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A study of the integration of technology in interdisciplinary curriculum

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A STUDY OF THE INTEGRATION OF TECHNOLOGY IN INTERDISCIPLINARY CURRICULUM

by
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Dedication

To my daughter and her family.

I appreciatively dedicate the results of my labor, learning, and knowledge to my daughter, an accomplished woman who has the amazing capacity to combine an incredible work ethic, a sterling character, and a spirit of generosity unmatched by another. I thank my son-in-law, who has the self-confidence and strength of character to accept and encourage the talents and strengths of others and always helps them to be all that they can be. He has sincerely and genuinely welcomed me within his world. I honor my grandchildren whose joy and laughter stay with me long after my visit has ended. They ever remind me to think with the mind, spirit, and heart of a child.

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give me the confidence to say that the future is in good hands. They daily teach me what really matters and much more than I could ever possibly teach them.

Abstract

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The relationships among all subject areas in interdisciplinary instruction and the effectiveness of technology integrated within this process provide a pertinent study for educators, especially in the consideration of and adherence to recent national standards and mandates on cross-curricular instruction. The purpose of this study was to explore effective technology implementation in interdisciplinary activities in a middle school setting. The researcher qualitatively and quantitatively analyzed how to effectively structure media-rich inquiry-based learning and how to effectively integrate technology into a team project-based learning model.

A research plan was formulated to recursively collect, organize, and analyze data within a collaborative framework. Avoiding bias ensured the integrity of the study to ascertain the effectiveness of leadership practices within the context of a teaching team. A review of the literature cited effective technology integration and a constructivist interpretive approach to project-based learning experiences and differentiated instruction was employed as research guides to the research. The findings indicated effective interdisciplinary instructional practices conducive to improved student learning. An action research approach was used to inform and improve current practices regarding the integration of technology in cross-curricular instruction, programs, and units of study.

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Chapter I

Introduction

Research Background and Rationale

The relationships among all subject areas in interdisciplinary instruction and the effectiveness of technology integrated within this process provide a pertinent study for educators, especially in the consideration of and adherence to recent national standards and mandates on cross-curricular instruction. In a technologically rich and diverse world, it is incumbent upon educators to foster and enhance student appreciation of interdisciplinary research and inquiry-based learning. It is desirable to introduce students to a cross-curricular approach to learning in a manner that excites and engages their curiosity. The approach utilized must include project-based learning, while integrating technology into all aspects of the research (Bernard, 2009). This multi-sensory approach can and should be data driven to verify that students have cultivated an appreciation for the multi-faceted learning process. Blending traditional tactics with thoughtful, purposeful technology integration enables student learning to be enhanced. As Maurer and Davidson (1999) state, "As we introduce new technology into a district, school, or classroom, it is important to take advantage of children's natural ability, enthusiasm, and willingness to master new skills" (p. 459). For all learning styles and levels of student competence, infusing technology into the interdisciplinary research process increases student participation, responsibility, and knowledge.

Research Purpose

The purpose of this study is to explore effective technology implementation in interdisciplinary activities in a grade eight middle school team-structured setting. The researcher quantitatively and qualitatively analyzed how to effectively structure media-rich inquiry-based learning and how to effectively integrate technology into a project-based, cross-curricular learning model within the context of a team-teaching activity. This topic was determined as a result of both a district initiative on technology integration and upon conferring with members of a grade eight teaching team to identify a current grade-level school initiative, which could be facilitated using a qualitative and quantitative research approach with core curriculum integrated learning. There was also the added instructional benefit of utilizing technology within a thematic context. The team selected the theme of progress to underpin the student research.

Cross-disciplinary learning has the potential to be a data-driven, technology-based, and reflective decision-making tool in schools faced with the possible mandate of incorporating integrated curriculum to enrich a team-based instructional focus. The intent of the project was to help the researcher's team and school to evolve into an exciting place to learn with a conscious effort to keep the school culture always looking forward through innovative instructional approaches. It was also anticipated that the action plan generated from the study would provide the faculty with a functional teaching-team template that would be the basis of future interdisciplinary projects for the middle school setting.

Research Context, Reconnaissance, and Beliefs

Research indicates that although students use technology effectively for communication, they lack effective research skills (Watson, 2001). Accurate and relevant student technology research can be a daunting, unfamiliar factor in the classroom environment. Blending traditional tactics with thoughtful, purposeful technology integration enables the familiar approach to be enhanced. Additionally, project-based learning has been heralded as the hallmark of student-centered, holistic learning for decades. What is already perceived to be a successful learning model now has the potential to become enriched by appealing to multiple intelligences, thus enabling the spectrum of learning to encompass the needs of all levels of students. It facilitates the learning of those children needing enrichment, as well as those needing reinforcement in a combined traditional and technology-based classroom and intra-classroom experience.

Educators should endeavor to be committed to mastery instruction, reflective technology integration, and project-based co-curricular experiences for all students. Learning and instruction should be seen through the mind, eyes, and spirit of a child, and I am committed to helping teachers to implement these strategies into their instructional program. Both teachers and administrators must also strive always to put children's knowledge first. Learning should be fascinating, yet incorporate skills acquisition to meet the needs of all students. This is accomplished by sharing a vision of an ideal educational setting and inviting the teaching team and the school community to make it a reality. Instruction should be inclusion-based with special needs students, and ideally should include a special education teacher in a collaborative setting to facilitate the optimal learning of every child. The instructional methodology should include a mastery-learning

component to most activities. Differentiated instruction should be integrated into the instructional philosophy. Instead of traditional desks, the students should have computer stations with Internet access to help them be a part of the global community, enabling students to integrate technology into enrichment and reinforcement activities.

Change can be a difficult process, and planning the implementation of an interdisciplinary approach to student learning may potentially increase teacher work load and planning, as well as generate the need to compact some curriculum to adequately cover the material, echoing Fullan (2001) who states, "People express doubts or reservations and sometimes outright opposition to new directions" (p. 74). Also, the need to implement and lead a change initiative further reflects Fullan's research when he states, "If we live in a culture of change-and we certainly do-to understand the change process is a vital quality of all leaders" (p. 29). The researcher needed to employ leadership strategies and theories to facilitate the cross-curricular approach and to be a catalyst for change by using Goleman, Boyatzis, and McKee's (2002) emotional intelligence approach. To implement the grade 8 team project, Kotter's (1996) Eight Step change model was employed as the strategic plan. It was intended that the project would afford the team and grade level to achieve "second order change" (Schein, 2004) and would be an initiative which could spawn team reflection, renewal, and improvement (Stowell & Mead, 2007) to achieve improved student learning capacity.

Research Questions

Incorporating technology into a multi-disciplined framework in the grade 8 middle school curriculum poses a challenge to educators and faculty teams who wish to accomplish a seamless transition of the technology integration into the classroom cross-

curricular instructional practices. Technology has the potential to improve student learning, to provide access to inquiry-based learning in a holistic format, and to structure learning to empower students to be self-directed and motivated researchers. This study seeks to answer the following questions about integrating technology into a grade 8 interdisciplinary curriculum project:

1. In what instructional ways can a grade 8 team interdisciplinary project be structured to assist student inquiry-based learning?
2. How will technology integration support and enrich the cross-curricular instructional project?
3. How does a media-rich integrated curricular student learning project impact the teaching team?

Data Collection and Methodology

The study was introduced with the stated research questions and was designed to launch and guide the qualitative and quantitative inquiry. A research plan was formulated to systematically and recursively collect, organize, code, and analyze the data within a collaborative and participatory framework. The study participants were members of the grade 8 teaching team of a middle school comprised of more than 300 students in grades 5 through 8. The school community is a middle to upper-middle class school in a suburban central New Jersey town. Students are heterogeneously grouped in block-scheduled core content classes, which meet for 60 minutes a day, five times per week. The classes are inclusion-based with special needs students. A special education teacher is available for some of the classes in a collaborative setting. The school has a team-based focus, which has the potential to facilitate interdisciplinary activities and on-going

articulation; therefore, it would appear that every student might benefit from a cross-disciplinary study with technology integration.

Research Bias and Limitations

The data for the study contained five cycles and included observations, interviews, document analysis, and also a focus group of colleagues as well as a survey of the teaching team (Appendix A). The observations and interview process followed a protocol of anonymous observations and interviews, and participants were assured of the confidentiality of their responses to ensure that their answers would be candid. Attention toward avoiding bias and subjectivity through triangulation of the process, participant selection, and data validity ensured the integrity of the study. The compiled data were systematically collected and coded according to a data analysis coding procedure, and were organized and segmented into thematic research sections. The survey of the teaching team was analyzed, and the methods for researching the topic, designing the study, and the procedures followed will be explained in the report. The manner in which the data were collected and analyzed will be described. The findings will be delineated, and a relevant discussion will be presented. A conclusion and recommendations for further research will be discussed.

A review of the literature citing effective technology integration and a constructivist interpretive approach to project-based learning experiences and inquiry-based differentiated instruction were employed to serve as guides to the research. The findings of the qualitative study will indicate whether or not the interdisciplinary instructional practices and technology enrichment were effective and conducive to improved student learning. An action research approach (Hinchey, 2008) was used to

inform and improve current practices regarding the integration of technology in a grade 8 middle school multi-disciplinary learning unit.

Limitations of the Study

The project proposal limitations of the study are that it is not intended for the elementary or high school grades because of the difficulty and time involved in organizing and structuring cross-curricular instructional time. It also assumes a middle school team-teaching structure exists to facilitate and enable team instructional planning and implementation. It also assumes adequate, functional, and accessible technology. Additionally, this study is limited to eighth grade; however, segments of the media-rich cross-disciplinary strategies and template could be implemented in other similarly structured middle school grade levels.

Action Plan Cycles

To investigate the efficacy of a team approach to a technology rich interdisciplinary unit of study was the purpose of the qualitative and quantitative study, and the research involved a minimum of at least one to two months to gather the information necessary to formulate the study components in each of the five research cycles. An action plan based on the research of Hinchey (2008) was implemented. As a first step in the process, the researcher met with the grade 8 team colleagues to conduct preliminary interviews and observations, which were aligned with the research questions and which followed quantitative and qualitative research and interview protocols to determine effective approaches to design the interdisciplinary thematic unit of study. Technology integration techniques were investigated and employed to enhance the grade 8 study unit with progress as the core thematic context. Information was gathered to

assist the team in their goal of utilizing technology to inform and enhance an integrated curriculum to improve student learning.

Theoretically, wherever traditional learning techniques were formerly used, there was encouragement to change the format to an inquiry-based and student-centered approach. Dependent upon the formative results of the data, the participating team members themselves reinforced or contradicted the hypothesis of the study, namely, that correlated curriculum can prove to be an effective and expeditious tool for effective middle school learning. The data also attempted to serve to identify educators' opinions on the research questions and impact of the student research unit.

The literature search demonstrated the benefits rather than detriments of a cooperative versus a traditional learning methodology; however, a comprehensive overview of the utilization of a study unit template in a middle school setting is not readily available. This study will hopefully serve to be a holistic approach toward infusing technology purposefully, reflectively, and productively into a team setting with the aid of media use and access.

I hoped at the initiation of the study to learn how to effectively lead a team forward (Stowell & Mead, 2007) and to be a catalyst for change with the dedicated purpose of improving instruction and formulating a paradigm to effectively model further cross-curricular study units. It was also my intent to learn how to lead in implementing technology responsibly and reflectively; furthermore, I had hoped that the team approach would improve team functionality and communication, providing students with a more meaningful approach to learning. My intention was also to have potentially technology savvy students understand the complex procedures that they need to master in order to

accomplish valid online learning. Accomplishing this formidable task honed my leadership skills and improved my understanding of meaningful teaching, learning, and leading.

Organization of the Research Report

Planning a team-based grade 8 cross-curricular project with technology integration is a challenge rather than a series of leadership hurdles to be overcome. The substantive rationale and action plan for proceeding with the project has been described thus far. Research samples of successful projects will be cited and explained regarding the efficacy of technology and the cross-disciplinary approach in Chapter II, where related literature on technology integration and inquiry-based learning will be discussed. A leadership discussion that informed the research philosophy will also be provided in Chapter II. In the project report, the methods for researching the topic, designing the study, and the qualitative and quantitative procedures that were followed will be explained, and the manner in which the data were collected, coded, surveyed, and analyzed will be described and explained in Chapter III. The results and findings of the research data will be explained in Chapter IV, and the conclusions and recommendations for educators, as well as for further research will be reviewed in Chapter V. A comprehensive list of references and relevant appendices will conclude the research report.

Definition of Terms

There are key terms used in the research study that warrant a definition and clarification. They are as follows:

Inquiry-based Learning – is defined as a learning strategy enabling students to "think beyond the book" (Moses, 2009).

Integration Literacy – is "the ability to use computers and other technologies" (Shelly, Cashman, Gunter, & Gunter, 2002, p. 6).

Jigsaw Strategy –

> A cooperative learning strategy. Students work in learning teams made up of experts who are responsible for researching subtopics of a larger topic. Experts f rom each learning team meet to discuss their findings, then return home to their original team to teach their research findings to the group. (Silver, Strong, & Perini, 2000, p. 109)

Project-based Learning – synonymous with inquiry-based learned explained above.

Web Quest - is a web-based Internet guided student research project (Truet, 2001, p. 40).

Chapter II

Literature Review

The Impact of Technology on Education

It is an accepted fact that technology has redefined American education. The integration of technology into classrooms, media centers, school offices, conference rooms, committee meetings, and administrative offices has changed not only how educators teach, but also what is taught and why. District communication is immediate, transparent, and global. Technology committees include representatives from various segments of the district to collaborate, propose, and submit three or five-year plans to the state to delineate and clarify how the district will launch and update technology integration, and how software and hardware will be funded; however, as Symonds (2000) cautions, "Of course, reinventing America's schools will involve more than buying expensive gadgets" (p. 118).

The potential efficacy of technology in education was hailed by a few early visionaries, such as Dorricott and Peck (1994), who stated, "Increasing numbers of educators…are experiencing the power of technology" (p. 12). The authors were harbingers who recognized during the early stages of technology implementation that student achievement improved in schools which embraced technology; however, they also recognized that technology would not in and of itself create lasting, positive, "second order change" (Schein, 2004) at the deepest level, unless its implementation evolved effectively and reflectively. They also noted that efficient use of technology enhanced the

growth and development process of students, and that schools needed to be aware that technology could enhance traditional learning, which needed to evolve into a new kind of learning by going through an evolutionary process. Therefore, the implementation of educational technology should be integrated cautiously into the learning process. An additional benefit is its use as a powerful tool for meeting students' differentiated needs, because it allows for the individualization that is not always feasible in the traditional learning setting.

Other researchers and theorists cited that during the global technological revolution, education lagged far behind business and industry in using technology effectively. Semple (2000) states, "Though children are used to controlling and manipulating such a technological and interactive environment, educational systems and teaching have been left relatively unchanged" (p. 25). Education has often had the input of corporate leaders who have been vocal regarding how schools should prepare students for the world of commerce. Business leaders encouraged schools to embrace technology noting that students were leaving schools and entering the business world, which was filled with technology tools, but students were ill-trained regarding how to use these tools for economic advantage. The academic world responded by incorporating technology, not only in core academic classes, but also in the industrial and related arts courses. Often partnerships between business and education were formed to assist districts in implementing technology application, which mirrored the business world for students within the classroom walls. Although there was the perception that some schools were slow to use technology, this contradicted a fact cited by Symonds (2000) that "some 95% of public schools are wired to the Internet" (p. 120). However, if there is access to

technology, but no real commitment, progress is undermined. Schools historically have been places where concepts of change are debated first and often later implemented. If technology is embraced judiciously and thoughtfully, and if teachers are given training and a voice in the process, schools have been and will continue to be the launching ground for students to join the new era of e-learning.

