COLLABORATION BETWEEN A TEACHER LIBRARIAN AND A TEACHER OF TECHNOLOGY TO INFUSE 21\textsuperscript{ST} CENTURY SKILLS WITHIN A K-4 SCHOOL SETTING: A CASE STUDY

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Abstract

Educational goals and objectives are evaluated to ensure that students are prepared to be successful to meet the economic challenges within an ever-changing global environment. Over the past decade the educational focus has shifted to equip students with 21st century skills. This qualitative case study examines how two enrichment teachers, a K-4 teacher librarian and a K-4 technology teacher, collaborated on a science unit to teach information literacy skills and technology skills to 72 first graders at an independent K-12 school. Through the use of interviews and anecdotal records, the study investigates how enrichment teachers use their collaboration to influence curriculum decisions.

Key words: collaboration, 21st century skills, information literacy, STEM, curriculum, enrichment teachers
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Chapter One: Introduction

Statement of the Problem

The Topic

As education continues to evolve to fit economic and societal needs, a focus on skills students need to be successful in the 21st century has gained national prominence. Currently, students in the United States are lagging behind their peers within the global landscape (Brown, Brown, Reardon, & Merrill, 2011). A recent study by the Organization for Economic Co-operation and Development (OECD) places the United States twenty-first in science and twenty-sixth in math out of thirty-four OECD member countries (http://www.oecd.org/pisa/keyfindings/PISA-2012-results-US.pdf).

This problem is not just the concern of educators. American businesses also are apprehensive in regards to the preparedness of today’s students as they are being groomed to be the future workforce (http://www.todaysengineer.org/2008/Dec/STEM.asp). With the expectation that there will be a shortage of skilled workers, there is an ever-pressing need for highly skilled college graduates, who are able to face the challenges of the constant technological advancements and industrialization that is expected to occur continuously. (http://www.shrm.org/hrdisciplines/global/articles/pages/skilled-worker-shortage-worsens.aspx).

In order to address these deficiencies, President Barack Obama launched the education initiative “Educate to Innovate,” in 2009 as a means of promoting the necessary 21st century skills needed for student success, thus helping the United States stay at the forefront of the worldwide economy. The goal is that Science, Technology, Engineering, and Math (STEM) literacy and 21st century skills will increase through all grade levels, since more students will be exposed to real world situations and allowed opportunities to apply problem-solving skills,
critically think and utilize creativity, resulting in innovations for the betterment of society. As a result, with these new skills students’ test scores in these areas will rise and the United States will become more competitive with other nations (http://www.whitehouse.gov/issues/education/educate-innovate).

**Research Problem**

With this new focus on 21st century skills, teachers will need to adapt their methodologies to fit these parameters. Beginning in the elementary grade levels, instruction that includes these specific skill sets will need to be implemented effectively. The research problem was how instructional methodology in the elementary grades needed to evolve to meet the demands of creating curricular opportunities for students to engage in the STEM areas and 21st century skills. The purpose of this case study was to describe the collaboration between enrichment teachers and the curriculum and pedagogy that came from the teachers’ collaboration. At this stage in the research, the collaboration generally was defined as the work between two educators in order to improve instruction utilizing a science based topic in a grade one setting.

**Justification for the Research Problem**

There have been several key studies that pertain to teacher collaboration within K-12 academic settings. Mokhtar’s and Majid’s (2006) exploratory study concerning the collaborative relationship between teachers and librarians in Singapore’s primary and secondary schools discussed the importance of supportive library programs and collaboration between teachers and librarians as a means of increasing students’ skill sets. Additionally, Montiel-Overall’s (2008) qualitative study comprised of teachers and school librarians, from a primary school (Pre-K-2), an elementary school (K-5), and middle school (6-8), in a lower socio economic school district within the United States, supported the notion that teacher and librarian collaboration can be
considered a successful teaching and learning model. Furthermore, Johnson’s (2003) comparative case study pertaining to teacher collaboration at four schools in western Australia, including two primary schools, a boy’s secondary school, and a secondary college, concluded that teacher collaboration can be beneficial in exposing individuals to other subject areas. Nevertheless, this study highlighted some hindrances such as micro politics within the educational setting that made collaboration unappealing.

**Deficiencies in the Evidence**

Even though teacher and librarian collaboration has been studied, the research had deficiencies. These studies, specifically those taking place in elementary school settings, focused on collaborations between classroom teachers and librarians in public school settings. Therefore, research focusing on the collaboration between librarians and enrichment teachers, particularly technology teachers, was lacking. This study involved the K-4 teacher librarian and the K-4 technology teacher and their school’s seventy-two first graders. These teachers are considered enrichment teachers within their K-12 independent private school setting.

**Audience**

Librarians, technology teachers, and administrators would be the study’s primary audience. The study allowed for the examination of collaboration influences on curricular decisions. It provided information on determining if collaboration should continue in the form described in the study or if it should be altered.

**Significance of the Research Problem**

This research was significant on multiple levels. With the global emphasis on workers being equipped with 21st century skills, Rosefsky Saavedra and Opfer (2012) wrote that in order to assist students in acquiring these necessary skills, instructional methodology cannot stay
stagnant and in isolation. Instructional methodology should change to be more inclusive and incorporate the best ways to teach these vital skills. Therefore, collaboration is a tool that instructors may use to enhance lessons, since students would have access to teachers with different skill sets. This research included technology integration, which is one of the essential facets of STEM education. Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, and Sendurur (2012), wrote that the way teachers perceived technology being used in a classroom paired with their skills and comfort levels with technology determined how effectively they integrated technology into their lesson plans. Therefore, collaboration amongst teachers with knowledge of differing subject areas could create opportunities to learn from each other. Additionally, Montiel-Overall (2007) wrote about teachers who, in their collaborative endeavors, allowed for information literacy to be integrated into other subject areas. Subsequently, these collaborations positively affected student achievement.

Within the context of this research study, there were opportunities for the librarian to share expertise in research skills, while the technology teacher shared expertise in ways to integrate technology in meaningful ways. This allowed students to acquire 21st century skills. On a local level, this may spread into the general education classrooms, thereby allowing for additional collaboration opportunities and more integration and knowledge sharing possibilities.

**Positionality Statement**

My interest in studying the collaboration experiences of a teacher librarian and a technology teacher stemmed from my professional experiences. As a former self-contained elementary classroom teacher, then middle school multidisciplinary teacher working on grade level teams, to current K-4 teacher librarian, I have been exposed to varying degrees of collaboration. I had the opportunity to participate in collaborative endeavors with a K-4
technology teacher, in an independent school setting. I was intrigued by how to find ways to foster collaboration among enrichment teachers, without the restrictions of scheduling issues or curriculum mandates.

In this case study, I was a participant, observer, and data collector. The information garnered through this study would be used to ascertain ways to encourage worthwhile and efficient collaborative endeavors among other enrichment teachers. Subsequently, this could create opportunities for collaboration school wide, thereby extending beyond core academic teachers.

As an individual who has attended Catholic private schools, taught in public schools, and is now teaching at nondenominational coeducational K-12 independent private school that boasts diversity, academic excellence, and tuition costs in relation to the national average, I was aware that my outlook might be narrowed in scope. The professional environment in which I am teaching, specifically one that encourages teachers to take risks when developing meaningful curriculum, shaped my expectations. Therefore, I was comfortable seeking out others who willingly wanted to explore curriculum.

I had assumptions within this study. This included the idea that meaningful collaboration would take place and the curriculum development would be constructive. Even though I was an active participant within this study, I was not the only one who expressed a viewpoint. The classroom teachers and the K-4 technology teacher also conveyed their viewpoints.

In order to ensure that I did no harm, I needed to take into account my environment. Even though I was encouraged to take risks, I needed to be mindful of my responsibilities to the students I teach and the duties that I perform to be an effective teacher librarian. I was not only accountable to my students, but I also was accountable to my colleagues. This required a level
of trust and respect to ensure collegial relationships. Therefore, if I constructed leading interview questions, I would misrepresent the professional relationships amongst my colleagues, thus creating a sense of mistrust and apprehension with them.

As a K-4 teacher librarian who also interacts with the entire K-12 community, including, students, faculty, staff, and alumni, I was hoping to provide a model, provide insight, or provide inspiration into collaboration with enrichment teachers. I would have ample occasions to share my experience, since my daily duties require me to be readily accessible to community members. Also, with the library’s newfound commitment to structuring an educational online presence as well as instituting faculty professional development, these were resources that could be utilized to share the research I have conducted.

There were opportunities for me to learn something new. I had not had the chance to be involved in a collaborative opportunity established by enrichment teachers. This was a different perspective from a core academic teacher, who has more weekly contact hours with students and is usually the one that initiates collaboration. I hoped to gain understanding of how enrichment teachers could be the instigators of curriculum change and create a dynamic collaborative environment.

Research Question

In order to understand the collaboration between the two teachers this study focused on one central question. How did the collaboration between a teacher librarian and a technology teacher influence curriculum in a K-4 setting?

Theoretical Framework

The research questions for this study were framed within collaborative inquiry theory. Winkleman (2012) wrote that collaborative inquiry could be used to develop knowledge in a
communicative way. This is important since Nelson, Deuel, Slavit, and Kennedy (2011) wrote “much faith must be placed on the power of professional collaboration to positively impact teaching and learning” (p. 35). Nelson and Slavit (2008) wrote that this cycle of teacher inquiry involved teachers focusing on an issue, implementing a plan to address the issue, assessing the implemented plan, and repeating the cycle as needed (p. 101). They further expounded that through the use of collaborative inquiry theory, an ongoing dialogue that pertained to instructional methods and student outcomes could exist. Additionally, participation in the collaborative inquiry process could be viewed as a professional development opportunity, since this allowed teachers to meta-cognitively engage in the how and why they used instructional practices and examined if these practices were meaningfully engaging students in the lessons (p. 101). Donohoo (2013) wrote that through the systematic examination of educational practices, educators were able to confront adaptive challenges inherent in the educational environment. Since teachers’ instructional methodologies were expected to develop to fit student needs, the collaborative inquiry process provided teachers the chance to create, examine, and reflect on their teaching.

There were four collaborative inquiry stages. The first stage required the framing of the problem to be addressed. Donohoo (2013) detailed that in order for a meaningful focus to occur, educators needed to identify student-learning needs, which included prioritizing common needs among the collaborators. Through the identification of student learning needs, collaborators could be assured that the resulting inquiry reflected a worthwhile experience for both students and educators, thus meaningful to the educational environment. The first stage also incorporated a shared vision that collaborators agreed was within their limits of control. This encompassed participants having a clear vision of what they deemed to be successful, therefore helping to
determine where they stood, what they wanted to see happen, and a plan for getting to the desired result. Through the development of an inquiry question, participants were able to define the purpose of the inquiry. This question was used to guide the experience, the plan of action, and type of relevant evidence collected. With the formulation of a theory of action, there was an opportunity to examine underlying assumptions. Therefore, it was an opportunity to look at what collaborators believed in and how this compared to their practice. Subsequently, a well-framed problem focused on a manageable issue that team members feasibly agreed could be addressed.

The second collaborative inquiry stage was the collection of evidence. Donohoo (2013) wrote that before the development of a data collection plan could occur, it was important to consider the implementation of the changes in teaching practices. This required that the collaborators agreed to small changes, with a commitment to keeping with the changes through the inquiry process, developed and maintained a supportive environment, and solicited administrative support or involvement if applicable. Once the changes in practice were agreed upon, the collaborators could determine if the data collection plan would include student learning data, demographic data, perceptual data, school data, or a mixture of these data types. As a result the development of a data collection plan would involve the determination of the type of evidence collected and how the evidence would be collected.

Analyzing evidence was the third collaborative inquiry stage. Donohoo (2013) wrote that this stage focused on data analysis. This required organization of the data, reading the data, describing the data, classifying the data, and interpreting the data (Donohoo, 2013). The first step of organizing the data required that participants label, date, and sequence the data, while ensuring the data itself was legible (Donohoo, 2013). In the second step of reading the data, the collaborators needed to ensure that not only were they familiar with the data, but also were
becoming aware of emerging themes within the data (Donohoo, 2013). During the third step of describing the data, participants began to list facts that were apparent within the various data sources (Donohoo, 2013). In the fourth step of classifying data, the data was broken into units, so that the process of coding the data could begin (Donohoo, 2013). The final step of interpreting the data allowed collaborators to examine the implications and draw conclusions (Donohoo, 2013).

The fourth and final stage of collaborative inquiry was documenting and debriefing the process. Donohoo (2013) wrote about the key components within this stage. Documentation included ensuring there is identifying information, a collaborative inquiry question, a shared vision, a rationale and purpose statement, a theory of action, a description of the actions taken, findings and a conclusion, and recommendations and next steps (Donohoo, 2013). The debriefing process has an added benefit because it could be used to build team awareness regarding how to handle adaptive challenges (Donohoo, 2013). Since the process was collaborative, it allowed participants to gain new insights and to look for ways to enhance future collaborative effectiveness (Donohoo, 2013). Through the reflection collaborators were able to question their practices while simultaneously learning from the experience (Donohoo, 2013). Additionally, collaborative inquiry allowed for actions to be informed by evidence, since the process was driven by evidence (Donohoo, 2013). Furthermore, Given, Kuh, Leekeenan, Mardell, Reddit, and Twombly (2009) wrote that by documenting and reflecting upon the process, teachers not only were empowered to build new knowledge, but also strengthened their communities of practice.

Collaborative inquiry process fit into the context of this research study. Its lens allowed for an examination of the collaboration and resulting teaching practices that the teacher librarian
and technology teacher participated in throughout the different facets of the lessons. Zech, Gause-Vega, Bray, Secules, and Goldman (2000) wrote that this would allow for teacher discussions regarding scaffolding and ways to address learner needs to enlighten perspectives and create opportunities for teachers to interact meaningfully and to formulate theories related to classroom issues. They further explained that collaborative inquiry could extend beyond the classroom and permeate the school community (Zech, Gause-Vega, Bray, Secules, & Goldman, 2000). This occurred because teachers became aware that they were active knowledge constructors and through this process they were able to sustain the collaborative learning culture (Zech, Gause-Vega, Bray, Secules, & Goldman, 2000). Goodnough (2005) supported the idea that collaborative inquiry cultivated not only adult learning, but also engaged educators in educational research endeavors.

Collaborative inquiry as a theoretical framework was a way for educators to reflect upon implementing meaningful changes within the curriculum that would address student-learning needs and supported professional learner communities. Hughes (2005) wrote that the process supported educators in sharing their experiences, made allowances for teaching and learning through subjects and varying content areas, and empowered individuals to become actively engaged. Ultimately, collaborative inquiry could lead to changes beyond individual classrooms and could have a wider impact. Walton (2011) wrote that reflection of practices through collaboration had the potential to influence a larger environment, thus inducing social change.

**Conclusion**

This chapter discussed the need for the examination of instructional practices. With the ever-evolving changes occurring within the global environment, education must adapt to provide students the skill sets that are essential for their success. Educators have an obligation to find
meaningful ways to teach 21st century skills. Collaborative inquiry was the theoretical framework selected to investigate how teachers could work together to improve their curriculum to meet student needs and provide students with worthwhile learning experiences.

Chapter Two: Review of the Literature

Introduction

This literature review will contain four main parts. The first part is a discussion of teacher perceptions of teacher and librarian collaborations and will include the hindrances that affect this type of collaboration. Additionally, it consists of ways that teacher and librarian collaborations are successful and the effects of teacher and librarian collaboration on student achievement. The second part discusses the current perceptions of teacher librarians within K-12 settings, including expectations and realities of the librarian’s role. In the third part, there is a review of the role of technology teachers in these same settings. Lastly, the fourth part encompasses the skills that are deemed necessary for success in the global landscape, such as STEM education, 21st century skills, and the need for information literacy skills and information technology skills. Subsequently, the knowledge garnered from these sections will provide the basis for the proposed study.

Teacher Perceptions of Teacher and Librarian Collaborations

This section will be a review of how teachers and school librarians view collaborations. It will discuss the perceptions of school librarians and how school faculty view librarians in a K-12 setting. This section also will discuss hindrances that collaborators have experienced as well as perceived hindrances that prevent instructional partnerships from occurring. Lastly, there will be a review on how students were affected by collaborations.
Teachers’ perceptions of librarians and how to best utilize their school librarians varied. Some classroom teachers felt that they were the best purveyor of information regarding their subject matter and did not have confidence in their librarians’ skills as a means of enhancing instructional methodologies (Bogel, 2008). According to Schultz-Jones and Ledbetter (2009), there were classroom teachers that were unaware of the types of training that librarians undertook and the subsequent knowledge that they could offer. Montiel-Overall (2010) further elaborated that teachers might not understand 21st century skills fully, which could further diminish their concept of the importance of information literacy. Consequently, teachers’ perceptions of librarians were that they were sources for materials, rather than instructional collaborators (Small, Shanahan, & Stasak, 2010).

Even some teachers who participated in past collaborations agreed with others who had not participated in collaborations about types of hindrances they perceived existed in teacher and librarian collaborative scenarios. These hindrances included the time commitment involved, the structure of school schedules tending to be fixed rather than flexible, the varying levels of collaborative experience of those willing to participate in the instructional endeavor, and the overall view of how to partake in the collaborative process. Mohktar and Majid (2006) wrote that the perceived time commitment involved when forming instructional partnerships was discouraging collaborative opportunities, because teachers did not view their schedules as being conducive for something this time consuming. Morellion (2008) specifically wrote about how school schedules had a tendency to be fixed and lack the flexibility for necessary planning and instruction to take place. Jones, Zambone, Cantor, and Voytecki (2010) supported the idea that time and scheduling were barriers, but addressed that even though librarians might be viewed as instructional partners, collaborators still had misconceptions or were not fully able to value the
other’s role. Therefore teachers who were willing to collaborate might not necessarily have had occasions to participate in collaborations. Schulz-Jones and Ledbetter (2009) wrote that lack of knowing how to effectively and efficiently collaborate could prevent collaborations from organically taking place, even if participants were willing. This was due to lack of support structures in place, training, years of instructional experience, and trust in the skill sets that librarians had to offer. Additionally, since some schools lacked qualified librarians, this led to teachers being unwilling to collaborate (Mohktar & Majid, 2005).

