with the students’ moderate responses. Adding more scenarios, as suggested by students, would likely increase the enjoyment level.

Student and teacher reactions to the “Internet Safety” module were more negative than the experts’ moderate concern. The students in iteration two gave “No opinion” and “Okay, cool!” reactions to the module. The three respondents ranked it as their fourth, fifth, and least favorite. During the talkalouds, two students ran out of teaching content which is only presented when answering incorrectly or selecting “I don’t know.” They expressed frustration when they could not continue. With the third talkaloud student, I provided reminders and guidance on a few of the questions to help him succeed. Before iteration three, I added more questions and more content to reduce the chances of students’ progress having to request being reset (and start over). These changes increased successful completion of the Internet Safety module in iteration three, but it was clearly not enough to overcome some negative opinions. Teacher responses from both rounds were spread out regarding the “Internet Safety” module: (1)“So-so,” (1)“Okay,” (1)“Very Nice,” (1)“Loved it!,” and (1)“N/A or No opinion.” In ongoing conversations with teachers during iteration three, they often reported students were getting frustrated with the Digital Citizenship module. Non-completers typically stopped at some point in this module. In an
attempt to keep students engaged in this activity, I asked teachers to encourage the students not to rush, use the notes I provided on the “For students” page of the website, and partner up to help each other. This is what the regular classroom teacher in SchoolB_Oct did to re-invigorate her students. In iteration 3, with the addition of more content (videos, comic strips, text and images), more questions, and more reference notes, when asked to rate the activities from least to favorite, the students’ rankings were evenly spread out with half ranking it in first, second, or third place. Five of the seven students who described their opinion of the module chose “Loved it!” one said, “Okay, Cool!” and only one said, “Not good.” This positive trend from the experts’ moderate reactions to the positive responses from students and teachers in iteration three suggests the modifications were effective. I hypothesize that adding even more engaging content and adding questions that vary more to reduce the feeling of redundancy should continue to improve enjoyment and engagement levels for the “Internet Safety” module. Hopefully, adding more scenarios to “What a Character” will also provide more game time to increase enjoyment of that game as well.

**Purpose 2: Test, modify, and retest to measure effectiveness.** To measure the effectiveness of the iteration in achieving the literacy objectives, a pre- and post-test was given. There were also some questions on the student and teacher questionnaires as to their perceptions of its effectiveness. In the expert review stage, the reviewers assigned “fit scores” of how well they believed the question fit the corresponding literacy objective. The averages were all 3.67 or higher on a scale of 1 to 5, with 5 being the highest level of fit. A few helpful comments were made which informed some minor revisions. In iteration two, only 10 students, all from the same school, completed both the pre- and post-test. None of these students participated in the discussion board prior to taking the test and most of them had not completed the Internet Safety
Module. A one-tailed t-test was conducted to look for evidence of positive change. Unfortunately, there was not a statistically significant change (p=0.1438). After modifications to the website were made, a new group of students interacted with the intervention in iteration three. This time, 16 students completed both tests. All of them completed the Internet Safety module and almost all of them participated in the discussion board. In iteration three, there was a statistically significant difference (p=0.0026). One can infer from this result that in iteration three, learning took place. Extrapolating further, the modifications combined with completion of the tasks had a positive effect on the students’ mastery of the literacy objectives. An average score of 62%, however, represents a fairly low level of mastery. Earlier in this chapter, however, I summarized the results in regards to level of difficulty. An overwhelming majority of both students and teachers indicated the activities were difficult and most of the students had never experienced activities like these. With more practice opportunities and a level 2 to further develop their skills, I hypothesize an even greater increase in overall mastery.

Some questions on the post-questionnaire asked students’ about their perceptions of the activities’ impact on their writing in book talks, their understanding of the characters, and the effect of the book talks on their understanding of the book and their understanding of what they learned in the website. Table 22 lists the average student responses for these questions from both iterations. Each question had five response options with five being the highest.
Table 22: Students’ and Teachers’ Perceptions of Effectiveness

<table>
<thead>
<tr>
<th>Student Questions</th>
<th>Iteration 2 (3 responses)</th>
<th>Iteration 3 (16 responses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>After completing the Reader’s Treasure, how well do you feel you know the characters?</td>
<td>5</td>
<td>4.5</td>
</tr>
<tr>
<td>When writing to other students in the online book talks in The Reader’s Treasure, how likely were you to consider the quality of your writing?</td>
<td>5</td>
<td>4.14</td>
</tr>
<tr>
<td>In your opinion, how did participating in the online book talks in The Reader’s Treasure affect your understanding of the book?</td>
<td>4.33</td>
<td>3.93</td>
</tr>
<tr>
<td>In your opinion, how did participating in the book talks online affect your understanding of things you learned in The Reader’s Treasure?</td>
<td>4.67</td>
<td>3.93</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher Questions</th>
<th>Iteration 2 (1 response)</th>
<th>Iteration 3 (4 responses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consider the quality of your students’ writing in the online book chats in The Reader’s Treasure. How does their input in the online book chats compare to other written responses to reading other books?</td>
<td>N/A (students did not participate in book talks)</td>
<td>2.33</td>
</tr>
<tr>
<td>How effective do you feel the website was in leading students to mastery of the objectives?</td>
<td>4</td>
<td>3.25</td>
</tr>
</tbody>
</table>

Students reported knowing the characters very well and “very” to “highly” likely to consider their quality of writing while posting to the discussion board. The effect of the discussion board on their understanding of the book and the things they learned on the website was rated lower. Teachers believed the students’ responses on the book talks were “About the same” or “Poorer” than on other written responses in their classrooms. Overall, teachers were split on their perceptions of the website’s effectiveness in moving students toward mastery of the objectives. Three teachers selected “somewhat” to “very” effective and two selected “not very” effective. Although the test scores for iteration three indicate some learning occurred and somewhat positive students and teachers perceptions, the low scores for items related to the book talks highlight a need for improvement. Modifications planned to address this include expanding
the example conversations to be more rigorous and adding a tutorial focused on the literacy objectives tied to the reading responses. The mixed opinions about the effectiveness in achieving the literacy objectives may be partly due to a lack of understanding of exactly what the objectives were. To make these more evident, I could add a button on the menu bar of each game to open a box showing the objectives with an example to help both students and teachers understand what the game is designed to help them learn. Additionally, I will add a link on the “For Teachers” page to a chart showing the activities’ objectives along with how the strategy shows differentiation according to theory and practice in gifted and literacy education. I will also add links to sources to help teachers understand what appropriate differentiation is and why it is important.

**Purpose 3: Reactions from teachers and students.** The overall affective response from both students and teachers was positive. The honest and specific feedback shed light on some areas that need improvement. The modifications from each iteration resulted in improvement of perceptions and achievement of literacy objectives. Given the school-related struggles students face and the needs of teachers in differentiating, the third purpose of this design experiment was to gauge the reactions—affective responses—from teachers and students. If the intervention relieves teachers’ workload and engages gifted students in learning, then I will consider the intervention a success.

**Students.** The most popular feature in both rounds was “playing games.” Learning games have been proven to be both motivating and effective (Gee, 2007; Gee, 2013). This study supports that body of research. In iteration two, with only three questionnaires completed, the only feature that was rated as “not good” was “working in any order I want.” In iteration three, three students also marked this item as “not good” and one person rated “going at my own pace”
as “not good.” I plan to add a checklist for students so those who want to go in the order of the list may do so, although the freedom to choose their own order will remain in place. “Writing in book talks” and “Learning about being a good digital citizen” each received one rating of “not good” in iteration three. When asked why they selected a particular activity as their favorite, the top two reasons from both iterations combined were “student interaction” (8) and “area of interest” (9). Their top two reasons for their selection of least favorite were “too difficult” (4) and “not area of interest” (4). Despite the mixed reactions on the discussion board showing a need for improvement, the students really enjoyed the opportunity to interact with their like-minded peers. Based on the data from the three iterations, the modifications planned for both of these areas of the website should increase success and enjoyment of these activities.

The last question on the student post-questionnaire was an open-ended question encouraging students to share any comments or suggestions they had about The Reader’s Treasure website. The three responses (reported here verbatim with errors) in iteration two were, “The spinner game did not work. the website was really not that good,” “besides the spinner game everething was fine,” and “I liked this program.” After fixing the technical issues with “Novel Games” (a.k.a. “spinner game”), and other modifications, the responses at the end of iteration three (Figure 3) were much more positive. Their affective responses are evident in their suggestions.

The students love of the games is underscored in their request for more of them. Adding more content included suggestions such as “add more books to read so people can do more things on the website” and “I wish there was more to do.” One student mentioned adding more books with the caveat they not be scary. Expert reviewers had also requested more content to allow students additional practice in order to increase mastery. For future development, I will
add more interactions in each activity to provide a stronger scaffold upon which to build the more complex level 2 activities. The teacher at School D had informed me that one of her students was not allowed to participate because the family was from Puerto Rico and the parents were concerned that the topic of a tsunami would be too scary. In the future, when more books are added, they will have a description pop-up prior to selection of the book that will include the topics addressed in the book. All the responses on the questionnaires from both iterations show a general positive response to the experience. Modifications for iteration three appear to have increased the affective responses by fixing the technical glitches and addressing some of the student frustrations from iteration two.

**Teachers.** The teachers were asked to describe their overall reaction (Table 23). Several said it was “interesting,” “user-friendly,” “I liked the interactive games,” and “combining music with mood was very clever.” The negative comments were mostly about the frustration the students faced when they worked in the “Internet Safety” module. One teacher also mentioned the lack of computer time.

Table 23: Teachers' Affective Responses

<table>
<thead>
<tr>
<th>Please, briefly describe your overall reaction to the instructional website. Include what you liked/disliked and why.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I thought the site was interesting; decent graphics, and large icons. The kids did not really know that the pictures were icons to click on. They had some difficulty with the site. One thing that really frustrated them was the progress bar. They would be making progress and then the bar would get smaller. The website was user friendly and the students were able to help others trouble shoot as problems arose. I liked the interactive games for the students. However, the internet safety and netiquette module is way too hard for students to complete on their own. The vocabulary itself was confusing and hard for them. The students lost all the interest when they reach this point on the website. I like this website, but unfortunately my computer lab time here at school was affected. The students enjoyed it greatly, especially when they saw prizes coming their way! Some of the activities were interesting. Combining music with mood was very clever. The students seemed to enjoy this too.</td>
</tr>
</tbody>
</table>
The most telling indicator of the teachers’ opinions would be whether they would use it again and whether they would recommend it to other teachers. Table 24 presents teacher responses to these questions.

Table 24: *Teachers’ Recommendation for Future Implementation*

<table>
<thead>
<tr>
<th>Would you use this instructional website again? Why or why not?</th>
<th>Would you recommend this instructional website to other teachers? Why or why not?</th>
<th>Yes or No</th>
</tr>
</thead>
<tbody>
<tr>
<td>I would use this site again, but it took a fair amount of teacher support to get the kids through it. If it was more autonomous for students I would be more likely to use it. I loved that the questions had musical and artistic responses that tied into the book. I think that the discussion boards could be a great way for peer communication and feedback outside of school. I know that I respond more to online comments than in person, so maybe the kids would too. (Especially some of the quieter ones.)</td>
<td>I would recommend that teachers check out this site, but only after some of the kinks are worked out. Also, it would be great to have a companion site to go with each one of our grade level literature based units. I love the idea of it.</td>
<td>Yes with revisions</td>
</tr>
<tr>
<td>If I were assigned gifted students again I would use this website but It was difficult to find the time for students to access the website at school due to limited technology and scheduling conflicts.</td>
<td>I would recommend this website to other teachers because the students enjoyed it and were motivated by seeing their progress.</td>
<td>Yes in spite of barriers</td>
</tr>
<tr>
<td>Probably not because once you get to the module of internet safety he students require help to complete it and it is impossible with one teacher to guide them through the entire module in order to get to the discussion board.</td>
<td>No, because once the games are completed the internet safety module is too complicated.</td>
<td>No Internet Safety Module</td>
</tr>
<tr>
<td>I would only use this site again if I could have designated computer time for the students to become engaged. The learning on the site was valuable.</td>
<td>I would recommend this site only if teachers would have an opportunity to link information from the site (beyond internet safety) with the classroom teaching. I feel that would be the most beneficial situation.</td>
<td>Yes with computer access; if linked more to existing curriculum</td>
</tr>
<tr>
<td>Not at this time of the year. When we are able to go to the computer lab as a class, then I would be able to put all my gifted student on their own computer to complete the activities. But it is difficult to get all gifted students on the 2 computers I have in the classroom. Some games &quot;froze up&quot;, which was very frustrating.</td>
<td>Maybe, not sure. We have so many other websites we are required to use.</td>
<td>Maybe with computer access; too many other required websites</td>
</tr>
</tbody>
</table>
One teacher said she would use it again and recommend it to others. In spite of the barriers, she saw value in the intervention. Two said yes with some conditions: more computer time, content linked more to the existing curriculum, and improvements with the “Internet Safety Module.” One said she would not use it again, nor would she recommend solely because of the “Internet” module. Finally, one teacher was not sure due to lack of computer time, technical glitches, and the requirements for using other websites for other students. I am confident that the modifications planned, especially for the “Internet Safety” module, and some more support on how teachers can integrate the website into the existing curriculum would alleviate their reservations.