In the early quest to implement technology, some teachers, while adhering to traditional methods, still maintained a strict alignment to the text, while the most successful teachers who diligently explored integration, involved the students in real-life research situations. Additionally, the curricular movement toward student-based inquiry practices precipitated a complete shift from the textbook-mode of teaching. Successful programs evolved from classroom teacher facilitators who lead and challenged students to work as a "learning community." Since education is a continually evolving process, for some classrooms the textbook has become a reference source, rather than the basis of instruction, and technology has been the catalyst (Johnson, Scwab, & Foa, 1999, p. 30). An integrated learning setting however is a constant challenge, but it becomes mutually rewarding for both educator and student. Traditional methods and technology (McLester, 2001) can indeed live "side by side." Obstacles still exist in attitude, financing, and implementation, but these can be overcome. Current technology has become all encompassing, and when it is used in addition to traditional teaching methods, it provides a tool for youngsters who may find the traditional environment a difficult one in which to find success.

Semple (2000) discussed numerous studies which verified that the reason technology had not transformed some classroom settings was due to inadequate training,

infrequent reinforcement, and lack of continued support for teachers. In those instances, key teachers and administrators needed to change the teacher learning and professional development process. She explained, "New tools alone do not create educational change" (p. 23). Most teachers willingly attended workshops to find out how they could improve the learning environment, but reinforcement and ongoing assistance often were not provided, which would have given the teacher a comfort level to implement technology. A one-time workshop was an incomplete strategy, which often was all that was provided. The difference in the success stories appears to be directly proportionate to the district's commitment to teacher training. Student success and improvement are linked to the quality of the teacher's performance and training, proving that one of the best ways to reach students is to support teachers effectively. Schools often reverse this process by teaching and reinforcing the student experience with technology, while giving a minimum of instruction to the teacher. Much still needs to be done to enable schools to prepare students to live in the "e-world," including changing the archaic methods and philosophies of traditional schools.

In the initial stages of computer use in academia, there was sometimes apprehension regarding gender equity issues. Hanor (1998) expressed concern as a result of her research that some of the girls in computer classes did not have reaffirming technology experiences, sometimes citing that their male peers tended to block or exclude their computer participation. This resulted in student frustration since the female students felt strongly about their ability to solve the given technology problem and/or explore creative alternatives. Some girls also expressed that they sometimes experienced a gender disparity regarding teacher expectations. Hanor exhorted educational reformers and

designers to be aware of differences in learning styles when designing technology projects, to be cognizant of how students derive meaning from their computer work, and to provide diverse, equitable experiences for the academic success of all students. It is interesting to note that a recent study cited in *School Library Journal* found that income rather than gender currently influences standardized test performance. The study also noted that an increase in family income appears to correlate with an increase in test scores, regardless of gender (Anonymous, 2008).

There are educators who are concerned with ubiquitous digital communication. Technology has not always been hailed as efficacious to the learning process, or as a panacea to heal the ailing problems school districts face in educating children in a modern era. Dissentient views abound regarding technological ill-use or over-use. November (1998), an early techno-visionary, related the true story of a student, Zack, who searched the Internet on the topic of the Holocaust, without any concept of Website evaluation. Zack encountered an extremist site and did not understand the process of information verification. November (1998) cautioned educators to teach students to evaluate the author, to establish the purpose, and to confirm a site's validity before accepting the information as a veritable source. More recently, Monke (2005) offered a dissenting view on the value of computers, especially for the social and emotional development of younger students. She cited that although computers are powerful tools, inadequate preparation and implementation in the classroom may undermine their academic and developmental value, leaving a social and values void. Her views gave credence to the negative effects that computers can have if they are not used in a

thoughtful, reflective environment. Even eminent and vocal advocates of technology caution against technology that has gone awry and unchecked.

The most successful and earliest classroom uses of the computer were in the language arts classroom, because of the obvious benefits of word processing to improve student writing and its ability to enhance creativity and productivity. With technology integration and a project-based approach, some of the traditional basics like grammar, spelling, and vocabulary were compacted and incorporated into writing instruction as part of the computer editing process; furthermore, teaching these skills in isolation from writing was usually not as effective. Tedious tasks, such as revision, addition, deletion, and reorganization were streamlined and expedited with the editing powers of the computer. This trend continues into current curricula, and state and national technology standards have been embedded into language literacy standards.

The study of technology and literacy has become a part of pre-service teacher instruction. For example, in 2002, college students in a language arts methods class explored the connection between information and technological literacy. They found that technology incorporation appears to have three stages: learning procedures, supporting existing concepts, and re-conceptualizing the literacy subject matter. The best sources for positive change again appeared to be teachers themselves who analyzed "what, how, and why" they incorporated technology into their teaching, as opposed to techno-fads that are transient (Shamburg, 2002). Focus must first be given to the acquisition of the subject knowledge rather than the presentation of the flashy techno-projects.

In the current educational setting, young teachers bring knowledge of technology with them and are able to implement its use more readily because "pioneers" have paved

the way for its meaningful integration into the school curricula. What was new is now expected as students and teachers live and learn in a constantly evolving technological world. Symonds (2000) projected that student learning would become "more relevant" as distant learning and virtual learning become the norm, and that teachers would eventually become more efficient by sharing and learning each others' best technology projects and practices.

According to Wenglinsky (2005), in only a single decade from the beginning until the end of the 1990s, technology evolved from just an assistive tool to a major component of the curricula because teachers had acquired sufficient training to implement technical changes and content. As technology use in schools escalated nationally and globally, the need arose to create and incorporate technology standards into the academic world. The International Society for Technology in Education (ISTE, 2009) was founded to assist educators "by providing leadership and service to improve teaching and learning by advancing the effective use of technology in education" (para. 3). One of the many goals of ISTE was to establish technology standards and performance indicators for students, teachers, and administrators. Since its inception in 1998, ISTE membership quickly grew into the current 85,000 members who are committed to quality technology integration. Standards for teachers, National Education Technology Standards (NETS), focus on "technology infusion and …skills" (ISTE, 2009), while NETS for students focus on "creative thinking, communication, research, critical thinking, and digital citizenship." The standards for teachers were updated in June 2008, and the latest ISTE endeavor involves establishing a draft for administrative NETS. Currently, ISTE is conducting a formal compilation of NETS for administrators, which is being amassed using an online

administrative electronic survey. ISTE (2009) has thereby become a source for "…topics relevant to the educational technology community" (para. 7).

District Uses of Technology

It has been well documented that technology is used by districts to disaggregate high stakes test data, and the resulting analyses are used to inform instruction with the goal of targeting areas of improvement. These identified weaknesses need to be addressed, with the anticipated effect of enabling students to achieve higher learning levels and assuring that districts are able to meet annual yearly progress targets. Sharkey and Murnane (2003) stress the importance of acquiring test data quickly, and technology enables administrators to implement improvements efficiently, which are ultimately aimed at not only targeting deficiencies, but also affording insight into formative and summative assessment criteria. Comparative student performance can also easily be tracked through district databases (Sharkey and Murnane, 2003, p. 79), although there is a potential concern "between access and privacy." Over the past few years, an increasingly larger support industry has evolved to aid districts that need to assess test scores and organize this information into a reporting format to comply with state and federal mandates and requirements.

Another district use of technology is gathering data from stakeholders through the use of electronic surveys, which are replacing traditional manual instruments. Surveys have been a viable avenue for the collection and dissemination of myriad types of data for decades. Surveys are ubiquitous, finding their way into all sections of business, media, commerce, entertainment, politics, education, and recreation. Surveys abound from simplistic checklists in magazines to sophisticated national polls that collect,

correlate, and predict events. Obviously, the more sophisticated the survey, the more complex the data gathering and statistical relevance of the results. In education, surveys can assist in learning, teaching, and policy-making areas. For example, surveys were conducted in seven states (Berry, Wade, & Trantham, 2008) to ascertain what mattered to teachers regarding empowerment, time, leadership, facilities, professional development, and respect. The study (Berry et al., 2008) found that there appears to be a disparity regarding teacher and district perceptions. The results suggested that subsequent surveys should be conducted to determine if there is a further need to determine if a correlation exists between student performance and school working conditions. A strong point is made regarding the powerful use of surveys to affect change for school improvement.

Surveys to obtain feedback from students regarding their academic learning experiences are well documented, but another realm of student experience can also be a viable source of student social and emotional development. Bowman (2009) conducted a recent survey on social behavior. The focus of the study was on students' ability to get along with each other because the inability to relate to others obviously increases the likelihood of aggression, depression, and substance abuse. The survey was the vehicle to gather data, which could be expanded by districts to ascertain and implement social and emotional learning components into any district curricula. Gathering behavioral data offers a potentially positive and quantifiable solution to student emotional problems and development, as well as having the potential to foster improvements in school climate.

Data from electronic surveys can reach into the recreational lives of students and form a bond between playing and learning. To validate this concept, students at more than 20 colleges were surveyed to obtain statistics on their use of technology games

(Jenkins, 2005). All of the surveyed students had played computerized games. The information garnered from the data regarding student skills acquisition in techno-games could be positively applied to instruction if the engagement and sequencing game skills are first identified, and the learning practices are then employed in learning and instruction, thereby mirroring the learning interactions embedded in playing the games.

In addition to surveys, other applications of technology and new electronic programs, such as media access and delivery, district web pages, and interactive learning, have been dramatic, but sporadic (Symonds, 2000), but consistently improving due to necessity and demand. Hargadon (2008) offers educators a glimpse into a media-rich educational district scenario and offers a collection of technological and Web tools to assist educational leaders in maximizing time spent in meetings and to make them "more efficient and effective" (p. 25). He postulates that these tools will noticeably increase productivity and ownership of the meeting process and progress. The tools suggested are wikis, shared document programs, digital photos, posted meetings, social networks, and synchronous chats. These tools are relevant and already in use and suggest other further technological avenues to pursue in addition to the electronic survey for improving district management and decision-making. Clearly, technology applications in the educational setting need to be continually expanded, albeit thoughtfully and reflectively.

As discussed above, a promising tool for gathering input in the school's decision-making process is the electronic survey, which has the potential power to inform and document decisions made at all levels of academia. It is critical to garner information from all the stakeholders in any comprehensive district initiative, and the electronic survey may offer fast, reliable, and efficient information gathering, while adding a layer

of validity to any decision regarding teaching and learning. Typically, in an electronic survey, an access icon is engaged, a client responds to the survey questions, and the results, including graphs, charts, and synthesized anecdotal responses are available immediately. It is a tool that is already extensively used by industry, commerce, and government and can easily be adapted to the educational setting.

The efficacy of using electronic surveys stems from professional and personal experience. The researcher was once requested to do an urgent task by an administrator, which involved gathering student input on a school-wide assembly that would hopefully provide evidence of the school's compliance with a No Child Left Behind (NCLB) mandate. By the end of the school day, an e-survey was designed, and arrangements were made to schedule computer-access time for students. On the following day, the survey results afforded tangible evidence, graphs, and charts confirming the value of the assembly performance, based on values and character education requirements. The state deadline was met with success. The administrator was grateful and amazed at how quickly the information had been obtained. The researcher personally has e-surveyed students to gather feedback regarding their self-assessment and progress, and has obtained concrete evidence regarding which programs students felt were most academically successful. Quantifiable data, statistics, and facts are an implicit component of various athletic and academic events in schools, and should be used in areas of school improvement, other than test data. Technology-based surveys have the power to be catalysts for positive change with minimal effort, provided they are done within acceptable parameters and guidelines.

Educational Technology Policy

Equitable student use of the power of technology to access the world.

Most educators and I believe that the integration of computer technology into district curricula promotes an optimal environment for equitable student achievement (Darling-Hammond, 2010). A prominent educational journal recently dedicated a complete volume highlighting the observable truth that "technology counts" (*Education Week*, 2010). Additionally, project-based learning has been the hallmark of student-centered, holistic learning for decades (Wiggins & McTighe, 2005). Infusing technology into this already effective learning modality appears to increase student participation, responsibility, and knowledge; however, for some underprivileged students, it is an essential component to their academic growth and development (Ash, 2010). Admittedly, as I have witnessed, for some teachers technology can be a daunting, unfamiliar factor in the classroom environment, but it is essential to use instructional technology to level the academic "playing field" for both special needs and underprivileged students (McLester, 2001).

Educators who wish to facilitate a technology-rich environment in their district curricula may find that assistance, training, resources, and money for technology are not readily available, especially in the current challenging economic climate despite the importance of equitable technology use to increase student achievement (Walker, 2009), and technology literacy is a crucial skill for teachers to ensure student success in the business world after graduation. I postulate the urgent need to continue funding districts to maintain their technology programs and plans, and to facilitate and possibly increase teacher and student access to the global digital world.

I discuss the relevant national and New Jersey technology standards. Legislation and policy statements and questions of funding and equal access to technology will be illuminated. The impact of technology nationally, in the state of New Jersey, and globally, especially in parts of Africa will be highlighted. Recommendations for maintaining technology programs and equity in funding will be discussed for the purpose of improving the capacity of all students to "live in a digital world" (Walker, 2009, p. 25) and thrive in a global classroom (Bolch, 2008). All students should have equitable instruction in and access to technology independent of their socioeconomic status with the vision and intent of lessening or eliminating the digital divide. Undermining and under-funding educational technology undermines student achievement.

Equitable student technology use. Constructing relationships in core subject areas, in interdependent content among various disciplines, and in effective instructional technology within these processes provides a pertinent examination for educators, especially in the consideration of and adherence to recent national standards and mandates on cross-curricular instruction (Semple, 2000). In a technologically rich and diverse world, it is incumbent upon educators to foster and enhance student appreciation of interdisciplinary research and inquiry-based learning. It is desirable to introduce students to a cross-curricular approach to learning in a manner that excites and engages their curiosity to enable them to understand that all separate subject areas and disciplines are actually inextricably intertwined with each other in a panoramic and holistic view (Erickson & Tomlinson, 2006). The instructional approach utilized must include project-based learning while seamlessly integrating technology into all aspects of the research (Bernard, 2009). This multi-sensory approach can and should be data driven to verify that

students have cultivated an appreciation for the multi-faceted learning process. It facilitates the learning of those children needing enrichment, as well as those needing reinforcement. This suggests that underprivileged children appear to fare better when technology is at the core of the learning experience, and a plethora of thematic concepts can be explored and mastered by students of all socioeconomic backgrounds and learning capacities. Changing the archaic methods and philosophies of traditional schools necessitates adequately funding and supporting technology professional development initiatives.

Federal educational technology policy. As has been discussed, learning with technology is critical to improving student achievement, provided that it is equitably utilized and implemented (National Research Council, 1999). Title I of The No Child Left Behind Act of 2001 (NCLB, 2001) is entitled "Improving the Academic Achievement of the Disadvantaged." The amended Title I of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 6301 et seq.) spearheaded the dominant authority shift of educational responsibility from the states to the federal government (Badolato, Bucholz, & Drake, 2008) and set standards and achievement indicators as benchmarks for elementary and secondary student knowledge acquisition. This impelled states to implement Title I provisions at an accelerated rate. Funding for some of the mandated standards and projects was inconsistent, but it appears that NCLB is a permanent fixture in present and future educational policy.

Part D of NCLB Title II, "Enhancing Education though Technology," and Section 2401 (NCLB, 2001) refer to the plan of supporting states in the funding of technology literacy with the express purpose of improving student achievement. In Section 2402,

there are eight purposes for technology education, which outline and delineate a comprehensive technology initiative for states and school districts to have an infrastructure to enable them to be technologically functional. They must have the capacity to provide for student access, to organize teacher and administrative professional development, to enable schools to access electronic data, and to have the capacity to reach the community electronically. The primary goal is "to improve student academic achievement through the use of technology" (NCLB, 2001). There are two additional goals. The first deals with equitable student access as follows: "To assist every student in crossing the digital divide by ensuring that every student is technologically literate by the time the student finishes the eighth grade, regardless of the student's race, ethnicity, gender, family income, geographic location, or disability" (NCLB, 2001, §101). The last technology goal cited ensures that there will be professional development in "research-based instructional methods that can be widely implemented as best practices by state educational agencies and local educational agencies" (NCLB, 2001, §101). There are many dissident voices regarding the educational efficacy of NCLB. Tamatea (2008), an opponent of NCLB high-stakes testing, postulates that testing increases student drop-out rate for disadvantaged students and forces many into the military; furthermore, Tamatea argues "that NCLB is an exercise in producing docility and conformity to the desires of capital" (p. 121). Nevertheless, New Jersey is a state that had already spearheaded instructional technology almost a decade before NCLB and appears to have successfully implemented its technology initiatives and goals.