Even with existing obstacles that could thwart instructional partnerships, there were teacher and librarian collaborations that were positive and successful experiences. Several attributes led to these successes. One of the most often cited was the participants’ perception of the time commitment involved versus the perceived benefits. While the time commitment involved might be a hindrance to some teachers, many teachers who had thriving collaborations viewed the time commitment as an essential factor. Both Chu (2009) and Montiel-Overall (2007) wrote that setting aside time dedicated to collaboration was an essential aspect for success. Harada (2005) wrote of collaborators putting in additional time to ensure that there was thorough planning, with participants willing to meet during non-school times, such as in the summer. Specifically, according to Brown (2004), time was a factor in scheduling meetings that allowed not only for open communication of expectations, but also gave opportunities to design goals and specific objectives. Chen and Lee (2009) wrote that time gave participants chances to pre-plan, discuss, and be reflective on their lessons. Opportunities to build relationships, share knowledge, and critically think about ideas occurred due to the time put into the collaborations (Montiel-Overall, 2010). Johnson (2003) wrote that learning communities developed from collaboration endeavors resulting in opportunities to break down barriers between subject areas.
Therefore, by having opportunities to verbalize frustrations, teachers and librarians could work together to create solutions (Harada, 2005).

Another facet to successful collaborations was administrative support. School culture helped in setting the expectation of these educational alliances; especially if administrators had expectations and structures in place that supported a collaborative environment. Mohktar and Majid (2006) wrote that administrators had the ability to promote and motivate teachers into collaborative opportunities within their respective educational settings. This might include additional planning periods to meet the expected time commitment involved and assessing collaborative endeavors as part of teaching assessments. Montiel-Overall and Grimes (2013) further detailed that administrators could be proactive by providing professional development opportunities that outlined collaborative elements.

Additionally, other positive contributing factors include shared vision, a common interest, and mutual trust (Bogel 2008). Without these facets, teachers might not have a buy in to enter instructional partnerships. Shared vision could lend itself to creating a basis of common goals and trust in each other’s knowledge base and abilities. Therefore, this led to willingness by educators to participate in collaboration. Brown (2004) wrote that librarians needed to be proactive with a positive attitude toward collaboration, thus creating a comfortable atmosphere with a strong foundation of mutual trust and respect to build collaborative opportunities.

Bogel (2008) noted that trust leads to defined roles. Defined roles are helpful in organizing instructional responsibilities, especially once participants begin to understand that instruction and learning are not always linear processes (Harada, 2005). Once a willingness to collaborate existed, teachers can show their mutual trust and respect through co-teaching. Co-teaching or team teaching was considered to be a major factor leading to collaborative success.
Lastly, teacher and librarian collaboration could lead to increased student achievement. Chu, Tse, and Chow (2011) wrote that the expertise of each of the participants was the main catalyst to student achievement, specifically the areas of information literacy skills taught by the librarian and technology skills taught by the technology teacher. Mokhtar and Majid (2006) added that school programs with strong teacher and librarian partnerships enhanced the curriculum of the school, thereby assisted in increasing students’ development of new knowledge. Additionally, Williamson, Archibald, and McGregor (2010) included anecdotal evidence suggesting that the librarian and subject matter teacher, when working together, allowed students to bolster their information literacy skill set and subject matter content. Therefore this led to students actively engaging in the metacognitive process. Montiel-Overall (2007) described this collaboration of subject areas encompassing library instruction and information literacy as high-end collaboration. Montiel-Overall (2009) explained that high-end collaboration would result if joint planning, joint teaching, and joint student evaluation occurred. Furthermore, this high-end collaboration was the product of worthwhile teaching goals that encompassed ways to improve teaching and learning (Montiel-Overall, 2008).

The previous section presented a variety of aspects pertaining to teacher and librarian collaborations. While it was noted that there were negative perceptions regarding these types of collaboration, it was also noted that when done in a relevant, clearly defined, and supported way teacher and librarian collaborations could lead to student success. Results from these studies were beneficial in building upon existing collaborations and fostering new ones.

**Perceptions and Realities of the Librarian’s Role**

This section will discuss the roles of school librarians in the K-12 environment. It will involve the varied perceptions of teacher librarian tasks. This will include traditional
perspectives of school librarians and how the roles differ among schools. Lastly, it will review ways the position of school librarian has changed and expectations of the 21st century librarian.

The school librarian’s role has evolved since the beginning of the twentieth century. Barron and Bergen (1992) wrote that the primary role of school librarians from the early to the mid part of the twentieth century involved providing materials that supplemented textbooks along with materials that interested students. Braxton (2008) supported this idea by writing that the librarian was considered the school’s literature expert, who was expected to match students’ interests and abilities with books. Conversely, school libraries were considered to be important to the English curriculum and often were managed by classroom teachers, rather than a qualified librarian (Barron and Bergen, 1992). When standards for school librarians were developed in the 1960’s and modified during the years after, it became evident that the role of school librarians was to gather information, store information, develop information retrieval systems, and help school community members become efficient and effective users of information (Barron and Bergen, 1992). When the American Association of School Librarians (AASL) released *Information Power: Building Partnerships for Learning*, it reiterated that the school librarian’s role was to be viewed within the context of an evolving educational environment that incorporated advancements in technology (Braxton, 2008). As a result, the school librarian was to be a teacher of information literacy to community members, an instructional partner who collaborated with faculty, an information specialist who acquired, evaluated, and shared information in a range of formats from various sources, and a program administrator who developed practices and policies that enrich and enhance programs for student learning (Braxton, 2008).
There were differences in opinions on how school librarians and school libraries are viewed and utilized in school settings. Loertscher (2006) wrote that school library programs could fit into five flavors. A vanilla program included a staff that was service oriented, welcoming and knowledgeable. It also included technology, a materials collection with a focus on the physical library location, and community members initiating services. The strawberry program focused primarily on reading initiatives that ensure students are proficient readers within the school environment. Chocolate programs were concerned with information literacy taught in isolation and often not in conjunction with classroom instruction. Mint chocolate chip programs centered on ensuring that technological devices were current. Finally, spumoni programs included those that were collaborative with supporting documentation of successes, were focused on the achievement of learners through the development of units that interdisciplinary and integrative in nature, and incorporated reading skills and the promotion of literacy initiatives. Spumoni programs were considered to be the most rewarding, because they enveloped elements of the other flavors in a way that enriched the overall school environment. It allowed the school librarian to be viewed as a learner leader in the school and increased collaborative, literacy, and technology endeavors. Giorgis and Peterson (1996) also wrote that schools could view librarians and library programs in multiple ways, such as a means of solely checking out books, scheduled library time with the librarian who checks out books and teaches a lesson or reads a story, or teachers and librarians collaborating to integrate lessons in a meaningful way. The difference between a comprehensive library program and one that may not encompass all of the expected roles of a school librarian involved how the school utilizes the librarian. Haycock (2002) wrote that scheduling, such as librarians having a fixed schedule to secure teacher coverage and teacher-planning time, led to less time for collaboration or co-
teaching opportunities; therefore, librarians were finding themselves focusing on collection
development and teaching library skills in lieu of participating in instructional partnerships.

Due to the ever-changing educational environment, school libraries and subsequently
school librarians were finding their roles changing. Johnson (2013) wrote that library
automation led to a need for librarians to become technology savvy. A focus on information
literacy and educational reforms concentrated on student achievement placed an emphasis on the
teacher aspect of the librarian’s role. This was even more important as the World Wide Web
becomes ubiquitous in and out of educational settings. Therefore, with these technological
advancements and the presence of technology devices within classroom settings, school
librarians were tasked with ensuring that digital citizenship is stressed within the expanding array
of materials and resources available when developing the library’s collection. Hamilton (2003)
wrote that the view of librarians is that of an educational resource and they were essential to the
learning process. Consequently, librarians were to view their roles as proactive, rather than
reactive or passive, when developing lessons that were significant to the objectives of classroom
instruction. Mikalischen (2001) supported this by writing that librarians were to be flexible and
view students as the priority by being actively involved with the students. This included being
an information specialist, curriculum collaborator, reading advocate, teacher, and provider of
access to quality library resources (Morris, 2012).

As focus shifted to skills students need to be successful in the 21st century, the school
librarian needed to adapt to support intended student skills acquisition outcomes. The
International Federation of Library Association’s Manifesto described elements that school
libraries should provide to equip students to become responsible citizens (Farquharson, 2009).
This encompassed models and strategies teacher librarians and classroom teachers use to teach
reading and online reading in collaborative endeavors (Farquharson, 2009). The United Nations Educational and Cultural Organization explained that due to emerging technology and challenges that education encounters, education must address information literacy, visual literacy, and technology literacy (Farquharson, 2009). Therefore school librarians were essential in helping students navigate, analyze, evaluate, and create and communicate ideas through various media (Farquharson, 2009). Emmanuel (2013) wrote that since the millennial generation was comfortable using technology, there was a foreseeable trend that these digital natives would require technology integration in school library settings.

Guidelines have been created to help school librarians in developing effective library programs. The National Guidelines of Library Media Programs listed the goals of library media specialists to include being an information specialist, a teacher, an instructional partner, and overseeing the library at a technical level (Kaplan, 2007). The American Association of School Librarians guidelines for student library programs also stated the importance of school librarians being educational leaders (Moreillon, 2013). The guidelines supported the significance of teaching literacy skills, literacy standards, and collaborations that supported the American Association of School Librarian Standards (Kovalik, Jensen, Schloman, and Tipton, 2010).

As school librarians adjusted to provide effective 21st century library programs, some successful components emerged. Marcoux (2010) wrote that award winning school library programs were student centered, had support and strong relationships from faculty and administrators, shared the school wide vision, and were highly collaborative. These elements also impacted student achievement. Hartzell (2003) wrote that significant gains in student achievement could be attributed to the integration of information literacy within the school
curriculum, extensive librarian and teacher collaborations, and librarians showing leadership throughout the school setting, not solely just in the library.

This section discussed the past and current roles of school librarians. It focused on how school librarians have transformed from the twentieth century as primarily literature experts and material resources to integral members of the school community. Additionally, this section showcased how school librarians and library programs vary amongst schools and the guidelines that school librarians should follow to promote successful twentieth century library programs.

**Technology Teachers’ Roles**

The role of technology teachers in K-12 settings will be the focus of the next section. There will be a discussion of the main technology education goal within the K-12 educational environment. This also will include the expectations involved with being a technology teacher.

Technology literacy is the primary goal of technology education. Brown and Brown (2010) wrote that there is a need for individuals to conceptually understand the function technology has in the world, so that not only are they appreciative, but also are able to evaluate unfamiliar technology. Therefore, technology standards comprise five categories including the nature of technology, how technology impacts society, technological design, problem solving technology issues, and how technology is used (Brown and Brown, 2010).

In the early part of the 21st century the technology teacher’s focus was the development of technology programs using research based instruction, teaching technology literacy (Barnette, 2003). This role focused on both the acquisition of materials and providing students with developmentally appropriate educational plans (Barnette, 2003). Consequently, due to the nature of technological advancements, there was a challenge of creating effective lessons within technology programs that needed to be adaptable (Barnette, 2003). The role eventually evolved
from solely teacher delivery of technological knowledge, to facilitating students to actively engage in their learning (Ejiwale, 2012). Additionally, activities were to connect to the real world and have applicable components that were identifiable so students would be able to identify and relate (Ejiwale, 2012).

This section discussed the role of technology teachers. It highlighted the importance of technology literacy and its components as being the focus for technology educators. Additionally, it explained how technology instruction should be implemented.

**Skills Needed for Success in the Global Landscape**

**STEM Education**

Since the collaborative unit features the science topic of the solar system, the next section will focus on the need for STEM education, focusing on science literacy. It will examine why science and technology education needs to be emphasized (The National Academies, Advisers to the Nation on Science, Engineering, and Medicine, 2007). This discussion will be followed by an examination of the importance teaching informational technology and informational literacy within 21st century education.

The National Science Board (2010) stated “that to ensure the long-term prosperity of our nation, we must renew our collective commitment to excellence in education and the development of scientific talent” (http://www.nsf.gov/nsb/publications/2010/nsb1033.pdf, p.1). This focus on scientific talent was viewed as an economic imperative (The National Science Board, 2010). The National Science Board rational was two fold. The first part consisted of the United States benefitting from its scientific ventures for the past six decades (The National Science Board, 2010). If this investment was to continue reaping rewards, then efforts to develop human capital in science would be necessary since other countries are seeking to do the
same (The National Science Board, 2010). The second part of The National Science Board (2010) rational was that all students should be afforded an opportunity to realize their potential to the fullest degree and be given opportunities to thrive in the modern world.

However, the United States which once had the historical advantage of attracting individuals from around the world to be part of the country’s scientific innovations is now competing against other nations who have become competitive in attracting talented individuals to their STEM programs (The National Science Board, 2010). Therefore, the United States should develop the scientific talent of its own citizens to compete in the global marketplace (The National Science Board, 2010). STEM education should begin from kindergarten and continue beyond twelfth grade (The National Science Board, 2010). Scott (2009) stated that if students were going to be prepared for future economic success in a global environment, competence in STEM “is only accomplished by building on the foundation of knowledge established at each level of education” (p.3). This included starting in elementary school (Scott, 2009). Even with students receiving STEM education at an early age, they were not inclined necessarily to select a career in science once they were in a higher education environment. Instead they were choosing to enter professions that were non STEM related (The National Science Board, 2010). Therefore, there was concern on how to recognize and nurture students interests in science, beginning in kindergarten or early childhood (The National Science Board, 2010). Moreover, educators needed to have the ability to intervene, because “no matter how talented the individual, realization of this potential may not occur on its own” (The National Science Board, 2010, p.10). With this emphasis on science, the nation could benefit from the subsequent scientific achievements for years to come (The National Science Board, 2010).
Science literacy should not be viewed solely as a means of acquiring content (The American Association for the Advancement of Science, 1990). The American Association for the Advancement of Science (1990) stated “science education-meaning education in science, mathematics, and technology-should help students to develop the understandings and habits of mind they need to become compassionate human beings able to think for themselves and face life head on” (p. viii). While this document was written over twenty years ago, this historical viewpoint aligned with the reasoning for stressing science education in modern society. According to Zollman (2012), the current STEM generation should focus on resolving “(1) societal needs for new technological and societal advances; (2) economic needs for national security; and (3) personal needs to become a fulfilled, productive, knowledgeable citizen” (p.12). Otto (2011) focused on the political aspects of science and the need to keep dialogue open when discussing various viewpoints within the scientific and political communities. When taken in conjunction with Queenan’s (2011) discussion that science does not have to be taught in isolation, especially in an era where reading is the central focus, hands-on science could be utilized as means of supporting reading motivation.

This section focused on the need for science literacy. As Steven C. Beering wrote in his letter to President Barack Obama “Our national economic prosperity and security require that we remain a world leader in science and technology” (Brenner, 2009, p.14). By nurturing interest in science at an early age, students’ perceptions of science could change. This would result in increasing numbers of students filling future science career demands. Therefore, the United States would continue to remain economically viable.
Teaching 21st Century Skills

This section will focus on the importance of teaching 21st century skills. The Partnership for 21st Century Skills (2011), which is comprised of public and private education stakeholders, view 21st century skills as the attributes necessary for students to develop if they are to be successful in the modern world (http://www.p21.org/overview). These skills include learning, innovation, information, media, and technology skills (http://www.p21.org/overview). Kay and Honey (2006) wrote, “These skills cannot be taught in a vacuum. They must be taught in the context of the subject matter” (p.69). The Partnership for 21st Century Skills (2011) states that 21st century skills should be incorporated throughout the core curriculum, with science being considered a part of this core curriculum (http://www.p21.org/overview).

In order for 21st century skills to be taught effectively, teachers need to plan lessons that incorporate these attributes in a meaningful way. Rosefsky Saavedra and Opfer (2012) wrote that students need seven survival skills, which include critical thinking and problem solving, agility and adaptability, initiative and entrepreneurship, effective oral and written communication, accessing and analyzing information, and curiosity and imagination. These skills encompass how students think, work, and live in the world (Rosefsky Saavedra & Opfer, 2012). Teachers need to be mindful to develop instruction that develops these skills and encourage learning transfer, while utilizing technology to support the learning (Rosefsky Saavedra & Opfer, 2012).

Yet, educators and policy makers are not the only ones that consider teaching 21st century skills to be essential; the American public and the business sector also recognizes the importance. Sacconaghi (2006) wrote “American attitudes toward the need for teaching 21st century skills appear as strong as the socioeconomic research being done that shows how critical
these skills are for students’ future access to the middle class and the country’s economic competitiveness” (p.39). Bruett (2006) stated that American businesses’ demands require workers with these skills. Businesses recognize that they need to evolve continually in order to remain competitive, which means that the skills needed from their workers cannot remain stagnant (Bruett, 2006).

This section centered on the importance of 21st century skills. This is best summed up by Kay and Honey who wrote, “Just as reading, writing, and arithmetic are essential for any student to succeed regardless of career, education, research and innovation are essential if the nation is to succeed in providing jobs for its citizenry” (p.78). Without these essential skills, the United States could find itself facing an economic downturn and lagging further behind their peers on the global landscape.