**Reflection.** The qualitative and quantitative data analyses revealed a positive affective response by both students and teachers to the intervention as a whole. Particular features need some development to further improve the effectiveness on achieving the mastery of the skills, as well as improve the affective response of the students. While these results are definite grounds to pursue further development, conducting my research met with many of the obstacles that teachers have reported for decades: training, time, and resources (Archambault et al., 1993; Loveless et al., 2008; Shaffer & Gee, 2005; U.S. ED, 1993). These challenges not only extended the time to complete the study and limit the amount of data collected, but also impeded the teachers’ implementation options which could have provided information on a broader array of innovative strategies to inform future practice. This study adds to the body of evidence that indicates these obstacles are ubiquitous to K12 practice and research.

**Modification Plans for Future Development**

The modifications listed in this section will be reserved for future development. An effective instructional design team should include programmers, instructional designers, web
design experts, and subject matter experts (SME). First, I will recruit someone with extensive knowledge and experience with literacy education and differentiation for gifted to join the development team. Second, the team will conduct a more extensive literature review on strategies for the specific literacy skills currently addressed in level 1—characterization, vocabulary, and tone/mood. The new team and our literature search, along with the data from iteration three, will inform modifications needed beyond what I have listed below. Third, I will investigate other literacy skills to determine the objectives for levels 2 and 3. A draft of activity ideas will be developed with the team of experts in instructional design, literacy education, and gifted language arts curriculum. At this point, as before, a programming team will develop a viable prototype for experts to review before implementing in classrooms.

The extensive process I just described will undoubtedly produce very specific design plans. Although doing so now would go beyond the scope of this study, an initial review of some relevant literature in literacy spurs some interesting options that my future team of experts would develop. Research-based, effective instructional strategies for vocabulary, tone/mood through arts integration, and character studies provide ample suggestions as starting points for designing more complex activities in level 2. For example, Dymock (2007) discusses the importance of teaching story grammar, including characterization, as a means to improve reading comprehension. Some strategies include story webs, episode analysis, and character analysis. My team would start with the traditional activity where the class compiles a list of characters’ physical descriptions and adjectives describing their character, then go on to explore more complex components such as their influence on the plot and theme and perhaps even locate real-world equivalents as Dymock suggests (2007). Engaging with literature through drama is an impactful way for students to gain a deeper understanding of characters both in and outside of
the story (Adomat, 2012). Some of the examples in Adomat’s article include interviewing a student who is in the role of a character, having characters from two stories interact with each other, and problem-solving after coming out of role (2012). In *Creating Meaning Through Literature and the Arts*, Cornett describes other strategies for exploring characters in depth such as character wheel, graph, sociowheel, inventories, poems, and character report cards (2011, p. 127). Working from this literature, for level 2 of my website, I could add a blogging area in “What a Character” where students can take on various roles and communicate with each other about motives, problems, and consequences of actions; create multimedia presentations of fan fiction where a character goes to a new setting; or write in role and grant interviews by another student. Sociowheels and character report cards could be converted to a game. Multimedia presentations focused on characters could include music and art to convey the tone/mood of the text as well. The process of pairing subjects engaging the same cognitive process “appears to generate a cognitive resonance between the two subjects, deepening learning in both” (Rabkin & Redmond, 2006, p. 29). Pairing the process of identifying mood in music and art with identifying tone/mood in literature deepens understanding. In future development, this pairing can be taken even further by having students do podcasts reading excerpts with vocal variations and background music to create mood for the listener. Adding visuals for a video, rather than just audio, storytelling can connect art, music, and literature in an even more complex way (Gullat, 2008; Rabkin & Redmond, 2006). Using visual aids while talking about vocabulary can be an effective strategy for vocabulary instruction (Ming, 2012). Yet another connection across the literacy skills can be added to the level 2 student response activities by weaving in a focus on the nuances of vocabulary. For example, in the students’ multimedia product, an image could portray the meaning of a particular word or phrase used in the students’ work at the point in their reading
where the word appears. Students could write a song from the perspective of a character, using effective word choice and music that creates the mood appropriate for the character’s message. For a summative project in level 2, students could create a music video of the song they wrote. This activity would bring in drama, music, and visual representations tied to the vocabulary and deep understanding of the character. Such a summative project would demonstrate the students’ mastery of all three literacy skills—characterization, vocabulary, and tone/mood. This project takes a sociocultural approach leveraging the potential in new literacy studies as discussed in chapter 2.

The current activities and proposed level 2, not only integrate multiliteracies, they also fit the accepted gifted differentiation guidelines of modifying content, process, and products (Tomlinson, 2005; VanTassel-Baska & Wood, 2010). The suggested modifications would meet the three interrelated dimensions of the Integrated Curriculum Model (ICM). ICM requires “emphasizing advanced content knowledge that frames disciplines of study…to enhance the challenge level of the curriculum” (VanTassel-Baska & Wood, 2010, p. 345). Self-directed study in art and music, exploring the nuances of language, and delving into character studies as part of the intervention are all examples of the first dimension. The next dimension involves, “providing higher-order thinking and processing” (p. 345) through thinking models and discipline-specific models to generate projects and rich discussions. Investigating literacy skills in unique and challenging ways, participating in the online discussions, posing and answering word challenges, and finally creating a culminating multimedia project fits this criteria. Applying understanding across disciplines in “Art Appeal” and settings in “What a Character,” as evidenced by complex discussions helps students gain a better understanding of literacy as a discipline. This addresses the third dimension of ICM which involves “organizing learning experiences around major
issues, themes, and ideas that define understanding of a discipline and provide connections across disciplines” (VanTassel-Baska & Wood, 2010, p. 346). Level 3, then, would be a good place to begin exploration of other literary elements in a systemic approach to new literacy learning.

Undoubtedly, a more extensive literature search and collaboration with experts in gifted and literacy education would yield a plethora of ideas that could be incorporated into the website for level 2. For now, based on the literature reviewed thus far and the qualitative and quantitative data obtained in iteration three, I would propose the following modifications to level 1 and the website overall:

**What a Character**

- Add more scenarios to experience when students are unsuccessful, rather than repeating the same one so they can just memorize the correct response.
- Add more feedback. When students guess incorrectly, a pop-up box that explicitly states what in the dialogue would disqualify the character they guessed. This should help them learn the process of examining characters’ interactions, which reveal something about their individual characters.

**Novel Games**

- Add more links to other sources (tsunami video, science vocab/concepts, nuances of language)
- Add a variation to focus on whole sentences rather than just individual words.
Art Appeal-Music

- Add audio clips and more description on the information page of how elements of music evoke moods. This is especially important for students with little background knowledge in music.

- Add a link on the menu to fun activities for Art and Music (currently located at the bottom of the information page) so students can go to the interactive art websites at any time. Art and Music were both highly popular among the students and teachers were pleased to see the arts being incorporated too.

Art Appeal-Art

- Add feature to click or hover over picture to enlarge it, possibly with a brief description of the artist’s techniques which create the tone of image.

Netiquette and Internet Safety Module

- Create a separate hot spot to enter the module. Students and teachers reported not knowing how to get to the discussion board. I had already created a video on the “For Teachers” page about it, but that did not seem to reduce confusion.

- Add a directions page at the beginning that explains how to succeed before they begin.

- Remove the progress bar or modify it so it does not move backward when the user answers a question incorrectly. The non-completers and some frustrated completers expressed their displeasure with seeing the progress bar reverse.

- Revise some questions to reduce similarity leading to the feeling of redundancy.

- Add even more instructional content and questions to reduce redundancy. Although there were fewer students who ran out of content, it still happened so even more content is needed. (modify content)
• Make an animated gif of the phone ringing appear after completing the Internet Module, so they know they have to click the phone again to access the discussion board.

• Add a lesson plan on the “For Teachers” page on internet safety and netiquette if they feel their students need the information more explicitly taught up front.

Discussion board-book talks

• Add link to possible questions for discussion to include as many areas of interest as possible. (persuasive writing; communicating)

• Remove the post-test link from the opening page so students have to log in to the book talks before they can take the post-test. This modification should reduce the number of students who move on without participating.

• Expand the current examples to be more rigorous since most teachers said their students’ writing was less rigorous than current reading response activities.

• Add an area for posting reading response artifacts (podcasts, visuals, multimedia presentations, etc.). Perhaps this should become available to students only after they have participated in all other areas of the discussion board or even after they have completed level 2 activities.

Discussion board-word games

• Investigate the possibility of replying to individual guesses without the others seeing it.

  Once a student guesses, the other student responses will be.

Teacher Page

• Mention options for homeschoolers.

• Add links to lessons related to Escaping the Giant Wave.

• Add links to literature on effective strategies for literacy education
• Add links to literature on understanding nature and needs of gifted students, as well as appropriate differentiation

**Website Features**

• Create a bookshelf of multiple titles. Hovering over titles triggers a pop-up box with a description of the book. Users will then select the book of their choice. The games that follow would be related to that book.

• Add a checklist that shows what has been completed. Students who did not like “Working in any order I want” could follow the order of the list.

• Make opening the treasure chest lead to a new game and then level two

• Collaborate with curriculum developers to add books already used in class with differentiated activities on the skills covered. Per teacher comments, this should make the website a more seamless integration rather “just another thing to do.”

**Research Obstacles**

Differentiation in schools for gifted students has been minimal for as long ago as the early 1920s when Lewis Terman (1925) and Leta Hollingworth (1942) conducted their seminal research on high IQ students. A number of survey studies indicated teachers still only differentiate curriculum slightly. Across the studies, teachers self-reported a desire for more training and resources, and expressed the desire for more enrichment opportunities for gifted students (Archambault et al., 1993; Loveless et al., 2008; Shaffer & Gee, 2005; U.S. ED, 1993). With so much research calling for change, why has no significant change occurred? One step toward overcoming the barrier of training is for teachers to gain an understanding of the struggle of the gifted child. Gross (2006) found significant attitudinal change in just one workshop. Convincing teachers of the need for differentiation would not require much effort to take this
first step. Changing in practice, however, is a much slower process (Cashion, 2000). More needs to occur to get knowledge from the researchers to teachers who can apply it to their practice. With so much research supporting differentiation and so little differentiation in practice, the knowing-doing gap (a.k.a. research-practice gap) is evident.

In 2012, the AERA convention motto was “Non Satis Scire: To Know Is Not Enough.” The presidential address expounded on the theme by reporting the phenomenon of the gap and calling for a change in research approaches to bridge the gap. The AERA president, Dr. Ball, reiterated the goal of AERA is to “advance knowledge about education, encourage scholarly inquiry related to education, and promote the use of research to improve education and serve the public good” (Ball, 2012, p. 283). In her address, she summarized explanations for the gap including lack of professional norms; sufficient time for teachers and policy makers to consult findings; and lack of opportunities for collaborations between educators, policy makers, and researchers (Ball, 2012). Time, resources, and support from administration impede not only differentiation for gifted students, but also the opportunity for research to have any practical impact on practice. The K12 community needs to create new professional norms to increase collaboration with researchers and to allow teachers to test research-based innovations. The research community also needs to shift focus to become generative—seeking to have an impact beyond one’s self. My study sought to do just that.