New Jersey educational technology policy. In 1993, the New Jersey Department of Education established a five year plan, "Educational Technology in New Jersey: A

Plan for Action," which was piloted as a statewide strategy for the effective and equitable utilization of technology. Its leading caption stated, "Preparing today for tomorrow," and indicated its forward-looking vision for computer literacy. Its implementation was intended to be all inclusive throughout New Jersey's educational system. It offered a "statewide strategy for the effective and equitable utilization of technology and the implementation of the plan at every level throughout the state's educational system" (NJDOE, 1997 para. 2). In 1997, the Department of Education accelerated the implementation of educational technology in all schools. Technology had caught on and swiftly escalated, and the goals were met two years ahead of schedule. In 2003, the goals were again revised and updated.

New Jersey followed the national NCLB standards initiative. The state's implementation information cited that:

> All students, no matter which district or school they attend, will be able to achieve the Core Curriculum Content Standards because they will have unlimited access to people, to a vast array of curriculum and instruction, and to information and ideas—no matter where they exist. (para. 1).

These standards delineated the necessary skills for students to achieve technology literacy. Additionally, the Comprehensive Educational Improvement and Financing Act (CEIFA, 2003) was implemented as a state supported educational technology performance drive enabled through Distance Learning Network Aid (DLNA), which had been established by CEIFA.

All eighth grade students in the state must achieve computer and information literacy benchmarks and are required by the New Jersey Department of Education

(NJDOE) to take the state Technology Assessment of Proficiency (NJTAP) at the end of the school year. The NJTAP, an assessment of resources, tools, and skill indicators, was created by a consortium of schools under the leadership of the NJDOE. This enabled districts to meet the No Child Left Behind – Title II, D requirement "that all students are technologically literate by the end of grade eight." It also correlated to NJ Core Curriculum Content Standard 8.1: Technology Literacy (NJDOE, 2009). The results of this assessment must comply with NJ Administrative Code 6A:8-3(a)3 requiring districts to assess student achievement in identified content areas. The federal policy and New Jersey's policy toward implementing technology to enhance student achievement is almost synchronous, but not without litigious incidents. There has been only one federal Supreme Court case that involved technology library usage (*United States et. al. v. American Library Association, Inc., et. al. 2003)* and did not involve public educational technology; however, there has been landmark litigation in NJ (*Abbott v. Burke* 1981) aimed at ensuring that enhanced technology and other benefits are offered to the poorest districts. Gewertz (2007) explains, "In one of 10 *Abbott* decisions, the New Jersey Supreme Court said that the state's poorest students need an education beyond the norm" (p. 42). She further states, "Activists also use it as a case study of how a court's deep involvement in schools' inner workings has benefits—or limits" (p. 43).

Global technology literacy. In the opening letter to the 2010 report entitled, "Teachers' Use of Educational Technology in U. S. Public Schools," government officials stated the following purpose of their educational center: "The National Center for Education Statistics (NCES) is the primary federal entity for collecting, analyzing, and reporting data related to education in the United States and other nations" (Gray,

Thomas, & Lewis, 2010). This congressionally mandated agency synthesizes national educational information as well as global education initiatives, thereby recognizing the international technology revolution. For example, in Africa, students are able to capitalize on technology (Davis, 2010) by taking advantage of current wireless innovative tools, sidestepping the tedious chronological morphology of technology integration in America that began with traditional landlines. Students in Mali, Ghana, Rwanda, Cameroon, and South Africa use cell phones, iPods, and laptops through the efforts of the Massachusetts-based nonprofit organization that established the One Laptop per Child (OLPC, 2010) program.

Africa has the fastest growing cell phone use in the world, which affords the children the opportunity to electronically connect with the world. Cell phone use decidedly and positively impacts students because of the timely manner of educational delivery in the remotest areas. In the recent past, sometimes months would go by before the government realized that there was no longer a teacher in a remote outpost (Davis, 2010). Technology circumvents this problem. If the underprivileged countries of the world can recognize the need to implement distance learning, surely our federal and state governments could benefit from Africa's example by funding the academic use of cell phones and other mobile technology. Educational policymakers should continue to support instructional technology tangibly and intangibly to eliminate the digital divide. Technology also promotes global literacy (Bolch, 2008) and enables American students to view the world as their classroom, and the children of the world as their classmates.

Building the Technology Bridge to Student Achievement

High stakes testing and well-publicized school district achievement profiles haunt educators who ethically wish to improve instruction and student learning though a best-practices paradigm. It has been proven that technology integration has the potential to achieve this goal. As Long (2009) states, "More and more educators, however, are discovering that it is precisely digital media's limitless possibilities for collaboration, sharing, and communication that can captivate students" (p. 26). Nevertheless, there are still equity gaps to be addressed and closed. The 2010 Department of Education (DOE) report, "Teachers' Use of Educational Technology in U. S. Public Schools," conducted by the Office of Educational Technology (OET) indicated that 97 percent of teachers had classroom computers and 93 percent had Internet access. There were, however, striking differences in the statistics of high and low poverty schools. For example, high poverty schools used technology for written reports 56 percent of the time, while low poverty schools had 66 percent usage. There was a disparity of 20 percent for electronic basic skills practice and a 10 percent disparity for multimedia presentations. Regarding teacher contact with parents via email, the variation was even more disconcerting with 69 percent of high poverty parents versus 39 percent of low poverty parents not receiving electronic information about their children (Gray et al., 2010). It may be stating the obvious that this indicates the most impoverished parents probably do not have home access, an additional equity issue that should be addressed by community outreach programs using libraries, borrowed equipment, and inexpensive cell phones to increase contact with socio-economically disadvantaged parents.

Bridging the technology equity gap. It is unconscionable to teach modern curricula with outmoded methodology. Reviewing the research on best practices of improving student achievement via integrative technology and inquiry-based instruction mitigates the potential for not only district litigious concerns, but also for the ethical need to enhance and enrich the learning of all children across America. In a negative economic climate, funding cuts should not negatively impact district technology initiatives (Darling-Hammond, 2010). Government officials and educators must keep pace with students who "live in a digital world" (Walker, 2009). Lesson planning with technology integration is a challenge rather than a series of leadership hurdles to be overcome, and educators need to keep pace with best practices to improve teaching and learning (Shelly et al., 2002).

It is evident that the instructional technology explosion is ubiquitous, and federal and state funding needs to be maintained and apportioned to verify that equitable student access is at the forefront of e-learning (Bolch, 2008). Teachers will decidedly never be replaced by technology, but they can utilize it as a valuable tool, which can reinforce and enrich the learning environment, and thereby enable the students to become more independent, self-reliant, and self-directed learners. In a modern and rapidly changing world, the computer allows students and teachers to keep pace with change. It also enables them to monitor their learning, and the Internet allows a glimpse into the world beyond the classroom and community. It must also be acknowledged that not all students have home access, and cutting technology access at school victimizes the most vulnerable students. Without school access they have no access; this is unethical and a testament to the failure of schools to help them (Bolch, 2009; Gewertz, 2005).

Despite all the efforts of American education to keep pace with improvements and to lesson the digital divide, children of poverty still have fewer advantages. This does not only bode well regarding potentially litigious consequences, but also hampers underprivileged students from using the very tools which would make it possible for them to succeed in the electronic world (Darling-Hammond, 2010). For the sake of America's future, the digital divide must be prevented from widening.

There is certainly a need for technology funding to be used more judiciously. Taking an example from the frugal yet advanced efforts of African governments to use inexpensive digital mobile devices to educate their children (Davis, 2010), American educators should endeavor to optimize technology access and minimize technology expenditures. As I discussed above, students in Africa are gaining access to mobile technology more rapidly than American students. The national NCLB skills-driven focus can be accomplished through inquiry-based learning embedded within and afforded by technology, which should not be compromised. This will enable more students, especially disadvantaged children, to have access to technology (Darling-Hammond, 2010; Gewertz, 2005) and enable them not only to lessen the digital divide, but also to empower them to learn the skills needed for their future prosperity both academically and economically.

The Potential Impact of Technology on Interdisciplinary Learning

The advantages of incorporating technology into the classroom learning experience are well documented. The term, "integration literacy," is defined by Shelly et al. (2002) as "the ability to use computers and other technologies combined with a variety of teaching and learning strategies to enhance student learning" (p. 6). The academic

goals and objectives of any subject area can more easily be met by students when their familiarity with technology is coupled with project-based learning. Students can learn to think "beyond the book" (Moses, 2009). Teachers who wish to integrate technology can find numerous "lesson plans for the digital classroom" (Bernard, 2009, p. 22) in articles and on websites for educators.

Students can experience the world within the confines of a classroom by virtual learning (Bolch, 2008) through the use of technology and an inquiry-based process approach to learning. The dimensions of the classroom remain constant, but the ability of students to experience the world via virtual learning creates classrooms without walls and student curiosity without boundaries. Subject area learning and the compartmentalized knowledge contained within strict disciplinary parameters is broadened to include a holistic understanding that all aspects of learning are inextricably intertwined and interrelated. There is almost no area of learning that escapes the potential to become cross-curricular through the judicial and effective use of technology as a learning tool. McLester (2007) offers numerous examples of best practices for incorporating technology into classroom projects including career exploration, virtual learning, and hybrid courses, but these examples only begin to represent a portion of all of the thematic concepts that can be project-based.

Teachers will decidedly never be replaced by technology, but they can utilize it as a valuable tool, which can reinforce and enrich the learning environment, and thereby enable the students to become more independent, self reliant, and self directed learners. In a modern and rapidly changing world, the computer allows students and teachers to keep pace with change. It also enables them to monitor their learning, and the Internet

offers a rich source of alternative evaluation opportunities, as well as a source of myriad assessment rubrics, such as the Internet teacher rubric resource, Rubistar. (Rubistar, 2009). Indeed, rubrics are an excellent teaching tool, and the cornerstone of holistic assessment. They provide an objective format with which teachers and students can evaluate a cross-curricular assignment. As a teaching tool, rubrics provide guidelines to help students to appreciate the recursive process of learning and to act as independent thinkers and researchers.

Many classrooms have evolved together with the technology strides made in education in general. It is necessary to investigate the importance of the inquiry-based learning approach and to discuss the significance of the project process versus the completion and performance of the final research project. This is the initial research question asked by Chapman and Migdol (2001), "Why do the National Science Education Standards incorporate the Technological Design Process into the curriculum?" The answer addresses a concern expressed by some educators, which is that students often consider the finished product to be more important than the process of learning. This rush to complete the product results in a loss of student ability to develop problem solving skills and questioning techniques. The Design Process standards that the authors created ensure that students experience an algorithm of learning how to solve problems. The authors also provide an exceptional guide and a grading rubric to assist teachers in developing learning-process skills. The authors give an example of fourth grade students who were asked to create a picture frame. They had to share their ideas on what materials were needed, and why these materials were necessary. After discussion with one another, the students realized that first, thinking, and then sharing ideas about the project were as

important as creating the frame itself. This experience resulted in an intellectual shift in student attitudes concerning both the assigned task and the successful completion of their goal. After reviewing the guide for constructing the frame, the students evolved an appreciation for the preparatory steps, which needed to be accomplished before they even started construction. The guidelines included initial brainstorming, designing, planning, and constructing the frame, and finally, reflecting upon and evaluating the completed process. This last step proved to be an extremely comprehensive guideline for student self-analysis of focus and productivity.

The delineation of process is valuable because students frequently want to showcase, and often do not wish to follow the steps necessary to accomplish a task well. Cross-curricular guidelines help to set the goal, to focus, and to establish a clear task chronology for accomplishment. The last phase of the authors' guide emphasizes reflection rather than presentation. This affords the student the opportunity to reflect on what worked well, what did not, and how to do better the next time--a valuable outcome of real project-based learning.

Many teachers have embraced the process and project approach. "Good teachers are always looking for new ways to deliver the curriculum," states Truet (2001, p. 39) in her study of web quests, which are interactive student subject searches on the Internet. Although the information focuses on a language arts application using Sherlock Holmes and the mystery genre as a sample, it can easily be adapted not only to other genres, but also to any other discipline. A group participation rubric is offered as well as the list of "Relevant Information Literacy, Content, and Technology Standards." Truet lists the basic components of a Web Quest activity including the purpose, tasks, resources,

activities, evaluation, and summary. She also offers additional sites and references for further investigation in an attempt to help structure a technology and project-based approach to learning. A Web Quest "requires active learning and the development of higher-order thinking skills" (Truet, 2001, p. 40), but the teacher sets the stage for the depth of learning by orchestrating the search and selecting worthwhile sites. A quest could be a waste of valuable teaching time unless it is well constructed and challenging; furthermore, any subject area teacher could consider the possibility of designing a Web Quest for any interdisciplinary activity unit. It is imperative, however, that the teacher or the teaching team endeavors to design, structure, and provide an organizational format in order for interdisciplinary learning to be effective.

The topic of the literature review is an analysis of the potential efficacy of technology in designing grade-level team interdisciplinary learning units with technology integration to facilitate project-based learning. As has been stated, if the design, process, and assessment of cross-disciplinary learning are carefully and reflectively planned and implemented, it has the potential to enrich student academic experiences and teacher instruction at the highest levels of learning. The effective leadership and implementation of this process also has the potential to reflect Schein's (2004) layers of espoused beliefs and/or hidden agendas regarding team interaction and implementation, and can hopefully offer lasting school change and improvement.

Leadership

Administrators, school leaders, and teachers must endeavor always to put children's needs first. This is their primary goal and defines their mission because the safety and well being of children is paramount. Parents place a trust in the district that

their children will succeed in school, and that trust must be honored. Academically, children's learning should be fascinating, yet incorporate skills acquisition to meet the needs of every student because all students have the capacity to learn. An educational reformer, John Goodlad (1994), proposed the re-creation of child-friendly schools because districts need to be mindful that at the center of the complicated educational labyrinth is the child. The cornerstone of education is the social, emotional, and academic development of the children who are entrusted to the care of dedicated educators. This can be accomplished by sharing a vision of an ideal educational setting and inviting all members of the school community to make it a reality. As an administrator, I would try to see learning and instruction through the mind, eyes, and spirit of a child.

Any worthwhile leadership philosophy, professional or personal, is intertwined with basic courtesy and civility. Respect and tolerance are the cornerstones of a civilized society, and are my core values as a leader and as a person. Everyone is entitled to respect. Translating this concept to an educational setting involves fostering the dignity of children and, indeed, of everyone involved including the entire school community. In the words of Joan Didion (2004), "To have that sense of one's intrinsic worth…is potentially to have everything" (p. 24). It is imperative to honor everyone's intrinsic worth. Unfortunately, sometimes education is a much-maligned profession (Evans, 1996). Teachers and administrators, who work for the good of students and who have a vision and commitment to the improvement of instruction, do not always get the respect and consideration they deserve. As an administrator, I would hope that my respect (Covey, 1999) for students and faculty would be the cornerstone of the school culture and

climate, which would in turn foster a supportive and tolerant learning environment based on trust, which underpins the district's cultural construct.

Throughout the doctoral program at Rowan University, I have been immersed in the study of leadership theories and philosophies. It has informed my understanding of how to lead and how to follow in an educational setting. Studying these leadership theories has enriched my knowledge, not only of the theoretical basis of leadership, but also of the self-knowledge that accompanies the personal growth and development of a leadership construct and belief system. As an evolving emotionally intelligent leader, I identify with Goleman et al.'s theory (2002) of emotional intelligence, exemplified by the statement, "A person's philosophy is the way he determines values—and which leadership styles he gravitates toward" (p. 93). In essence, how I lead echoes who I am and what I value.

Due to my professional experiences, as well as having an ability to be a creative problem solver and to be visionary according to leadership surveys I have taken, I am more transactional than transformational. I have observed some educational leaders who imagined that they were transformational, when they were really only destructive because they came into a well-functioning district and reinvented everything without going through the process of examining what was working well. If they felt that they needed to improve the district, they should have changed only those aspects that were in need of a complete overhaul. In my experience, they left a mess with everyone else trying to pick up the pieces as they went on their way to another district. They should have first been transactional, and only then transformational to achieve the lasting change that Schein (2004) postulates.