Need for Information Literacy and Technology Skills

Information literacy and technology skills will be the focus of this next section. At the International Association of School Librarian Conference in 2001, Keynote speaker Todd Ross stated a school library in the 21st century should not solely be centered on physical aspects such as the building, collection, and technology or the types of staffing (Bishop, 2003). Instead it should be characterized by the effective ways that it is able to aid in the development of how humans understand, make meaning, construct knowledge (Bishop, 2003). With the innovative ways that students can garner information, through a variety of formats and resources, student success is dependent on their ability to discern how best to produce and consume information to flourish in the 21st century (American Association of School Librarians and Association for Educational Communications and Technology, 1998). This supports the Partnership for 21st Century Skills, which states that the ability to critically think is an important facet within the
framework of providing students the necessary skills needed to succeed in a global economy (http://www.p21.org/overview).

While information literacy generally acknowledged a variety of meanings, most authors understand information literacy to be the foundation that allows individuals to decipher the complexities of the information age (Ryan & Capra, 2001). The American Association of School Librarians and the Association for Educational Communications and Technology (1998) stated, “Information literacy—the ability to find and use information—is the keystone to lifelong learning” (p.1). Arp and Woodard (2002) wrote that being information literate includes the ability to determine the type and amount of information that is needed, to effectively and efficiently access the required information, to critically evaluate information and incorporate information into one’s knowledge base, to effectively use information for one’s intended purposes, to legally and ethically use the intended information, to understand the use of the information in economic, social, and legal constructs. Consequently, it is important that skills are taught within specific subject areas rather than in isolation, since this allows students the opportunity to put this knowledge in a context that is emphasized through a pertinent activity (Barron & Bergen, 1992). This includes opportunities to critically think, acquire problem-solving skills, and develop information technology skills. In order to accomplish this, the school library program simultaneously needs to create opportunities for teacher and librarian collaboration for planning and curriculum development allowing for the incorporation of technology into the lessons, while providing leadership in student learning so that authentic learning can be supported through information literacy (American Association of School Librarians and Association for Educational Communications and Technology, 1998).
Technology skills involve “the use of hardware, software, services, and supporting infrastructure to manage and deliver information using voice, data, and video” (http://www.nd.gov/itd/about-us/definition-information-technology). As a means of assisting students in being effective users of information technology, the International Society for Technology in Education (ISTE) has created standards that incorporate research and information fluency (http://www.iste.org/docs/pdfs). This includes the ability to utilize digital tools in the gathering, evaluating and utilization of information (http://www.iste.org/docs/pdfs). Additionally, students are able to identify appropriate information sources available to find, to manage, and to synthesize information in an ethical manner (http://www.iste.org/docs/pdfs).

This section provided information on why information literacy and informational technology are essential components to the 21st century educational framework. Since information literacy and technology share similar components, it allows for collaborative opportunities in support of the essential skills to occur. Ching (2012) wrote that in order to enhance and create meaningful and relevant educational experiences, subjects should be integrated with technology strands.

**Conclusion**

This literature review discussed reasons why increasing science literacy is important. It recognized four key areas.

1. Collaboration between teachers enriches the learning environment and can positively impact student achievement.

2. While the perceptions and realities of librarians vary by the individual school setting, the K-12 school librarian should be considered a teacher, instructional partner, information specialist, and program administrator.
3. The role of a technology teacher goes beyond assisting in technology acquisition and includes ensuring students are able to adapt to the evolving nature of technology.

4. 21st century skills need to be promoted in all academic areas. These skills are essential from both the public and business perspectives if the United States is to continue its historical leadership as an innovative nation.

This literature review centers on the importance of finding effective ways to assist students in acquiring 21st century skills. It highlights the importance of preparing students to deal with issues on a global scale, adapt to the high rate of innovation, and be able to critically think, especially with the amount of information available (Box & Yell, 2008). Educators are tasked with finding ways to incorporate these essential skills into the traditional curriculum (Rosenfeld, 2007). Since the 21st century is well under way, this is an area that requires much needed attention.

Chapter Three: Methodology

Introduction

This case study has one central question: How did the collaboration between a teacher librarian and a technology teacher influence curriculum in a K-4 setting?

Purpose Statement

The purpose of this case research study was to describe the collaboration between enrichment teachers, specifically a K-4 teacher librarian and a K-4 technology teacher. At this stage in the research, the collaboration was defined generally as the work between two educators in order to improve instruction in a grade 1 setting. The focus of the instruction was a unit on the solar system and combined information literacy with technology.
Research Design

This qualitative research study was rooted in the social constructivist, also known as interpretivism, paradigm. Creswell (2009) wrote that social constructivists rely on the participants’ experiences, within the context of the study’s situation, to construct meaning. Since this study focused on the teaching interaction of a technology teacher and a teacher librarian, who was also the researcher, it fit into the constructivist view that situational meanings are developed through the interactions of individuals as they engaged in the study’s focus. Subsequently, this social aspect allowed for open-ended questions, thus allowing for meaning to be constructed from the collected data (Creswell, 2009). Ponterotto (2005) further wrote that the interaction between the researcher and the study’s participants were vital in understanding the deeper meaning, because it was through this dialogue that deeper meaning could come to fruition.

Research Tradition

This study stemmed from the phenomenological research tradition. Creswell (2009) wrote that phenomenological research was guided by an understanding that the research is grounded within the experiences of the participants. Marshall and Rossman (2011) wrote that through the participants’ shared experiences meaning could be derived to form the essence of the experience.

As a result of the constructivist paradigm, phenomenological research tradition, and role of the researcher as a direct participant, this was an intrinsic case study. Hancock and Algozzine (2011) wrote that intrinsic case study researchers could use the information garnered to examine a specific event. They further elaborated that outcomes should not be generalized and applied to broader populations (Hancock & Algozzine, 2011).
Participants

Case study research can focus on a particular event. Hancock and Algozzine (2011) wrote that the event being studied was to be restricted to the specific time frame that it occurred, such as a certain part of the academic school year and the individuals involved. The focus of this study was enrichment teacher collaboration involving two participants and how this collaboration influenced curricular decisions. Participants in this study included individuals identifying an area of their practice that they would like to further explore, without the involvement of outside initiators. I was the teacher librarian who conducted reflective interviews at the end of the unit and also utilized anecdotal records from debriefing sessions with the K-4 technology teacher, who was my primary collaborator. Four first grade teachers were interviewed. They were the classroom teachers of the seventy-two first graders who participated in the lessons. Additionally, the K-4 technology teacher also was interviewed.

Recruitment and Access

Since both the K-4 teacher librarian and the K-4 technology teacher had a willingness to explore collaborative opportunities, with me as the teacher librarian also being the study’s researcher, recruitment was based on the professional relationship between the two participants. Additionally, since I was formerly a first grade teacher at the site and worked with the four first grade classroom teachers for two years prior as the teacher librarian, a professional relationship existed between all of the participants. Accessibility involved both participants working at the same school site, teaching the same students and having available time periods to plan. The study’s site promoted teachers reflecting on their teaching practices; therefore the investigation of collaborative endeavors was something that could be accessed.
Protection of Human Subjects

The human subjects within this study were protected within the IRB process. This study involved adult participants who were reflecting on their practices, in order to improve their instructional methodology, for the benefit of their students. Therefore, adults in the study were represented in a professional manner and information obtained was through informed consent. Interviews were conducted upon receiving IRB approval (Appendix A), which was received after the unit was completed. Each of the interviews was conducted once I explained to the individual participants the IRB informed Consent Form (Appendix B) and received their written consent. Utilizing an interview protocol (Appendix C), I asked each participant the same questions.

Data Analysis and Coding

Cresswell (2007) wrote that qualitative research data analysis involves the preparation and organization of the research data, coding the data, and presenting the data through visual representations, such as figures and tables, or through discussions. Anecdotal records were collected and interviews were conducted at the end of the collaborative experience. The anecdotal records, which included discussions of the successes and concerns resulting from the collaboration, were online Microsoft Word documents with weekly entries recorded by the teacher librarian. I wrote anecdotal notes during the planning phase of the unit, after each of the unit’s lessons, and at the end of the unit. Interviews were conducted upon receiving IRB approval (Appendix A), which was received after the unit was completed. Each of the interviews was conducted once I explained to the individual participants the IRB informed Consent Form (Appendix B) and received written consent. Utilizing an interview protocol (Appendix C), I asked each participant the same questions. The questions were open ended and
allowed for elaboration of answers if needed. Interviews, conducted at the end of the unit, were recorded digitally, transcribed by the researcher, and stored on a computer.

Once the data was collected it was coded using initial coding. Saldana (2013) wrote that initial coding allows for data to be reflected on in an intense manner. By summarizing data, such as paragraphs into one word or phrase, a topic of the data is selected. The data can then be organized for further analysis. Through the use of a computer assisted qualitative data analysis software MAXQDA (www.maxqda.com), coding, construction of categories, and analytic memo writing occurred. Next, evaluation coding was used to determine the effectiveness of the collaboration. Through this coding, the researcher’s perspectives and the participants’ perspectives emerged within the coding process (Saldana, 2013). Then an analysis of each participant’s data, which involved comparing the newly developed codes that resulted from the category generating method, allowed for compatibility and transferability assessment (Saldana, 2013). Finally, focused coding, which involved the researcher utilizing significant codes from the first cycle to determine categorization of data, was utilized to create the most frequent categories, thus allowing for themes and sub-themes to emerge (Saldana, 2013).

Data Collection Methods

Since this is a phenomenological study, the experiences of the participants were used to construct meaning. Therefore, primary data was collected. Creswell (2007) wrote that data is used to present not only the participants perspectives, but is also influenced by the researcher’s interpretation.

Data was collected through anecdotal records, which included discussions of the successes and concerns resulting from the collaboration, and interviews. Throughout the unit, the teacher librarian recorded observations and discussions with the technology teacher and first
grade teachers pertaining to the lessons. This was done without any specific prompts. At the end of the collaborative process, reflections through the use of interviews were conducted. Even though the interviews were structured, there was ample opportunity for elaborations of answers through follow up questions.

The timeline for this collaboration was three months. This includes the planning of the collaborative unit, the teaching of the collaborative unit, and the reflection on the collaboration. The interviews were conducted at a time convenient to the interviewee, which occurred at the end of the unit. Interviews were expected to last approximately sixty minutes and varied according to participant responses. Once the interviews were transcribed the participants had the opportunity to validate the transcript.

**Data Storage**

All of the study’s data will be stored in a secured location for three years. Interviews were digitally recorded and transcribed on a password-protected computer. IRB forms were secured in a safe.

**Limitations**

This study did have limitations. The study may not necessarily be generalized, as it involved participants with specific skills collaborating under specific circumstances, such as support and scheduling structures. Additionally, this study was conducted in an independent private school setting, with small class sizes and curriculum planning flexibility. There was also a willingness among the participants in this study to undertake the collaboration, which may not exist in other settings.
Conclusion

In order to examine how the collaboration between a teacher librarian and a technology teacher influenced curriculum, an intrinsic case study was proposed. It utilized qualitative research, specifically the use of anecdotal records, which included discussions of the successes and concerns resulting from the collaboration, and interviews, as a means of gauging the collaborative experiences in an independent K-12 school setting. Descriptive and focused coding was used to categorize the data from the lesson plans, student observations during applicable instruction, and interviews from the teachers involved.

Chapter Four: Report of Research Findings

Introduction

The purpose of this research was to gain an understanding of how a teacher librarian and a technology teacher influenced curriculum in a K-4 setting that is part of a K-12 co-educational independent school in Nashville, Tennessee. As a means of examining the findings of this research, this chapter is divided into three main sections. The first section will describe how the curricular unit was conducted. In the second section, there will be an introduction of the participants, with participants other than the teacher librarian who is the researcher in the study, being identified by pseudonyms to protect their identities. The third section will review the emergent themes developed from the participants’ interviews and anecdotal notes taken throughout the unit.

Curricular Unit

The teacher librarian and the technology teacher were responsible solely for the development of this unit. After initial discussions about having limited time with students, due to the structured enrichment schedule, they decided to collaborate. Each teacher shared their
scope and sequence for the school year, and decided on a first grade unit. Since the teachers decided to collaborate early in the school year, first grade was selected because students were familiar already with the school environment and the enrichment teachers, from having attended kindergarten. In relation to the scope and sequence, the enrichment teachers agreed that a collaborative unit could fit into their curricular goals easily for first grade and potentially could guide other future collaborative endeavors. Additionally, with a shorter designated class time when compared to the upper K-4 grades, the teachers felt this could help to maximize their instructional time within the academic schedule.

Both enrichment teachers set up guidelines for the collaboration. Each teacher shared what skills and objectives they would have for first graders to learn at the beginning of the school year. The teacher librarian focused on information literacy, especially the parts of a book, and laying a foundation of how to access information in print materials. The technology teacher designated time to teaching first graders presentation software. This was a necessary foundation for students to learn, since classroom teachers in the upper K-4 grades often used presentation software as a means for students to showcase their work.

Next, the enrichment teachers needed to select a topic. Since the first grade curriculum did not have a theme that the enrichment teachers could support, the collaborators realized that they would need to select a new topic. This topic needed to have readily available materials. Subsequently, the library’s collection was reviewed for cognitively appropriate materials for first graders. The teacher librarian used these materials for instruction and additional books were available if students wanted supplementary information on the topic. Technological tools also were reviewed to ensure that appropriate clipart and websites were available.
Assessments also were discussed at these initial meetings. Formative assessments in the form of verbal questioning and observations were used during each of the enrichment classes. It was decided that summative assessments would be conducted and reviewed at the end of the unit. In library class the summative assessment focused solely on information literacy skills. It involved small groups of three students, each given an unfamiliar non-fiction book. Students were asked to identify and explain the parts of a book. The summative assessment in technology class was the culmination project of a student created book on the topic and addressed both content and skills acquisition of information literacy and technology.

The teachers agreed to meet weekly to discuss the unit’s progress and were also open to communicating as necessary. These discussions allowed for updates on how each class was progressing. This included reviewing formative assessments and discussing any lesson plan changes that needed to be made due to scheduling conflicts, such as days off from school. It also provided an opportunity for the teachers to reflect on teaching practices and adjust their lesson plans to facilitate the students’ learning.

The curricular unit focused on the solar system. It was taught over twelve weeks to four first grade classes. The teacher librarian taught each class once per week for thirty minutes during the scheduled library class time and the technology teacher taught each class once per week for thirty minutes during the scheduled technology class time. The instructional goals centered on 21st century skills and STEM education.

The topic of the solar system was selected because as a science topic it allowed for STEM awareness, especially when taught in conjunction with technology class. In library class the emphasis was on informational literacy, a 21st century skill, specifically focusing on how to access information effectively. Students were taught the parts of a book, including the title page,
copyright page, glossary, index, and table of contents. In technology class, students were taught to use presentation software to create the parts of a book discussed by the librarian. The students’ books were to show book elements with content from what they learned about the solar system. Each week, information literacy, specifically the parts of a book, and science content were taught during library class, whereby students were introduced to a different celestial body. The parts of a book were taught through a non-fiction book focusing on a specific celestial body, with the class completing a group attribute web reflecting what they learned about the particular part of the solar system at the end of the lesson. The attribute web was e-mailed to the technology teacher who used it as a review at the beginning of the students’ technology class.

During each technology class, students created a page on the presentation software for each celestial body. By the end of the unit, students added a title page, copyright page, table of contents, glossary, and index; thereby creating their own solar system book.

Library class for each of the first grade classes took place at the end of the school day, with students dismissed from school immediately after class. Technology class did not occur on the same day as library class. It usually would occur earlier in the week than the scheduled library class and at an earlier time in the school day. Since the unit required essential background and content knowledge to be taught in library class, it was important that library class start the unit one week before the technology class did. This ensured that students had the content knowledge about the solar system, attribute web available for review, and familiarity with the parts of the book they were constructing.

**Introduction of the Participants**

This study had six adult participants. Each participant was an educator to the seventy-two first grade students. Four of the participants were self-contained first grade classroom
teachers each responsible for eighteen first graders, one participant was the K-4 teacher librarian, and one participant was the K-4 technology teacher.

**Alice:** Alice is a teacher with over thirty-five years’ experience in both public and independent school settings. She has taught at the research site’s location for over thirty years, beginning as a kindergarten teacher and then as a first grade teacher. Alice has a steadfast presence and has served as a mentor to fellow teachers at the research site.

**Helen:** With over twenty years’ experience, Helen has been at the research site for a majority of her career in education. At the research site, she has worked as a kindergarten and first grade teacher, worked as part of leadership committees, was the K-4 curriculum coordinator, and mentored fellow teachers. Helen has worked as a teacher trainer and taught adult education classes.

**Kristin:** Kristin is the only participant to have graduated from and taught at the research site. She has over ten years’ teaching experience at the site and during this time has worked as a first grade teacher. She has held leadership positions at the school site and works with other school divisions to create cross-divisional experiences for her students.

**Lea:** Lea is the youngest member of the team and has worked in both public and independent schools. She has worked for over five years as a teacher, with three years of teaching experience at the research site. During her time at the research site, she has worked solely as a first grade teacher. Before becoming a classroom teacher, she worked as a teaching assistant in Alice’s classroom.

**Matthew:** Matthew is the K-4 technology teacher, which is considered an enrichment teaching position. As an enrichment teacher, he sees each individual K-4 class once per week, twenty classes in all. He has taught for over ten years in self-contained classrooms and as a
Matthew has presented at technology conferences and led technology workshops both at and outside of the research site. He has been at the research site for three years, solely as the K-4 technology teacher.

**Dawn:** I am the K-4 teacher librarian, which is considered an enrichment position. I see each individual K-4 class once per week. With nearly fifteen years educational experience in both public and private school settings, I have worked as self-contained elementary classroom teacher, middle school teacher, and teacher librarian. I have been at the research site for five years, with three years as the teacher librarian. I have also worked with Alice, Helen, and Kristin as a member of the first grade team.