The resistance of the research community to generative research was evident in my pursuits. Many professors and fellow graduate students warned me to avoid doing research in schools because it would just be too difficult or take too long. They were correct. The systemic resistance to research, even research with potential to yield significant positive results, is well ingrained. Resistance from principals and teachers to participate in research adds to the gap. In
retrospect, I would still do the same study because I believe in the AERA mission goal. As a classroom teacher and mother of gifted children, I cannot ignore the disservice done to them. Change must start somewhere. For my innovation to succeed in the face of resistance, I had to do a lot of communicating with teachers to keep them informed as to the purpose of the intervention, share ideas on ways to motivate the students, and even discuss why the students were behaving as they did. Providing prizes the teachers could award the students helped too. Perhaps a stipend for the experts and teachers would have motivated them to respond more quickly. It would have been easy to get frustrated and give up; remaining positive, supportive, and patient while providing informal training is imperative when working with practitioners under so much pressure.

When asked what difficulties they faced integrating the website into their instruction, three of the five teacher participants reported both time and limited technology (resources). The other two identified time as an issue. One teacher added the comment that “regular education students are expected to use the classroom computers for programs such as FASTT math and iStation during the school day,” which further illustrates school’s focus on ensuring all students meet minimum standards. Yet again, this pressure left the gifted students behind. None of the teachers reported lack of training as a difficulty. One teacher commented, “The immediate responses from the website/program developer (when I had questions or problems) made it extremely easy to track the progress of the students and provide them feedback.” In summary, I believe the teacher responses demonstrate that access to the intervention coupled with strong support from the researcher did not require extra training. The barriers of time and resources, however, had a significant negative impact on the implementation of this innovative approach to literacy instruction. Unfortunately, I cannot eliminate these barriers.
**Implications for Classroom Practice**

The findings from this design experiment, combined with my experience as a researcher and a teacher, inform my suggestions for implementation of an online differentiated instructional resource offered in this section. The intervention was designed to fill the need of regular classroom teachers facing the obstacles I have described. Participation from gifted educators provided insight into additional challenges (limited time with each student and being pulled away from classroom instruction for other administrative tasks especially during testing windows). Although this study involved only four schools and five teachers, the limited success by the gifted educators facing additional challenges compared to the success of the regular classroom teachers would suggest it may be more efficient to implement this intervention as a curriculum enhancement in the setting for which it was intended—the regular classroom. In iteration two, the regular classroom teacher who was able to get 10 students through to completion in about two weeks at the very end of the school year had no formal training in gifted education and limited informal training. She was a parent of a gifted child, though, so she understood the student and teacher struggle with differentiating for gifted students. The regular classroom teacher in iteration three picked up where the gifted educator stalled after several months. Her implementation strategies resulted in all 13 of the gifted students moving forward to complete all remaining tasks successfully in less than two weeks. Only one of the three participating gifted educators was able to get any students successfully through the tasks, though only three students. This gifted educator had taught four years in a regular classroom with at least one gifted child. This was her first year as the school’s gifted educator. Additionally, she teaches at a charter school, which gave her a little more freedom with the curriculum, though she still reported frustration with constraints by the school district on curriculum and computer
access. Based on this small-scale design experiment and in light of the additional challenges gifted educators face with pull-out programs, I recommend an intervention like *The Reader’s Treasure* would be most successful as a supplement to the regular classroom curriculum.

Within the regular classroom, various strategies were employed that led to success. Other factors contributed to student completion as well. Regular classroom teachers were able to allow the gifted students to log on in small time chunks throughout the day. These teachers were faced with the pressure of focusing their time and attention on the struggling students, so having this resource to keep their gifted students working independently and engaged in learning freed them for the other demands of their job. The teacher with the most completers reported that when she picked up the project from the gifted teacher, she took the opportunity to teach an important life lesson—the importance of finishing what you start. The gifted educator from School D expressed her concern about how quickly the gifted students give up in the face of a challenge, not just with this website. She planned to spend a class period having the students reflect on why they lost motivation when they were unable to get through the Internet Safety Module quickly. Integrating differentiated online resources like this would create great opportunities to teach another important life lesson—persistence.

Figure 3 shows the ways teacher participants chose to integrate the website into their instruction. This chart can be used as a list of potential uses for teachers considering ways to integrate the website, or others like it, into their current language arts curriculum.
Figure 3. Implementation Strategies

The “For Teacher” and “Teacher Tip” pages of the website present other ideas for integrating the site such as starting a book talk in literacy groups then having the students finish online in the discussion board. At one potential school, a parent volunteer was going to use the book and website with a pull-out reading group in the regular classroom. The school, however, had too few gifted third graders to meet the eligibility criteria. A media specialist at another school had agreed to use the book and website with a Lunch Buddies group. Unfortunately, none of the third grade teachers signed their gifted students up for it even though it would all take place during lunch period. As a result, this school did not participate. The teachers told the media specialist they did not want to put more on their students just as testing was approaching. This shows a lack of understanding of the needs of their students. These are the students who do not need to spend hours in review of basic facts. This wasted time could be more productive and engaging with a resource like this. Bored gifted students can sometimes become disruptive or even defiant
(Caraisco, 2007), refusing to do their best on the low-level tests. Studies have shown that students who have already mastered 35–50% of the content and who were removed during or prior to the classroom instruction scored as well as or even higher than the gifted students who had not been removed (U.S. ED, 1993). In the end, teachers would possibly find their gifted students would perform better on standardized tests by reducing the monotony of test prep activities. By forcing gifted students to endure low-level test preparatory activities, they may actually be reducing test scores. Teachers need to know the negative, unintended consequences of not differentiating appropriately.

Because there were obstacles that teachers cannot control, they must look to administrators for support. The administrators in this study could have reduced some of the obstacles the teachers faced. First, administrators should be instrumental in changing the experience of gifted students during the test prep windows. For example, instead of pulling gifted educators to do testing administrative tasks, they could increase the pull-out time for gifted students. In addition to providing an opportunity for continued enrichment, this approach would allow regular classroom teachers to focus instruction on the most urgent test prep skills for the struggling students. Second, administrators could also encourage curriculum compacting. They could reward regular classroom teachers who come up with creative ways to group students across classrooms to provide differentiated instruction in place of low-level test prep for students who have demonstrated mastery. Teachers reported lack of access to computers in class and the computer labs as an obstacle too. To address this concern, administrators should protect teachers’ computer time during testing windows and provide more computers, or at least create technology committees with parent involvement to write grant proposals to receive more computers.
Unfortunately, this call for change is not new as shown by the literature review in Chapter 2. Teachers have been requesting more support for decades. Revamping the school experience for gifted students has to begin at the top. Large organizations such as the American Educational Researcher Association (AERA) pushing for the closing of the research-practice gap, together with the National Association for Gifted Children (NAGC) and other established national organizations for gifted students pressing for improved K12 curriculum, could partner with curriculum developers to integrate appropriate differentiated supports like this website into the packaged curriculum. Administrators need to provide for and encourage innovation. Researchers, educators, administrators, curriculum developers, and parents need to work together to close the research-practice gap by making study findings and easy-to-implement, research-based tools more accessible to teachers.

**Future Research Possibilities**

In software development, the key is to keep moving forward. Developers start with a minimally viable product (iteration one or “alpha testing”), gather data, modify, then repeat (iteration two or “beta testing”). My plan to continue the current design experiment was outlined earlier in this chapter. The wide range of factors, topics, and data being collected also provides opportunities for related future research. I could replicate a review of level 1, seek out more regular classroom teachers who would integrate this online, differentiated reading instructional tool in a variety of ways (literacy centers, replacement for low-level work, extension during class time, lunch buddies, etc.). I could then compare student and teacher reactions and assessment scores from various contexts. If I had larger numbers of participating teachers, I could also examine if there is a significant difference in student outcomes and teachers’ perceptions between the teachers who have different levels of training and experience with gifted educators.
Addressing the motivation and affective responses, I could add a self-evaluation component on characteristics such as how well the students believe they handle challenges, finish what they start, deal with boredom, and so forth. Then at each stage of completion, in addition to earning a “key,” one group could receive a positive message about its persistence. I could then compare their rate of completion, scores on the assessment, and themes in their surveys to those of a control group who did not receive the positive messages.

Both the adults and students all requested more content to include more practice opportunities and more books. Expanding the current activities would be the first step. Next, I would do a more extensive search of the literature on game-based literacy instruction and current effective instructional practices for the specific skills addressed and other skills that ought to be added. This literature would guide the design of a more complex and generative level 2.

As the site grows with multiple levels, multiple books, additional supports for teachers and students, and possibly integration into the established curriculum, the research opportunities would abound. The findings of this study not only reaffirm the systemic challenges teachers and researchers face with innovation, but also adds to the body of knowledge on design experiments and differentiated reading instruction for gifted elementary students. Despite the obstacles, the results encourage me to press forward. The struggles I witnessed by students and teachers demand that I continue to call for change with curriculum/software developers, teachers, administrators, and national organizations. The underachieving, unmotivated gifted child is a struggling student, too. In order to have no child left behind, the gifted must not be overlooked. When society recognizes the benefits of challenging and supporting our nation’s brightest, and sees the possibility of doing so without sacrificing struggling students, then real change can begin.
References


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Clarenbach, J. (Feb 2007). All gifted is local: without federal guidance, no two districts deliver gifted education services in the same way. *School Administrator, 64*, 16-21.


### Appendix A: Standards Alignment

<table>
<thead>
<tr>
<th>What a Character Characterization</th>
<th>Art Appeal Tone/mood</th>
<th>Novel Games Vocabulary</th>
<th>Get Connected Book chats &amp; digital response</th>
</tr>
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<tbody>
<tr>
<td>Describe characters in a story (e.g., their traits, motivations, or feelings) and explain how their actions contribute to the sequence of events.</td>
<td>Describe how tempo and dynamics can change the mood or emotion of a piece of music.</td>
<td>Determine the meaning of words and phrases as they are used in a text, distinguishing literal from nonliteral language.</td>
<td>Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.</td>
</tr>
<tr>
<td>MU.3.O.3.1 Enduring Understanding: Every art form uses its own unique language, verbal and non-verbal, to document and communicate with the world.</td>
<td>CCSS.ELA-Literacy.RF.3.4c Use context to confirm or self-correct word recognition and understanding, rereading as necessary.</td>
<td>CCSS.ELA-Literacy.RL.3.5 Refer to parts of stories, dramas, and poems when writing or speaking about a text, using terms such as chapter, scene, and stanza; describe how each successive part builds on earlier sections.</td>
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<td>VA.3.H.3 Connections among the arts and other disciplines strengthen learning and the ability to transfer knowledge and skills to and from other fields.</td>
<td>CCSS.ELA-Literacy.L.3.4d Use glossaries or beginning dictionaries, both print &amp; digital, to determine or clarify the precise meaning of key words &amp; phrases.</td>
<td>CCSS.ELA-Literacy.W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.</td>
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<tr>
<td>What a Character characterization</td>
<td>Art Appeal Tone/mood</td>
<td>Novel Games Vocabulary</td>
<td>Get Connected Book chats &amp; digital response</td>
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<td><strong>CCSS.ELA-Literacy.L.3.5c</strong> Distinguish shades of meaning among related words that describe states of mind or degrees of certainty (e.g., knew, believed, suspected, heard, wondered).</td>
<td><strong>CCSS.ELA-Literacy.W.3.2</strong> Write informative/explanatory texts to examine a topic and convey ideas and information clearly.</td>
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<td></td>
<td><strong>CCSS.ELA-Literacy.W.3.6</strong> With guidance and support from adults, use technology to produce and publish writing (using keyboarding skills) as well as to interact and collaborate with others.</td>
<td><strong>CCSS.ELA-Literacy.L.3</strong> Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>CCSS.ELA-Literacy.L.3.2</strong> Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.</td>
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Appendix B: Pilot Test Development and Validity Measures

Development/design

The website that will be used in the proposed study underwent a design experiment in the spring of 2009. The development team consisted of a third-grade regular classroom teacher with ten years’ experience teaching primary grades, a literature instructor and artist, an instructional designer, and a web designer/programmer. All team members were in graduate programs for Instructional Technology.