The best philosophy of education is a combination of all philosophies, and these must be well researched and tailored to the needs of the children of the district, mirroring Hersey and Blanchard's (1995) situational leadership, an adaptive strategy in which the leader's behavior is malleable and contingent upon the expertise and maturity of the followers. Educational research provides the evidence to implement philosophy, but the research cited must mirror the district culture and match the student population. I have witnessed and admired strong leaders who follow a creative transactional leadership style initially, and evolve into transformational leaders who move the district goals forward (Burns, 1978). I am a transactional leader, first and foremost as described by Burns in his research, and I am also hopefully a transformational leader because leaders need to have a vision that moves followers to a higher level of values and responsibilities; but a district needs to be stable and functional before it can be transformational, much like Maslow's (1943/2001) hierarchy of needs.

The work of Marzano (Marzano, Waters, & McNulty, 2005) had a surprisingly serendipitous effect on my understanding of my leadership style. Based on the work of Bass (1985) and Burns (2003) mentioned above, I consider myself a transactional leader and a transformational hopeful. Burns (2003) describes a transactional leader as a person who engages in a "practical, give-and-take leadership" style (p. 23). He also defined a transformational leader as one who can achieve far-reaching results based on moral and motivated leadership. I am predominantly a transactional leader because in my experience, a leader must first assess and study a district before making sweeping changes, albeit necessary ones. Burns (2003) states, "Continual transactions over a long period can produce transformation" (p. 25). I have witnessed and admired strong leaders

who follow a creative transactional leadership style initially, and evolve into transformational leaders who move the district goals forward.

Marzano et al. (2005, p. 14) also mentioned the work of Bass and Avolio (1997) who "describe three forms of transactional leadership: passive, active, and constructive." I identified with the constructive transactional leader who "sets goals, clarifies desired outcomes, exchanges rewards and recognition for accomplishments, suggests or consults, provides feedback, and gives employees praise when it is deserved" (Bass & Avolio, p. 14). This helped me to view my style positively rather than hoping that I can be a charismatic transformer who is predominantly only a superficial change agent.

In my administrative experience as an assistant principal of a private high school, I saw a microcosm of what could be. The school consisted of immigrants, as well as many first and second-generation students from 35 countries and all faiths. There was a zero tolerance policy for bigotry. I initially practiced transactional leadership to ascertain the climate and culture of the school as my first priority. The building sometimes functioned as an educational oasis because the schools in the surrounding towns were not known for their safety or academic standards. Respect was expected, and respect was practiced by all members of the school community. The facilities were old, and unfortunately some of the methodologies practiced were outdated, but education prospered in this supportive environment. I hope to have the opportunity to replicate this experience of honoring and respecting diversity in my role as an administrator and believe that my respect for students and faculty is a decided strength.

A moral approach to leadership is essential and Bandura's theories of Social Learning (as cited in Prince, 1995) to inform ethical leadership principles, which, in turn,

inform my leadership (Prince, 1995 beliefs and values. At times, if necessary, I can be charismatic, but I am a careful proponent of this theory because of Nadler and Tishman's (1995) research when they cite how important positive values are in charismatic leadership, or the leader can cause irreparable harm to followers.

Leadership profiles. According to various leadership profiles, my range of leadership skills can go from Bass's (1995) description of the Hegelian ideal to the temptation of a Machiavellian expedient when I am up against colleagues whom I believe are acting with only marginally ethical principles. In these leadership surveys, my strengths are in having a vision and being able to communicate it to others, which appears to validate my hopes to evolve reflectively from a transactional into a transformational leader. I also communicate clear expectations and model responsible behavior reflecting Barrett's theory (2005) of values-based leadership and the moral leadership theory espoused by Burns (1978). I am also a creative problem solver, and agree with Burns (2003), who states, "So the ultimate test of creative leadership lies not only in having a new idea but bringing it to life, accomplishing the real-world change it promises" (p. 168). In my district, I am on numerous committees because we all need to express our beliefs and concerns to benefit the students. I have also given many presentations to colleagues, the Board of Education, pre-service teachers, and professional organizations on best practices and responsible technology integration because communication is an essential component of leading change (Kotter, 1996). This is substantiated by some of my efforts with other educators in surrounding districts. For example, I was a founding member of a county teachers' consortium, which was established through a grant. The mission of the consortium was to provide ongoing positive support for teachers, and to

assist each other to revitalize and to renew our commitment to education and to our students by using various experiential professional activities and experiences.

In the surveys of my leadership style through assessment tools from the Learning Center (2002), Bolman and Deal (2003), and the Center for Rural Studies (1998), I found much to enlighten my understanding of who I am as a leader, and how I approach the leader's role. I was pleasantly surprised by the number of assets I seemed to have, or at least, think I have. It gave me a boost of confidence. Recently, I have realized that I sometimes lack the courage to fight for my beliefs, and this was substantiated in some of the surveys. In the Bolman and Deal Leadership Orientations (2003) profile, my low scores in the political arena attest that I dislike powerful people whom I believe are manipulative and self-serving. I have known many principals and superintendents who have been excellent, empowering leaders, but I have also experienced a couple who are political and power hungry. My weaknesses and lack of patience with them stifle and inhibit any chance of my helping the district to move ahead in spite of their selfishness and lack of self-knowledge. This definitely does not help the children, and I must rediscover a courageous voice (Stowell & Mead, 2007) and use my ability to communicate to improve whatever I can for the sake of the children; otherwise, I am the one who could be considered self-centered and counter-productive because I am reluctant to change how I handle self-serving people.

Many years ago, as a sophomore in college, I was once told by a professor that I was "wise beyond my years." The wisdom that comes from an insatiable curiosity and excitement for learning was an identified strength in two of the surveys, but I sometimes lack the strong voice that I need to be a sound leader, which was evident in the Center for

Rural Studies (1998) Assessment of Leadership Qualities and Skills. Concerning my intellectual capacity, I have been told by some of my colleagues that I am intelligent and "communicate expectations clearly and effectively," and can speak extemporaneously with "dignity and kindness." I continue to strive to improve my communication skills and try diligently to write with "clarity and grace" (Williams, 2000). Although I have strong communication skills and have a knack for envisioning the "whole" problem and all of its components, I am sometimes shy and reticent, preferring to sit back and listen perhaps too much of the time. I speak only when I feel necessary, which has been noted by a few of my professional friends.

I try to compliment colleagues and students frequently (Evans, 1996) being careful to be specific about my praise. I learned this in a course taught by a retired principal who explained that compliments were meaningless unless they were supported with specific details and an explanation of why the person was being complimented. Since then, I have always added specific praise to any compliments I give. However, if I am stressed or feeling overwhelmed, my praise of others is infrequent and my patience with people whom I judge are not doing their fair share is virtually non-existent, which is a decided leadership weakness.

According to the Learning Center (2002) survey cited above, I need to strengthen my ability to balance my professional and personal life and manage my stress levels. I know that this is true because I succumb quickly to a feeling of being overwhelmed and disheartened when I have too much to do, and I fear I will not do my work as well as I should. It also sometimes clouds my moods and impacts the usually positive view I have of my abilities to meet the challenges I face daily. To help me with this weakness, I read

inspiring literature and post positive reinforcement posters to surround myself with reminders to forge ahead. It frequently works by changing my perspective. I have a good knowledge of emotional intelligence techniques (Goleman et al., 2002), but learning it involves living it on a daily basis. This is the challenge for me: to keep the team of colleagues in mind rather than to just get things done. I need to review emotional intelligence frequently, not necessarily to learn it better or more about it, but rather to apply it. It is so important that it sometimes gets tossed to the sidelines, but I need every day to make every effort I can to keep it the foremost priority on my list of responsibilities.

The leadership survey profile in the Glanz book, *Finding Your Leadership Style* (2002), enabled me to assess my leadership qualities, and I cross-referenced this profile with the three leadership surveys cited above. The Glanz instruments identified me as a Dynamic-Aggressive Leader, which represents approximately 0.5% of the population. The characteristics of leaders in this category are an affinity for hard work and a contemplative nature, which correlates with the Center for Rural Studies Assessment of Qualities and Skills (1998) survey and the Bolman and Deal (2003) instrument. Glanz also postulated that women in this category are often conditioned to downplay qualities or are relegated to minor positions, and as a result, sometimes they hide their disappointment and can become anxious and depressed. I definitely identify with this assertion. Additionally, I scored highly in the Creative-Assertive Leadership profile whose characteristics include independent thinking, perception, carefulness, and a propensity to be driven, which corresponds with the Learning Center (2002) survey.

In addition to leadership study and survey profiles, any profession needs guidelines, strategies, and formulae to give substance, organization, and a framework to assigned responsibilities. The New Jersey Professional Standards for School Leaders (NJDOE, 2009) provide a valid guide and/or roadmap for the ethical and humanistic approach of leading our schools with clear vision and lofty standards. Having a school where students, teachers, and administrators are nurtured, ethical, and respected is not necessarily utopian. Education must be a profession of honor, and its goal must be to honor the uniqueness of every child, honor the teachers who honor their students, and honor the administrative leaders who have the courage to serve the best interests of children. A climate where honor and respect (Covey, 1999) pervade and benefit the entire school community becomes a place where education and learning can prosper and flourish with ethical mores strong and intact.

Leadership survey synthesis. Assuming a leadership role is a formidable responsibility, and one that I do not take lightly. I tend to underestimate my abilities because on one hand, I feel that I possess the ability and wisdom to lead, but on the other hand I sometimes doubt whether I can rediscover the stamina and courage I once had to forge ahead, reigning in the self-doubt that sometimes plagues a leader. My analytical mind, however, embraced the challenge of this leadership team project because the discovery of my strengths and weaknesses lies within and beyond the context of a chart or a score on a validated instrument of a leadership skills inquiry. Leadership surveys are informative, and I have used them for a number of years, not only for self assessment, but also as valid data instruments to assist my district and to inform my teaching, including using them with my students in a career exploration unit where I had the students match

the results of their personality and skills assessments to the qualities identified as essential to be successful in their chosen "potential" profession.

Leadership for change. I had always thought that since change was easy for me that it was for every educator as well. When talented "rookie" teachers walk into their first class, they know that change is ongoing and inevitable because they work with children, who are constantly changing, almost in front of their eyes. I have sometimes said to novice educators whom I mentor that if they are not flexible and open to change, they really should reassess their decision to pursue education as a career. The world is in a constant state of flux and chaos, and as leaders we must model, teach, and implement the skills and tools to cope with change. Researchers of educational change, such as Evans (1996), Kotter (1996), and Fullan (2001), confirm the difficulty of leading schools and trying to institute effective second order change to transform the teaching and learning processes in a district. Critical to the change process is the effectiveness of the school principal.

Marzano and his colleagues (2005) administered a survey to more than 650 principals to gather school leadership data. They cited one of their significant findings that, "A highly effective school leader can have a dramatic influence on the overall academic achievement of students" (p. 10). They categorized 21 responsibilities of the school leader and discussed the critical difference between first and second order change (Schein, 2004). The authors stressed the importance of determining, selecting, and matching the "right work" (p. 76) to enhance student achievement to match the specific student and school needs. They suggest a five-step plan of action to assist school leaders

in implementing school cultural change by developing a leadership team, delegating some of the responsibilities, taking "action steps" toward the goal, selecting the correct work needed to achieve the stated goal, initiating first or second order cultural change, and finally, employing the leadership behaviors that will accomplish the goal. These steps would be most helpful to me as a guideline in achieving the sustained school change that the leadership project requires and which is discussed later in this chapter.

Understanding the strategies of force field analysis and intervention theories have given me a sort of reference book for research-based and tested theories to use when I am implementing changes as a leader. I identify with Kotter's change model (1996), and will probably use this paradigm to inform some of the structure that will underpin this leadership project. Although I identify with Kotter, some of his strategies are not consistent with Goleman et al.'s emotional intelligence (2002), because some of the steps to take to move an organization forward lack emotional intelligence, but are sometimes necessary. Kotter's work (1996) confirmed my belief that his model plus the other theories and analysis models are excellent scholarly and handy references to use in leadership practice in general and in this team project specifically. Before this research, I would develop a fairly logical and organized action plan to implement change, but now I can use a tested, research based strategy to implement this team change initiative.

It was beneficial to study the culture of resistance (Fullan, 2001) and try to understand the grief and loss felt by stakeholders when change occurs. I have heard this kind of talk so often in my career and wish that I could have learned the loss-syndrome sooner. I would have understood grieving teachers and could have helped them move forward with compassion, and as an "authentic" leader, I possibly could have minimized

their resistance to change with understanding, but resolve. Fullan's (2001) approach, that "Leaders are not born, they are nurtured" (p. 131gives me hope when I think I may not always have what it takes to be an authentic, moral, visionary leader, capable of leading effective, forward-reaching change.

Lifelong leadership learning. There is so much to learn about leadership theories and organizational cultures that it can at times be overwhelming. One's philosophy of leadership is amorphous and changing with the next article or book read, but there are some universal and solid truths that can center and anchor personal research and reflection: the desire to be a consistently fair, trustworthy, and dedicated leader for the sake of the children, which should inform who we are and how we act. If we then align and verify this through the rigor of research, as has been done in the Rowan doctoral work, we can learn from those who have studied people's traits and the cultures they create; therefore, the layer of research underpins and validates our self perceptions and forces us to reflect, question, and possibly "reframe" how we lead. It is a challenge to unearth the truth, but a necessary voyage (Bolman & Deal, 2003, p. 433) for a leader: "Leaders must be deeply reflective, actively thoughtful, and dramatically explicit." Leadership should be carefully and thoughtfully accomplished through continued research to allow learning and reflection to become a part of life's professional journey.

Before engaging in leadership research at the doctoral level, I thought that I had a fairly good handle on who I was as a leader. I relied on my instincts, role models, and a smattering of leadership study. I had some blind spots, which were clarified by surveys, colleagues, supervisors, and job interview experiences. For example, on an interview with a superintendent, she told me that my credentials and talents were impressive, but

because I was too humble and reluctant to discuss them, she had to work at getting me to "highlight them." She told me how valuable I would be to her district when the proper situation arose because of my extensive experience, respect for others, technology acumen, and global educational frame of reference. She took the time to show me how to highlight my strengths in the course of answering questions. I was grateful, but understood that I am weak in explaining the value of my administrative experiences and talents, and I need to work on my levels of confidence. By nature, family background, and training, I am automatically reflective, but more as a self-examination regarding my weaknesses, rather than my strengths. The study of leadership in the Rowan course work has taught me not to be so self critical, but rather to use the knowledge gained from my experiences to make me a stronger and more enlightened transactional leader.

If I were asked a question regarding which leadership theory or philosophy is the "best," I would respond with what I truly have felt for many years that with differentiation, the "best" theory is a combination of every theory. It depends upon the situation and circumstances, and that no one theory has it all. Researching many of the different theories has made me feel more knowledgeable about how others lead, and how I hope to lead others. One of the most enlightening theories on district culture was the Bolman and Deal (2003) study of organizations. Their work explained how to fragment an organization into discrete frames. The structural frame explains the foundation and framework of the group and how to achieve efficacy and organization. The human resources frame extols the virtues of cooperation and collaborative experiences with colleagues to foster relationships with a focus on interpersonal relationships and "feel-good" interactions. The political framework with its ubiquitous urgency discusses how to

wield power and get things done both within and beyond the organizational walls. Finally, the symbolic frame represents the symbols, signs, and pageantry that colors the working world and drives publicity, profit, and loyalty. These frames helped me to recognize the necessity of studying the parts to see a vision of the holistic workings of an organization. Coupled with Schein's theory (2004) of cultural layers in organizations, where he simply stated, but brilliant explained the concept of levels, he put the layer of research upon what people intrinsically know about the hidden agendas of organizations, but could not necessarily explain or understand. This research taught me how to look at many things in life, not just organizations, with different and deeper perception.

In the beginning of my doctoral study of leadership, I had thought of myself as marginally charismatic, visionary, and transformational, but I have learned to be more cautious, and I feel that my style is now more reflective and initially transactional, while moving toward transformational; therefore, I consider myself a transformational "wannabe" because a leader must marry the ideal with the real. If a leader keeps the goals lofty with a vision of what could be, combined with high moral values (Covey, 1999), and a structured systematic application, that is, transactional, it is a successful scenario for the district, and matches what has evolved into my leadership style, but I need to be very careful to consistently glean pertinent information with all of the district stakeholders. A leader needs to stand back and assess what is good and worthwhile about a district. It is necessary to canvas everyone involved to see what they judge to be valuable about the district, as well as what needs to be changed, which is the protocol I will attempt to utilize in this project to lead a team of teachers in developing a technology based interdisciplinary unit of study.