**Emerging Themes**

The following themes and sub-themes emerged from the information collected. There were two main themes. The first theme involved student engagement. There were five subthemes that fit into this theme. The first sub-theme will discuss how the solar system topic was selected and how the students reacted to this topic. Next, the second sub-theme will focus on how students applied what they learned in the unit outside of the instructional setting. In the third sub-theme, personal inquiry of the topic will be examined. This will involve how students took initiative to expand on the lessons on their own time. The fourth sub-theme to be discussed will focus on if and how the participants extended the lessons. Finally, the sub-theme of transference of 21st century skills will be discussed and this will focus on how students took the skills learned in this unit and utilized them in other academic activities.

The second theme focused on collaborative perceptions. There were two sub-themes under this theme. The first sub-theme will focus on classroom realities and how it affects collaborative opportunities. It will be broken down into two sections. The first section will
involve how the enrichment teachers used their classroom realities to enter into this collaboration. The second section will focus on the classroom realities that affected how first grade teachers view collaboration. In the second sub-theme of professional relationships, there also were two sections. The first section will involve how the professional relationship evolved between the collaborators. In the second section, there will be a discussion of how the first grade teachers viewed their professional relationship with the collaborators and how this affected their views on collaboration with the enrichment teachers. These themes will be discussed in more detail with supporting documentation extracted from the data.

**Theme 1: Student Engagement.** The first emergent theme involved how students engaged in the unit. Since the unit was a collaboration between the teacher librarian and the technology teacher, the interviews highlighted a theme of the various ways students would be considered engaged from what was taught solely in library class and technology class. Once the data was analyzed, it became evident that students primarily engaged with the unit in five ways. The resulting sub-themes and representative sample of quotes will expand on this theme of student engagement.

**Sub-theme 1: Topic Selection.** The unit of study was the solar system. Anecdotal records taken from the planning sessions between Dawn and Matthew showed how and why the topic was selected. The enrichment teachers agreed that the topic should be one that could be taught over a feasible time frame. They also wanted to select a topic that was age-appropriate and aligned with students’ natural curiosity. After examining the library’s collection of materials, specifically looking for resources appropriate for first graders, the collaborators recognized that the solar system could be divided into manageable lessons that could be taught
during the specified time period. There also were additional library and technological resources that could be used to supplement the lessons as needed.

The enrichment teachers each clarified why they thought this topic should be taught to first graders. Dawn was drawn to the topic because information literacy encompassed both 21st century skills and research skills. These skills were part of the library curriculum and the solar system’s non-fiction texts supported elements related to these skills. Matthew noted he hoped to have students acquire foundational skills within the technology curriculum. He wanted to teach technology relevant to the subject matter of the solar system, rather than teaching the skills in isolation. He felt that this easily could create a more meaningful learning experience.

Participants were told that the K-4 teacher librarian and the K-4 technology teacher selected this topic because of the available age and cognitively appropriate library books, kid friendly technology resources, and the fact that this content was not addressed in any area of the K-4 curriculum. Additionally, it was explained to the classroom teachers that the collaboration took place at the very beginning of the school year, whereby first grade teachers were entrenched in assessing students and their skills levels, thus not fully engaged in a classroom thematic unit. Since the topic was not taught in the K-4 curriculum, it allowed the enrichment teachers to design a unit specifically focusing on areas that fit their scope and sequence, without infringing on the classroom teachers curriculum.

The teachers agreed that this topic created excitement and helped in content and skills retention. Lea shared that the overall topic did have an impact on her students:

There was noticeable excitement around that unit. They loved the topic. It is great to teach the kids in the library what the classroom teacher cannot get to. It was more meaningful. The solar system was not taught in lower school. They loved the topic.
They remembered the facts and talked a lot about the change in seasons, the earth’s rotation and day and night.

Helen explained that the topic was interesting to students and she felt that the collaborative aspect was beneficial to the unit’s instruction:

I think it helped that it was collaborative. I think the topic itself was of such interest to the kids. Of course that is one of the ways you engage them. Picking the topic that is something of high interest and they wanted to learn more about and wanted to know if I had more books about it here so they can read more about it in their independent reading time.

Dawn was able to add to the topic being of student interest:

The students would see me in the hallway and ask what part of the solar system they were going to learn about that week. Some students would come to library class and tell me that they spoke with a friend who had library class earlier in the week and told them some of what we did in class, what their friend learned, and admitted to being excited about participating in the lesson’s activities.

By selecting an age appropriate topic, participants agreed that it added to the students’ interest. Kristin stated “First grade is an age where students enjoy the idea of exploring what is out there and this topic allowed them to think about what is beyond their environment.” Helen agreed when she said “The students are at an age where they are curious about what else is out there and it is important to engage them with multiple intelligences and this topic allowed for many ways to that.” Alice further specified, “The topic is one that kids just love to learn about and that can go a long way in engaging them.”
In conclusion, topic selection was deemed by the participants to be a motivator for student engagement. Student excitement in this topic was grounded in their cognitive development as first graders who are wondering about ideas beyond their physical environment. Since the students enjoyed learning about the topic, they seemed excited to attend enrichment classes and participate in activities related to the topic.

Sub-theme 2: Application of the Topic’s Content. Each participant was asked to discuss if they noticed the students sharing what they learned in class and share any relevant examples. The majority of the participants were able to cite specific instances of students sharing and applying what they learned about the solar system. Lea discussed her thoughts on how students engaged with the topic’s content, considering she did not formally address the unit in her class:

They came back and talked about it non-stop. They talked about how they enjoyed what they learned in the library. The topic was interesting to them. They knew nothing about it. They talked about day and night and the seasons. They showed off their books, which was perfect for first graders. I believe the kids were learning a lot in the library. They were willing to share and state facts but not ask questions.

Helen had similar viewpoint:

They talked about the solar system not directly in our lesson because it wasn’t a focus in the classroom but they talked about … like they would be outside and ask why the sun was where it was. They had a better understanding on the rotation of the earth. They understood at a deeper level what seasons were. They would get down the globe and talked about when it would be day and when it would be night.
Matthew discussed how a week after library class, students were able to remember the content learned:

The students knew their topic. Students were excited to share their attribute web. After each class we did a True and False segment and that reflected how knowledgeable they were about the planets. On one occasion another attribute web was shown and they knew immediately that this was not their web, but that of another class. They recognized their web. The computer class always followed the library class so the students had to wait to complete the whole book.

Students also were creative in the ways they wanted to share what they learned. Dawn mentioned how one parent e-mailed her asking if her child could teach the class a song she made up about the solar system. Dawn also stated that students would volunteer to act out a planet and moon’s rotation to the class. During library class, students would make associations about a celestial body’s features and compare and contrast this information without any prompting as a means of contributing what they learned during the class discussions. This included pointing out which planets had atmospheres and how that determined temperatures. Dawn shared that as the weeks progressed, students became more adept at categorizing the information when distinguishing between the different features of the parts of the solar system and their explanations became more detailed when answering questions with students referring back to content knowledge from prior lessons to support their statements. This included how inner planets and outer planets had different physical makeups, moons, sizes, and atmospheric conditions.

This sub-theme highlighted the ability of students to connect with content learned throughout the unit. They were able to discuss in and out of the unit’s instructional settings
information related to the solar system. Additionally, they were able to synthesize the information taught, even though they were not taught the subject matter on a daily basis or part of their self-contained classroom.

**Sub-theme 3: Personal Inquiry of the Topic:** Since students were taught this unit in two of their enrichment classes, participants were asked if they noticed students seeking out information on the topic without being prompted by a teacher. The responses indicated that some students actively sought additional materials to enhance what they learned in library and technology classes. Responses included parental feedback. Kristin stated, “Since library class was at the end of the day, parents have mentioned that the children talk about their topic and wanted to further read about the solar system.” Helen supported the idea of parents being aware of this unit, because students were actively and voluntarily asking parents more about the solar system and parents were apt to look up information to answer the queries.

Another apparent way students inquired about the topic was noticed by a majority of the participants. This was the penchant for students to seek out print material on the solar system. Dawn mentioned that she saw, throughout all phases of the unit, an increase in books related to the solar system being checked out of the school library by the first graders. Alice also stated “The children were more interested in the solar system books in the classroom and would choose those to read.” Helen also agreed as she noted that during her independent classroom time when students get to select what they would like to read, they were choosing books on the topic. Lea discussed that while students were not directly asking her questions about the topic, she noticed they were prone to ask if she had books available on the solar system in her classroom.

As a result, teachers agreed that students tended to inquire about the topic in their free time. This was noticeable to parents as well who commented to teachers that students continued
to inquire about what they learned at home. It was also evident in students utilizing their school library checkout allotment to select books on the topic and during non-directed or free choice classroom reading time, selecting reading materials from their classroom library.

**Sub-theme 4: Classroom Extensions.** The solar system unit for first graders was initiated, developed and taught by the K-4 teacher librarian and the K-4 technology teacher. Participants were asked if they enriched the unit beyond what was planned originally for during the enrichment classes. A couple of the participants found that they enhanced the unit beyond what the original lesson planning entailed. Even though Kristin did not extend the unit during the time period that it was taught originally, she later used the content students learned from this collaborative unit. Kristin explained

> We are in a K-12 building and I was able to collaborate between the students in my first grade class and students in the eighth-grade. Their work entailed brainstorming, creating works where they put their ideas into words and illustrations. They were partnered, a first grader and an eighth grader, and worked together writing and drawing, creating and illustration. They created a Zine, which is a student made magazine. We put a copy of the magazine in the school library’s Zine collection. Other students in the building could read the Zine in the school’s library or even check it out of the library.

Kristin explained why the topic of the solar system was selected.

> It is such a high interest topic. The first graders had been so excited and since we did this project later in the year after the solar system was already taught, I did not have to spend a lot of time teaching content knowledge. The middle schoolers also were interested in the topic and it made sense that we create the Zine on the solar system.

Matthew enriched the lesson during the time frame the unit was taught.
With building the book, I grabbed a few books and talked about and showed on the document camera the table of contents and the dedication page. They knew and were able to discuss these items. On occasion I would also look for a website with the solar system.

Mathew explained that as students became proficient using the technology tools and effectively answering his review questions on content, he found students finishing up their task earlier. He would encourage students to use the extra time in class to learn more. He stated that he was able to augment the lessons, only if there was extra time available and that students seemed excited to learn more information.

The participants who enhanced the unit were motivated by different reasons. While one participant utilized the topic as a means of optimizing a cross-divisional collaborative student project, the other used it only if time permitted in his scheduled class time. None of the participants indicated that they felt they had to or needed to extend lessons.

**Sub-theme 5: Transference of 21st Century Skills.** In addition to students gaining exposure to information about the solar system, the unit incorporated students partaking in activities that focused on STEM and 21st century skills. Anecdotal records show how the collaborators were able to assess how students were attaining these skills. The communication between Dawn and Matthew allowed for them both to share their formative assessments. This was an essential component in determining if students were meeting the lesson’s objectives. Dawn’s notes indicate that these communications allowed the collaborators to reflect on their instructional practice and make any necessary changes. Matthew noted how quickly students were learning how to use the presentation software and how this became clear as the weeks went on as students completed the summative assessment. The notes indicated that during the
summative assessment in the library, students transferred their informational literacy skills by effectively identifying and explaining the parts of a book they had not seen previously.

With one of the culminating activities being students using technology to create a science-based book that required an understanding of information literacy, participants were asked if they saw a transfer of information literacy skills in other areas beyond the solar system unit. They also were asked if they thought it had to do with the unit’s collaborative nature.

Kristin stated

It was obvious that this class was familiar with non-fiction more than previous classes. Being taught in the library made them more aware of the parts of a book. The collaboration helped get the children excited. They liked the idea that the classes were connected. They knew more about parts of a non-fiction book than past classes. I believe it is positive for the kids to be in a collaborative setting. It is effective as is. Kids loved their library and computer classes. I was very impressed by the retention of information. Having being taught in the library made them very aware of the parts of a book.

Dawn’s viewpoint regarding transference of skills was similar:

I did notice students utilizing the parts of the book features in other settings. For example, when we worked with the Atlas, some students turned to the table of contents and other students turned to the index to look up information. I had taught information literacy in other units without the collaboration. I found students were able to remember the book parts and their uses with not as much prompting in this collaborative unit. In the non-collaborative units, I did have to do a more in depth review of the parts of a book.
Alice noted that there was a difference when she formally introduced parts of a book in her classroom after the collaborative unit was completed when compared to prior years:

They were more aware of the parts of non-fiction books. The unit on the solar system finished before we started non-fiction books in the classroom. They were very good at pointing out terminology and using table of contents, glossary and index.

Helen agreed that she found success when teaching her informational writing unit compared to past years:

Our last writing unit was on creating an informational book. They understood table of contents and were able to create table of contents. They understood what it meant to have different sections of the book or chapters of the book, even though they read books like that, I am not sure they would have understood how to create one if they hadn’t had the experience before.

Lea explained that even though her students struggled in past years with learning the parts of a book, she found that the topic and collaboration of this unit to be helpful precursors to her instructional experience when teaching the parts of a book in her classroom. She stated “When studying non-fiction at the end of the year, they were great with the table of contents. The index and glossary were a bit tricky for them. Identifying was easier than creating them.”

Participants found that after students were taught the solar system unit, students grasped non-fiction book elements easier when compared to years past. They acknowledged that the ability to create a book earlier in the year seemed to assist students in creating a book in other curricular areas later in the year. The transference of skills was evident when students recognized and were able to explain how these book elements were used in their future writing endeavors.
Theme 2: Collaborative Perceptions. A major instructional unit component was the collaborative aspect. While the K-4 teacher librarian and the K-4 technology teachers were responsible for the collaboration that took place, all participants were asked questions pertaining to the collaborative aspect of the unit. After the data was analyzed, two sub themes emerged. These sub-themes highlight how the enrichment teachers and the classroom teachers viewed collaborative endeavors and how future collaborative endeavors between classroom teachers and enrichment teachers are affected by classroom realities and professional relationships. The resulting representative teacher comments will showcase these sub-themes.

Sub-theme 1: Classroom Realities. Anecdotal records show that the enrichment teachers recognized a problem with the time constraints of the enrichment class schedule. Due to these constraints, they admitted it prevented them from fully exploring a topic on their own. Matthew stated that he was unable to introduce and go in-depth into a topic and also teach technology skills in his allotted class time. Both Dawn and Matthew agreed that by focusing their class times on the topic of the solar system and sharing responsibilities of the unit’s skills and learner outcomes, this potentially could be a beneficial learning experience for students.

Participants were asked to explain their viewpoints on the unit’s collaboration and how they perceived opportunities to enhance the lessons further. Classroom teachers discussed their views on the solar system collaboration and the realities that affect their ability to participate in the unit, including enhancing it. Each participant seemed to have a different reason for not extending the unit. Alice discussed that time is an issue in her class:

The collaboration seemed to be exciting and the students did talk about what they did in technology class, when making the book. Library is at the end of the day and we rarely talk about what they do in enrichment class in a whole group setting the next day. I know
it was interesting to them, because of them selecting books to read during independent reading time. It is just too difficult to fit everything in. We are skills based in first grade and there is so much to cover.

Helen liked the idea of collaboration in general and was open to finding more ways to include it in the curriculum:

Collaboration is a great way to teach. They need to have something to connect to. By having it being discussed in both places, they were able to connect to the concepts in both places and were reinforced with the ideas that were presented. I would love to have more collaboration with the enrichment teachers and the classroom teachers, but it comes down to timing and how to implement it. I think we should have more communication between enrichment teachers and classroom teachers. There is need for the sharing of skills that will help everyone understand what is being taught outside of a traditional classroom setting. It would need to be willingness to do this by the first grade team. There is also an issue of what happens if a student missed a library or technology class and that information is also needed in the classroom unit. First grade teachers do not currently have technology tools available in their individual classroom setting.

Kristin agreed that collaboration is great and the solar system topic still should be taught:

I believe that collaboration was effective. The children were more engaged. They loved the combination of going to the library then technology. It was beneficial, the kids were excited –what they learned in the library was reinforced in technology class. Extremely engaging. It would be more effective if the classroom teacher was involved, but then the classroom teacher would have to give something up.
Lea thought the collaboration was effective also, but agreed that there is so much to teach in first grade that fitting it into the curriculum would not be easy. She explained that the unit is worthwhile but “No need to enrich. The students learned a lot from the library. The classroom teachers do not have a lot of extra time.”

The classroom teachers all found that collaboration, especially in this unit, was a worthwhile instructional strategy. They agreed that the topic definitely was engaging and meaningful and should remain in the first grade school curriculum. Yet, they agreed that their current classroom curriculum does not permit another unit to be taught and they are unsure what they could give up in order to include more from the unit.

Sub-theme 2: Professional Relationships: The professional relationship between the enrichment teachers and the professional relationships between classroom teachers and the enrichment teachers are examined in this section. The professional relationship between the teacher librarian and the technology teacher will be discussed first, through the anecdotal records and the interviews.

Anecdotal records indicated that the collaborators decided to collaborate because they believed their subject areas complemented each other. They created an outline of the skills they would incorporate in the unit. Since they were aware of each other’s expertise they agreed on their roles within the unit. Dawn was to introduce the unit and each week’s focus, ensuring that the topic’s content and informational literacy was covered. She would e-mail an attribute web, which was created by the whole class to Matthew. He would use the web as an introduction to his technology lesson. This allowed students who may have been absent from library class to become familiar with the missed content. Matthew then would have students use the subject
matter content, information literacy skills, technology skills and presentation software to create pages in their individual solar system book.

The interviews reflected the collaborators' perception of this collaboration. Dawn and Matthew needed to ensure that their unit would make sense to the students, since it would not be as part of the daily classroom curriculum. This included reviews of information previously presented and summaries of prior weeks’ lessons. They both stated that they trusted that the other person would complete their assigned tasks and were aware that the unit could not be successful if they did not follow through on the agreed upon lesson plan. Dawn stated “I knew if this collaboration was to be successful, I needed to be open to sharing ideas and committed to sticking with the agreed upon unit outline. If I didn’t do my part, it would impact Matthew’s lesson.” Matthew shared that early on they agreed to keep the lines of communication open and this helped to ensure there were no surprises. He stated “the formative assessments were a great tool to determine how the unit was progressing and if changes were needed. The observations and questioning of students helped us make instructional decisions.” He further explained “I know that my weekly lesson was going to lead to the final product and if I didn’t complete those objectives, we would not be able to have the agreed upon final assessment.”