After a review of the literature, informal discussions with gifted students and teachers about what literacy areas they found to be most difficult to teach/learn, the site was designed and created with four portals that are accessed by the student through a main page. This portal uses the metaphor of a personal library. The items in the room (framed art, family photo, stack of books, and a telephone) are hot spots which when clicked take the user into the different sections. The four areas within the website are as follows:

**Art Appeal** (integrating arts with literary elements)

- LA.3.2.1.3 - identify and explain how language choice helps to develop mood and meaning in poetry (e.g., sensory and concrete words as well as figurative language);
- LA.3.2.1.5 - respond to, discuss, and reflect on various literary selections (e.g., poetry, prose, fiction, nonfiction), connecting text to self (personal connection), text to world (social connection), text to text (comparison among multiple texts);

The purpose of this activity is to engage the students in identifying various visual and audio queues based on particulars within the novel. Students connect various visual and
audio cues based on particulars with the novel. It is comprised of two sections, art or music. Students choose which section they wish to enter first. In each section, the students view art pieces and/or listen to audio files then identify which of the artistic interpretations exemplifies the mood of the given passage or the feelings of the character within the passage. They are given explanations of the elements of art and/or music which connect it to tone/mood. When asked to match them to a passage from the book, students have the option of returning to the instructive screen to review. This connects art, music and literature in an interactive and unique way developing the idea of tone and emotion in writing.

What a Character (characterization through multimedia approach)

- L A. 3.2.1.2 - identify and explain the elements of story structure, including character/character development, setting, plot, and problem/resolution in a variety of fiction;
- LA.3.1.7.7 - compare and contrast elements, settings, characters, and problems in two texts

In this activity, the readers identify with characters designed to mimic the personal traits found in characters from the novel. The student applies their knowledge of the characters’ relationships and roles to similar characters in a new situation. In this text-based game, the student will click on a vendor in a public park. The vendor will address the approaching character (controlled by the student who does not realize which character s/he is). Then they click “Talk” to see “their” words appear. At any point in the dialogue, students can opt to guess who they are. If they are incorrect, they continue the discussion. After they have correctly guessed, they can still play as much as they want. These connections help the readers gain a deeper understanding of the motivations behind characters’ behaviors in the novel and to recognize that a person’s actions and words reveal a lot about who they are.
Novel Games (text features and vocabulary development)

- LA.3.1.6.6 - identify “shades of meaning” in related words (e.g., blaring, loud);
- LA.3.1.6.8 - use knowledge of antonyms, synonyms, homophones, and homographs to determine meanings of words;
- LA.3.2.1.3 - identify and explain how language choice helps to develop mood and meaning in poetry (e.g., sensory and concrete words as well as figurative language)

"Novel Games" focuses on the nuances of vocabulary and how effective word choice can affect the mood of a passage, not just matching words to definitions. Students “spin” the wheel to select a mood. Then a sentence from the novel appears. There is one word that the students must change in order to make the sentence match the desired mood. This allows students to experience the options writers face as they go through their word selection process to set the appropriate tone and mood. There is a link to an online dictionary/thesaurus if they need a definition or are just want to explore words more. It is intended to act as a learning activity. The student cannot move on until getting the correct answer. Feedback reminds students to read the whole sentence and think about the mood it portrays with their choice inserted.

Get Connected (social networking for writing application of literary analysis)

(Note: this section has changed significantly since the pilot according to the participating school district’s policies while still maintaining high interaction with the book and like-minded peers)

- LA.3.2.1.5 - respond to, discuss, and reflect on various literary selections (e.g., poetry, prose, fiction, nonfiction), connecting text to self (personal connection), text to world (social connection), text to text (comparison among multiple texts);
- LA.3.2.1.4 - identify an author’s theme, and use details from the text to explain how the author developed that theme;
- LA.3.3.5.1 - prepare writing in a format appropriate to audience and purpose (e.g., manuscript, multimedia);
- LA.3.3.5.3 - share the writing with the intended audience.
LA.3.4.1.2 - write a variety of expressive forms (e.g., chapter books, short stories, poetry, skits, song lyrics) that may employ, but not be limited to, figurative language (e.g., simile, onomatopoeia), rhythm, dialogue, characterization, plot, and appropriate format.

LA.3.6.4.1 - use appropriate available technologies to enhance communication and achieve a purpose (e.g., video, websites);

LA.3.6.4.2 - use digital tools (e.g., word processing, multimedia authoring, web tools, graphic organizers) to present and publish in a variety of media formats.

Through this portal, students have the opportunity to interact with other students using Social Media Classroom (SMC), an open source platform with a variety of web 2.0 tools (blog, wiki, forum, social bookmarking, chat). Each student receives a unique user name and password and his or her identity is only visible to other visitors to the site. In the wiki, students will collaborative write alternate endings, sequels, and/or fan fiction. In the blog they may informally chat about their reactions to the book or the website. In the forum students conduct book chats on different topics related to the book such as bullying and being responsible. Our iteration of SMC uses the social aspect of the program to enable each student to interact with other students, share and comment on ideas, discuss the text and apply the skills introduced and practiced in the other three parts of the site. Currently, students receive credit just for participating.

On the next page is a flowchart showing the paths students may take to complete the website. Note they have autonomy over the order they proceed. Also, they may return to the main portal page at any time.
Testing the validity

After going through the creation of the website based on the literature, a small pilot study was conducted with 15 gifted third graders in a local public school. First, the principal was contacted to receive permission. One of the researchers was a third-grade teacher at the time. The other third-grade teachers were interviewed. They were asked what literacy skills seemed to be most challenging for their students. Teachers and students were asked what books they liked most. The results indicated three particular areas to target: characterization, tone/mood, and nuances of vocabulary (particularly synonyms and word choice).

In order to test whether the software help students meet the objectives as intended, a post test was created. The objectives from the Sunshine State Standards were selected; the instructional software was designed incorporating the unique skills and needs of gifted students. The participating students read *Escaping the Giant Wave* and then they took a post-test in paper pencil format consisting of 10 multiple-choice questions. Scores reported as percentage of responses that were correct. The average score for the 10 multiple-choice questions was 70%. In addition, 10 of the 13 respondents scored 70% or better, 5 scored 80% or better and 2 scored 90% or higher. Table 1 shows a further breakdown for each of the ten questions. Each question focused on the skills developed in one area of the website or a combination of the skills from two areas, representing mastery of the interconnectedness of the skills.

The results showed that questions focused on the skills from *Novel Games* and *Character / Art Appeal* had the highest percentage of correct answers with 90% correct answers, while *Novel Games / Connected* combined skills questions got the lowest correct answer at 30%. This is not surprising given that online social interaction (*Get Connected*) is a brand new experience for these students.
Table 1: Breakdown of focus area and scoring percentage

<table>
<thead>
<tr>
<th>Question #</th>
<th>Focus area</th>
<th># of students correct</th>
<th>Average # of students answering correctly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Novel/Connected</td>
<td>4</td>
<td>30%</td>
</tr>
<tr>
<td>2</td>
<td>Novel/Art Appeal</td>
<td>8</td>
<td>60%</td>
</tr>
<tr>
<td>3</td>
<td>Novel</td>
<td>12</td>
<td>90%</td>
</tr>
<tr>
<td>4</td>
<td>Connected/Art Appeal</td>
<td>9</td>
<td>70%</td>
</tr>
<tr>
<td>5</td>
<td>Character/Connected</td>
<td>11</td>
<td>80%</td>
</tr>
<tr>
<td>6</td>
<td>Character/Art Appeal</td>
<td>12</td>
<td>90%</td>
</tr>
<tr>
<td>7</td>
<td>Character/Novel</td>
<td>10</td>
<td>80%</td>
</tr>
<tr>
<td>8</td>
<td>Character</td>
<td>9</td>
<td>70%</td>
</tr>
<tr>
<td>9</td>
<td>Art Appeal</td>
<td>8</td>
<td>60%</td>
</tr>
<tr>
<td>10</td>
<td>Connected</td>
<td>8</td>
<td>60%</td>
</tr>
</tbody>
</table>

Discussion

The project created a great deal of excitement with the students. They were able to participate in an assignment that was outside of the normal scope of projects being worked on by their peers. The testing showed that students learned a considerable amount about characterization. Initially, results from the survey of students and teachers indicated one of the most troublesome areas for students included characterization; however, after completing *The Reader's Treasure* the students showed some of the highest scores, 70-90% correct, on characterization questions. These scores indicate that the characterization section of the website did indeed align with the objectives in this area. Ninety percent of the students responded correctly to the questions that only tested the vocabulary skills. This suggests that *Novel Games* was also well aligned with the objectives of that section. Art Appeal and Get Connected will
likely require additional scaffolding since they involve content and processes that were new to this sample.

A focus group was conducted as well. Students were very animated as they shared their reactions. They loved the game features such as spinning the wheel and earning “keys” to open the treasure chest. There were many suggestions about what to get when you open the chest rather than just a certificate. One suggestion was to go to another level with more games like these only different. When asked if they would like the website to have games for other books, they all jumped up and crowded around the interviewer simultaneously naming books and talking about game ideas. These test results, along with the positive emotional response, firmly suggest this project is worthwhile to pursue further.
Appendix C: Data-driven Design Decisions (Pilot 2009)

The pilot study in 2009 was conducted to guide the design of the instructional website. The study took place in a computer lab. Students were observed by the research team. A follow up focus group session was also held to gain more feedback from the students. Below is the document showing student actions and comments along with the modification decision made by the development team in response.

Timber Faught, Shelley Hayes, Beth Jordan, and Stephen Ringo
EME6613 Sp09

The Reader’s Treasure Pilot Test
*Monday, March 23 (12:45-1:45)—Part 1

Four students in third grade who are in the highest reading group in their class. All have read the book and have signed permission forms from parents. Pilot test is conducted in a computer lab. Moderator sits behind them and takes notes while they work. They were told to not do the Get Connected page due to time constraints. They were unable to do What a Character due to technical difficulties. These two sections were tested the following day.

St01 picked Art and used mouse pointer to follow along with text.
St02, St03 and St04 picked novel games. Started spinning right away.
After several questions, St03 started clicking the spinner more than once. Then he asked me “what do you do when you’ve got it?” Reply “What do the directions say?” He read them and said, “OH…then he clicked ‘Submit the Answer’.”

- No change. Only one student had this confusion. Team determined that if student had no help from moderator, the child would have eventually read the directions and found the correct solution.

St03 got the screen that said you clicked the spinner too many times. Then he clicked to play over and got the error page. Instructed to click Main portal instead.

- Link fixed
He chose to go to Art Appeal.
St01 says, “I got them all right so far!”
St02, stated “maybe instead of a pop-up saying ‘well, done’ it should be under the spinner. The pop-up sound gets annoying and it makes me think something is wrong.

- St01 says, “I got 100%! ” Then he went to Novel Games next.
St03 on Question 2 of Art says, “I got it right on my first try!” continues expressing excitement with each correct attempt.St02 got “Congratulations you have completed…”(not the key page) and says “What do I do next.” (What do you think?) He says “Main Portal?” (yes)

- Key page added.
St03 dances to the music. St04 is listening carefully and doing the clips one at a time (clicking check after each choice). St03 makes his choice for all three and then clicks check. St01 is on the three-word sentence and thinking carefully. Makes several tries and then hears neighbor listening to music and looks at it. He clicks on main portal and goes to what a character. Clicks on ice cream man and gray boxes pop up. Keeps clicking I know who I am. I finally instruct him to click Next. The gray box is still there with no dialogue. He tries all three vendors and gets the same result. He returns to main portal and says, “I already did art and this one (novel games). It takes too long… Oh, the music one. Should I do that?” (yes)

- This error only happened in the school’s lab (not classrooms or admin office). The lab has Windows 2000 and IE6.0 which was determined to be the problem. Students did this section in the classroom the next day as a temporary solution to complete the testing.