Educators must be life-long learners, and model learning for their staff, and for the students. I enjoy studying about leadership, which helps to inform my future decisions and approaches toward instruction and learning. Self–reflection is an intrinsic part of who I am, based on my early childhood and young adult experiences, which I carried into my professional life. As a teacher, I often told students that reflecting on their new-found knowledge would transform this knowledge into wisdom; reflection is the key to true understanding. I have always appreciated studying the educational systems of other countries, and was able to study the Mexican and Canadian educational systems, as well as an alternative educational, experiential program for high school students in the Colorado Rockies from grants I was fortunate to receive from the Geraldine R. Dodge Foundation. I was also fortunate to study the Japanese educational system for three weeks on a Fulbright Japan Memorial Fund grant. What I experienced and learned from these educational opportunities made me keenly aware of the importance of a global view of education to enable educators and their students to better understand their place in world culture, which will help me to structure this leadership change initiative with a universal perspective and focus.

Leadership and followership: Impact on the leadership project. The purpose of the qualitative and quantitative leadership project was to explore effective technology implementation in interdisciplinary activities in a grade 8 middle school setting. The researcher qualitatively and quantitatively analyzed how to attempt to effectively structure media-rich inquiry-based learning and how to effectively integrate technology into a project-based learning model by using a predominantly transactional leadership style (Burns, 2003) to effect lasting (Schein, 2004) and significant instructional change.

The Kotter (1996) change model facilitated the action plan construct to implement the cross-curricular unit of study. It was understood that leaders must make decisions that are holistic, systemic, far-reaching, and multi-purposed for complex and stratified groups of stakeholders, sometimes in the midst of chaos (Wheatley, 2001), and the leadership project involved a similar scenario. Giuliani (2002) echoes this understanding when he states, "In the real world, leaders have to make decisions that are multidimensional, usually between two or more imperfect remedies, on criteria that encompass long-range goals and plausibility" (p. 126).

As a leader of the project, I attempted to develop an equitable partnership with the team of teachers who followed my lead in the difficult job of educating students in the acquisition of technological research skills to prepare for a future filled with possibilities we perhaps cannot even perceive. Greenleaf's (1995) theory of servant leadership informed my beliefs regarding the leadership project, because although it may be difficult, we must first serve those whom we wish to lead, the concept of which is amazing in its simplicity and scope. Of course, we should all strive toward servant-leadership, but it is almost unattainable for the common leader. It seems to require almost a total abandonment of the "self," which was required to lead this team project. Very few can achieve such a lofty purpose. Also, an effective leader must understand Gardiner's theory of followership (Indiana University, 2007), because there is no leadership if your followers do not share your mission, passion, and values. This ideal demonstrates "primary qualities of flexibility, collaboration, and confidence" (2007, p. 33), which are Stowell and Mead's (2007) "fundamental qualities" of leadership. I attempted to impress upon the teachers that educators need to be committed to mastery instruction (Hunter,

1982), reflective technology integration, and project-based co-curricular experiences for all students and invited them to be a crucial part of the process.

The relationship between a leader and the followers is so critical to any type of leadership, and the leader must always look at any situation through the lens of the follower. The research of Bolman and Deal (2003) has taught me to look at many things in life, not just organizations, through multiple refracted and ultimately coalesced lenses, and I used this knowledge in focusing and spearheading the change that the project entailed. Schein's (2004) concept of cultural levels informed my appreciation that the espoused beliefs of an organization are not always aligned with its hidden agenda, providing the layer of research upon what I intrinsically know about the hidden agendas of organizations. Schein states, "If one wishes to distinguish leadership from management or administration, one can argue that leaders create and change culture, while managers work within them" (p. 11). Although it is an arduous task, together with my followers, I can create and meaningfully change team, school, or district culture based on a solid qualitative and quantitative research foundation. I am confident that my intrinsic understanding of how to listen to followers and often being a follower myself has broadened my self-knowledge of why I want to lead, and why I am empathetic toward those who follow. This helped me not only to broaden the scope of my leadership practices, but also to attain the project goals. This is the approach I attempted to take, and which mirrors Bolman and Deal (2003) who state, "Successful change requires an ability to frame issues, build coalitions, and establish arenas in which disagreements can be forged into workable pacts" (p. 378). I will continue to strive to assure that future team projects will attain the status of a workable pact. I have come so far in understanding the

multi-faceted process of change, but I have so much still to learn to be the kind of leader I hope to be.

A leader must be mindful of the concept of "Groupthink" (Janis, 1971/2001) and the "Abilene Paradox: when teams take action contrary to their real desires" (Stowell & Mead, 2007, p. 48) in an effort to keep the peace or appear loyal to the group. These are detrimental to any team. I have seen numerous instances when people have been stifled when giving their opinions because leaders did not want to hear contrary points of view. I have noticed this more as a phenomenon in smaller school districts rather than in larger ones because larger groups tend to offer more protection and diversity, enabling a safer environment for contrary opinions. This makes me keenly aware of how important it was to entertain divergent points of view regarding this leadership project to structure a grade 8 interdisciplinary unit or for any future projects. I have witnessed insecure leaders who have surrounded themselves with colleagues who actually insulated them from understanding the needs of the staff and students in their district. Their leadership was compromised, misinformed, and misguided.

The need to be aware of negative leadership behavior is confirmed by Cronin (1995) in his research when he discusses the need to study "bad leadership as well as good" to understand and inform a personal quest to be a successful leader and be able to transform a group into a team (Lencioni, 2002). In one particular situation I witnessed, a school district leader who surrounded herself with "yes" people got blindsided when her "in-group" failed to speak out against the problems inherent in a massive change in political structure. Although well intentioned and perhaps even necessary, she went full steam ahead because she was insulated by her group from the negative ramifications of

forcing change too quickly, and without getting all of the stakeholders on board, and making them aware of the valid reasons for the changes. A vocal group of parents, who felt their children were negatively impacted, moved against her. Although she had the potential to be a good leader and was genuinely interested in the well being of the children, she decided to leave the district because of this controversy and the attendant negative community climate. I was cognizant of these pitfalls and attempted to circumvent them by using data triangulation, an interview protocol, and anonymity to assure accurate, honest team and project feedback.

Fawcett (2004) admonishes leaders not to invalidate the beliefs and opinions of colleagues at first glance. Instead, respect their contributions and opinions before leaping into transformational change. It affirms my caution and sense of collegial ethics in the positive ways needed to treat my followers. As a leader, I must try to transform my school, but I cannot disregard the visions and beliefs of those whom I hope to transform, or I might turn them off to change, or worse, make them bitter and cynical. I need to captain the ship, not capsize it, and that is what I attempted to do in order to effectively lead the team members and colleagues who worked with me on the project. I am committed to helping teachers to implement current strategies and methodologies into their instructional program by offering and supporting relevant professional development opportunities gleaned from teacher input and district goals, such as Understanding by Design (Wiggins & McTighe, 2005), various college reading and writing programs, differentiation and tiered instruction, and data-driven instruction. Instructional methodology should be predominantly a project-based and/or inquiry-based learning approach with a mastery-learning component for most activities, which was reflected in

the action plan and unit design. Differentiated instruction was integrated into the instructional philosophy. Instead of traditional desks, the students had access to computer stations with Internet capabilities to help them be a part of the global community, enabling the students to integrate technology into the enrichment and reinforcement unit activities.

My leadership endeavor was intended to help my team and school to evolve into a media-rich environment in which children experience and learn globally, with a conscious effort to keep the school culture always moving forward to the next step in the educational improvement continuum. This project initiative to design and implement a team-based cross-curricular, technology rich unit of study was an extrapolation of what I have learned in the doctoral leadership courses regarding the arduous process of change. Actualizing the project action plan helped me strive to function in the highest levels of my abilities. I needed to be more patient with colleagues who did not always meet deadlines by helping them to succeed and by offering assistance and strategies to improve, much like the leader, Kathryn, in the Lencioni (2002) leadership fable whom he uses as the ideal model of a strong leadership style. If I continue my efforts to succeed, not only will I benefit, but also the children will be better served by my willingness to lead by example.

Chapter III

Methodology

Introduction to Methodology

The research topic was determined as a result of conferring with members of a grade 8 core faculty team to identify a current grade-level need which could be facilitated using a qualitative and quantitative research approach with core curriculum integrated learning and with the added instructional benefit of using technology within a conceptual context. The technology segment resulted from a district technology initiative to improve and enhance technology integration. This topic was also a component of a school administrative request that each middle school team design and organize a cross-disciplinary learning experience for each grade level; therefore, the study had the potential to meet both district and grade level goals. The purpose of the project was to help the researcher's team to acquire data to inform the construction of a comprehensive technology-based multi-disciplinary project. It was also intended that an action plan would be implemented to formulate a template, which could possibly be used to develop additional middle school cross curricular projects and to structure and model this generic framework to benefit other teaching teams. The generic model was aligned with New Jersey Core Curriculum Content Standards (NJDED, 2009). It was hoped that this template could be expanded to include other topics and disciplines to foster innovative instructional methods and practices. The study utilized a mixed qualitative and

quantitative design and was comprised of five cycles beginning with Cycle I beginning in January 2010 and continuing through Cycle V, which ended in December 2010.

Qualitative Research Design and Setting

The study that was conducted initially and recursively utilized a qualitative approach. Bogdan and Biklin (2007) define qualitative research as "an approach to social science research that emphasizes collecting descriptive data in natural settings, uses inductive thinking, and emphasizes understanding the subject's point of view" (p. 54). Permission to gather the research data for this study was obtained from the administration, from the team leader, and from members of the eighth grade team, as well as from the grade eight special education teacher. Cycle I of the research study was initially launched by conducting and documenting open discussions, observations, and informal interviews related to the topic. Suggested themes and concepts were identified, categorized, and prioritized. The faculty team finally focused on the theme of progress, which could be interpreted through and aligned with the core subject areas. The team also decided upon a Web Quest as the technology section of the student study. Subsequent interviews followed a formal interview protocol, which assured the anonymity and truthfulness of the interviewees. Each cycle of the research involved a minimum of at least two to three months to gather the information necessary to formulate the study data and components.

Further observations and interviews continued to be conducted with colleagues and faculty members of this small suburban New Jersey middle school staff including special education and academic teachers through three cycles. The school is comprised of approximately 300 students in grades 5 through 8 with grade level teaching teams.

Students are heterogeneously grouped in block-scheduled language literacy, social studies, math, and science classes, which are inclusion-based with special needs students. A special education teacher is available for some classes in a collaborative setting. The classes meet for 60 minutes a day, five times per week.

Data Sources and Collection

The study was introduced with the stated research questions and was designed to launch and guide the qualitative and quantitative inquiry. The research plan was formulated to systematically and recursively collect, organize, and analyze the data within a collaborative and participatory framework. An interdisciplinary and emotionally intelligent team approach (Goleman et al., 2002) was utilized and was intended to help teaching team members to bridge the gap between and among the subject areas and help them to realize that learning is a holistic experience, which facilities the transfer of knowledge into all areas of life for the benefit of students.

Documents and artifacts were collected and analyzed including pictures, lesson plans, charts, meeting agendas, student project presentations, and course descriptions. The purpose of the data compilation was to gather qualitative and copious information regarding how a grade 8 level cross-curricular approach might be structured to facilitate student understanding of the process inherent in interdisciplinary study with technology application, differentiation, and with a special education component included in the study.

To conduct valid interviews, an interview protocol was developed to align with the research questions. This process was used whenever feasible and correlated with the established protocol parameters. Various segments and sections of interviews were designed to gather information on respondents' opinions regarding the need for the

interdisciplinary study, the thematic content, and appropriate technology application. Glesne (2006) offers numerous suggestions to facilitate the interview process; a key point involves the content of the questions. The author explains that they "tend to be more contextual" (Glesne, p. 81) to gain some understanding of the perspective of the interviewee. An additional point Glesne suggests is that "the questions must be drawn from the respondents' lives" (p. 82). These points were adhered to through the formulation of the questions with the purpose of eliciting information regarding the professional lives of the teachers who were interviewed. These suggestions were also relevant because the questions that are posed honor the people who are interviewed by informing them that their life experiences are valuable and worthy of study. These points that Glesne suggests mirror Goleman et al.'s (2002) emotional intelligence because patience, tact, understanding, and appreciation are integral parts of the interview process, reflecting the role of researchers and interviewees as competent professional people dedicated to the research and education process.

Detailed interview and observation notes were kept, and some interviews were taped and transcribed verbatim. Based on the analysis plan, the field notes, documents, interview contents, and artifacts were numbered, and the data were input and coded using data analysis coding procedures. The researcher referred to the work of Clandinin and Connelly (2000) to assist in the collection and analysis of the collected data. They state that "narrative inquiry can be of two types—descriptive and explanatory" (Clandinin & Connelly, p. 16). The researcher employed both kinds of inquiry to describe and to connect the narrative data research. Each set and type of data was gleaned to ascertain the

themes and concepts that emerged from the observations, interviews, documents, field texts, and artifacts.

Data Analysis

The researcher utilized the work of Glesne (2006) to assist in the analysis of the collected data. The compiled data were collected, organized, and coded according to a data analysis coding procedure, and further structured into sections of a research lab database. The coding steps provided by Bogdan and Biklin (2007) in their research were followed to organize the data, as well as their suggested coding categories including setting, situation, context, process, perspective, activity, strategy, social, and methods codes. The themes that emerged from the data categories were then organized and described to note relevant relationships among the various data.

Quantitative Survey Research Design

The study was non-random due to district, school building, and team goals and objectives, and that the researcher conducted the study with the entire population of grade 8 team faculty members of a small suburban New Jersey middle school staff including a grade level special education teacher. The researcher surveyed all members of the team population, which is defined as a "…census – a count or survey of all members of a population" (Patten, 2001, p. 73). The purpose of the survey was to gather qualitative information regarding a strategic plan to deliver a technology-based cross-curricular unit, and the questionnaire instrument was developed to align with the three research questions. A table question format was used based on a Likert scale with response stubs from positive to negative attitudes. A section of the two-page survey was dedicated to a non-structured, open-ended question to enable the researcher to identify opinions on the

research questions. There were survey content considerations in the questionnaire design to avoid bias. Due to the small number of faculty members ($N = 4$), demographic questions were eliminated to assure confidentiality regarding gender and subject discipline taught.

For the purposes of statistical analysis, the Likert-scaled stubs were given a numerical value. "Very inexperienced" was given a value of 1, "inexperienced," the value of 2, and "not sure" the value of 3. The scaled rating of "experienced" was given the value of 4 and "very experienced," the value of 5. On the second page of the survey, "strongly disagree" was given a value of 1, "disagree," the value of 2, and "not sure" the value of 3. The scaled rating of "agree" was given the value of 4, and "strongly agree," the value of 5. The assignment of numerical values created the opportunity for statistical analysis. This process was used with two of the three sections of the survey instrument questionnaire. The first section was designed to gather information on respondents' access to computers and the frequency of their use.

The research study was initially launched by distributing the survey participation informed consent, which initiated the survey instrument questionnaire (see Appendix A) to the team members for Cycles IV and V. Preparatory to presenting the survey, "Integration of Technology in Interdisciplinary Curriculum" instrument, a field test and think-aloud was conducted a few weeks prior to the team meeting. The following week after the completion of the grade 8 implemented team learning unit in Cycles IV and V, the first item on the team agenda was the distribution of the survey. For both the pilot Cycle IV project unit and the Cycle V implementation unit, the researcher verbally explained and distributed the explanatory letter of transmittal containing written

assurance of confidentiality and anonymity, and the survey participation informed consent information at the beginning of the survey instrument. The researcher also assured the team staff that they could choose not to participate and submit a blank survey instrument. The exact procedure that was followed is listed below.

Survey Procedure

1. Distribute informed consent form, which contains written assurance of voluntary participation and anonymity.
2. Verbally explain to staff the intent and purpose of the survey instrument.
3. Verbally assure anonymity and confidentiality discussed in survey instructions and informed consent form.
4. Verbally thank staff for their participation if they choose to participate.
5. Distribute the survey with an expected completion time of 5 to 10 minutes based on preliminary field test sampling information.
6. Provide a collection box to assure anonymity for completed or blank surveys.
7. Collect surveys and forms from boxes for analysis.
8. Remove the surveys and data from the survey site to preserve confidentiality.