The review of the summative assessments provided the collaborators an opportunity to reflect on their unit and their collaboration. Matthew stated, “It was obvious that the students were proficient in Keynote by the end of the unit and they also acquired a lot of the solar system content. This meant that this was a successful collaboration from my perspective.” Dawn stated, “The group summative assessment showed that students were able to effectively locate, identify, and explain parts of a book. The learning outcomes were definitely achieved.”
Once the unit was completed collaborators were able to make recommendations about how the unit could be taught in the future and felt comfortable sharing ideas. Matthew stated,

I thought the unit was great and was a success, but we were both open to improving it. I thought the pacing should be changed, because students acquired the technology skills faster than we predicted. I have no problem enriching it, but would like to enhance the technology side. I think that in the future students could complete more than one page per week, once they learned the skills. I can extend the unit if needed to allow all students to complete the assignments. We talked about having my lessons start two weeks after yours and slowly condensing my part. We would have to make sure that students did not lose too much content and skills, because of the delayed start in my class. We may have more frequent check-ins at the beginning of the unit to see if this affects student learning in any way.

Dawn shared, “I enjoyed teaching this unit and want to continue with it in the future. The time frame for Matthew would have to change, but the amount of information I cover would require the same pacing as the current unit.”

Another change that they agreed on was the images used in the student created books. Matthew stated,

I have been using clipart to teach students how to import images on their Keynote pages. I think it would be great to introduce the first graders to Creative Commons. I would have to work with you to see where in the unit you could introduce why students should consider using this. It would probably have to be taught weekly.

Dawn agreed with integrating Creative Commons in the future,
I think it is important that students understand ownership of work and why citing sources and possibly getting permission is imperative. Creative Commons is a great way to do this. It does require both technology and library lessons, so we will have to alter the unit to make sure they are reviewed on a weekly basis.

They also found that their professional relationship grew beyond solely discussing the unit. Dawn stated “The collaboration also allowed us to address individual student concerns and we were able to share ideas on how to enhance the overall learning experience for the students.” Additionally, these reflections on teaching practices provided opportunities to build camaraderie and learn more about the others overall instructional scope and sequence. Dawn stated, “I learned a lot about how Matthew built upon the technology skills students learned in kindergarten, through this solar system unit.” Matthew stated, “I gained a better understanding of copyright. We had detailed discussions about web resources and copyright and why I should incorporate Creative Commons.”

The growth in their professional relationship also led to discussions about expanding collaboration to include other teachers. The idea of including additional enrichment teachers was discussed. Matthew stated, “I think that including other enrichment teachers would help expand the unit.” Dawn stated “I think students would be able to make additional connections to the material and it could be more meaningful to them.” They both expressed interest in including the art teacher and the Spanish teacher as part of the planning process. They discussed the idea of having the students’ books be more personalized if it included their own artwork. Matthew stated, “I think having student art work would be a great addition, but I am concerned about the time it would take to scan all 72 students work.” Dawn stated, “I think involving the Spanish teacher would be a great way for students to expand their Spanish vocabulary. They could
possibly learn about the parts of a book in Spanish and the subject matter. We could have
students include Spanish words on their Keynote pages.” Dawn and Matthew agreed that the
other enrichment teachers could have a limited involvement and would not have to have a
weekly lesson throughout the unit. Even if they participated in a couple of lessons, it could still
enrich the unit and be meaningful to the students’ learning. Matthew stated that involving other
enrichment teachers also could open up communication the way it did when he worked with
Dawn on this unit. Dawn agreed that it would allow for enrichment teachers to share their scope
and sequence and hopefully lead to other collaborations throughout grades K-4.

Dawn and Matthew also discussed if they should involve classroom teachers. Dawn
shared:

I think that it would be great to involve the classroom teachers, but one of the reasons we
chose this topic and decided to collaborate, was that the time in the school year we taught
the unit was when the classroom teachers were not heavily involved in a thematic unit
within their classrooms. If we could manage to include the teachers, it would be
wonderful to include other subject areas. Math is a possibility.

Matthew stated, “If the students have time in their classrooms we could go more in depth on the
content and their Keynote pages could have more sentences.”

Dawn and Matthew were in agreement that time should be scheduled to include
classroom teachers, but also were cognizant that it could be difficult. Dawn stated,

It could be tricky, because enrichment teacher planning times differ from classroom
teachers and I have library duties before and after school. If we could find the time to
collaborate, I think it would be great. I would love to share ideas and find a way to
meaningfully include the classroom teachers. I learned a lot from Matthew, so it would be great to learn and share ideas with them.

Matthew stated that even though it could be problematic, he found that the classroom teachers were often accommodating and it definitely would be worthwhile to see if the classroom teachers would be receptive to participating.

As classroom teachers reflected on the unit, it became apparent that their views about the enrichment teachers affected their perception of collaborations. Classroom teachers discussed their professional views about their colleagues, the skills that enrichment teachers are responsible for, and how enrichment teachers could be utilized in the future. Alice stated “I would not infringe on the enrichment teachers. The topic was interesting to the students and the students did not need to have anything else explained.”

Lea agreed that the enrichment teachers should teach additional topics outside the classroom.

The unit should be kept as is. There should be more library impact with other things not taught in the classroom. Topics which are not taught in first grade, but would be helpful background information in preparation for second grade, for example, Native Americans, Westward Expansion, science, social studies and geography, could be taught in the library. This way the students can get extra content in the first grade curriculum. We just don’t have time to cover all the topics we would like to in first grade.

Kristin stated that the solar system unit is wonderful and was open to other collaboration with enrichment teachers:

I think you did a great job with the unit. There is no need to change the unit. It can be kept as is. There was a lot of material that was covered. I don’t know how the first grade teachers can make this unit better, because the students learned so much. Maybe there is
another unit, which enrichment teachers can be a part of. I think it would be great to meet as a team and discuss.

Helen agreed with her colleagues that the solar system unit is great, but she elaborated that there are additional ways that enrichment and classroom teachers can get involved with different units:

- Enrichment teacher should attend a morning meeting to give an overview at the beginning of the unit. They could inform teachers to incorporate the topic into the curriculum such as math, science, and social studies. There should be a team approach where the enrichment teachers come together with the classroom teachers to look at the lessons throughout the year and see how to incorporate. This could be very enriching.

- Kids learn at different levels, but all teachers have the same goals. Flexibility is best for the kids. There should be flexible scheduling with administrative guidelines and support.

- Year at a glance should be shared with the lower school librarian. The enrichment teachers should be invited to lower school meetings to discuss how their program fits into the classroom and if there is an overlap. Back up plans should be in place for students in tutoring and missing enrichment classes.

Alice agreed with Helen’s assessment that there are ways to build on the professional relationship with enrichment teachers when she stated,

- I think we could probably find some way to work with enrichment teachers. It is a team decision and we would need to find time to meet and plan. If the administration were to be involved, we might get some additional planning time to work together on another unit. I don’t know how it would work now, with our current schedule. I am open to it for a unit that we are currently teaching in first grade. I don’t think there is a way to work together with the solar system unit. You all did a great job with that unit and I don’t
know how we can add it in with everything else we are doing in first grade. The first grade team would have to see if it is possible.

The classroom teachers all viewed collaboration and the solar system unit as a positive addition to the curriculum. There were differing opinions on how enrichment teachers could be utilized in the future. Views on enrichment teachers varied. Classroom teachers trusted enrichment teachers to continue collaborating without their involvement. Additionally, classroom teachers’ views varied. This included not modifying the solar system unit. It also included having enrichment teachers create units that were not taught in the classroom and solely taught by enrichment teachers. Participants also embraced creating collaborative opportunities between classroom and enrichment teachers, whether through a limited collaborative unit to a more fully realized and integrated one.

**Conclusion**

This chapter reviewed the findings of the study. The first section described the curricular unit of the solar system and how it was taught. It explained the lesson planning involved and how the enrichment teachers decided on the topic of the solar system. The second section provided an overview of the participants. This section highlighted characteristics of individuals mentioned in the study, which included the collaborators, who are enrichment teachers, specifically the K-4 teacher librarian and the K-4 technology teacher, and the classroom teachers, who are first grade teachers. Next, through a discussion of the process of initial, evaluation, and focused coding, the emerging themes of student engagement and collaboration perceptions and their sub-themes were identified and explained. These emergent themes and sub-themes included:

- Theme 1: Student Engagement
○ Sub-theme 1: Topic selection-This explained how the solar system topic was selected and how the students reacted to this topic.

○ Sub-theme 2: Application of the topic’s content-This discussed how students applied what they learned in the unit outside of the instructional setting.

○ Sub-theme 3: Personal inquiry of the topic-This focused on how students used their own time to expand on the lessons without any prompting from the study’s participants.

○ Sub-theme 4: Classroom Extensions-This explained if and how the participants found ways to extend the unit.

○ Sub-theme 5: Transference of 21st century skills-This discussed how students took the skills learned in this unit and utilized them in other academic activities.

• Theme 2: Collaborative Perceptions

○ Sub-theme 1: Classroom realities-This focused on why enrichment teachers chose to enter into a collaborative unit and the classroom realities that affect classroom teachers perceptions of collaboration.

○ Sub-theme 2: Professional relationships-This explained the evolution of the professional relationship between the collaborators and how the first grade teachers view their professional relationship with the collaborators and how this affects their views on collaboration with the enrichment teachers.

This case study’s findings provided an overview of the subject matter studied, participants within the study, and the emergent themes that resulted. These findings gave an understanding of how the case study was conducted. In the next chapter the study’s findings will be discussed in relation to the problem of practice, theoretical framework, and literature review.
Chapter 5: Discussion of Research Findings

In Chapter Five, the results of the research findings will be assessed. This chapter begins with a summary of the problem of practice, summary of the research results in relation to the research question, and an examination of the study’s research findings through the collaborative inquiry theoretical framework. The chapter will conclude with a discussion of the findings in relation to the literature review, a summation of the study’s limitations, and recommendations for practice and future research.

Summary of the Problem

In order to meet the ever-changing needs of a global society and prepare students for success, 21st century skills must effectively be integrated into educational endeavors. With the United States struggling in relation to other Organization for Economic Co-operation and Development (OECD) countries, there is concern among American educators, American businesses, and the American Government that students will not be prepared for the challenges awaiting them as they enter the workforce (http://www.shrm.org/hrdisciplines/global/articles/pages/skilled-worker-shortage-worsens.aspx). As a means of focusing efforts on addressing these concerns, the “Educate to Innovate” 2009 educational initiative was introduced to promote 21st century skills within Science, Technology, Engineering, and Math Literacy, beginning early and building through each grade level of the student’s academic career (http://www.whitehouse.gov/issues/education/educate-innovate). Since these skills should be implemented in the elementary grade levels, the research problem is how instructional methodology in the elementary grades needs to evolve to meet the demands of creating curricular opportunities for students to engage in the STEM areas and 21st century skills.
As a means to achieve the mission of “Educate to Innovate,” teachers have to adjust their instructional methodologies. One way this can be done is through the use of collaboration. Hence, the purpose of this case study was to describe the collaboration between two enrichment teachers and how their students experience the curriculum and pedagogy that came from this collaboration. The enrichment teachers incorporated cognitively appropriate 21st century skills into a STEM unit and used a collaborative structure for the unit’s instructional delivery.

Even though teacher and librarian collaboration previously had been studied, these studies, specifically those taking place in elementary school settings, focused on collaborations between classroom teachers and librarians in public school settings. Therefore, research focusing on the collaboration between librarians and enrichment teachers, particularly technology teachers, was limited. Thus, one research question was involved in this study: How did the collaboration between a teacher librarian and a technology teacher influence curriculum in a K-4 setting?

Data was collected through the use of interviews and anecdotal records. Through the use of analytic memo writing, initial coding, evaluation coding, and focused coding, two themes and their sub-themes became evident. The first theme that emerged was that of student engagement, with the sub-themes of topic selection, application of the topic’s content, personal inquiry of the topic, classroom extensions, and transference of 21st century skills. The second emergent theme was collaborative perceptions, with the sub-themes of classroom realities and professional relationships.

**Summary of the Research Results**

**Research Question**: How did the collaboration between a teacher librarian and a technology teacher influence curriculum in a K-4 setting?
The study’s evidence revealed that K-4 enrichment teachers were able to influence curriculum in their academic setting. By selecting a topic that was not part of the classroom curriculum, there was a consensus amongst the interviewees that this topic was worthwhile and meaningful to first grade students. The enrichment teachers designed lessons that fit with the students’ cognitive development. They selected a high interest topic, resulting in students actively being engaged with the unit’s activities. Students connected with content learned throughout the unit. They were able to discuss in and out of the unit’s instructional settings information related to the solar system. Students synthesized the information taught, although they were not taught the subject matter on a daily basis or as part of their self-contained classroom. While participants more likely were to not enhance the lessons, this was due to available time as well as the agreement that the unit was taught sufficiently, and classroom teachers observing that no additional instruction was necessary. Yet, students had the tendency to extend these lessons beyond the enrichment classes, by making personal inquiries regarding the topic on their own time.

The STEM topic of the solar system also instilled 21st century skills, specifically informational literacy. Participants found that after students were taught the solar system unit, students grasped non-fiction book elements easier when compared to years past. The transference of skills was evident when students recognized and were able to explain how book elements were used in their future writing attempts.

The collaboration between the two enrichment teachers did have an effect on student learning and influenced how participants viewed both collaboration and curriculum within the K-4 setting. The classroom teachers all found that collaboration, especially in this unit, was a worthwhile instructional strategy. They agreed that the topic should remain in the first grade
curriculum, but also conceded that their current classroom curriculum did not permit another unit to be taught. Even though the classroom teachers all viewed collaboration and the solar system unit as a positive addition to the curriculum, there were differing opinions on how enrichment teachers could be utilized in the future. This included enrichment teachers being trusted to continue collaborating without classroom teacher involvement, which included not modifying the solar system unit and possibly adding other units not taught in the classroom to be taught solely by enrichment teachers. Another view comprised of developing collaborative opportunities for both classroom and enrichment teachers, whether a limited unit or a more fully realized and integrated collaborative one.

**Discussion of Findings in Relation to the Theoretical Framework**

This case study utilized the theoretical framework of collaborative inquiry theory, which was a way for educators to reflect upon and implement meaningful changes within the curriculum, address student learning needs, and support professional learner communities. Collaborative inquiry theory was selected, since its lens allowed for an examination of the teacher librarian’s and technology teacher’s collaboration. It also allowed for an analysis of the resulting instructional practices they employed throughout the different phases of the unit.

Collaborative inquiry theory could be used to develop knowledge in a communicative way (Winkleman, 2012). Nelson and Slavit (2008) wrote that this cycle of teacher inquiry involved four stages. This included focusing on an issue, implementing a plan to address the issue, assessing the implemented plan, and repeating the cycle as needed (Nelson & Slavit, 2008). They further explained that by using collaborative inquiry theory, an ongoing dialogue that pertained to instructional methods and student outcomes could exist (Nelson & Slavit, 2008).
**Focusing on an Issue:** The first stage of focusing on the issue involved framing a problem to be addressed. According to Donohoo (2013), in order for a meaningful focus to occur, educators needed to identify student-learning needs, which included prioritizing common needs among the collaborators (Donohoo, 2013). It was an opportunity to look at what collaborators believe in and how this compared to their practice (Donohoo, 2013). Therefore, a well-framed problem focuses on a manageable issue that team members feasibly agreed could be addressed (Donohoo, 2013).

This study revolved around a collaborative STEM unit that integrated 21st century skills as taught by a K-4 teacher librarian and a K-4 technology teacher. Both teachers met to discuss the problem to be addressed, which focused on how to develop a cognitively appropriate unit that would meaningfully comprise of STEM and utilize 21st century skills that fit into their curricular purview. Each teacher recognized that the limited time frame, in which they saw first graders, prevented them from exploring a topic fully. They agreed that the topic should be one of interest and age appropriate, yet be one that could be taught over a feasible time frame. Looking through the library’s collection of materials, with resources appropriate for first graders, the collaborators recognized that the solar system could be divided into manageable lessons that could be taught over one semester. The solar system was not a topic taught in the school’s K-4 grades and with the unit being science related, it allowed for a combination of both science and technology to be addressed in the curriculum. Dawn stated that information literacy was comprised of both 21st century skills and research skills within the library curriculum, and the solar system’s non-fiction texts supported elements related to these skills. Whereas Matthew stated that teaching technology relevant to the subject matter of the solar system easily could help students acquire foundational skills within the technology curriculum and be more meaningful an experience,
rather than teaching the skills in isolation. They both stated that there would be appropriate library and technological resources if needed and time permitted. Matthew shared that due to time constrictions, he simultaneously was unable to introduce and elaborate on a topic and teach technology skills. Both surmised that dedicating their class times to the topic of the solar system and sharing responsibilities of the unit’s skills and learner outcomes, potentially could create a beneficial learning experience for students.

Once the skills were outlined, the collaborators agreed on their roles within the unit. Dawn stated that she was the one to begin the unit and each week she introduced the specific week’s focus. She introduced the weekly lesson topic within the unit, taught informational literacy skills through the individual lesson’s topic, and ended the lesson by reviewing the lesson’s content by having the class create a whole group attribute web, which was e-mailed to Matthew. He started his lesson with a review of the attribute web. Students then used the information learned to create pages in their solar system books using the computer software.