- Gray box issue was then resolved by changing graphic format.

St02 on music. Paying careful attention. St04 and St03 try What a Character and get the same result with the gray boxes. They both have only one key. I asked if they finished novel games all the way to the key and they said no. Then they went back to it. St03 asks again how to check the answers. I remind him to read the directions. He says Oh and clicks submit my answers. St01 asks, “How many questions are there in Art because there were like 15 on the words game.” I laughed and said, no there were only 10.

St04 and St02 now have two keys. St03 still has one. I asked if he ever finished Novel Games to the point that it said congratulations. He said, “OH, no I didn’t. How many are there? I did a lot.” I told the other three they can do whichever they want while they wait for St03. St02 says he’ll just wait. St04 went back to Novel Games. Sentence #8, on Angry mood: hard and twisted does not register as a correct choice. Then he clicked spin and it went to the next sentence.

Correct problem on #8 on Novel Games

Focus Group

Q1: Did any of you use the dictionary to look up words?
Nope. St02, St01 & St03 saw it but didn’t want to use it. St04 saw it but didn’t understand what it was.

- Add directions next to Dictionary?

Q2: What did you like and why?
St03: I liked how they make you get keys to unlock the treasure chest (all agree). St02: I liked the spin game. It makes me read the other parts of the sentence to see which word works.
St04: I liked how there’s a bunch of different games and I agree with St03 about the keys. St01: I liked the music game (all chime in and start humming the same song). I like hearing it (St03: It’s funny music.)

Q3: What did you not like and why?
St04: That the noise was loud when you get it wrong and right. St03: That it had mistakes.

- Working on them😊
St01: How the gray part was popping up (all agree). St02: The pop-ups. Each time it pops up it kinda makes me think something is wrong with the computer (St04: Me agree! Me agree 100 times!)
Reword feedback to start positively when correct.
St01: What do you get in the treasure chest? St04: Maybe it’s another portal with more games.

Q4: What would you like it to be?
St04: I would like it to be that when you open the treasure box there is another portal with different games, like different versions of these games.
St03: a homework pass or more games like Call of Duty (just a fun strategy game).
St01: a million dollars 😊
St02: maybe it can be kinda like 39 clues where you have to find clues and then you earn stuff online.

Q5: What are your suggestions?
St03: If you have trouble click here and then you get really good directions to help you out.
Help button (Due to time constraints, this will have to wait for beta test.)
St04: Ads for Call of Duty and stuff. Add a counter to show how many people played or are playing right now.
Help Ads? No thanks. Counter is a common feature among online games. Will determine if this is feasible for Alpha test.
St02: make your own character and have them go through mazes with the other characters
St04: When you name your own character it lets you know if that name is already taken.
Interesting suggestions, but not aligned with site learning objectives. Possibility for future activity to be awarded with keys.
St01: I already memorized the answers for the first two in the character game. So maybe you should change it a little bit. You only needed two to get the key. So, the story should change when you go back to the worker so you can’t memorize it.
St04: Yeah, every time you go in, it should mix them up cause I already memorized the answers in the art game.
More scenarios have been written. Due to platform issues with What a Character, changes were delayed until function corrected.

Q6: Would you guys like this site to play games with other books?
YEAH!!! (They all jumped up and came toward me when they answered this.)
Team fully intends to do this if allowed to continue on project beyond this semester (other coursework or independently). There will be a book selection page before selecting the games.

Q7: Anything else?
St02: instead of games from the treasure chest, you can get money and you can buy stuff like new clothes for your character (St04: or a magic potion that turns you into a frog for 6 hours or a horse for your character).
Group: or a house and furniture, TV and stuff.
Again, interesting suggestions, but not aligned with site learning objectives. Possibility for future activity to be awarded with keys.

*Tuesday, March 4(12:45-1:45) Pilot Test-Part 2*
The same four students tested the What a Character and Get Connected sections. This was conducted in the classroom two at a time since What a Character was working correctly in the room and there are only 2 computers in the room. The other two students played board games while waiting.
St01 very quickly went to Character. He selected answers from first two questions that he memorized yesterday. Then he read the dialogue for the café and got it right. He said, “I got it because the words he was saying sounded like Daren, so I guessed Daren and it was right.”

St04 entered What a Character. Guessed early on that it was BeeBee. She said, “AH, I know who this is!”

St01 went to Art Appeal and said, “I like this one with the music, can I put on the earphones?”

St04 then went to the same place. She said, “I like this first one (Question 1a, choice A). We learned it in music.” St01 says I like this one (Question 2a, choice C). That’s my favorite.” St04 I like B on question 2, St01, “What the sad one?”

Question 2 choice C is still cut off. I asked if it was like that yesterday and they said yes.

Corrected object size

After reading the feedback, if they got it wrong they corrected before continuing.

St04: On question 4 I like C, on question 5 I like A…and B. I like to play them all at the same time. I think it’s cool. (If you click play for all of them, they play simultaneously.)

Team decided to leave this since it was such a hit. It demonstrates the unique thinking of gifted children.

St01 & 04 both zoom through Art without reading. They say they remember all of them.

Randomization is not feasible at this time. We will need more questions.

St04 clicked on Get Connected. She asked me which she should do. I told her to read the directions and pick what she wants. When she read Blog, she said, “Oh YEAH! I’m doing that one.” Then she told st01 to do Blog because you can say whatever you want. I told them their username and password. St04 read the “Read this First page” and then said, where do I click? It says click on create new blog post is it this? (Create Blog Post). Yes.

St01 clicked on Add New Comment and asked what subject means. I said that it’s like the title of what you are going to say. St04 saw st01’s screen and said, How did he get there? I said he clicked Add New Comment. They both asked what is the difference between comment and new blog. I explained and then they worked on their own exploring the text size and style.

The help page will help.

I told them if they post a new blog, then maybe the other two students would read it and comment. That got them excited and they started being more careful. St04 was concerned about how to spell a word. After posting a comment to the Main entry, they both selected Create Blog Post. They put some time into thinking about what they wanted to write. St04 asked, “Can we use ‘text’?” I asked what she means. She said you know like abbreviations you use when you text people. I said it’s okay, but she has to consider if the readers will know what you mean. St04 earned his 4 keys and clicked on the treasure chest. The certificate popped up and we clicked the printer. The certificate printed out.

St. 03 and 02 came to the computers (I deleted the cookies).

St03 went to Art Appeal and played music. St. 02 went to What a Character. He moved through very quickly. Ice Cream stand had no graphics, but all the text worked as expected.

We weren’t able to recreate this error. It didn’t occur again even on the same computer 10 min. later.

St02 said that Music Q1a, choice A is a piece they listened to in music class today (It was the one they all sang simultaneously yesterday). St03 commented that Q3a, A is in his sister’s Barbie movie.
St03 finished Art Appeal and went to Novel Games. He moved quickly through some questions (he had some of the same choices yesterday) and slowly on the new ones. St02 is still working carefully through Music.

St03 goes to What a Character next. He read the first line of the directions and clicked next. He read the Congratulations page more carefully.

St03 finishes the other three sections and asks, “How do we do the telephone?” I said to click and see. The mouse click on the handle didn’t work. He had to move around to find the hot spot.

Second set of books on left were removed, phone moved over to separate from novel games hot spot, hot spot changed to a circle instead of a square.

On Blog it went straight to the most recent blogs. They don’t see the “READ THIS FIRST” post.

ST03 posted a comment. Then asked what to do next. I said you can post a comment, reply to a comment, or exit and do one of the other activities. He chose to go to discussion. He clicked on All Alone in the Hotel and read it.

Students will become more proficient as they interact with this site. After a couple tries without assistance, they were operating fine in the Discussion Forum. Additionally, the help function will be there if they become too frustrated.

St02 finished and printed his certificate.

Summary of modifications:

- Add __ of __ page marker or status bar
- Add directions on how to return to portal in Get Connected
- Add directions next to Dictionary
- Check Question 2 choice C
- Fix grey box pop-up problem
- Add directions on how to return to portal in Get Connected
- Leave emotions up for each song on Music
- Correct problem on #8 on Novel Games
- Students had a difficult time clicking on Get Connected phone… rearrange Portal page
- Put in Darren and BeeBee Text for 3rd question in Art Appeal instead of Is Darren Dead.
Appendix D: Letter of Consent (Teachers)

Informed Consent to Participate in Research
Information to Consider Before Taking Part in this Research Study

IRB Study # Pro00015116

You are being asked to take part in a research study. Research studies include only people who choose to take part. This document is called an informed consent form. Please read this information carefully and take your time making your decision. Ask the researcher or study staff to discuss this consent form with you, please ask him/her to explain any words or information you do not clearly understand. We encourage you to talk with your family and friends before you decide to take part in this research study. The nature of the study, risks, inconveniences, discomforts, and other important information about the study are listed below. Please tell the study staff if you are taking part in another research study. We are asking you to take part in a research study called:

Developing Differentiated Reading Instruction Online for Gifted Third Graders: A Design Experiment

The person who is in charge of this research study is Beth Jordan. This person is called the Principal Investigator. However, other research staff may be involved and can act on behalf of the person in charge. She is being guided in this research by her major professor, Dr. Glenn Smith.

The research will be conducted at your school and online.

Purpose of the study

The purpose of this study is to:

- The researcher is proposing to conduct a design experiment “to create a viable theory-driven intervention for achieving a pedagogical goal” (Reinking & Bradley, 2008, p. 12). The pedagogical goal is to develop an appropriately differentiated instructional tool for intellectually gifted third graders which regular classroom teachers can easily incorporate into their literacy instruction. The purpose of this proposed design experiment is to (1) develop an instructional intervention aligned with current theory using iterative design process, (2) test, modify and retest the intervention in a regular classroom while
simultaneously measuring its effectiveness in achieving the literacy objectives and pedagogical goals to answer if it works, and (3) to describe the reactions of the regular classroom teachers and their third grade gifted students in order to answer why and in what context the intervention works.

The first phase will elicit feedback from content area experts on the intervention (website) and instruments (no data about humans). The next two phases will take place in a naturalistic setting (classrooms) with no student identifiable information collected. Like any other typical online educational resource, teachers will incorporate the intervention as they see fit. Teachers (identified) and students (unidentifiable) will provide feedback via survey about the website. Students will also take a pre-/post-test to see how well they mastered the objectives addressed in the intervention. The results are not generalizable, but sufficient to inform further development of the instrument as well as support the validity and reliability of the instruments.

- This research is being conducted for partial completion of a Ph.D. in Curriculum and Instruction with an emphasis on Instructional Technology and a cognate in Reading.

**Study Procedures**

If you take part in this study, you will be asked to:

- Sign this letter of informed consent
- Complete pre-questionnaire (demographic info & your training and perceptions regarding differentiation for gifted students).
- Obtain parents’ permission for students’ data to be collected with no identifiable information.
- Assign students to read the award-winning book (provided) and take the objectives-based literacy assessment pre-test.
- Register identified intellectually gifted students with unidentifiable username and passwords.
- Implement the website into your language arts curriculum as you see fit (various options will be discussed in the orientation).
- Complete a post-questionnaire after approximately three weeks (longer if factors such as testing, holidays, etc… interfere) when students have completed all the tasks.
- When all tasks are completed, students will complete a post-questionnaire and a post-test (equivalent form of the pre-test).

**Total Number of Participants**

A total of about 20 teachers and 40 students are expected to participate in the study at all sites.

**Alternatives**

You do not have to participate in this research study. Your participation is completely voluntary.