The consent forms and survey instruments were manually collected, and the total population of four team faculty members participated and completed the surveys within 5 to 10 minutes for Cycle IV and v. Cycle IV was considered to be the pilot cycle and student research unit and cycle V was considered to be the implementation student research unit. Based on the analysis plan, the survey questionnaires were numbered and the data were input and analyzed using *SPSS 16 for windows: Student version* (2006). The researcher referred to the work of Cronk (2008) to assist in the analysis of the

collected data. Each individual question was tabulated to ascertain the frequency and percentage of responses and the measures of central tendency, that is, the mean, mode, and median. Cross tabulations were also done. Frequency tables were generated and analyzed. The responses were then organized and described to note relevant relationships among various data to answer the research questions. Research question one, "In what instructional ways can a grade 8 team interdisciplinary project be structured to assist student inquiry-based learning?" was addressed via survey questions 4, 5, 7, 8, 10, 18, 19, and 20. Research question two, "How will technology integration support and enrich the cross-curricular instructional project?" was addressed with survey questions 1, 2, 3, 6, 9, 18, 19, and 20. The third survey question, "How does a media-rich integrated curricular student learning project impact the teaching team?" was addressed by survey questions 11, 12, 18, 19, 20, and 21.

Triangulation and Member Checking

These numerous data collection techniques and layers of information were implemented for the purpose of triangulation to avoid undue subjectivity and bias. Detailed interview and observation notes were kept, and some interviews were taped and transcribed verbatim. There were continual content considerations and review in the interview design to avoid bias, both by the researcher and by trusted colleagues. Attention toward avoiding bias and subjectivity through triangulation of the process, participant selection, and data validity attempted to ensure the integrity of the study. The observations, interview process, and surveys followed a protocol of anonymity, and participants were assured of the confidentiality of their responses to ensure that their answers would be valid and forthright.

Subjectivity, Validity, and Generalizability

The researcher initially was aware that her positive bias could possibly factor into the research process; therefore, the researcher additionally interviewed other educators from different districts to gather diverse data on the topic, and attempted to verify the objectivity of the data and to ensure further triangulation and data integrity. The research of Peshkin (1988) confirms that a researcher needs diligence to avoid subjectivity, and he includes an admonition that a study needs to be many faceted and rigorous to achieve validity. The process of piloting questions (Glesne, 2006) is desirable because it helps to prevent potential problems; therefore, a field test of relevant questions was conducted. Having trusted colleagues offer interview suggestions is also a good basis for integrity, and they serve as a sounding board for the initial research stages.

There was a follow-up to the study, and a report was disseminated to the faculty team. A suggested collection of viable, piloted procedures, practices, rubrics, and methods of promoting the integration of technology within a cross-disciplinary curricular unit of study was created with the core teachers. Additionally, the special education teacher provided modified rubrics and assessments to accommodate special needs students.

An action plan reflecting the research of Hinchey (2008) was employed with the intention of improving grade level project formulation, instruction, and implementation. It was hoped that this research study would provide a model process, which could be replicated in other grade levels and possibly in other interested middle schools with a similar schedule, structure, and student body. It was also hoped that the research data and process would empower students to be self-directed and self-motivated researchers. The

study was not intended for grades lower than five, however, because of the difficulty of the content, nor was it intended for middle schools without a team structure or without adequate technology access.

Chapter IV

Results and Findings

Introduction

The action-based research to conduct the study utilized a combined quantitative and qualitative methodology to explore the efficacy of technology implementation in grade 8 interdisciplinary activities with a faculty team approach within a middle school setting. The researcher qualitatively and quantitatively analyzed how to effectively structure media-rich inquiry-based learning and how to effectively integrate technology into a project-based learning Web Quest model. The methodological analyses of the qualitative and quantitative data within this context afforded the researcher the opportunity to ascertain whether or not the investigation of data was relevant to and aligned with the three research questions posed by the study. This chapter will discuss the relevant research findings.

Quantitative Findings and Discussion: Cycle IV

Cycle IV quantitative findings. During Cycle IV, the grade 8 team introduced the pilot student interdisciplinary project. At the conclusion of the interdisciplinary unit, the faculty team respondents were asked 21 survey questions, which reflected the research questions of this study. As presented in the methodology chapter above, research question one, "In what instructional ways can a grade 8 team interdisciplinary project be structured to assist student inquiry-based learning?" was addressed via survey questions 4, 5, 7, 8, 10, 18, 19, and 20. Research question two, "How will technology integration

support and enrich the cross-curricular instructional project?" was addressed with survey questions 1, 2, 3, 6, 9, 18, 19, and 20. The third survey question, "How does a media-rich integrated curricular student learning project impact the teaching team?" was addressed by survey questions 11, 12, 18, 19, 20, and 21.

The survey questionnaire was segmented into three distinct sections. The first section consisted of an informational page of three questions to gather general information about the respondents' computer access, use, and experience. The first question was intended to ascertain whether or not the respondents had access to a home computer. The second question asked how frequently the respondents accessed their home computer. The third question asked how frequently the respondents accessed their computer at school. The results of Question 1, Question 2, and Question 3 indicated that 100% of the respondents (N=4) with a median and mode of 5.00 had access to a home computer and that they used their home and school computer on a daily basis. It is important to note here that daily access to a school and home computer underpins the viability of the study. There would be limitations in replicating the results where school staff members have limited computer access at home and at work. This will be discussed further in the limitations segment of the research analysis.

The second section of the survey consisted of a table of questions regarding staff experience concerning their experience implementing a grade level technology integrated interdisciplinary project with rubrics. Table 1, with frequencies, mode, and means, follows.

Table 1

Experience of Respondents with Technology Interdisciplinary Projects – Cycle IV (*N* = 4)

	Very Experienced (5)	Experienced (4)	Not Sure (3)	Inexperienced (2)	Very Inexperienced (1)
4. I have experience with team projects. Frequency 4 Mean 5.00 Mode 5	4	0	0	0	0
5. I have experience with interdisciplinary team projects Frequency 4 Mean 5.00 Mode 5	4	0	0	0	0
6. I have experience using technology with interdisciplinary projects. Frequency 4 Mean 4.50 Modes 4 & 5	2	2	0	0	0
7. I have experience using rubrics. Frequency 4 Mean 4.50 Modes 4 & 5	2	2	0	0	0
8. I have experience using rubrics with interdisciplinary projects. Frequency 4 Mean 4.50 Modes 4 & 5	2	2	0	0	0
9. I have experience using online sources for interdisciplinary projects. Frequency 4 Mean 4.50 Modes 4 & 5	2	2	0	0	0

It can be seen from the table for survey Questions 4 and 5 that the frequency profile is skewed in the positive direction with 3 of all 4 respondents who are very experienced with team projects and 1 of 4 who is experienced with interdisciplinary team projects. The mode of response for these questions is 5.00, and it produced a mean of 4.75.

The data table for survey Questions 6, 7, 8, and 9 indicate that the frequency profile is skewed in the positive direction with 2 of the 4 respondents who are very experienced, and the other 2 of the 4 respondents who have experience with technology in interdisciplinary projects, with the use of rubrics, and with online sources for interdisciplinary learning units. The mean for survey Questions 6, 7, 8, and 9 is 4.50 and the bimodal results are 4 and 5.

The second page of the survey concerned the confidence level of the respondents utilizing interdisciplinary teaching units and implementing interdisciplinary teaching units while functioning within a team structure. The data chart is exhibited in Table 2.

Table 2

Confidence of Respondents Concerning Team Interaction with Interdisciplinary Learning – Cycle IV ($N = 4$)

	Strongly Agree (5)	Agree (4)	Not Sure (3)	Disagree (2)	Strongly Disagree (1)
10. I am confident teaching inter-disciplinary learning units.	2	2	0	0	0
Frequency 4					
Mean 4.50					
Modes 4 and 5					
11. The teaching team exhibited leadership with the cross-curricular project.	2	2	0	0	0
Frequency 4					
Mean 4.50					
Modes 4 and 5					

Table 2 (Continued)

12. The team collaborated effectively on the interdisciplinary learning unit. Frequency 4 Mean 4.50 Modes 4 and 5	2	2	0	0	0
13. The team coordinator exhibited responsible leadership skills. Frequency 4 Mean 4.25 Mode 5	2	1	1	0	0
14. The team coordinator facilitated a climate of trust among the team members. Frequency 4 Mean 4.50 Modes 4 and 5	2	2	0	0	0
15. The team coordinator facilitated a climate of respect among the team members. Frequency 4 Mean 4.50 Modes 4 and 5	2	2	0	0	0
16. The team coordinator exhibited a reflective and thoughtful process with the interdisciplinary project. Frequency 4 Mean 4.50 Modes 4 and 5	2	2	0	0	0
17. The team coordinator communicated a clear vision of the team project. Frequency 4 Mean 4.25 Mode 5	2	1	1	0	0
18. The team coordinator gathered input on the goals of the team project. Frequency 4 Mean 4.50 Modes 4 and 5	2	2	0	0	0
19. The team coordinator clearly implemented changes in organizing the team project. Frequency 4 Mean 4.25 Mode 5	2	1	1	0	0
20. The team coordinator was accessible during the stages of implementing the team interdisciplinary project. Frequency 4 Mean 4.50 Modes 4 and 5	2	2	0	0	0

A visual view of Table 2 and examination of the statistics indicates that regarding the confidence levels of respondents concerning team interaction with interdisciplinary learning, Question 10 is skewed in the positive direction with 2 of the 4 respondents who strongly agree, and the remaining 2 of the 4 respondents who agree that they are confident teaching interdisciplinary learning units. The bimodal response for this question is 4 and 5, and it produced a mean of 4.50.

Questions 11 and 12, which focused on the interaction among team members, are also positively skewed with 2 of the 4 respondents who strongly agree and the remaining 2 of the 4 respondents who agree that the team functioned with leadership and collaboration. Questions 13 through 20 focused on the leadership role of the researcher in leading the team interdisciplinary project. Questions 14, 15, 16, 18, and 20 demonstrated identical statistics with means of 4.50 and bimodal results of 4 and 5. Question 14 concerned whether a climate of trust was facilitated by the researcher and Question 15 ascertained whether a climate of respect permeated the project planning. Question 16 queried if the researcher as team coordinator exhibited a reflective and thoughtful process, while Question18 determined whether the researcher gathered input on the goals of the team project. Additionally, Question 20 regarded the accessibility of the researcher during the stages of implementing the team interdisciplinary project. The results of these five questions indicated a positive skew with half of the respondents strongly agreeing, and the other half agreeing that the research as leader and coordinator of the project created a trusting, respectful, and reflective process, gathered input on the project goals, and was accessible during the various stages of project implementation. There is a positive skew in Questions 13, 17, and 19 regarding the leadership responsibility of the

researcher as coordinator and communicator of the project vision, as well as the capacity of the researcher-leader to implement changes in organizing the team project with 2 of the 4 respondents who strongly agree and 1 of the 4 respondents who agree that the researcher exhibited responsible leadership, communicating the project's vision and implementing organizational project changes. The resulting percent of the two positively skewed scales is 75%. One of the 4 respondents was not sure regarding the responsible leadership skills of the researcher as coordinating leader and communicator of the project vision, or of the implementation of changes in organizing the team project. The mode of response for these questions is 5, and they produced a mean of 4.25.

The data for open-ended Question 21 indicated a response rate of 100% representing 4 respondents to the request to explain, "What changes occurred on the team during the planning and implementation of the technology-integrated interdisciplinary learning project? If appropriate, write 'none'." The responses included reference to the teaching of interdisciplinary learning units and the impact of the team on the planning process, as well as the leadership role of the team project coordinator.

In response to open-ended Question 21, the data revealed that 3 respondents listed positive components, such as planning discussions as a desirable component of the planning strategy, while one respondent indicated that there was no change to the team structure. One respondent representing 1 member of the team discussed the flexibility of time frames and the incorporation of product and presentation differentiation and scheduling flexibility to meet student needs.

Discussion for Cycle IV Survey

The first part of the survey instrument questionnaire concerned team computer access and frequency of use and addressed Research Question 2 regarding team technology competencies to support and enrich cross-curricular instruction. All team members used their computers daily at home, and all respondents used their computer at home and at school every day. All team members were very experienced or experienced using technology and online sources for interdisciplinary projects reflecting Research Question 2 explained above. Additionally, all 4 respondents had experience with team projects and interdisciplinary team projects utilizing rubrics, which addressed Research Question 1 regarding the instructional ways that a grade 8 team could structure a technology-based student inquiry-based learning unit. Also, the survey indicated that all of the team members agree or strongly agree that they are currently confident teaching interdisciplinary learning units, which again references Research Question 1.

According to the survey, all 4 members of the team members agree or strongly agree that they are currently confident teaching interdisciplinary learning units and that the team demonstrated leadership and collaborated effectively. This corresponds with Research Question 3 regarding how a media-rich integrated curricular student learning project impacts the teaching team. Three-quarters of the team members strongly agreed or agreed that the researcher as leader and coordinator of the project clearly implemented changes in organizing the team project, while one-quarter of the team was not sure of this, which addressed all three research questions. Additionally, all of the team members strongly agreed or agreed positively regarding the capacity of the researcher as leader and project coordinator to gather team input on the goals and to be continually accessible

during the team's implementation of the student learning project unit, referencing all of the three research questions posed at the beginning of the study and delineated above. Finally, the role of the researcher as leader and coordinator of the project within a team structure reflects upon how the researcher's leadership positively affected the project and conversely, how the project positively affected the researcher's leadership.

The data from open-ended Question 21 regarding the changes, if any, which occurred on the team during the planning and implementation of the technology-integrated interdisciplinary learning project, addressed Research Question 3. If appropriate, respondents could have responded, "none." This yielded a 100% response rate with one respondent indicating "none" for changes on the team during the planning and implementation of the team project. Three of the four respondents cited positive changes, such as "discussions regarding the focus and topics of the projects, ongoing planning, effective team functioning, ability to give input on technology implementation, instructional differentiation to meet student needs, and flexibility of time frames."

Quantitative Findings and Discussion: Cycle V

Cycle V quantitative findings. The following school year, the pilot interdisciplinary project of the preceding year was refined and implemented as a student Web Quest. There were personnel changes on the team from the preceding pilot year. Upon conclusion of the team implemented project, the survey was distributed to the grade 8 teaching team. The respondents were asked the same 21 survey questions as the preceding pilot year, which reflected the research questions of this study. Research question one, "In what instructional ways can a grade 8 team interdisciplinary project be structured to assist student inquiry-based learning?" was addressed via survey questions

4, 5, 7, 8, 10, 18, 19, and 20. Research question two, "How will technology integration support and enrich the cross-curricular instructional project?" was addressed with survey questions 1, 2, 3, 6, 9, 18, 19, and 20. The third survey question, "How does a media-rich integrated curricular student learning project impact the teaching team?" was addressed by survey questions 11, 12, 18, 19, 20, and 21.

The identical survey questionnaire was segmented into three distinct sections. The first section consisted of an informational page of three questions to gather general information about the respondents' computer access, use, and experience. The first question was intended to ascertain whether or not the respondents had access to a home computer. The second question asked how frequently the respondents accessed their home computer. The third question asked how frequently the respondents accessed their computer at school. The results of Question 1, Question 2, and Question 3 indicated that 100% of the respondents (N=4) with a mean and mode of 5 had access to a home computer and that they used their home and school computer on a daily basis. It is important to note here again that daily access to a school and home computer underpins the viability of the study. There would be limitations in replicating the results where school staff members have limited computer access at home and at work. This will be discussed further in the limitations segment of the research analysis.

The second section of the survey consisted of a table of questions regarding staff experience concerning their experience implementing a grade level technology integrated interdisciplinary project with rubrics. The frequencies, mode, and means, are presented in Table 3.