**Collection of Evidence:** Collection of evidence, the second stage of collaborative inquiry theory, involved developing a data collection plan, which could be created once collaborators agreed to implement changes in their practices and committed themselves to these changes throughout the entire inquiry process (Donohoo, 2013). In addition to the summative assessment of individual student created solar system books, Dawn and Matthew also agreed that weekly formative assessments of students’ work should be collected.

The formative assessments were collected in both library and technology classes. Dawn stated her weekly formative assessment, in the library, involved observations. She primarily utilized verbal questions to the students, pertaining to both the prior weeks’ and the current week’s instruction, to assess both student understanding of the information literacy skills as well
as content information. Utilizing the attribute web at the end of each class, she was able to further assess the current week’s content acquisition and understanding. Matthew stated that his formative assessments in technology class were a mixture of observations, from verbal questions, and individual student Keynote solar system pages. He used this information to assess students information technology, information literacy, and content acquisition skills.

The information garnered from the formative assessments determined if modification to instruction was needed. Each week the teachers connected in order to review what they were able to cover in the lesson plan and strategized the next week’s lessons. It was an opportunity to share observations, which led to discussions regarding pacing of the unit, content taught, and skills coverage. Dawn stated that it also provided an opportunity for both teachers to reflect on their practices. She indicated that sometimes there was so much to get done in the course of the week; it could be difficult to build in time for reflection. Matthew discussed that enrichment teachers may have skills to teach that were unique to their class. Dawn explained that this sometimes deterred conversations and opportunities to reflect on teaching practices with other colleagues. They both agreed that the formative assessments allowed them to examine their lessons and their teaching practices and the collaboration offered more of these occasions when compared to teaching isolated units.

Both teachers agreed on summative assessments to conclude the unit. The summative assessments showed if students attained the required information literacy skills, information technology skills, and science concepts pertaining to the solar system. One summative assessment was a book that each student created about the solar system. It included a cover page, title page, dedication and copyright page, table of contents, main pages, and an index. Each main page provided information about one part of the solar system. The book was created
utilizing presentation software, specifically Keynote and was developed in technology class. Dawn stated that in the other summative assessment, which occurred at least two weeks prior to Matthew’s, students participated in an activity to determine if they acquired the unit’s targeted information literacy skills. Students were broken into groups. Each group of three students met with her and each student in the group was given a non-fiction book and asked to identify the parts of the book. She used this to determine if additional lessons were needed and discussed this information with Matthew before he completed the unit. Once students completed their books with Matthew, both teachers met to review the summative assessments.

**Analyzing Evidence:** The third stage of collaborative inquiry theory was analyzing evidence. In order to focus on data analysis, it entailed organization of the data, reading the data, describing the data, classifying the data, and interpreting the data (Donohoo, 2013.) Dawn stated that after each week’s formative assessment review with Matthew, she took notes regarding their discussions and also upon the conclusion of the unit, in regards to the summative assessment. These notes were dated and labeled by the lesson’s topic and skills. Since Matthew usually was at least a week behind Dawn’s covered topic, it was important that Dawn distinguished which lessons and skills were being discussed. Matthew and Dawn referred to these notes as the unit progressed and soon became familiar with the types of data that frequently was being collected.

Eventually, Dawn and Matthew were able to notice a pattern of emerging themes within the data sets. These themes focused on student observations, teacher reflection on instructional practices, and lesson/unit plan adjustments. Dawn stated that it was clear that the three themes that the discussions revolved around started to inform their practice. Student observations were a mixture of academic, social, and emotional elements. Matthew described how quickly students were adapting to the use of technology and using the Keynote software. He stated that the
attribute webs allowed for students who were absent from library class to become familiar with the content and not feel overwhelmed or frustrated that they missed the library lesson. He described the need to ensure that students who were finished early had opportunities to enrich their learning experience and not distract others from the learning process. Dawn stated that she reviewed information literacy skills at the beginning of each lesson and had a quick summary of the prior weeks’ content before introducing the upcoming lesson. They both agreed that their discussion provided opportunities to address individual student concerns and shared ideas on how to enhance the overall learning experience for the students. Additionally, these reflections on teaching practices provided opportunities to build camaraderie and learn more about the others’ overall instructional scope and sequence. Dawn stated that she learned a lot about how Matthew built upon the technology skills students learned in kindergarten, through this solar system unit. Matthew stated he was gaining a better understanding of copyright, which led to more in-depth discussion regarding web resources and copyright and the benefits of using Creative Commons. The theme of lesson/unit plan modifications also brought up discussions on how to account for missed class time, this included days when school would not be in session or alternative schedules were used.

Once the summative assessments were completed, the educators met to review the students’ work. This provided opportunities to ascertain how well students acquired the skills and content taught throughout the unit. Matthew stated that students became more adept at using the Keynote software and felt that the finished products showcased this along with the acquisition of content goals. Dawn stated that during her group assessment, it was evident that students were able to locate, identify, and explain parts of a book effectively. Overall, both
teachers agreed that students attained the unit’s learning outcomes and became more proficient in technology and information literacy.

**Documenting and Debriefing:** The fourth and final stage of collaborative inquiry theory involves documenting and debriefing the process. Throughout the instructional unit, Dawn took anecdotal notes and at the end of the unit both educators met to discuss and reflect on the overall process and make recommendations for future instruction of the unit. There were some key areas that were addressed during this final stage of the collaborative inquiry process.

One area that was discussed concerned the overall pacing of the unit. Matthew stated that students seemed to progress quicker than he anticipated utilizing the unit’s technological elements. He explained that mid way through the unit, students were able to complete individual pages at a substantially faster rate when compared to the unit’s beginning weeks. He asserted that he felt that the next time the unit is taught, he may be able to spend less time on it, by possibly having students complete two pages per week in their book rather than the current one page per week plan. Dawn stated that she would have a difficult time completing two solar system elements in a weekly lesson, since the majority of information literacy and content acquisition occurred during her instructional time in the library class. Matthew agreed that the attribute web was essential, albeit a more time consuming facet to the lesson plan and that it did hinder Dawn from completing two solar system topics per week. Matthew shared that he was able to enrich the lesson, but felt it would be better for students if he taught the unit in less weeks and moved on to new technology skills. He stated that he had no issues enriching the lessons, especially since it allowed for absent students to catch up on their work. Matthew felt that he still would have adequate time during the regular class period to do this and was willing to add in certain class days for students to get caught up on their work if needed. Both agreed that the next
time the lesson is taught Matthew would start at least two weeks after Dawn. They felt students’ content acquisition would be monitored to ensure that there was not too much of a content regression between library and technology class and this would be an essential part of their formative assessment and weekly discussions.

The next area discussed involved the use of amending the information technology and informational literacy elements of the lesson plan. Matthew stated he learned from Dawn about appropriate websites, with images that did not have many copyright restrictions, which could be used in the unit. Currently, he has been using clipart as a tool for students to import images onto their Keynote pages. He stated he would like to use more images from Creative Commons if appropriate. This also would require Dawn to introduce to students why this site was acceptable. Dawn agreed that even though she gave a basic introduction on the importance of copyright and students understood the basic ideas of it showing someone’s work, the importance of citing sources, and if necessary getting permission, she still would need to give a basic overview of why Creative Commons was a valuable tool. Both agreed that students would need to understand how Creative Commons differed from any other website and this would have to be taught and reviewed weekly in both classes.

Another area discussed involved expanding the unit to involve more enrichment teachers. With only library and technology classes represented, both teachers felt that they possibly could expand the unit further by incorporating other enrichment teachers. Matthew stated this feasibly would allow for content to be reiterated in other subject areas, especially if he were to spend fewer weeks on the unit. Dawn stated that this could make the unit even more meaningful to students. Mathew and Dawn discussed the possibility of having the art teacher and the Spanish teacher be part of planning the unit. Both agreed that if students could use their own drawings in
their books, it would allow for more personalization. Matthew’s only concern was the time to scan the pictures in, but agreed that it could be used for some of the pages and would bring another technological element to his lessons. Dawn mentioned that the Spanish teacher also could be utilized. She stated that this would allow for students to learn content words in Spanish that they could add to their Keynote pages. Both agreed that even if the teachers were not involved actively with teaching an element of the unit weekly, even a few lessons potentially could add greater depth, understanding, and make the project more meaningful to the students. Matthew also stated it would enhance the lines of communication with these enrichment teachers. Dawn shared that she thought it would provide an opportunity to learn about what their scope and sequence were and possibly allow for future collaborations for other units in other grade levels.

The final area discussed involved getting the classroom teachers potentially involved in the unit. Dawn stated this would allow the subject matter to be incorporated in other areas, such as math. Matthew affirmed that the students could delve even deeper into the content and could write more sentences for each of the Keynote pages. Both agreed that scheduling time to meet with teachers would be somewhat of a challenge, since their planning times and weekly team meetings were scheduled when Dawn and Matthew were teaching scheduled classes. Dawn also explained that she has morning obligations in the library, which hindered before school meetings, so they would need to schedule meetings after school. Matthew shared that the teachers often were accommodating and he definitely thought they should explore this recommendation to determine if the teachers would be receptive.

**Summary of Findings in Relation to Collaborative Inquiry Theory:** By utilizing the lens of collaborative inquiry theory, this study examined how the teacher librarian and
technology teacher were able to collaborate on a unit and utilize the information gathered to inform their instructional practices. By allowing for discussions that focused on learner needs, the teachers were able to interact meaningfully and make recommendations that potentially could enhance the learning experiences of students (Zech, Gause-Vega, Bray, Secules, & Goldman, 2000).

The collaborators committed to teaching the first grade solar system by following the four phases of the collaborative inquiry process. The constant communication between collaborators allowed for informational literacy skills, informational technology skills, and subject matter to be taught in a cognitively age appropriate way that permitted students to reach the desired learning outcomes. The classroom teachers noticed that students engaged in the unit, without any prompting, by voluntarily reading about the subject matter, sharing what they learned about the subject matter, and applying their informational literacy skills in other units. The collaborators were able to support each other’s teaching and gain a better understanding of the other’s scope and sequence. With opportunities to reflect on teaching practices, there was discussion on how to further extend the unit. Classroom teachers shared that they trusted in the capabilities of the enrichment teachers and felt comfortable with these teachers taking the lead on this unit and potentially future units. While the classroom teachers seemed to consider partaking in this solar system unit, they acknowledged it could be hindered by their other academic endeavors. It was evident that there was support for the unit to be continued and all participants shared this viewpoint. They all witnessed how the skills were transferred to other classroom instruction, which helped to facilitate other areas of learning, especially in the area of informational literacy and creating a book.
Discussion of the Findings in Relation to the Literature Review

In this section, the results of the study will be examined in relation to the literature review. It will focus on how participants perceived collaboration, with the sub topics of hindrances, facets in successful collaborations, and student achievement. Additionally, it will discuss how the teacher librarian and technology teacher used their instructional roles to develop a collaborative unit that infused 21st century and STEM skills.

Collaboration: This study focused on the collaborative endeavors of two enrichment teachers, a teacher librarian and a technology teacher. The study’s findings showcased how the enrichment teachers viewed their collaboration. It also showed how the classroom teachers perceived the enrichment teachers’ collaboration. The literature review highlighted how there had been varying perceptions regarding teacher and librarian collaboration within K-12 settings. One perception involved classroom teachers indicating that they were the best purveyor of information regarding their subject matter and not having confidence in their librarians’ skills as a means of enhancing instructional methodologies (Bogel, 2008). Yet, this was in contrast to the study’s findings, as each participant viewed collaboration as being a positive aspect of student engagement and stated they trusted that the collaborators would teach the unit in an effective and meaningful way. Another perception mentioned was that classroom teachers might not fully understand 21st century skills, which further could diminish their concept of the importance of information literacy (Montiel-Overall, 2010). The study’s findings contradicted this perception. It indicated that participants were aware of the importance of information literacy and 21st century skills, since the classroom teachers also incorporated lessons that addressed these areas. Lastly, the literature review discussed teachers’ perceptions of librarians being sources for materials, rather than instructional collaborators (Small, Shanahan, & Stasak,
The study’s findings showed that teachers were open to having the collaborators take on other units of study that the classroom teachers were unable to address as part of their current curriculum.

**Hindrances:** The literature review examined different types of hindrances to collaboration. Mohktar and Majid (2006) wrote that the perceived time commitment involved when forming instructional partnerships was discouraging collaborative opportunities, because teachers did not view their schedules as being conducive for something as time consuming. The collaborators did not agree that the time commitment involved was a deterrent and readily agreed to meet as necessary throughout the collaboration. They were in agreement with both Chu (2009) and Montiel-Overall (2007) who wrote that setting aside time dedicated to collaboration was an essential aspect for success. This was in contrast to the classroom teachers, who felt that they did not have time within their schedules to commit to taking on another instructional unit. Morellion (2008) wrote about school schedules having a tendency to be fixed and lack the flexibility for necessary planning and instruction to take place. The study’s findings indicated that the fixed schedule assisted in the collaborative opportunities between the collaborators, but was considered a hindrance to classroom teachers who were not available during the same time frames as the collaborators. Schulz-Jones and Ledbetter (2009) wrote that even if participants are willing, the lack of knowing how to effectively and efficiently collaborate could prevent collaborations from occurring. While the collaborators found ways to integrate collaborative elements within the unit, the classroom teachers were unsure about how the collaboration would work if they were involved in this or another unit.

**Facets in Successful Collaborations:** The study’s findings supported the attributes mentioned in the literature review that led to successful collaborations. Brown (2004) and Chen
and Lee (2009), wrote that time was a factor in scheduling meetings that allowed not only for open communication of expectations and planning opportunities, but also allowed participants to be reflective on their lessons. Both collaborators were in agreement that opportunities to discuss helped in outlining an effective unit plan and allowed them to reflect upon their teaching practices. Montiel-Overall (2010) noted that opportunities to build relationships, share knowledge, and critically think about ideas occurred due to the time invested into the collaborations. The collaborators indicated that they gained a better understanding of each other’s instructional roles and curricular responsibilities. Johnson (2003) explained that collaborative endeavors provided opportunities to break down barriers between subject areas. The study’s findings supported this. The collaborators shared insight on their areas of expertise and agreed that they were able to include some of this newfound knowledge into their instructional plans. Lastly, all of the study’s participants stated they had trust in their colleagues’ capabilities and felt that the students were gaining valuable learning experiences. The collaborators had trust in each other teaching abilities, which was evident in their willingness to work together again. According to Bogel (2008) collaborators need a common interest and mutual trust and that trust led to defined roles. These defined roles helped to organize instructional responsibilities, so participants could begin to understand that instruction and learning were not always linear processes and instead apt to change (Harada, 2005).

*Student Achievement:* The literature recognized that increased student achievement resulted from collaboration. Chu, Tse, and Chow (2011) wrote that the expertise of each of the participants was the main catalyst to student achievement, specifically the areas of information literacy skills taught by the librarian and technology skills taught by the technology teacher. The study’s findings support this, because the collaborators were able to enlighten the other on their
area of expertise and assisted the other in reinforcing these elements throughout the unit. Mokhtar and Majid (2006) added that school programs with strong teacher and librarian partnerships enhanced the curriculum of the school and assisted in increasing students’ development of new knowledge. This was evident in students’ learning about a new topic that currently was not being addressed in the lower school’s curriculum. Additionally, the study’s findings supported that students were able to transfer their skills into other academic classroom units. This resulted in a willingness by classroom teachers to have enrichment teachers teach other units that were not being taught in the classroom curriculum.

This section addressed the study’s findings in relation to the literature review. It was evident that the study’s participants had professional trust in each other’s instructional abilities. Even though the participants varied in their willingness to participate in collaboration, mainly due to perceived hindrances, they all agreed that collaboration has benefits, including professional growth and student achievement.

**Librarian and Technology Teachers’ Roles:** The literature review presented differing expectations for the librarian and technology teacher roles. While these roles vary from setting to setting, the study’s findings were in agreement with The American Association of School Librarians guidelines for student library programs, which stated the importance of school librarians being educational leaders (Moreillon, 2013). These guidelines reinforced the significance of teaching literacy skills and literacy standards. They also supported any collaborations that promoted the American Association of School Librarian Standards (Kovalik, Jensen, Schloman, & Tipton, 2010). The American Association of School Librarians and the Association for Educational Communications and Technology (1998) stated, “Information literacy—the ability to find and use information—is the keystone to lifelong learning” (p.1). The
The study showcased how the teacher librarian participated in a collaborative unit as one method of infusing information literacy skills into the curriculum.

Technology teachers’ roles also have evolved to meet the ever-changing technological advancements. This was mentioned in the literature review and was supported in the study’s findings. The role eventually evolved from teaching technology skills in isolation to integrating technology skills with opportunities for real world application (Ejiwale, 2012). Ching (2012) wrote that in order to enhance and create meaningful and relevant educational experiences, subjects should be integrated with technology strands. This study showed that the technology teacher was able to incorporate technology and informational technology skills in a relevant way, by having students create their own solar system books. This student-created book was a precursor to classroom activities involving non-fiction texts.

This section focused on how the current expectations of teacher librarians and technology teachers were in line with the literature review. It showcased how the teacher librarian was able to follow the standards of the American Association of School Librarians to infuse information literacy into the curriculum. Additionally, it highlighted how the technology teacher was able to find real world applications and a final product to engage students in the technology curriculum.

21st Century Skills and STEM: The study’s findings supported the literature review’s examination on how 21st century skills and STEM should be implemented into the curriculum. By teaching 21st century skills in a solar system unit, this corroborated Kay’s and Honey’s (2006) statement, “These skills cannot be taught in a vacuum. They must be taught in the context of the subject matter” (p. 69). Additionally, since this subject matter was taught with a science focus, it supported the Partnership for 21st Century Skills (2011), which stated that 21st
century skills should be incorporated throughout the core curriculum, with science being considered a part of this core curriculum (http://www.p21.org/overview).