**Benefits**

The potential benefits of participating in this research study include:

- the opportunity to reflect on differentiating literacy instruction for gifted students
- experience blogging as a platform for critical literature response

**Risks or Discomfort**
This research is considered to be minimal risk. That means that the risks associated with this study are the same as what you face every day. There are no known additional risks to those who take part in this study.

**Compensation**

If you agree to participate, you will be provided with free access to the instructional website being developed in this study for each of your students identified as intellectually gifted within your classroom. Additionally, you may have free access again the following school year. Once you agree to participate, you will be provided with a copy of the book for each student identified as intellectually gifted in your classroom for language arts instruction whether they agree to participate or not. Upon completion of the study, you may retain the books for your classroom library. If you withdraw for any reason from the study before completion you may still retain the books provided to you.

The findings from this research may result in the future development of products that are of commercial value. There are no plans to provide you with financial compensation or for you to share in any profits if this should occur.

**Cost**

There will be no costs to you as a result of being in this study.

**Conflict of Interest Statement**

Currently, there is no conflict of interest; however, if the school district selects the school where I taught for 6 years, this may constitute a conflict. If this should arise, I request an alternate site. If there is not a comparable site available that would provide adequate numbers of participants, I would address the issue with the teachers at the orientation. The concern would be the teachers could be tempted to provide only positive feedback. I would be very explicit that both positive and negative feedback will be equally beneficial to me and urge them to be as forthright and thorough as possible.

**Privacy and Confidentiality**

We will keep your study records private and confidential. Certain people may need to see your study records. By law, anyone who looks at your records must keep them completely confidential. The only people who will be allowed to see these records are:

- The research team, including the Principal Investigator, study coordinator, and all other research staff.
- Certain government and university people who need to know more about the study. For example, individuals who provide oversight on this study may need to look at your records. This is done to make sure that we are doing the study in the right way. They also need to make sure that we are protecting your rights and your safety.
- Any agency of the federal, state, or local government that regulates this research. This includes the Food and Drug Administration (FDA), Florida Department of Health, and the Department of Health and Human Services (DHHS) and the Office for Human Research Protection (OHRP).
- The USF Institutional Review Board (IRB) and its related staff who have oversight responsibilities for this study, staff in the USF Office of Research and Innovation, USF
Division of Research Integrity and Compliance, and other USF offices who oversee this research.

We may publish what we learn from this study. If we do, we will not include your name. We will not publish anything that would let people know who you are.

**Voluntary Participation / Withdrawal**

You should only take part in this study if you want to volunteer. You should not feel that there is any pressure to take part in the study. You are free to participate in this research or withdraw at any time. There will be no penalty or loss of benefits you are entitled to receive if you stop taking part in this study. The decision to participate or not to participate will not affect your job status.

**New information about the study**

During the course of this study, we may find more information that could be important to you. This includes information that, once learned, might cause you to change your mind about being in the study. We will notify you as soon as possible if such information becomes available.

**You can get the answers to your questions, concerns, or complaints**

If you have any questions, concerns or complaints about this study, or experience an adverse event or unanticipated problem, call Beth Jordan at 813-965-2141.

If you have questions about your rights as a participant in this study, general questions, or have complaints, concerns or issues you want to discuss with someone outside the research, call the USF IRB at (813) 974-5638.
Consent to Take Part in this Research Study

It is up to you to decide whether you want to take part in this study. If you want to take part, please sign the form, if the following statements are true.

I freely give my consent to take part in this study and authorize that my information as agreed above, be collected/disclosed in this study. I understand that by signing this form I am agreeing to take part in research. I have received a copy of this form to take with me.

_____________________________________________  ________________
Signature of Person Taking Part in Study                  Date

Printed Name of Person Taking Part in Study

Statement of Person Obtaining Informed Consent

I have carefully explained to the person taking part in the study what he or she can expect from their participation. I hereby certify that when this person signs this form, to the best of my knowledge, he/ she understands:

- What the study is about;
- What procedures/interventions/investigational drugs or devices will be used;
- What the potential benefits might be; and
- What the known risks might be.

I can confirm that this research subject speaks the language that was used to explain this research and is receiving an informed consent form in the appropriate language. Additionally, this subject reads well enough to understand this document or, if not, this person is able to hear and understand when the form is read to him or her. This subject does not have a medical/psychological problem that would compromise comprehension and therefore makes it hard to understand what is being explained and can, therefore, give legally effective informed consent. This subject is not under any type of anesthesia or analgesic that may cloud their judgment or make it hard to understand what is being explained and, therefore, can be considered competent to give informed consent.

_______________________________________________________________  ________________
Signature of Person Obtaining Informed Consent / Research Authorization                  Date

Printed Name of Person Obtaining Informed Consent / Research Authorization
Appendix E: Letter of Consent (Students/Parents)

Dear parents,

Reader’s Treasure is a literacy website like you have never seen before. This online environment is designed to develop specific literacy skills (vocabulary, characterization, tone/mood, and literature responses via Web 2.0 tools) for gifted 3rd graders through appropriately differentiated activities. This self-contained, self-paced learning space will guide students through an exploration of the complexities of literacy in a fun and engaging way. After reading a quality, award-winning book, students will log on to readerstreasure.org and explore literature and language on a different level, creating unique connections to text, self, and the world, as well as to connect and collaborate with their like-minded peers in response to literature.

In this website, students complete the instructional games at their own pace in the order they prefer. Then students will complete a module on digital citizenship (Internet safety, netiquette, etc...). Students will be required to demonstrate understanding of and agree to appropriate blogging behavior and internet safety during the module before gaining access to like-minded peers through social interaction where they can apply understanding of reading and writing using Web 2.0 tools.

I am seeking your child’s voluntary participation in my research study related to the website. Your child’s teacher will assign tasks as part of their reading instruction in a way that most benefits your child. Students will be required by their teacher to complete the activities (approx. 1 ½ to 2 hr) and pre/posttest (approx. ½ hr) as they would any other assignment; however, if you give permission, I will include their anonymous data from the website in my analysis to guide further improvements. With your permission and their consent, they will also be asked to complete a brief survey (approx. 10min.) at the end to share their opinion of the site and provide suggestions. This survey is voluntary and will not request any personal information either.

Your child’s personal information will never be requested or included in any research results/publications. Your teacher will register your child with an unidentifiable username and password. Students will be instructed to not provide any personal information in their online discussions either. There is no cost to you or the school. Your child will be able to log in from home as well, allowing you to see how your child is doing.

I am a doctoral candidate at the University of South Florida, College of Education studying Instructional Technology. For over 10 years, I have taught elementary school from kindergarten through third grade. Gifted children have always had a special place in my heart. For my dissertation research, I am developing this website to be a place teachers can incorporate into their classrooms so gifted students can be challenged and rekindle their joy of reading.

Respectfully,
Beth Jordan & The Reader’s Treasure

*** If you have any questions, concerns or complaints about this study, or experience an adverse event or unanticipated problem, contact Beth Jordan, via email ReadersTreasureHelp@gmail.com or phone (813-965-2141).
*** If you have questions about your rights as a participant in this study, general questions, or have complaints, concerns or issues you want to discuss with someone outside the research, call the USF IRB at (813) 974-5638.

--- Sign and return the entire form ---

___ Yes, you may include my child’s work and survey responses in your research.
___ No, you may not include my child’s work and survey responses in your research.
Parent/Guardian signature _______________________ Child’s username __________________

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Appendix F: Expert Reviewer Questionnaire

In order to save space, page breaks have been removed and tables have been resized.

The purpose of this instrument is to assess the alignment of the instructional website with current pedagogical theory and practice in your field in order to inform further development. The Reader’s Treasure currently has activities related to only one book, Escaping the Giant Wave by Peg Kehret. First, students complete the three games designed to help them understand some concepts regarding vocabulary, tone/mood, and characterization. The students then complete an Internet Safety and Netiquette module before participating in book talks online with other registered, gifted third graders. Currently, students will receive a certificate for completing level 1. In future developments, students at this point, will move to level 2 for more complex tasks related to the book.

Although you do need to complete the tasks within each area on the website, I have provided you with an answer key so you can move quickly through after completing a few as a student would. After completing the three games (earning 3 keys), you will complete the Internet Safety and Netiquette module just as the students would to access the discussion board. If you get too many incorrect, you will run out of instructional content and the site will just stop. More content is being added so this will not happen with students. For now, if it does, just let me know and I will reset your attempts.

Your feedback will be used to modify the instructional website prior to implementation in third-grade regular classrooms. Your responses guided by your vast experience will be an invaluable source of data for my research. Any comments on this form itself are also welcome.

Thanks so much for taking the time to complete this evaluation!

STEP 1: Watch the orientation video (about 8 min.) to become familiar with the website and the functionality of this form.

STEP 2: Log in and play each game until you receive a “Congratulations” page. To save you time, open the “Shortcuts through The Reader’s Treasure” document.

STEP 3: Complete the form (overall reaction and five areas for effectiveness). For open-ended responses, click on the grey text, “Click here…”, then start typing. On the chart, place the letter x inside the appropriate box.

STEP 4: If you care to make comments on the form or the questions, you may use the open-ended question after each section or feel free to add comments (Go to the Review Pane in Word. Put your cursor where you want to comment, and click Add Comment on the ribbon. Then type your thoughts.)
**Overall Reaction**

1. Please, briefly describe your overall reaction to the instructional website.

   Click here to enter text. The box will expand as you write.

2. In your opinion, does the website provide instruction and activities aligned with current practice in literacy education for gifted students in the third grade? Share any insights or comments to support your answer.

   Click here to enter text. The box will expand as you write.

3. Would you recommend this instructional website to elementary school teachers to use as part of their literacy instruction for their gifted students? Why or Why not?

   Click here to enter text. The box will expand as you write.

**Effectiveness**

On the next few pages, you will find a chart for each section of The Reader’s Treasure. On each chart, you will see the directions and the main objective or goal of that game. On each row mark a box indicating the extent to which you agree or disagree with each statement as it pertains to the use of this instructional website within a regular third-grade classroom for intellectually gifted students.

### Novel Games (level 1)

**Directions:**
Students will select from a list of similar words to match the mood of the sentence to the mood indicated on the spinner. The feedback instructs the student to read the sentence to see how the different word choice affects the mood of the sentence. An online dictionary is available for student use, as needed.

**Objectives:**
- **CCSS.ELA-Literacy.L.3.5** Demonstrate understanding of figurative language, word relationships and nuances in word meanings.
- **CCSS.ELA-Literacy.L.3.4d** Use glossaries or beginning dictionaries, both print and digital, to determine or clarify the precise meaning of key words and phrases.

**Extension of the objectives:** The nuance in meanings explored here is related to how words with very similar meanings or objects that appear can impact the mood of the passage.

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**Benefits and Challenges**

**In your opinion, what are the strengths of Novel Games?**

Click here to enter text. The box will expand as you write.

**In your opinion, what are the weaknesses of Novel Games?**

Click here to enter text. The box will expand as you write.

**What technical issues arose, if any, when you explored Novel Games? Provide details.**

Click here to enter text. The box will expand as you write.

**Other comments/suggestions for Novel Games:**

Click here to enter text. The box will expand as you write.
On each row mark a box indicating the extent to which you agree or disagree with each statement as it pertains to the use of this instructional website within a regular third-grade classroom for intellectually gifted students.

**What a Character** (level 1)

**Directions:**
Students will take on the persona of a character from the book in a setting not related to the book. The student clicks “talk” to have a textual dialogue with a vendor. Recognizing that someone’s character is revealed through their words and interactions with others, the student will guess which character they are using the text dialogue. When they have figured out which character they are, they click “I Know Who I Am” to submit their guess.

**Objectives:**
CCSS.ELA-Literacy.RL.3.3 Describe characters in a story (e.g., their traits, motivations, or feelings) and explain how their actions contribute to the sequence of events

**Extension of the objectives:** This activity goes beyond describing the character with adjectives. Instead the student must understand the character on a deeper level to recognize them through interactions in a different situation.

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Benefits and Challenges

In your opinion, what are the strengths of What a Character?
Click here to enter text. The box will expand as you write.