Table 3

Experience of Respondents with Technology Interdisciplinary Projects - Cycle V ($N = 4$)

	Very Experienced (5)	Experienced (4)	Not Sure (3)	Inexperienced (2)	Very Inexperienced (1)
4. I have experience with team projects. Frequency 4 Mean 4.75 Mode 5	3	1	0	0	0
5. I have experience with interdisciplinary team projects Frequency 4 Mean 4.75 Mode 5	3	1	0	0	0
6. I have experience using technology with interdisciplinary projects. Frequency 4 Mean 4.25 Modes 4	1	3	0	0	0
7. I have experience using rubrics. Frequency 4 Mean 4.75 Modes 5	3	1	0	0	0
8. I have experience using rubrics with interdisciplinary projects. Frequency 4 Mean 4.50 Modes 4 & 5	2	2	0	0	0
9. I have experience using online sources for interdisciplinary projects. Frequency 4 Mean 4.75 Modes 5	3	1	0	0	0

It can be seen from the table for survey Questions 4 and 5 that the frequency profile is skewed in the positive direction with 3 of all 4 respondents who are very experienced with team projects and 1 who is experienced with interdisciplinary team projects. The mode of response for these questions is 5, and it produced a mean of 4.75.

The data table for survey Questions 6 is skewed in the positive direction with three of the respondents indicating that they are experienced with technology in interdisciplinary projects, while 1 respondent who answered very experienced with technology in interdisciplinary projects. The mode of the response was 4 and the mean was 4.25. Questions 7 and 9 indicated that the frequency profile is skewed in the positive direction with 3 of the 4 respondents who are very experienced and 1 of the 4 respondents who has experience with the use of rubrics and with online sources for interdisciplinary learning units. The mean for survey Questions 7 and 9 is 4.75 with a mode of 5. Question 8 produced a positively skewed result with 2 of the 4 respondents indicating that they are very experienced and 2 who are experienced with the use of rubrics for interdisciplinary learning units.

The second page of the survey concerned the confidence level of the respondents utilizing interdisciplinary teaching units and implementing interdisciplinary teaching units while functioning within a team structure. The data chart is exhibited in Table 4.

Table 4

Confidence of Respondents Concerning Team Interaction with Interdisciplinary Learning – Cycle V ($N = 4$)

	Strongly Agree (5)	Agree (4)	Not Sure (3)	Disagree (2)	Strongly Disagree (1)
10. I am confident teaching interdisciplinary learning units.	4	0	0	0	0
Frequency 4					
Mean 4.50					
Modes 4.00 and 5.00					
11. The teaching team exhibited leadership with the cross-curricular project.	4	0	0	0	0
Frequency 4					
Mean 4.50					
Modes 4 and 5					
12. The team collaborated effectively on the interdisciplinary learning unit.	4	0	0	0	0
Frequency 4					
Mean 4.50					
Modes 4 and 5					
13. The team coordinator exhibited responsible leadership skills.	4	0	0	0	0
Frequency 4					
Mean 4.25					
Mode 5					
14. The team coordinator facilitated a climate of trust among the team members.	4	0	0	0	0
Frequency 4					
Mean 4.50					
Modes 4 and 5					
15. The team coordinator facilitated a climate of respect among the team members.	4	0	0	0	0
Frequency 4					
Mean 5.00					
Mode 5					

Table 4 (Continued)

16. The team coordinator exhibited a reflective and thoughtful process with the interdisciplinary project. Frequency 4 Mean 5.00 Mode 5	4	0	0	0	0
17. The team coordinator communicated a clear vision of the team project. Frequency 4 Mean 5.00 Mode 5	4	0	0	0	0
18. The team coordinator gathered input on the goals of the team project. Frequency 4 Mean 5.00 Mode 5	4	0	0	0	0
19. The team coordinator clearly implemented changes in organizing the team project. Frequency 4 Mean 5.00 Mode 5	4	0	0	0	0
	4	0	0	0	0

A visual view of Table 4 and examination of the statistics indicates that regarding the confidence levels of respondents concerning team interaction with interdisciplinary learning, Questions 10 through 20 produced positively skewed results with identical modes of 5 and identical means of 5.0, and with all 4 respondents who strongly agree that they are confident teaching interdisciplinary learning units. Questions 11 and 12, which focused on the interaction among team members, achieved the same results, with all respondents strongly agreeing that the team functioned with leadership and collaboration.

Questions 13 through 20 focused on the leadership role of the researcher in leading the team interdisciplinary project. Questions 14, 15, 16, 18, and 20 demonstrated identical statistics. Question 14 concerned whether a climate of trust was facilitated by the researcher, and Question 15 ascertained whether a climate of respect permeated the project planning. Question 16 queried if the researcher, as team coordinator, exhibited a reflective and thoughtful process, while Question18 determined whether the researcher gathered input on the goals of the team project. Additionally, Question 20 regarded the accessibility of the researcher during the stages of implementing the team interdisciplinary project. The results of these five questions indicated that all respondents strongly agreed that the researcher, as leader and coordinator of the project, created a trusting, respectful, and reflective process, gathered input on the project goals, and was accessible during the various stages of project implementation. There is a positive skew in Questions 13, 17, and 19 regarding the leadership responsibility of the researcher as coordinator and communicator of the project vision, as well as the capacity of the researcher-leader to implement changes in organizing the team project, with all 4 respondents who strongly agree that the researcher exhibited responsible leadership, communicated the project's vision, and implemented organizational project changes.

The data for open-ended Question 21 indicated a response rate of 100% representing four respondents to the request to explain, "What changes occurred on the team during the planning and implementation of the technology-integrated interdisciplinary learning project? If appropriate, write 'none'." In response to open-ended Question 21, the data revealed that all 4 respondents listed positive components,

such as flexible scheduling and locations, debriefing meetings, differentiated materials and the use of rubrics.

Discussion for Cycle V Survey

The first part of the survey instrument questionnaire concerned team computer access and frequency of use and addressed Research Question 2 regarding team technology competencies to support and enrich cross-curricular instruction. Although there were personnel changes on the grade 8 team, all team members used their computers daily at home, and all respondents used their computer at home and at school every day. All team members were very experienced or experienced using technology and online sources for interdisciplinary projects reflecting Research Question 2 explained above. Additionally, all 4 respondents had experience with team projects and interdisciplinary team projects utilizing rubrics, which addressed Research Question 1 regarding the instructional ways that a grade 8 team could structure a technology-based student inquiry-based learning unit. Also, the survey indicated that all 4 members of the team members strongly agree that they are currently confident teaching interdisciplinary learning units, which again references Research Question 1.

According to the survey, all (N=4) of the team members strongly agreed that they are currently confident teaching interdisciplinary learning units and that the team demonstrated leadership and collaborated effectively. This corresponds with Research Question 3 regarding how a media-rich integrated curricular student learning project impacts the teaching team. All respondents strongly agreed that the researcher as leader and coordinator of the project clearly implemented changes in organizing the team project, which addressed all three research questions. Additionally, all of the team

members strongly agreed positively regarding the capacity of the researcher as leader and project coordinator to gather team input on the goals and to be continually accessible during the team's implementation of the student learning project unit, referencing all of the three research questions posed at the beginning of the study and delineated above. Finally, the role of the researcher as leader and coordinator of the project within a team structure reflects upon how the researcher's leadership affected the project and conversely, how the project affected the researcher's leadership.

The data from open-ended Question 21 regarding the changes, if any, which occurred on the team during the planning and implementation of the technology-integrated interdisciplinary learning project, addressed Research Question 3. If appropriate, respondents could have responded "none." This yielded a 100% response rate with all respondents (N = 4) indicating positive changes on the team during the planning and implementation of the Cycle V team project. The responses included references to the "flexibility" in scheduling, grouping, location, and instruction. The "debriefing" caucus following student presentations was cited, and the use of "rubrics and differentiated materials" was noted.

Quantitative Comparison of Cycle IV and Cycle V Surveys

The findings of the study in Cycles IV and V closely mirror each other. Despite the personnel changes in the grade 8 teaching staff, in both the pilot school year in which the interdisciplinary technology-based Web Quest was launched, and the succeeding year in which the project was modified, improved, and expanded with a view toward yearly curricular implementation (Schein, 2004), all team teachers had access to computers and used them daily, which facilitated technology integration. In both Cycles IV and V, the

teachers were experienced or very experienced with team technology-rich cross-curricular projects using rubrics. In both school years, the teaching teams were confident or very confident that the team demonstrated leadership and collaborated effectively. The major difference between the Cycle IV and Cycle V projects appeared in the researcher's ability to coordinate the project. While the Cycle IV results were predominantly positive in the researcher's leadership role to gather team input on the goals and to be continually accessible during the team's implementation of the student learning project unit, the Cycle V responses were unanimous in strongly agreeing that the researcher as leader and coordinator of the project created a trusting, respectful, and reflective process, gathered input on the project goals, and was accessible during the various stages of project implementation. This addressed all of the three research questions posed at the beginning of the study. The open-ended Question 21 responses were 75% positive during Cycle IV, but 100% positive during Cycle V and indicated flexibility, team discussions, and de-briefing sessions, which augmented the Cycle V student learning project within a strong team structure. Again the responses reflected upon how the researcher's leadership affected the project and conversely, how the project affected the researcher's leadership from the pilot year to the implementation of the curricular unit.

Quantitative Discussion of Cycle IV and Cycle V Surveys

Based on the findings of the 21 questions of the survey questionnaire instrument, some observations regarding teacher perceptions of integrating technology into interdisciplinary curriculum appeared to evolve. Considering that the respondents in this study are predominately experienced computer users with daily access to a home and school computer, the study indicated that based on grade 8 team faculty perceptions,

planning an interdisciplinary project using scheduling, location, and grouping flexibility, rubrics, differentiated instruction, and student input and choice, in addition to technology integration supports and enriches cross-curricular instruction. The creation, formulation, implementation, and evaluation of a media-rich curricular student learning project appears to positively impact the team teaching structure as a learning community.

Qualitative Results

Qualitative findings. In analyzing the data regarding the study's three research questions, there appears to be a learning correlation among the core disciplines at the eighth grade level. The coding of interviews, observations, relevant documents, and research of the literature appears to indicate that project-based learning is intertwined with positive cognitive processes and that the implementation of technology is similarly intertwined in both an analytical and creative context within the structure of project-based learning (Baron, 2010), addressing Research Question 1, which asks, "What instructional ways can a grade 8 team interdisciplinary project be structured to assist student inquiry-based learning?" and Research Question 2 regarding team technology competencies to support and enrich cross-curricular instruction. There is a recursive process in project-based structured learning that students can transfer into all core disciplines, benefiting both regular education students and those with special needs. In the coding of the observations and interviews, the need for information literacy was a recurrent theme, indicating the correlation among all subject areas, referencing Research Question 2 on technology's function in enhancing instruction. For Research Question 3 regarding the impact of a media-rich student learning project on the teaching team, the process whereby a team of teachers recognize the need for a cross-curricular approach appears to be confirmed in the

qualitative research data and in the literature, most notably in the New Jersey Core Content Technology Standards' recommendations on fostering literacy in the classroom. Indeed, high-stakes testing, which incorporates open-ended questions requiring students to thoroughly delineate their explanation in an analytical conclusion, has spurred an interest in fostering project-based learning across the curriculum (Baron, 2010). As a grade 8 team teacher noted

> I feel that the interdisciplinary model is actually a wonderful implementation of getting different ideas from a different student, and wherever their interest lies, they can actually go forward with that and implement their product with their classmates and their project in that particular area. (J. C., personal communication, December 12, 2009)

It was ascertained that students were able to develop and use critical thinking skills to solve national and global problems, and with assistance, they were able to research, analyze, and describe solutions with their self-selected topics. The project introduction is Appendix C. These findings relate to Research Question 1 regarding the instructional ways that a grade 8 team could structure a student inquiry-based learning unit.

In the document analysis, assessing a special education teacher's lesson plans revealed her strategies to help her students complete the interdisciplinary project, reflecting Research Question 1. Similarly, in the artifacts that were collected and analyzed, there were teacher and student-generated graphic organizers that were used to facilitate research for both regular and special needs students. In an interview with a special education teacher, she discussed the correlation among the disciplines, and she explained her classroom methods and practices to assist her special needs students regarding "how to write" in a collaborative setting, as well as in her pull-out-support classroom. In another observation, she discussed her methods of "researching within the disciplines" using spreadsheets,

notes, open-ended discussions, rubrics, (Whittaker, Salend, & Duhaney, 2001) and subsequent technological research and analysis, which relates to Research Question 2 regarding how technology integration might support interdisciplinary learning.

In a further review of the documentation, the data included an analysis of a special education teacher's lesson plans, which revealed her strategies to help her students write for academic classes referencing Research Question 1. These resource lessons were linked to inclusion classes (Whittaker et al., 2001). Similarly, in the artifacts analyzed in the study, student-generated graphic organizers using technology (Wenglinsky, 2005) were employed to learn content area vocabulary and the connectivity among the core academic disciplines, aligning with Research Question 2. In an interview conducted with the team of grade level teachers, they discussed their methods including journals, open-ended discussions, research, rubrics, and writing activities on lab data analysis. In an overall synthesis of the data resulting from observations and interviews, almost every teacher concurred that cross-curricular literacy was crucial for students to be able to communicate their learning verbally in presentation format and in written expression, relating to Research Question 3 regarding the impact of inquiry-based learning on the teaching team.

An additional theme concurrent with Research Question 3 which emerged from an analysis of the coded data also revealed the need for a team-based approach (Collins, 2001), at least for the core content subjects, and that cross-curricular student learning experiences need to be implemented thoughtfully and reflectively. There is a need to focus on learning as a process, which should supersede the need to create a hollow, superficial product. Process is more important than the end result because learning is a

journey. Students in the middle school grades need to see how the process of learning in all core content classes affords them a road map to knowledge at all levels and with all learning styles and abilities.

In an analysis of grade 8 team procedures for Research Question 3, it was suggested that a team approach facilitated a cross-curricular approach to conceptual learning, albeit with some student difficulties. A teacher expressed her thoughts by stating,

> Sometimes it is the transfer from one class to another, the application of certain processes whether it is in language arts or language literacy to science, or the math connection to science, students do have some difficulty in transferring the skills that they've learned in those classes into other classes. (G. C., personal communication, December 12, 2009)

A team approach (Senge, 2006) enables the teaching staff to be knowledgeable about the interdisciplinary foci of student learning. Relating to Research Question 1, the teacher further stated,

> We do share rubrics; we do share different processes and things that work in other classes so with that in mind it does help. And the students are then familiar with what to expect. So if I give them their lab report to write up, there is a rubric that goes hand in hand with that and there is a follow through with language arts to science. (G. C., personal communication, December 12, 2009)

Regarding a cross curricular approach, an analysis of the interviews, observations, and documents of a special education teacher appeared to reveal that special needs students benefit from a team approach (Kegan & Lahey, 2001) to learning, mirroring Research Question 1, 2, and 3. In an interview with her, she was asked what advice she would give to a teacher to help that teacher to improve literacy, and she stated that,

> That they should remind students that they have a lot of these strategies already and that the teachers work as a team, as a collaborative team to encourage cross-curricular discipline. And that what they're learning in all of the course subject

> areas for the New Jersey Core Content Standards are intertwined with each other. (J. C. , personal communication, December 12, 2009)

The analysis of other observations and interviews reflected similar views regarding the potential efficacy of differentiated student learning with a team approach (Stowell & Mead, 2007) to benefit all students, which corroborates with Research Question 3 regarding the benefits of a team approach.

Qualitative Discussion

During the middle school years, students are beginning to transfer their understanding of the world from a concrete-based environment to a more abstract and analytical framework. They need to operate comfortably within this educationally challenging environment. They are learning the processes of evaluating, assessing, and examining concepts. They investigate content to make larger connections among all aspects of learning. This can prove to be problematic if they are not helped to understand the transfer of knowledge across disciplinary lines. They may be overwhelmed if they have experienced learning as a disconnected set of discrete bits of information and facts. The humanities-based classes may appear to "speak" a different language from the quantitatively-based content of the math and science subjects; however, the research data appeared to indicate that there is a definite transfer of learning between and among the disciplines when their content is cross-referenced and concepts are connected, particularly between the sequential steps of the analytical research process (Campbell & Fulton, 2003), addressing all of the study's research questions. Students are helped to see that math is the language of science, social studies is founded upon research, and English is also a language with similar structure, processes, and complexity.