The study’s findings also supported the literature review on STEM education. Science and technology were incorporated into this first grade unit. According to the National Science Board (2010), STEM education should begin from kindergarten and continue beyond twelfth grade. Scott (2009) also stated that if students were going to be prepared for future economic success in a global environment, competence in STEM “is only accomplished by building on the foundation of knowledge established at each level of education” (p.3). This includes starting in elementary school (Scott, 2009). This study’s findings revealed that students continued to show interest in the science topic, without any additional prompting. The students were able to build upon the instructional foundation of the content matter. This was seen through student-initiated discussions, student initiated questions outside of the classes where the topic was taught, and student selection of additional reading material on the solar system.

This section highlighted how the study’s findings supported 21st century skills and STEM education. By picking a science topic that integrated 21st century skills, the collaborators created a unit that engaged students in necessary skills and subject matter in a cognitively appropriate way. With students partaking in activities that were initiated by them outside of the classroom instructional environment, the unit provided a basis for future interest in STEM education, with relevant 21st century skills application.

**Summary of Findings in Relation to the Literature Review:** The study’s results were examined in relation to the literature review. The areas of collaboration, teacher librarian and technology teacher roles, 21st century skills and STEM education were discussed. It was evident that while collaboration views vary in different K-12 settings, in this study’s setting it was
considered to be a positive aspect to the overall student learning experience. Even though
hindrances, specifically the time commitment in adding new academic content was discussed, it
was clear that participants would be receptive to enhancing their curriculum if there was allotted
time in the schedule for it. While the participants exhibited trust in the enrichment teachers’
professional abilities, they were more receptive in having enrichment teachers instruct on
additional content that could not be covered in the classroom if possible. The hindrance of time
seemed to be the most prevalent, specifically concerning finding planning time between
classroom teachers and enrichment teachers and the ability to incorporate additional subject
matter into the curriculum. The collaboration was deemed successful and the enrichment
teachers did have an impact on the curriculum, with classroom teachers agreeing that the subject
matter should continue to be taught. Classroom teachers also were receptive to more enrichment
teacher collaborations as a tool for teaching additional content matter not covered in the K-4
curriculum. Additionally, student achievement was seen in students transferring skills into other
units of study. The teacher librarian and technology teacher also followed the roles consistent
with creating a collaborative atmosphere while engaging in student centered learning activities.
Finally, the unit instilled 21st century skills and presented students with a STEM topic that
allowed for them to be self-motivated in their learning of the science topic.

Study Limitations

This study had the following limitations:

- The study took place at an independent school that does not conform to state and
  federal academic standards.
- The study was conducted in an academic environment that has a full time teacher
  librarian and a full time technology teacher.
Even though the participants were aware that their responses were confidential, they may have tempered their responses, so as not to provide any negative views regarding the questions.

**Recommendations for Practice and Future Research**

The purpose of this study was to describe the collaboration between a teacher librarian and a technology teacher and the influence to the curriculum that comes from the teachers’ collaboration. Through the first grade solar system unit, collaborators were able to infuse 21st century skills and STEM experiences into the weekly lesson plans. The study’s findings indicated the following recommendations for practice and for future research.

**Flexible Scheduling:** An essential element of successful collaboration was the ability for collaborators to find time to convene. Brown (2004), wrote that time was a factor in scheduling meetings that allowed not only for open communication of expectations, but also gave opportunities to design goals and specific objectives. Since the two enrichment teachers had similar planning times throughout the school day, they were able to meet as necessary. Yet, the majority of the time that they were able to meet, classroom teachers were unable to meet with them. During classroom teachers scheduled team meeting times, the enrichment teachers were unavailable. Morellion (2008) wrote that school schedules have a tendency to be fixed and lack the flexibility for necessary planning and instruction to take place. In the case of this research site, the times that students attend enrichment classes usually were the times that classroom teachers have their designated planning time.

With flexible scheduling, there would be opportunities for all interested collaborators to meet and possibly co-teach lessons. This might require administrative support. Mohktar and Majid (2006) wrote that administrators have the ability to promote and motivate teachers into
collaborative opportunities, which might include additional planning periods to meet the expected time commitment involved in assessing collaborative units. With a more flexible schedule, teachers might be receptive to partake in collaboration and an open dialogue of communication could be maintained throughout the length of the unit.

It was recommended that flexible scheduling be implemented whenever a collaborative opportunity arises. This could include selected division meetings, which usually occur outside of traditional school academic hours, to be designated as collaboration time. Utilizing teaching assistants to monitor students could allow classroom teachers and enrichment teachers to meet as needed. In-service days, whereby teachers are required to be at school and students are not, also could have time set aside to promote collaboration among the enrichment and classroom teachers. Furthermore, with administration support, additional professional development opportunities that outline collaborative elements could be provided (Montiel-Overall & Grimes, 2013).

Expansion of Enrichment Teacher Collaboration: The collaborative unit described in this case study was carried out by two enrichment teachers, without any support or input from the classroom teachers. The unit was deemed successful with students attaining the skills and content outlined in the unit’s goals. Yet, it was possible that more skills and content could be integrated in curriculum developed by enrichment teachers.

It was recommended that this study be repeated with collaboration taking place with other grade levels. Since enrichment teachers had the same planning times, it was possible that enrichment teachers in other areas, including art and Spanish be included in future collaborative units, with the teacher librarian and the technology teacher. Additionally, further research could be conducted on how different combinations of enrichment teachers could impact curriculum.
Examination of Enrichment Teachers’ Roles in Curriculum Development: This unit was created with the primary goals of integrating 21st century skills and STEM education. Yet, these skills could be integrated into additional units. It was recommended that enrichment and classroom teachers share their curricular goals, instructional units and yearly academic structure to determine if there are areas of overlap and existing opportunities for collaboration. This would provide open discussions whereby all teachers could share ideas and embark on designing units that could have more comprehensive and integrated goals. It also could lead to discussions on how best to utilize enrichment teachers’ instructional times, either as supporting classroom units or instructing on topics that classroom teachers are unable to cover.

Summary of Recommendations for Practice and Future research: This section provided recommendations based on this study’s findings. Upon reflection, there were three areas of consideration.

1. In order to allow for the collaboration to take place, a priority on scheduling must occur. This included having administrative support and implementing flexible scheduling.

2. Enrichment teacher collaboration should not be limited to the teacher librarian and technology teacher. Other enrichment teachers could team up to create more enrichment teacher collaborative opportunities. Additionally, more research focused on enrichment teachers’ collaborations with each other in various grade levels should be conducted.

3. There should be transparency between enrichment teachers and classroom teachers, regarding curricular goals. All teachers should work together to determine the best way that enrichment teachers could be utilized in the overall scope and sequence of the curriculum. Therefore, there should be an examination of enrichment teacher roles in curriculum development.
Conclusion

The purpose of this case study was to describe the collaboration between two enrichment teachers and how this experience influenced the curriculum and pedagogy that came from this collaboration. The enrichment teachers incorporated cognitively appropriate 21st century skills into a STEM unit and used a collaborative structure for the unit’s instructional delivery. Since there has been a lack of studies regarding collaboration between teacher librarians and technology teachers, this study addressed the question of how the collaboration between a teacher librarian and a technology teacher influenced the curriculum in a K-4 setting.

The results of the study denoted that K-4 enrichment teachers were able to influence curriculum in their academic setting. Through the use of a topic not taught in the classroom curriculum, the enrichment teachers developed high interest and engaging lesson plans that were cognitively appropriate, which allowed students to connect with content learned throughout the unit. Participants shared that after students were taught the solar system unit, it was evident that they were more familiar with the STEM topic of the solar system and 21st century skills, specifically informational literacy. Additionally, there was transference of skills to other academic areas.

While the collaboration between the two enrichment teachers did have an effect on student learning and influenced how participants viewed both collaboration and curriculum within the K-4 setting in a positive manner, there were differing opinions on how enrichment teachers could be utilized in the future. This included enrichment teachers being trusted to continue collaborating without classroom teacher involvement. This meant not modifying the solar system unit and possibly adding other units not taught in the classroom to be taught solely by enrichment teachers. Additional views involved developing collaborative opportunities that
included classroom and enrichment teachers with varying levels of participation by the classroom teachers.

The collaboration proved to be an effective instructional method to enrich the students’ learning. Through this collaboration, students were able acquire information literacy skills, such as identifying parts of a book. This is essential because having a strong foundation of these important skills will allow students to acquire information efficiently, which is made even more necessary in an information rich society. Additionally, students were exposed to science content, which is one element of STEM education. Students engaged with this subject matter outside of the instructional setting, which led to them having further independent opportunities to enrich their own learning. Also, by cultivating a science topic at an early age, students have the opportunity to build upon this foundational knowledge in future academic endeavors.

Technology was the other area of STEM that was enforced in this unit of study. Students gained an understanding of basic technology skills, in relation to other subject matter. They were able to apply what they learned throughout the unit in a relevant way, with the creation of a solar system-themed book. In addition, the students transferred their knowledge of what they were taught in the unit, and they were able to apply it to become aware that information learned in one area does not have to be thought of as separate from another area.

Both enrichment and classroom teachers benefitted from this collaboration. Enrichment teachers learned skills and content from each other, expanding their knowledge base. They built a partnership that was mutually advantageous, both for allowing for reflection on how the unit was taught as well as constructive evaluation of instructional methods. This created a collegial environment where a professional learning community was able to develop. Additionally, classroom teachers became aware that enrichment teachers could be seen as true partners in
developing meaningful and relevant units of instruction. The classroom teachers started to view enrichment teachers as partners in the educational process. As a result, this changing view opens avenues for both classroom and enrichment teachers to work together in developing future academic units, which will provide opportunities for students to further expand their knowledge base and reinforce concepts and ideas into additional learning environments.

This collaborative unit was developed, because the K-4 teacher librarian and the K-4 technology teacher wanted to explore additional ways to enhance their students’ learning experiences. The enrichment teachers felt comfortable examining their teaching practices and utilizing their skill sets to create a unit that was collaborative in nature. Their school environment was not rigid in how material should be taught, and teachers were encouraged to be innovative and take risks, because they were treated as experts in their related fields. Teachers were trusted to explore instructional methods that would enhance the overall curriculum, without having to follow inflexible mandates. Additionally, the K-4 school schedule allowed for other times for the enrichment teachers to meet, beyond traditional before and after school meeting times. Since this partnership was deemed successful, other academic institutions should create environments that support collaborations. Through trusting in teachers’ expertise and creating opportunities for teachers to meet and work on collaborative units, schools should find ways to encourage teachers to enter into these endeavors. It is because of these factors a partnership developed that allowed both teachers and students to expand their skill sets, leading to a truly enriching experience.

Since education should not be seen as stagnant, but ever-changing, educators should continue to find ways to develop instructional methods that evolve with students’ needs. One consideration should be how to capitalize on the specialized knowledge within academic
buildings. This case study highlighted the need for further examination of enrichment teachers’ roles in K-4 settings. The study’s findings revealed that these teachers effectively learned from each other and were able to incorporate their new knowledge into the their instructional plans. Additionally, by entering into a collaborative inquiry cycle they examined their practices through reflection and created a mutually beneficial instructional environment, whereby their students received quality and meaningful instruction.

**Personal Reflection**

As a former classroom teacher, I was used to working on a team with fellow teachers of the same grade. I had opportunities to share ideas, experiences, and reflections regarding all aspects of the teaching profession. Collaboration was the norm and curricular goals were often discussed, with members of grade level teams working together to develop instructional units that met the needs of their students. My time as a classroom teacher allowed me to experience first hand the instructional limitations that exist in this setting, the main limitation being time. With the range of student abilities and the curricular expectations, including content and skills acquisition, there was rarely a free moment to teach outside the established curriculum.

When I transitioned to becoming the K-4 teacher librarian, I moved from being a generalist to a specialist. While viewed as the expert in this instructional area within my educational setting, I also was the only person who held this position at the school site. As a result, I went from working on a grade level team, with inherently shared goals, to being an individual with a set of specifically defined instructional objectives. Additionally, I became aware of the learning trajectory and gained a comprehensive understanding of the skills that needed to be taught for grades K-4.
This research highlighted the importance of collaboration and how enrichment teachers can positively influence the overall school curriculum. While it is evident that classroom teachers are supportive of the enrichment teachers’ endeavors, there are concerns about how to incorporate the enrichment teachers into daily instruction. This includes how best to evaluate current classroom units and a willingness to examine enrichment and grade level classroom goals.

As someone who has worked as both a classroom teacher and teacher librarian, I am aware of the importance of building relationships. This study was successful because of my working relationship with the first grade teachers and technology teacher. Having worked with three of the four teachers as a fellow first grade teacher, there already was an established camaraderie. The classroom teachers were willing to participate and were receptive based on the trust built on our prior professional relationship. The technology teacher and I started our enrichment positions at the school site the same year and built a rapport through interactions when he would visit the library to check out books. In order to create more opportunities for collaboration, or at the very least opportunities to share, modify, or develop curricular units with targeted enrichment and classroom roles, I need to be proactive in creating connections with other grade levels and enrichment teachers. This includes sharing with colleagues my curricular objectives, the results of this study, and utilizing the study’s participants as references to expand on the positive aspects of their experiences with the unit.

This study provides an opportunity for me to reflect on the knowledge I have obtained. The information learned is essential to my future endeavors in education. It encompasses the importance of all educators, both specialists and generalists, and what they have to offer regarding an institution’s curricular goals. I can share these results at faculty meetings and
discuss my experiences as part of professional learning communities as a way to initiate conversations and examine other opportunities to merge enrichment and classroom curricular goals.
References


doi:http://dx.doi.org.ezproxy.neu.edu/10.1016/j.compedu.2009.02.019


doi:http://dx.doi.org.ezproxy.neu.edu/10.1016/j.lisr.2006.03.005


Morris, R. J. (2012). Find where you fit in the common core, or the time I forgot about librarians and reading. *Teacher Librarian, 39*(5), 8-12.


Appendices

Appendix A

Application for IRB Approval

APPLICATION FOR APPROVAL FOR USE OF HUMAN PARTICIPANTS IN RESEARCH

Before completing this application, please read the Application Instructions and Policies and Procedures for Human Research Protections to understand the responsibilities for which you are accountable as an investigator in conducting research with human participants. The document, Application Instructions, provides additional assistance in preparing this submission. Incomplete applications will be returned to the investigator. You may complete this application online and save it as a Word document.

If this research is related to a grant, contract proposal or dissertation, a copy of the full grant/contract proposal/dissertation must accompany this application.

Please carefully edit and proof read before submitting the application. Applications that are not filled out completely and/or have any missing or incorrect information will be returned to the Principal Investigator.

REQUARED TRAINING FOR RESEARCH INVOLVING HUMAN SUBJECTS

Under the direction of the Office of the Vice Provost for Research, Northeastern University is now requiring completion of the NIH Office of Extramural Research training for all human subject research, regardless of whether or not investigators have received funding to support their project.

The online course titled “Protecting Human Research Participants” can be accessed at the following url: http://phrp.nihtraining.com/users/login.php. This requirement will be effective as of November 15, 2008 for all new protocols.

Principal Investigators, student researchers and key personnel (participants who contribute substantively to the scientific development or execution of a project) must include a copy of their certificate of completion for this web-based tutorial with the protocol submission.

Certificate(s) Attached

Certificate(s) submitted previously – on file with the NU's Office of Human Subject Research Protection
A. Investigator Information

Principal Investigator (PI cannot be a student)   Dr. Karen Harbeck

Investigator is: NU Faculty       NU Staff       Other

College:  Choose an item. College of Professional Studies
Department/Program:  College of Education
Address:  360 Huntington Ave Boston MA 02115BV20
Office Phone (781)-321-3569   Email k.harbeck@neu.edu

Is this student research? YES       NO

If yes, please provide the following information:
Student Name  Dawn Maharaj   Anticipated graduation date  September 2015
Undergrad       MA/MS       PhD       AuD       EdD       DLP       Other Degree Type

College:  Choose an item. College of Professional Studies
Department/Program  Doctor of Education
Full Mailing Address  7408 Birkdale Place  Nashville, TN 37221
Telephone  615-646-8060   Primary Email maharaj.d@husky.neu.edu
Cell phone  615-839-6767   Secondary Email mhdwn@aol.com

B. Protocol Information

Title  Collaboration between a teacher librarian and a teacher of technology to infuse 21st century

skills within a K-4 school setting:  an action research study

Projected # subjects  6
Approx. begin date of project 6/1/15  Approx. end date 7/30/15

It is the policy of Northeastern University that no activity involving human subjects be
undertaken until those activities have been reviewed and approved by the University's
Institutional Review Board (IRB).

• Anticipated funding source for project (or none)       None

Has/will this proposal been/be submitted through:
  • NU's Office of Research Administration and Finance (RAF)
  • Provost
  • Corp & Foundations
C.

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<td>Non or Limited English Speaking Persons?</td>
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<td>People Living outside the USA?</td>
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<td>Pregnant Women/Fetuses?</td>
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Please answer each of the following questions using non-technical language. Missing or incomplete answers will delay your review while we request the information.

D. What are the goals of this research? Please state your research question(s) and related hypotheses.

The goals of this research centers on how enrichment teachers’ are able to collaborate with each other to assist students in acquiring 21\textsuperscript{st} century skills. Therefore, the research will examine how enrichment teachers can influence curriculum that may extend beyond their classes; thus influencing self–contained classroom instruction.

In order to understand the collaboration between the two teachers this study focuses on, there is one central question. How does the collaboration between a teacher librarian and a technology teacher influence curriculum in a K-4 setting?

E. Provide a brief summary of the purpose of the research in non-technical language.

Instructional methodology in the elementary grades needs to evolve to meet the demands of creating curricular opportunities for students to engage in the STEM areas and 21\textsuperscript{st} century skills. The focus will be on how to increase collaboration between enrichment areas, specifically a lower school technology teacher and a lower school librarian. Additionally, the research will detail how first grade teachers perceive this collaboration.