In your opinion, what are the weaknesses of What a Character?
Click here to enter text. The box will expand as you write.

What technical issues arose, if any, when you explored What a Character?
Provide details.
Click here to enter text. The box will expand as you write.

Other comments/suggestions for What a Character:
Click here to enter text. The box will expand as you write.

On each row mark a box indicating the extent to which you agree or disagree with each statement as it pertains to the use of this instructional website within a regular third-grade classroom for intellectually gifted students.

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<th>Art Appeal—Art &amp; Music (level 1)</th>
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Directions:
There are two sections to Art Appeal. Students will complete five questions in each. In Music, they play the three audio files and guess which mood or feeling it evokes. Information about musical elements that contribute to the mood/feeling are explained. Then the student moves on to part b of the question where they select the audio file that they learned about in part a, which corresponds with the passage of text presented. Similarly, in Art, they are given a passage of text and select a painting which has a similar mood/feeling. The feedback explains the elements the artist used to convey that mood/feeling.

Objectives:
MU.3.O.3.1 Describe how tempo and dynamics can change the mood or emotion of a piece of music.
MU.3.O Enduring Understanding: Every art form uses its own unique language, verbal and non-verbal, to document and communicate with the world.
VA.3.H.3 Connections among the arts and other disciplines strengthen learning and the ability to transfer knowledge and skills to and from other fields.

Extension of the objectives: This activity adds complexity by connecting literature to art and music.

For intellectually gifted 3rd graders:

- this activity is appropriately challenging, but not too difficult.
- this activity will likely be engaging.
- the appearance of this section is appealing.
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### Benefits and Challenges

**In your opinion, what are the strengths of Art Appeal (Art & Music)?**

Click here to enter text. The box will expand as you write.

**In your opinion, what are the weaknesses of Art Appeal (Art & Music)?**

Click here to enter text. The box will expand as you write.

**What technical issues arose, if any, when you explored Art Appeal (Art & Music)?**

Provide details.

Click here to enter text. The box will expand as you write.

On each row mark a box indicating the extent to which you agree or disagree with each statement as it pertains to the use of this instructional website within a regular third-grade classroom for intellectually gifted students.
Lightning Learning—Netiquette & Internet Safety Module

**Directions:** Students will answer a question that is presented. If they get it correct, they move on to the next question. Several questions on each topic will appear at different points in the module to assure mastery and not just a lucky guess. If the student responds incorrectly or selects “I don’t know”, then they will receive some information content (video, diagram, text). They may request more information or to return to the questions once they understand the material. The module is designed to ask a question first. This allows students who have already mastered portions of the content to move along at a faster pace.

**Objectives:**
NETS-S 5.Digital Citizenship
Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
NETS-S 2.Communication and Collaboration
Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

**Extension of the objectives:** Students will demonstrate understanding of protecting personal information and why; the meaning of cyberbullying, how to deal with it, and how to not bully inadvertently; and how to be an effective communicator via a discussion board using precise language, text formatting, and emoticons.

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**Benefits and Challenges**

In your opinion, what are the strengths of the Netiquette & Internet Safety Module?

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In your opinion, what are the weaknesses of the Netiquette & Internet Safety Module?

Click here to enter text. The box will expand as you write.

What technical issues arose, if any, when you explored the Netiquette & Internet Safety Module? Provide details.

Click here to enter text. The box will expand as you write.

On each row mark a box indicating the extent to which you agree or disagree with each statement as it pertains to the use of this instructional website within a regular third-grade classroom for intellectually gifted students.

**Discussion Board**

**Directions:** After watching a video guided tour (coming soon), students will post to either a Book Talk topic or a Word Riddle. They may also start a new topic or post their own riddles. The posts will not be visible until an administrator has previewed and accepted it. Students are encouraged to continue the discussion by responding to others.

**Objectives:**

- **CCSS.ELA-Literacy.RL.3.1** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
- **CCSS.ELA-Literacy.W.3.1** Write opinion pieces on topics or texts, supporting a point of view with reasons.
- **CCSS.ELA-Literacy.W.3.2** Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
- **CCSS.ELA-Literacy.W.3.6** With guidance and support from adults, use technology to produce and publish writing (using keyboarding skills) as well as to interact and collaborate with others.
Table continued

**ISTE Standards (NETS-S) 5. Digital Citizenship**
Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

**ISTE Standards (NETS-S) 2. Communication and Collaboration**
Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

**Extension of the objectives:** Students will apply what they learned in the other activities by using effective word choice and text features to convey meaning and evoke a tone/mood/feeling. Understanding a person’s character is revealed through their communications with others, students will write posts that demonstrate their good digital citizenship.

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<td>this activity will likely be enjoyable.</td>
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<td>the directions are clear.</td>
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<td>navigation within the module is easy.</td>
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<td>navigation into and out of the module is easy.</td>
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<td>the content is accurate.</td>
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<td>this activity provides instruction that likely will support students’ understanding of text features such as precise language, formatting, and emoticons.</td>
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<td>there are a sufficient number of practice opportunities to support mastery of the objectives.</td>
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<td>this module provides instruction that likely will support students’ in safeguarding their information in their writing on the discussion board.</td>
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<td>this module provides instruction that likely will support students’ in their writing on the discussion board contributing to academic discourse about the text.</td>
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<td>the feedback supports student success.</td>
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Benefits and Challenges

In your opinion, what are the strengths of the Discussion Board?
Click here to enter text. The box will expand as you write.

In your opinion, what are the weaknesses of the Discussion Board?
Click here to enter text. The box will expand as you write.

What technical issues arose, if any, when you explored the Discussion Board? Provide details.
Click here to enter text. The box will expand as you write.
Appendix G: Pre-questionnaire for Teachers

**Note:** The questionnaire was further developed in this study. It was delivered online so the appearance/formatting here is not what teachers viewed.

This questionnaire is intended to yield a description of your level of training/experience in gifted education and your perceptions about the needs of the gifted students within a regular classroom. The information you supply will only be used to see if a teacher’s training and experience seems to affect your perceptions and uses of the website in your instruction. Your views on needs of the gifted in the regular classroom will be compared to similar information gathered from teachers on similar questions asked in nationwide surveys to see if the same perceptions occur in this school district.

After completing this survey, I will provide you with books for your students (which you may keep) and access to an online reading website designed with gifted third-graders in mind for approximately a three-week period. You will attend a one-hour information session at your school. You and your students will be given a questionnaire after the three weeks to get your reactions to this new tool. Only the researcher will have this information. Your name will never be associated with your responses in any report, nor will it ever be made available to anyone other than the researcher. The researcher will remove your name from your data when all data analyses are complete or in seven years whichever comes first.

**Level of Training/Experience**
What training and/or experience do you have in the area of gifted education?
Please, check all that apply.

- I have taken one undergraduate-level course which included a section on gifted students along with other special needs (e.g., Integrating Exceptional Students in the Classroom)
- I have taken undergraduate-level courses dedicated solely to gifted education (e.g., Nature and Needs of Gifted, Curriculum for Gifted).
  - How many courses of this nature have you taken?
    1 2-4 5-7 more than 7
- 3 or more undergraduate-level courses dedicated solely to gifted education, but did not qualify for a minor or certificate in gifted education
- My undergraduate minor was in gifted education.
- I have a certificate in gifted education (typically 5 specific courses are required). I received the training from:
  - School district
  - College/university
  - Combination of both
  - Other (open response)
☐ I am working on a graduate degree in gifted education. Mark the target degree and include how many courses you have taken in the degree program.
  - Master’s
  - Ed.S
  - Ed.D
  - Ph.D

☐ I have a degree in gifted education.
  - Bachelor’s
  - Master’s
  - Ed.S.
  - Ed.D.
  - Ph.D.
  - Other (open response)

☐ I have attended workshops dedicated to gifted education.
  - How many?
    - 1
    - 2-4
    - 5-7
    - more than 7
  - Who provided the workshop(s)? Mark all that apply.
    - School district
    - Professional associations
    - Other

☐ I have some informal training. Mark all that apply.
  - Reading books and articles
  - Observing gifted classrooms
  - Interviewing gifted specialists
  - Online professional development materials. Describe (open ended)
  - Other (open ended)

☐ I have had at least one gifted student in my regular classroom.
  - If so, how many years (including this one) have you had at least one gifted student in your regular classroom?

☐ I have been the gifted specialist in a school. If so, how many school years, including this one? ___ Of those, how many years were pull-out programs versus co-teaching in a regular classroom? Pull-out ____ years  Co-teaching ___years

☐ I am the parent of an identified gifted child(ren).
  - Yes
    - If yes, how many of your children have been identified as gifted?
  - No

☐ Overall, I would rate my training and preparation as:
  - minimal to none
  - satisfactory
  - above satisfactory
  - extensive

**Perception of student needs**

1. In your experience as a regular classroom teacher, what school-related struggles do your gifted students commonly face?
2. As a regular classroom teacher, what challenges do you often face in providing appropriately differentiated instruction for your gifted students?

3. Please, share any ideas you may have for support(s) which might help you address your gifted students’ needs more effectively.
Appendix H: Post-questionnaire for Teachers

Now that you have had a chance to utilize the Reader’s Treasure in your classroom, please complete the following questionnaire. The purpose of this questionnaire is to ascertain your perceptions of its effectiveness for your students, ease of use, and feedback on particular features. Your name will never be associated with your responses in any report, nor will it ever be made available to anyone other than the researcher. The researcher will remove your name from your data when all data analyses are complete or in seven years whichever comes first. Your input will be used to improve the site and provide some ideas for other teachers on how to utilize the site in their own classrooms. Thanks for participating!

Overall Reaction
1. Please, briefly describe your overall reaction to the instructional website. Include what you liked/disliked and why.

2. Would you use this instructional website again? Why or why not?

3. Would you recommend this instructional website to other teachers? Why or why not?

Implementation
1. Which of the following describes the way you integrated the website into your instruction? Mark all that apply. Provide details after each item selected.
   - Extension activity in addition to regular classwork (e.g., when classwork is done)
   - Enrichment activity replacing part of the regular classwork.
   - Differentiated activity replacing most or all of the regular classwork.
   - Literacy group activity instead of previously used activities (i.e., book reports, worksheets, etc.) for this literacy group.
   - Launching point for self-selected projects (i.e., SEM-R phase 3, quarterly literacy project, etc.)
   - Homework
   - Other (Please, describe.)

2. Explain why you chose to integrate the Reader’s Treasure website into your curriculum as you indicated in the previous question. Include any factors that may have influenced your decision, such as an existing program, county policies, availability of technology, etc…
3. Rate the level of difficulty for each of the following:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Very Difficult</th>
<th>Difficult</th>
<th>Acceptable level of difficulty</th>
<th>Easy</th>
<th>Very easy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registering my students for the website</td>
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<tr>
<td>Accessing the student data</td>
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<tr>
<td>Understanding the student data</td>
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<tr>
<td>Viewing the discussion board</td>
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<tr>
<td>Previewing/approving student posts for the discussion board</td>
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</tbody>
</table>

4. Describe any difficulties you faced integrating the website into your instruction. How did you handle these challenges?
5. Please, share any suggestions or comments you may have regarding implementation or ease of use.

**Effectiveness**

1. If The Reader’s Treasure expanded to include activities for other books, how do you think integrating it into your curriculum on a regular basis might affect your students’ desire to read?
   - 5. They would want to read a lot more.
   - 4. They would want to read a little more.
   - 3. It would have no effect on their desire to read.
   - 2. They would want to read a little less.
   - 1. They would want to read a lot less.

2. Compared to traditional literature response assignments, how engaging was The Reader’s Treasure for your students?
   - 5. Much more engaging
   - 4. Somewhat more engaging
   - 3. About the same
   - 2. Less engaging
   - 1. Much less engaging

3. In comparison with the typical class activities, how much thought and effort did your students have to put in to successfully completing the activities in The Reader’s Treasure?
   - 5. A lot more effort than typical classroom activities
   - 4. Somewhat more effort than typical classroom activities
   - 3. About the same as typical classroom activities
2. A bit less effort than typical classroom activities
1. A lot less effort than typical classroom activities

4. Consider the quality of your students’ writing in the online book chats in The Reader’s Treasure. How does their input in the online book chats compare to other written responses to reading other books?
   5. My students’ posts were much better than previous written responses.
   4. My students’ posts were somewhat better than previous written responses.
   3. My students’ posts were about the same as previous written responses.
   2. My students’ posts were not as good as previous written responses.
   1. My students’ posts were of much poorer quality than previous written responses.