Discussion of Qualitative and Quantitative Data

At the middle school level, students are aided in the organization of information from numerous approaches aligned and differentiated with their learning styles. They should be helped to see that communication, which may originate in language arts, is indispensable to communicate in other subjects (Tierney & Dorroh, 2004). According to the participants included in this research study and addressing Research Question 3, it appears that the best way to achieve this goal is to use a solid, functional teaching team approach.

The original purpose of the qualitative research via the three research questions was an attempt to study the potential correlation among core subject areas and the effective integration of technology to enrich the learning process and its impact on a grade 8 teaching team. It appears that, based on coding the copious data, including interviews, observations, documents, and artifacts, the analysis substantiated that the team of teachers feel there is a positive aspect to a cross-curricular approach in the core disciplines. The study concentrated on the eighth grade level to narrow the focus, because using all of the middle school grades involved too large a database. From the cumulative data gathered, the multi-discipline approach appears to help students to understand how various processes of research are inextricably intertwined in the evolution of the analytical process. The data were decidedly informative and positive, even with careful attempts by the researcher to keep an unbiased database. Technological investigation and communication are integrated processes and are interrelated, and instruction in all academic classes can be reciprocal

aspects of the learning process, addressing Research Question 2 on the impact of technology in inquiry-based learning (Baron, 2010).

Since the school has a team-based focus, interdisciplinary activities and on-going articulation and communication (Kegan & Lahey, 2001) foster the environment for cross-curricular learning; therefore, it is possible in that team environment for every student, including regular and special education, to benefit from a team-based effort focusing on information literacy in cross-curricular learning.

The qualitative and quantitative findings of the study confirmed much of what the review of the literature uncovered regarding the need to implement and promote technology and inquiry-based learning. This extrapolates to all disciplines within a teaching team approach to interrelate and connect learning. There is a need to approach learning holistically and recursively, while honoring and reinforcing processes and procedures from all disciplines (Douglas, 2006). Internet research and investigation and communication as an integrated process are interrelated, and the investigation indicted how various subject areas can be reciprocal aspects of the learning process (Gilbert & Kotelmen, 2005). The study also appears to confirm that there are numerous best practices for implementing efficient methods of incorporating research and writing via a cross-curricular understanding of how the steps of the research process mirror those of the communication process (Klentschy, 2008).

Team-based instruction (Lencioni, 2002) can enrich and enhance conceptual learning and the transfer of concepts and procedures across disciplines. Establishing emotionally intelligent (Goleman et al., 2002) teaching teams is a decidedly worthwhile venture. Interdisciplinary learning offers connectivity to the learning process with the

potential to improve both teaching and learning. It also affords students the opportunity to organize, conceptualize, and experience learning as a holistic process that is recursive and continual throughout their educational experiences and beyond.

Chapter V

Conclusions and Recommendations

Introduction

The inquiry-based model used to deliver instruction technologically as part of district practices is a decidedly worthwhile venture. The purpose of this study was to explore effective technology implementation in interdisciplinary activities in a grade 8 middle school team-based setting. Computer-based interdisciplinary learning offers instructional continuity with the potential to improve district student performance, to provide equitable access to online learning, and to foster cooperation and cohesion of faculty teams (Stowell & Mead, 2007) into learning communities. It also affords the opportunity to organize, prioritize, and validate crucial technology implementation.

Technology Concerns

Integrating technology, however, is not accomplished without numerous difficulties. The team debriefings after completing the student Web Quest in Cycles IV and V indicated that there were many improvements that needed to be implemented into the next year's cross-curricular student project, such as reframing student presentations to eliminate student lack of concentration during presentations, band-with capacity shortfalls, lack of functional computers, and problems arising from grouping structures. The team indicated that there was also a need to provide improved access to computers with additional virtual learning tools. The team teachers appeared willing to improve their subject-area components (Fullan, 2001), and to thereby improve the overall grade

level project by creating additional strategies to enhance instructional practices in media-rich student learning units. They also cited possible expanded computer teaching tools to investigate how to improve mobility along with practices and instruction.

Qualitative Conclusion

Based on the findings of the qualitative study, some observations regarding best practices of the correlation between technology and project-based learning appeared to evolve. Considering that the participants in this study were predominately experienced teachers, the study indicated that, based on their perceptions, there seems to be a definite correlation between effective student project-based learning and technology integration (Watson, 2001), coupled with the numerous cross-currents that link all disciplines. This is a confirmation of and an alignment with the three stated research questions. The teachers additionally indicated that there is a definite need for continued efforts toward technology literacy due to the high-stakes state testing mandate that incorporates open-ended questions in all sections of standardized tests. This is also documented in the current NJCCCS (NJDOE, 2009) literature and recommendations. All team teachers indicated that there is also a need to provide ongoing professional development to improve information literacy and offered practical applications to achieve it. The majority of team members appeared willing to improve their literacy teaching skills to gain the training and confidence to explore further project-based opportunities in their respective classes. It also appeared that the team of teachers (Collins, 2001) already understood the need to increase computer literacy, because they already used a myriad of strategies to improve and increase computer access in their classrooms through the use of word processing,

technology lessons for experimentation, and through their use of electronic rubrics and graphic organizers, which are used and shared among all classes.

Quantitative Conclusion

Based on the findings of the 21 questions of the survey questionnaire instrument, some observations regarding teacher perceptions of technology infused inquiry-based learning appeared to evolve. Considering that the respondents in this study are predominantly experienced computer users with virtually daily access to a home computer, the study indicated that based on faculty team's perceptions, current computer usage is capable of being expanded to include additional cross-curricular learning when needed and/or appropriate. The faculty indicated that there might be a need to provide professional development to improve familiarity with more advanced cross-curricular instruction.

Conclusion Summary

The researcher has been using technology as an instructional tool for more than two decades. As the only grade 8 language arts teacher, together with the collaborative special education teacher, the grade 8 students have always achieved higher than 90% on the state standardized language arts test in both the former New Jersey Grade Eight Proficiency Assessment (GEPA) and the current New Jersey Assessment of Skills and Knowledge (NJASK) achievement tests. During the Cycle IV student Web Quest pilot of this study, the grade 8 students (N = 68) achieved a 95.9% on the language arts section of the NJASK, which represented a 5.5% Annual Yearly Progress (AYP) benchmark from their prior year's cohort results. This yearly data, albeit anecdotal, could indicate that the basic skills needed to pass mandated state tests could be more efficiently and engagingly

taught within the context of reflective technology implementation and a project-based instructional approach (Moses, 2009), which the results of this study posits.

Recommendations

The following recommendations are offered to policy makers and government officials, administrators and boards of education, and faculty regarding future inquiry-based technology integration and professional development planning.

Policy makers and government officials. It is unconscionable to teach modern curricula with outmoded methodology. Reviewing the research on best practices of improving student achievement via integrative technology and inquiry-based instruction mitigates the potential for not only district litigious concerns, but also for the ethical need to enhance and enrich the learning of all children across America. In a negative economic climate, funding cuts should not negatively impact district technology initiatives (Darling-Hammond, 2010). Government officials and educators must keep pace with students who "live in a digital world" (Walker, 2009). Lesson planning with technology integration is a challenge rather than a series of leadership hurdles to be overcome, and educators need to keep pace with best practices to improve teaching and learning (Shelly et al., 2002).

It is evident that the instructional technology explosion is ubiquitous, and state and district funding needs to be maintained and apportioned to verify that equitable student access is at the forefront of e-learning (Erickson & Tomlinson, 2006). Teachers will decidedly never be replaced by technology, but they can utilize it as a valuable tool, which can reinforce and enrich the learning environment, and thereby enable the students to become more independent, self-reliant, and self-directed learners. In a modern and

rapidly changing world, the computer allows students and teachers to keep pace with change. It also enables them to monitor their learning, and the Internet allows a global glimpse into the world beyond the classroom and community. It must also be acknowledged that not all students have home access, and cutting technology access at school victimizes the most vulnerable students. Without school access they have no access; this is unethical and a testament to the failure of schools to help them (Gewertz, 2005).

School administration and boards of education. There is a decided need to increase student access to technology to enable them to become global citizens (Bolch, 2008). District leaders should sample and/or survey the student body to determine their access to home computers and familiarity with virtual learning tools. Budgets must continue to provide funds not only for teacher technology training and support, but also for upgrading computer equipment. If it is not functional, it cannot possibly be used effectively for classroom instruction. Leaders should attempt to keep district equipment in excellent and current condition, perhaps by employing full-time technology technicians who can provide on-site technical support, and who can troubleshoot problems as they occur. Administrators need to investigate innovative upgrades to current hardware, such as wireless classrooms, laptops, Smart Boards, and distance communication devices, include technology integration into various district curricula, and provide the time and funding for academic teams to create project-based learning units. Despite economic cutbacks, it is important to increase faculty access to electronic audio and video teaching options, and to provide the time and funding for professional development and support for using and improving email, shared email, website posting,

chat rooms, and other distance learning tools. It is imperative to positively assume that staff is technologically competent (Goleman et al., 2002), and to assist them to demonstrate their expertise, possibly as mentor teachers. District leaders should not assume that mature teachers lack the capacity (Evans, 1996) to embrace technology; rather, extend a respectful and supportive hand, recognizing that their expertise and experience, together with the efficacy of technology, is a winning situation for all levels of faculty experience and competence. This could possibly indicate that there is fertile ground for a mentorship program pairing experienced with inexperienced staff to broaden exposure to more sophisticated technology-rich instructional methodology. Keep current with policy issues, and enlist the aid of community members and local corporations in district technology plans and projects is also desirable.

Classroom teachers and grade-level teaching teams. Incorporate computer technology into future lessons to enhance teacher and student learning and experiential skills. Incorporate electronic learning into daily lessons slowly, meaningfully, and reflectively in the classroom because students and staff need the time to transition from a traditional environment to computer-based activities (Symonds, 2000). Investigate on-line texts, Web Quests, and other electronic tools to enhance and augment middle school class content. Publicize and/or update on the school website which electronic learning is used and has been accomplished in the classroom to enlighten and inform parents, administration, and fellow educators. Attempt to function as a technology-oriented team learning community. Foster a team and/or Professional Learning Community approach (Bolman & Deal, 2003) in the school and strive to make it a functional team/community. Work collaboratively with teachers who may lack computer skills and who appear

reluctant to embrace technology, because it may be simply a fear of the unknown that keeps them from changing. A supportive and emotionally intelligent colleague may be the key to their successful venturing into uncharted technology territory. Respect and trust is the key to change (Fullan, 2001), which benefits not only fellow staff, but also all of the students. When using computer tools and emerging technology in current and future lessons, respect the strengths and prior knowledge of fellow staff and students (Evans, 1996), especially their technological expertise.

Implications for Future Research

Replicate the action research done with grade 8 students in other grade levels. Replicate the action research done with grade 8 students in all disciplines including related arts (Bernard, 2009). Research procedures for implementing project-based learning into numerous district activities and curricula. Investigate the perceptions of students regarding project-based learning and technology integration both qualitatively and quantitatively. Investigate ways of increasing technology hardware with minimal or no cost, such as grants and donations. Investigate cheaper and more mobile technology and its practicality within the current budget crisis. Research methodology to value and support global education (Bolch, 2008).

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Appendix A

Survey Questionnaire

Integration of Technology in Interdisciplinary Curriculum Survey

This anonymous survey is intended to gather information regarding the effect of integrating a technology-rich interdisciplinary curricular learning project on a grade level teaching team. While you are not required to participate in the study, your participation would be greatly appreciated. All surveys are anonymous; therefore, your name will NOT be included in any way. Please be advised that your completion of this survey represents your informed consent to participate.

Information Page #1 – Please mark the appropriate box. *This page will gather information about your computer experience.*

	Yes	No
1. I have access to a computer at home.		

Please mark the appropriate box below with a check beneath concerning the time-frame you feel that you spend using a computer.

	Every Day	A Few Times per Week	Two or Three Times per Month	Never
2. I use my computer at home.				
3. I use my computer at school.				

Please mark the appropriate box below with a check concerning your experience implementing a grade level technology integrated interdisciplinary project.

	Very Experienced	Experienced	Not Sure	Inexperienced	Very Inexperienced
4. I have experience with team projects.					
5. I have experience with interdisciplinary team projects.					
6. I have experience using technology with interdisciplinary projects.					
7. I have experience using rubrics.					
8. I have experience					

using rubrics with interdisciplinary projects.					
9. I have experience using online sources for interdisciplinary projects					

Interdisciplinary Curriculum Survey Page #2 - Please mark the appropriate box.

The following items provide important information regarding your perceptions concerning the team interdisciplinary technology project.

Please mark the appropriate box below concerning the team interaction with interdisciplinary learning.

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
10. I am confident teaching interdisciplinary learning units.					
11. The teaching team exhibited leadership with the cross-curricular project.					
12. The team collaborated effectively on the interdisciplinary learning unit.					
13. The team coordinator exhibited responsible leadership skills.					
14. The team coordinator facilitated a climate of trust among the team members.					
15. The team coordinator facilitated a climate of respect among the team members.					
16. The team coordinator exhibited a reflective and thoughtful process with the interdisciplinary project.					
17. The team coordinator communicated a clear vision of the team project.					
18. The team coordinator gathered input on the goals of					

the team project.					
19. The team coordinator clearly implemented changes in organizing the team project.					
20. The team coordinator was accessible during the stages of implementing the team interdisciplinary project.					

Please answer the following questions.

The following question provides an opportunity to gather information regarding your understanding of the team process during the interdisciplinary unit.

21. What changes occurred on the team during the planning and implementation of the technology-integrated interdisciplinary learning project? If appropriate, write "none".

Thank you very much for agreeing to participate in this survey. Your information is greatly appreciated.

Appendix B

Interview Question Protocol

Research Topic Proposal Title: A Study of the Integration of Technology in Interdisciplinary Curriculum

Preliminary Comment Content:

First of all thank you for allowing me to conduct this anonymous taped interview with the eighth grade team. Please be assured that your responses will be completely confidential to encourage candid answers. I will code your names as J, G, D, and V to assure anonymity.

Grade Level Team Interview:

I would like to reconstruct some of the content of the initial meetings the team had regarding an interdisciplinary unit at the eighth grade level by asking questions related to the team interdisciplinary project:

1. Why was an interdisciplinary unit suggested as a team project?
2. What were some of the themes suggested for the interdisciplinary team project?
3. What was the final team decision on the theme, and how was it determined?
4. What do you consider as applications to your own disciplines?
5. How will you implement technology into the project in your own eighth grade class?
6. Do you consider cross-disciplinary projects as beneficial to students at the eighth grade level? Please explain your reasons.

Appendix C

Web Quest Introduction

WEB QUEST INTRODUCTION

In the next few days you will be reading and discussing various topics regarding significant progress that has been made throughout history using scientific technology. Research has always been the cornerstone of progress, and you and members of your group will be researching various science topics of your choice. This web quest project is designed to introduce you to the world of scientific discoveries by knowing the background, progress, and possible solutions. You and your partners will analyze, discover, and synthesize scientific topics. Each of the categories will then be related to the theme, "Progress and Scientific Technology" , which you will investigate nationally (Social Studies), globally (all disciplines), and, dependent on your project, possibly cosmically (all disciplines).

"Science and technology have advanced through the contributions of many different people in different cultures at different times in history".
(National Science Educational Standards)

"The digital age has transformed social studies education, allowing 21st-century learners to transcend the limits of time and place and experience historic events virtually. By expanding their learning networks through online collaboration with experts and other students from around the world, New Jersey social studies students develop an increased depth of understanding of our global society. At the same time, their understanding of the fundamental principles and values of American democracy and citizenship provides the conceptual framework that allows them to make informed decisions about local, national, and international issues and challenges."
(Social Studies Education in the 21st Century [New Jersey Core Curriculum Content Standards for Social Studies])

LAL CS3.4: " A diversity of materials provides students with opportunities to grow intellectually,
socially, and emotionally as they consider universal themes, diverse cultures and perspectives,
and the common aspects of human existence."

NJ 21st Century Knowledge and Skills: Technology integration; Interdisciplinary connections; Infusion of global perspectives

Have fun exploring and learning the important progress made in the fields of science, economics, politics, culture, communication, mathematics, and technology!