The purpose of this action research study is to describe the collaboration between enrichment teachers and the first grade teachers’ perception of the collaboration. At this stage in the research, the collaboration will be generally defined as the work between two educators in order to improve instruction in a grade 1 setting.
F. Identify study personnel on this project. Include name, credentials, role, and organization affiliation.

Dr. Karen Harbeck-Principal Investigator, Northeastern University, College of Professional Studies, Department of Education

Dawn Maharaj-investigator, interviewer, transcriber of interviews, student in Northeastern University’s College of Professional Studies Doctoral of Education Program, Lower School Teacher Librarian (K-4 enrichment teacher), University School of Nashville (Independent, non-denominational, coeducational K-12 private school, located in Nashville, TN),

G. Identify other organizations or institutions that are involved. Attach current Institutional Review Board (IRB) approvals or letters of permission as necessary.

University School of Nashville-Independent, coeducational K-12 private school, not affiliated with any other educational institutions

H. Recruitment Procedures

Describe the participants you intend to recruit. Provide all inclusion and exclusion criteria. Include age range, number of subjects, gender, ethnicity/race, socio-economic level, literacy level and health (as applicable) and reasons for exempting any groups. Describe how/when/by whom inclusion/exclusion criteria will be determined.

The participants that will be recruited are first grade teachers and a K-4 technology teacher at the University School of Nashville. As the researcher, I will also participate, since I am the K-4 teacher librarian. The K-4 technology teacher and myself, the K-4 teacher librarian, conducted the collaborative unit that is focused on in the study. The unit was geared to first grade students as part of normal teaching responsibilities. The first grade teachers who will be reflecting on their perception of the collaboration and the collaborators of the unit will be the only ones recruited, since no other grade levels received this type of collaboration. As the study’s researcher, I determined the inclusion and exclusion criteria, which is based on the study’s focus of a collaboration regarding a first grade unit. The age ranges of the participants are 30-65. There are four Caucasian females, one Caucasian male, and one West Indian female. All six potential participants are professionals with Masters’ Degrees in the field of education. Accessibility involves participants working at the same school site and teaching the same students.
Describe the procedures that you will use to recruit these participants. Be specific. How will potential subjects be identified? Who will ask for participation? If you intend to recruit using letters, posters, fliers, ads, website, email etc., copies must be included as attachments for stamped approval. Include scripts for intended telephone recruitment.

Potential subjects are the K-4 teacher librarian, the K-4 technology teacher, and the first grade teachers at the site of the University School of Nashville. These subjects were identified because the study focuses on collaborative unit taught to first graders at this site. The subjects will be asked about how they perceived the collaboration, specifically looking at how enrichment teachers affect curriculum. As the study’s researcher who is also the K-4 teacher librarian, I will email the first grade teachers and the K-4 technology teacher identifying myself as a student in Northeastern University’s College of Professional Studies Doctor of Education Program. I will explain in the e-mail the purpose of the study and an overview of what participants will be asked to do, while emphasizing that this participation is voluntary.

What remuneration, if any, is offered?

N/A

I. Consent Process

Describe the process of obtaining informed consent*. Be specific. How will the project and the participants’ role be presented to potential participants? By whom? When? Where? Having the participant read and sign a consent statement is done only after the researcher provides a detailed oral explanation and answers all questions. Please attach a copy of informed consent statements that you intend to use, if applicable. Click here for consent form templates.

If your study population includes non-English speaking people, translations of consent information are necessary. Describe how information will be translated and by whom. You may wait until the consent is approved in English before having it translated.

After the e-mail of recruitment is sent, each participant will be contacted to meet at a time and location of the participant’s choosing. At this time I will explain to the participants the purpose of the study, my role in the study, the participant’s role in the study, and explain that participation is voluntary. I will then review each section of the informed consent form, answer any questions the participants may have and give participants an opportunity to sign the form.
If your population includes children, prisoners, people with limited mental capacity, language barriers, problems with reading or understanding, or other issues that may make them vulnerable or limit their ability to understand and provide consent, describe special procedures that you will institute to obtain consent appropriately. If participants are potentially decisionally impaired, how will you determine competency?

N/A

*If incomplete disclosure during the initial consent process is essential to carrying out the proposed research, please provide a detailed description of the debriefing process. Be specific. When will full disclosure of the research goals be presented to subjects (e.g., immediately after the subject has completed the research task(s) or held off until the completion of the study’s data collection)? By whom? Please attach a copy of the written debriefing statement that will be given to subjects.

N/A

J. Study Procedures

Provide a detailed description of all activities the participant will be asked to do and what will be done to the participants. Include the location, number of sessions, time for each session, and total time period anticipated for each participant, including long term follow up.

The activity participants will partake in is an interview that will be audio taped and a transcript review. Interviews will last approximately one hour, at a time and location of the participant’s choosing. Teachers will be asked to reflect on the collaborative first grade solar system unit. Once the interviews are transcribed, participants will be e-mailed a copy of their particular interview transcript. If participants deem that a clarification of their responses is necessary, they may give additional information at a time and location of their choosing.

Who will conduct the experimental procedures, questionnaires, etc? Where will this be done? Attach copies of all questionnaires, interview questions, tests, survey instruments, links to online surveys, etc.

This study will use interview questions, which are attached. I will conduct interviews with each of the participants individually. The interviews will be conducted at a time and location of the participant’s choosing.
K. Risks

Identify possible risks to the participant as a result of the research. Consider possible psychological harm, loss of confidentiality, financial, social, or legal damages as well as physical risks. What is the seriousness of these risks and what is the likelihood that they may occur?

Participants will be discussing how they perceived the collaboration. Since teachers are encouraged to reflect on lessons taught, in order to enhance or create beneficial student learning experiences, the likelihood that there are possible risks is minimal.

Describe in detail the safeguards that will be implemented to minimize risks. What follow-up procedures are in place if harm occurs? What special precautions will be instituted for vulnerable populations?

The interviews will be conducted individually at a location of the participant’s choosing. Participants will be given the opportunity to schedule the interview at their convenience and will be encouraged to ask questions about the process and the interview questions. After the interview, the researcher will follow up and address any additional questions or concerns.

L. Confidentiality

Describe in detail the procedures that will be used to maintain anonymity or confidentiality during collection and entry of data. Who will have access to data? How will the data be used, now and in the future?

As the researcher of this study, I will be the only one to have access to all of the data. Since the name of the site will not be used and teachers will be given pseudonyms, teachers will not be identifiable. In order to maintain confidentiality, I will assign each of the participants a unique identifier. I will be the only one with access to the unique identifiers and the corresponding participant. The corresponding list with this information will be kept on a password-protected computer and backed up on a password protected flash drive.

How and where will data be stored? When will data, including audiotapes and videotapes, be destroyed? If data is to be retained, explain why. Will identifiers or links to identification be destroyed? When? Signed consent documents must be retained for 3 years following the end of the study. Where and how will they be maintained?

All of the study’s data will be stored on a password-protected computer or a safe that only the researcher has access. Interviews will be digitally recorded and transcribed on a computer. Backups of the data will be secured on a password protected flash drive and along with IRB forms will be secured in a safe for three years.
M. If your research is HIPAA-protected, please complete the following;

Individual Access to PHI

Describe the procedure that will be used for allowing individuals to access their PHI or, alternatively, advising them that they must wait until the end of the study to review their PHI.

N/A

N. Benefits

What benefits can the participant reasonably expect from his/her involvement in the research? If none, state that. What are potential benefits to others?

The benefit of this research is that it may allow enrichment teachers and non self-contained classroom teachers to think of collaboration beyond the traditional self-contained classroom setting. It could expand the ways that enrichment teachers can meet their instructional goals and instructional objectives in an interdisciplinary way. It may also be beneficial in allowing for instruction in the enrichment setting to permeate the self-contained classroom, thus creating an expanding enrichment driven curriculum collaboration.

N. Attachments

Identify attachments that have been included and those that are not applicable (n/a).

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<th>Attached</th>
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<tbody>
<tr>
<td>Copy of fliers, ads, posters, emails, web pages, letters for recruitment</td>
<td>*</td>
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<tr>
<td>Scripts of intended telephone conversations</td>
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<tr>
<td>Copies of IRB approvals or letters of permission from other sites</td>
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<tr>
<td>Informed Consent Form(s)</td>
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<td>Debriefing Statement</td>
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<td>Copies of all instruments, surveys, focus group or interview questions, tests, etc.</td>
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<td>Signed Assurance of Principal Investigator Form</td>
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<tr>
<td>NIH Human Subject Training Certificate(s)</td>
<td>(required if not already on file at HSRP)</td>
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*(Approved forms must be stamped by the IRB before use)*

O. Health Care Provision During Study

Please check the applicable line:

___ √___  I have read the description of HIPAA “health care” within Section 4 of the Policies & Procedures for Human Research Protection. I am not a HIPAA-covered health care provider and no health care will be provided in connection with this study.

_____  I am a HIPAA-covered health care provider or I will provide health care in connection with this study as described in Section 4 of the Policies & Procedures for Human Research Protection. This health care is described above under “Study Procedures,” and the Informed Consent and Health Information Use and Disclosure Authorization form will be used with all prospective study participants.

If you have any questions about whether you are a HIPAA-covered health care provider, please contact Nan C. Regina, Director, Human Subject Research Protection at n.regina@neu.edu or (617) 373-4588.

Completed applications should be submitted to Nan C. Regina, Director, Human Subject Research Protection with the exception of applications from faculty and students of the College of Professional Studies, which should be submitted to Kate Skophammer, IRB Coordinator for CPS.

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<tr>
<td>Northeastern Univ., Human Subject Research Protection</td>
<td>Kate Skophammer, IRB Coordinator</td>
</tr>
<tr>
<td>360 Huntington Ave., Mailstop: 960 Renaissance Park</td>
<td>Northeastern Univ., College of Professional Studies</td>
</tr>
<tr>
<td>Boston, MA 02115-5000</td>
<td>Phone: 617.390.3450; <a href="mailto:k.skophammer@neu.edu">k.skophammer@neu.edu</a></td>
</tr>
<tr>
<td>Phone: 617.373.4588; Fax: 617.373.4595</td>
<td><a href="mailto:n.regina@neu.edu">n.regina@neu.edu</a></td>
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*The application and accompanying materials may be sent as email attachments or in hard copy. A signed Assurance of Principal Investigator Form may be sent as a scan, via fax or in hard copy.*
Appendix B

Signed Informed Consent

Signed Informed Consent Document

Northeastern University, Department of Education
Name of Investigator(s): [Principal Investigator-Dr. Karen Harbeck, Student Researcher-Dawn Maharaj]
Title of Project: Collaboration Between a Teacher Librarian and a Teacher of Technology to Infuse 21st Century Skills within a K-4 School Setting: An Action Research Study

Informed Consent to Participate in a Research Study

We are inviting you to take part in a research study. This form will tell you about the study, but the researcher will explain it to you first. You may ask this person any questions that you have. When you are ready to make a decision, you may tell the researcher if you want to participate or not. You do not have to participate if you do not want to. If you decide to participate, the researcher will ask you to sign this statement and will give you a copy to keep.

Why am I being asked to take part in this research study?

The collaborative unit that this study focuses on involves a first grade unit on the solar system. This unit was taught to the first graders in your class during their library and technology enrichment times. You are being asked to participate in this research study because you are a teacher of first grade students.

Why is this research study being done?

The purpose of this research is to gain an understanding of how a teacher librarian and a technology teacher influences curriculum in a k-4 setting.

What will I be asked to do?

If you decide to take part in this study, you will be asked to participate in an individual interview. This means that each participant in the study will be interviewed separately from each other. This interview will involve questions pertaining to a first grade solar system collaborative unit taught by the k-4 teacher librarian and a k-4 teacher of technology.

Where will this take place and how much of my time will it take?

You will be interviewed at a location of your choosing. The time will also be one that is convenient for you. The interview will take approximately one hour. Once the interview is transcribed, you will have the opportunity to review the transcript.
There is no foreseeable discomfort.

**Will I benefit by being in this research?**

There will be no direct benefit to you for taking part in the study. However, the information learned from this study may help influence future collaborative units.

**Who will see the information about me?**

The information you provide in the interviews will be published in a Doctoral dissertation. Your name will not be used in the publication, but you will be given a unique identifier. Only the researcher will know your identity and matching identifier. Your responses will be digitally recorded and be kept on a password protected computer, with a backup of the recording on a password protected flash drive that will be kept in a combination safe for three years. While the audio files are identifiable information, the researchers will be the only ones to hear it. After three years the audio files will be destroyed.

**What will happen if I suffer any harm from this research?**

There is no harm in participating in this research.

No special arrangements will be made for compensation or for payment for treatment solely because of your participation in this research.

**Can I stop my participation in this study?**

Your participation in this research is completely voluntary. You do not have to participate if you do not want to and you can refuse to answer any question. Even if you begin the study, you may quit at any time.
If you have any questions about this study, please feel free to contact Dawn Maharaj, Tel: 615.839.6767, E-mail: mahara.dj@husky.neu.edu, the person mainly responsible for the research. You can also contact Dr. Karen Harbeck, Tel: 781.321.3569, E-mail: k.harbeck@neu.edu, the Principal Investigator.

If you have any questions about your rights in this research, you may contact Nan C. Regina, Director, Human Subject Research Protection, 960 Renaissance Park, Northeastern University, Boston, MA 02115. Tel: 617.373.4588, Email: n.regina@neu.edu. You may call anonymously if you wish.

You will not be paid for your participation.

There will be no cost to you for participating.

The information gathered from this study will be used as part of an educational doctorate dissertation.

Signature of person agreeing to take part

Date

Printed name of person above

Signature of person who explained the study to the participant above and obtained consent

Date

Printed name of person above
Appendix C
Interview Protocol Form

Interview Protocol

Institution: Northeastern University; 360 Huntington Avenue; Boston, Massachusetts 02115

Interviewer: Dawn Maharaj

Date:

Interviewee:

Location of Interview:

****************************

Interview

Part 1: Introductory Protocol

Thank you for meeting me today.

The collaborative unit that this study focuses on involves a first grade unit on the solar system. This unit was taught to the first graders in your class during their library and technology enrichment times. You are being asked to participate in this research study because you are a teacher of first grade students.

The purpose of this research is to gain an understanding of how a teacher librarian and a technology teacher influences curriculum in a K-4 setting.

I would like to maintain an accurate account of today’s interview. I will be recording our conversation, which I will be the only one to have access. I will also be transcribing the interview and in doing so you will be assigned a pseudonym. This will ensure that your confidentiality will be upheld and no one will know your name. You will be referenced by you pseudonym, as pseudonyms will only be used in the transcripts and the dissertation. The audio files will be kept on a password-protected computer and password-protected flash drive and will be destroyed within three years.

I will begin recording our conversation now. The recording has begun.

As part of your participation, Northeastern requires that we review the Informed Consent Form and that you sign this form in order to participate.

I will review each section of the form. If you have any questions, please do not hesitate to ask.

(Read over Informed Consent Form)
Do you have any concerns, comments or questions about this form and today’s interview? Do you give consent? Please sign and date the form. Thank you.

The interview length is approximately 60 minutes. Do you have any questions before we begin?

Part 2: Interview Introduction

Today’s interview focuses on the solar system unit that was taught to your class during this school year.

Are you ready to start?

Part 3: Questioning

1. Did students seem more engaged with this topic since it was part of a collaboration between the library and technology classes when compared to library and technology classes that were non-collaborative? If yes, how? If no, why do you think that was?

2. Were students excited about the lessons and talking/sharing what they learned? Do you think it is because it was collaborative? If yes, can you discuss some examples?

3. Did teachers notice transference of information in and out of the classroom-example teachers or students pointing out the table of contents in a book during a read aloud or talking about facts learned about the sun on a sunny day? If yes, in what ways? If no, why do they think that is?

4. Did students ask additional questions about the solar system or the parts of a book and look for more information on these topics? If yes, can you share some examples.

5. Did teachers feel the need to enrich the lessons within their classroom environment? If yes, why they thought this was important to do and in what ways?

6. Do you think the way the unit is structured should be kept as is or modified? Why?
Part 4: Wrap-up

Thank you for taking the time to answer these questions today. I have no further questions at this time. However, if there is a need to ask any follow up questions, for clarification purposes, I will be contacting you. Once the information is transcribed, I will definitely contact you, so if you choose, you may view the transcript and provide any feedback or corrections you deem necessary. Once the dissertation is complete, I will also contact you about receiving an electronic copy. Do you have any questions?

Thank you so much for your participation.
March 23, 2015

Dear Ms. Maharaj,

Based on my review of your research proposal, Collaboration between a teacher librarian and a teacher of technology to infuse 21st century skills within a K-4 school setting: An action research study, I grant you permission to conduct your study. I confirm that I have the authority to approve the research that you are proposing to conduct in this setting.

Sincerely,

[Signature]

Director
Appendix E

Recruitment E-Mail

Dear Teacher:

I am a graduate student at Northeastern University. As a doctoral candidate in the Doctor of Education Program, I am looking to explore collaboration between enrichment teachers and how first grade teachers perceive this collaboration.

The study seeks to include interviews with first grade teachers and the K-4 technology teacher. As the K-4 teacher librarian, I will be a participant and will also be conducting the interviews. Interviews will be on a voluntary basis, with informed consent. The interviews will focus on a collaborative unit I taught with the K-4 technology teacher. This first grade unit centered on the solar system, with information literacy taught during the first graders weekly library class and technology skills taught during the first graders weekly computer class.

I would like to speak with you about your willingness to participate in this study. Please understand that your participation is entirely voluntary.

If you are interested in learning more about this study and possibly participating, please do not hesitate to contact me. I will be happy to meet with you at a time and location of your choosing to further explain the study and what participation entails.

Thank you for your time,
Dawn Maharaj

e-mail: maharaj.d@husky.neu.edu
phone: 615-839-6767