5. How effective do you feel the website was in leading students to mastery of the objectives?
   5. Very effective
   4. Somewhat effective
   3. So-so
   2. Not very effective
   1. Not effective at all

6. Have you ever utilized activities in your classroom similar to those on the Reader’s Treasure before?
   Yes
   No
   If yes, please briefly describe them. ____________________________

**Website**
1. Mark the box that best describes your opinion on each of the following features of the website.

<table>
<thead>
<tr>
<th>Feature</th>
<th>No opinion</th>
<th>Not good</th>
<th>So-so</th>
<th>Okay</th>
<th>Very Nice</th>
<th>Loved it!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student score reports</td>
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<tr>
<td>Students’ login dates/times report</td>
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<td>Being able to see my students’ book chats</td>
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<td>Good digital citizen module</td>
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<tr>
<td>Game format</td>
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<td>Teacher page information</td>
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</table>

2. **Tell us more.** Feel free to share any comments or suggestions you have about the features of the website.
3. Would you like to be interviewed by the researcher to add to your responses? Yes  No
   If yes, please, provide how you prefer to be contacted.
Appendix I: Post-questionnaire for Students

Your Reader’s Treasure Username: _________________

Directions: Please take your time and answer each question to tell how you feel about The Reader’s Treasure.

1. If the Reader’s Treasure expanded to include activities for other books and assigned in school on a regular basis, how would this affect your desire to read?
   - 5. I would want to read a lot more.
   - 4. I would want to read a little more.
   - 3. It would have no effect on my desire to read.
   - 2. I would want to read a little less.
   - 1. I would want to read a lot less.

2. When writing to other students in the online book chats in The Reader’s Treasure, how likely were you to consider the quality of your writing?
   - 5. Very likely
   - 4. Fairly likely
   - 3. As likely as if I was writing anything
   - 2. Fairly unlikely
   - 1. Very unlikely

3. After completing the Reader’s Treasure, how well do you feel you know the characters?
   - 5. Extremely well, better than just reading
   - 4. Somewhat better than just reading
   - 3. About the same as after I finished reading
   - 2. I am now confused by some things
   - 1. I thought I understood; now I don’t.

4. In your opinion, how did participating in the online book chats in The Reader’s Treasure affect your understanding of the book?
   - 5. Very much
   - 4. Somewhat
   - 3. A little
   - 2. Not much
   - 1. Not sure
5. In your opinion, how did participating in the book chats online affect your understanding of things you learned in The Reader’s Treasure?
   5. Very much
   4. Somewhat
   3. A little
   2. Not much
   1. Not sure

6. Have you ever experienced activities like these (online or in class) after reading a book before?
   Yes
   No
   If yes, briefly describe your experience. ______________________________

7. In comparison with the typical class activities, how much thought and effort did you have to put in to successfully completing the activities in The Reader’s Treasure?
   5. A lot more effort than typical classroom activities
   4. Somewhat more effort than typical classroom activities
   3. About the same as typical classroom activities
   2. A bit less effort than typical classroom activities
   1. A lot less effort than typical classroom activities

8. Mark the box on each row that best describes your opinion on each of the following features of the website.

<table>
<thead>
<tr>
<th>Feature</th>
<th>No opinion</th>
<th>Not good</th>
<th>So-so</th>
<th>Okay</th>
<th>Cool!</th>
<th>Loved it!</th>
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<tbody>
<tr>
<td>Working in any order I want</td>
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<td>Going at my own pace</td>
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<td>Playing games</td>
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<td>Using keys to open fun prizes</td>
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<td>Writing in bBook chats</td>
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<td>Getting feedback from my teacher</td>
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<td>Learning about being a good digital citizen in the module</td>
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<td>before entering the book chats</td>
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9. Order the activities listed below (#1 to #6) from your favorite to your least favorite.
   #1=most favorite and #6=least favorite.
   - Novel Games (spinner and changing the mood of the sentences)
   - Art Appeal-art (matching famous paintings to reading passages)
   - Art Appeal-music (matching famous pieces of music to reading passages)
   - What a Character (guessing the character based on conversations in new setting)
   - Digital Citizenship (learning about and showing what you know about internet safety and online communications)
   - Get connected-book chats (discussion forum with other students on topics from the book)
10. Think about the activity you listed in the previous question as your favorite (#1). Explain why you listed this activity as your favorite.

11. Think about the activity you listed in the previous question as your least favorite (#6). Explain why you listed this activity as your least favorite.

12. **Tell us more.** Feel free to share any comments or suggestions you have about The Reader’s Treasure website.
Appendix J: Objectives-based Literacy Skills Test for Students

Note: These 10 questions were used 2009 Pilot study. The final version has 36 questions and was developed as described in this document. For a copy of the final version, contact the author at beth.elaine.jordan@gmail.com

DIRECTIONS: Whether you realize it or not, you learned a lot playing these games and chatting with other students online. Let’s see what you learned. Please, circle the best answer choice for each question.

1. When blogging, your reader cannot hear the tone of your voice, how else can you convey your precise meaning?
   A. characters' attitudes   B. word choice   C. length of text   D. sequencing

2. If you wanted to connect a painting to a passage that used the word ephemeral (light and airy), which of the following would be something that you would use?
   A. dark colors   B. sharp contrast   C. soft colors   D. right angles

3. You are writing a paper describing your friend. You have already said she is fun, but want to explain that she also tends to get in trouble. What word could you choose to enhance your explanation without repeating yourself?
   A. playful   B. mischievous   C. amusing   D. merry

4. You are writing a blog post and want to include a link to a song that expresses the emotions of the story you are writing. In the story, the main character loses something special in the ocean. What characteristics would the music have?
   A. Quick and upbeat   B. Slow and upbeat   C. Loud and slow   D. Slow and quiet

5. You are writing a story to share in a blog. You want the other authors to understand that your character is confused. Which of the following would be the best response when your character is asked to go to the school store?
   A. School store, no problem. I’ll go there on my way back from the cafeteria.
   B. The school store? I don’t mind going if it’s important, but can I go after recess?
C. You want me to go to the school store? We have one? How do I get there?
D. The school store? What in the world could you want from that place? It doesn’t have much.

6. You are reading a book and the main characters each describe their favorite paintings. From their descriptions of the painting, choose the one who is angry.

A. My favorite painting is warm with oranges and yellows
B. My favorite painting is light and airy with soft pastel colors
C. My favorite painting is bright with primary colors.
D. My favorite painting is red with sharp black shapes.

7. The following sentence was written to describe a queen.

She often wore the same __regalia__ when dignitaries visited.
If you wanted the same sentence to describe her lady in waiting, what word could you use instead of “regalia”?
A. gown
B. garb
C. dress
D. clothes

8. Which of the following speeches by an unknown character would most likely be said by a mother to her child?

A. Sure we can have as much ice cream as you want. Just make sure you don’t spill any.
B. We can have ice cream, but we need to finish dinner and clean up first.
C. No, I’m sorry, we don’t serve ice cream here only cakes and pies.
D. I don’t actually like ice cream; it’s got too much fat in it.

9. Read the following passage then pick the description of the painting that most closely matches the tone of the piece.

Vanessa had never been to the city before. The buildings were so tall that they blotted out the sky. At home, the sky stretched as far as she could see like a cheery canopy. Here it was a small blue strip wedged between glass and concrete.
Her aunt’s apartment was on the 18th floor, but it still didn’t get any sunlight. The people below looked so small, but even though they looked like toys she could hear them rushing all day and night. Vanessa had a hard time sleeping at night when she thought of how far away the ground was from her bed.
Being on the ground wasn’t any more familiar. It seemed tight and noisy down at the street level. People were rushing by with determined faces, always going somewhere.
The subway was frightening. Rushing through tunnels in the ground like supersonic rats. She realized quickly that she missed the farm where she had grown up.

A. An abstract with primary colors and geometric patterns
B. A landscape with soft blues and greens
C. A pencil sketch in all grays and blacks
D. An impressionist still life with pinks and yellows
10. Consider the following prompt for a blog, then read the response posted. In the following question choose the new comment that would make the response stronger. You may choose as many as you think will make the passage better.

Writing Prompt:
A family has just won plane tickets to another country if they can agree on what country to visit in the next hour. Tell the story of what happens.

Posted Response: The brother and sister both want to go to Australia, but the parents want to visit France. Since it is a tie, they can't take a vote, so they have to figure out a different way to decide. The brother says they should draw straws, the sister says they should label different sides of a dice and the parents suggest since it's fifty-fifty they should flip a coin.

A. Change “take a vote” to “have a family vote”
B. Change “different way” to “fair way”
C. Change “dice” to “playing cards”
D. Change “parents suggest” to “parents say”
Appendix K: Internal Review Board (IRB) Approval

3/25/2014

Beth Jordan
Secondary Education
4202 East Fowler Ave.
Tampa, FL 33620

RE: Expedited Approval for Initial Review
IRB#: Pro00015116
Title: Developing Differentiated Reading Instruction Online for Gifted Third Graders: A Design Experiment

Study Approval Period: 3/25/2014 to 3/25/2015

Dear Mrs. Jordan:

On 3/25/2014, the Institutional Review Board (IRB) reviewed and APPROVED the above application and all documents outlined below.

Approved Item(s):
Protocol Document(s): BJordan_Proposal2_02272014_irb15116.doc

Consent/Assent Document(s)*:
15116_Parent_Consent_2.27.14_version1.docx.pdf
15116_teacher_Consent_2.27.14_version1.docx.pdf

Child Assent Script(s):
Child Assent Script Revised.docx

*Please use only the official IRB stamped informed consent/assent document(s) found under the "Attachments" tab. Please note, these consent/assent document(s) are only valid during the approval period indicated at the top of the form(s).

This study involves children; approved under 45 CFR 46.404: Research not involving greater than minimal risk.
It was the determination of the IRB that your study qualified for expedited review which includes activities that (1) present no more than minimal risk to human subjects, and (2) involve only procedures listed in one or more of the categories outlined below. The IRB may review research through the expedited review procedure authorized by 45CFR46.110 and 21 CFR 56.110. The research proposed in this study is categorized under the following expedited review category:

(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.

As the principal investigator of this study, it is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB. Any changes to the approved research must be submitted to the IRB for review and approval by an amendment.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

John A. Schinka, Ph.D.
John Schinka, Ph.D., Chairperson
USF Institutional Review Board
About the Author

Army wife, mother, teacher, and learner. My life has never been dull. The curiosity and willingness to take risks found in many gifted people definitely exist in me. As a young child I was identified as gifted. I was fortunate enough to attend a gifted center where I explored many different things. My children were not so fortunate, but they did get to spend six years in Germany where they attended German kindergarten to learn another language and culture. We also explored much of Europe’s history and culture. My husband was enrolled in a special gifted class one year in high school. That year was life-changing for him. Three very different approaches to enriching the lives of gifted students, but all were too short lived.

My husband, Nick, retired from the U.S. Army in 2010. This transient life means I have had quite a varied career. Overseas I taught undergrad child development courses for Central Texas College and a basic skills class for soldiers through the Army. I have taught 13 years in grades K-3. I taught Intro to Technology for Educators at my university. A teacher affects the lives of students. A teacher of teachers increases their impact on the world exponentially.

I entered my career like I approached most endeavors in my life, with vigor and perfectionism. I wasn’t just going to know the content and the children inside and out, I was going to change lives. The high-stakes testing and accountability systems have done their best to rob me of my fervor. This dissertation has spurred me to overcome the obstacles of the American education system of today and aim high for myself, my students, and the future teachers I am privileged to join on a portion of their journey.