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Middle School Teachers' Experiences with Cross-Curricular Connections at the Incident Level

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Dr. Linda Crawford, Committee Chairperson, Education Faculty

Dr. Christina Dawson, Committee Member, Education Faculty

Dr. Kurt Schoch, University Reviewer, Education Faculty

Chief Academic Officer

Eric Riedel, Ph.D.

Walden University

2015

Abstract

Middle School Teachers' Experiences with Cross-Curricular Connections

at the Incident Level

by

Melita M. PENCHALK

Ed.S, Kent State University, 1987

MA, John Carroll University, 1975

BA, Marywood College, 1968

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Education

Walden University

November 2015

Abstract

Many curricular innovations, including cross-curricular teaching, are started in schools without adequate teacher preparation and support, reducing the effectiveness of the interventions in supporting student learning. The purpose of this qualitative case study was to describe the implementation of the cross-curricular connections teaching technique in middle schools. Research questions focused on how middle school teachers experienced implementation of cross-curricular teaching at the incident level and how teachers perceived cross-curricular teaching and its long-term value. Myers-Briggs personality type theory informed the study, supporting the postulation that teachers are more comfortable teaching from their personality types. Data from 10 middle school teachers from 3 urban and semirural parochial schools in the northeastern United States were collected through interviews, focus group sessions, journals, and documents such as lesson plans and classroom materials. Open coding was used within progressive and comparative analyses. Primary themes included teacher comfort with cross-curricular connections; various applications of the teaching technique; cross-curricular connections within lessons; time constraints in planning, preparation, and implementation; and creative enhancement of lessons. Recommendations included enhanced professional development, more planning time for teacher teams, and more research about the technique. Positive social change implications include sustaining teachers' adoption and implementation of cross-curricular instruction in support of student achievement.

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Dedication

I dedicate this document to my religious community, the Sisters of the Order of St. Basil the Great, Our Lady of Perpetual Help Province, Uniontown PA, who generously sponsored me throughout the years in this educational endeavor.

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Thank you, one and all, who have helped me in any way through the years, in this educational endeavor. At the risk of leaving someone out I am not naming names but you are known by name to me.

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Chapter 1: Introduction to the Study

Introduction

The focus of this study was the implementation of the cross-curricular teaching technique in the middle school at the incident level and how teachers perceived the use of the cross-curricular teaching technique and its short- and long-term value. The middle school has striven to serve the students most difficult to teach. The middle school concept came into being in the mid-20th century, and educators have attributed it to William Alexander, then chairman of the department of education at Peabody College for Teachers in Nashville, Tennessee (Meyer, 2011). Middle school is the school "between the elementary and the high school" (Meyer, 2011, p. 42). Evidence has shown that Alexander was "reacting to the era's academic scare - Sputnik" with the more mathematics and science curriculum by saying that these middle grade students needed more "exploratory experience" (Meyer, 2011, p. 42) such as drama, journalism, music, and so forth. However, it seemed that by 1995 when a major study, *The Third International Mathematics and Science Study*, was conducted, middle school statistics showed "poor academic performance" (Meyer, 2011, p. 43). Nonetheless, education professionals continued to use the middle school concept.

Background of the Study

Challenges in Middle Schools

In 2007, Rockoff and Lockwood (2010) questioned the conclusions of previous findings in studies of middle schools and set out to provide a more rigorous scientific study that allowed them to track students from New York City schools from Grade 3

through Grade 8. This gave them the option to "rule out the role of other influences other than middle-school attendance on educational outcomes" (p. 69). Rockoff and Lockwood did look at things such as test scores, attendance rates, disadvantaged backgrounds, age of students, and class size. They were unable to find a full explanation to the dip in achievement, but they did note developmental psychologists' findings that adolescents "commonly" (p. 74) showed "signs of negativity, low self-esteem, and the inability to judge risks and consequences" (p. 74), and these factors in concert with large similar age groups may have been a consideration. Their study was quantitative in scope, but their research is of value in discussing the education of students in these grade levels.

Almost at the same time, across the country, researchers from EdSource (Williams, Kirst, and Haertel 2010) and Stanford University conducted a "mega study of 303 middle schools in California" (p. 1), again a quantitative study with findings reported in narrative form. The research question for the EdSource study was as follows: "Why do some middle grades schools clearly outperform others on standards-based tests even though they may serve a similar student population?" (p. 3). It appeared the results of this study were in opposition to the New York City study, but the demographic was very different. The EdSource study's contribution to the education field consists of their documentation of policies and practices in place in California that "have a significant impact on student outcomes regardless of student background" (Williams et al., 2010, p. 3).

The authors agreed this was a "complicated and comprehensive study" (Williams et al., 2010, p. 19), but one of their findings is useful as background to this current study.

One of their findings stated: "teachers with strong competencies, substantive evaluation of their practice, and adequate availability of support, time, and resources work collectively to improve student outcomes school wide and individually to improve instruction" (Williams et al., 2010, p. 13). A correlated implication was that "(w)hen hiring middle school teachers, districts and principals should consider looking for the kinds of interests, skills, and competencies that principals in higher-performing schools report about their teachers." (p. 17).

Meyer (2011) appeared to agree with the results of both these studies, as diverse as they were, and further added that, beginning with about the 2010 school year, the trend in education statistics showed a "definite reconfiguration of stand-alone middle schools" (p. 46) toward "elemiddle" (p. 46) schools, "a new term for K-8 schools" (p. 46). This returned configuration of grades appeared to provide more nurturing care, less violence, and "the academics are at least as good if not better" (p. 46). These recent studies stated implications for future research. The students, however, are still in Grades 5 through 8 and need to be educated to take their place in society.

The Use of the Interdisciplinary Education Teaching Technique

The use of the interdisciplinary education teaching technique with its various components seems to have had some success in the middle school years. Two studies utilizing the interdisciplinary approach in music and science curriculum development illustrated this success. Carrier, Gray, Wiebe, and Teachout (2011) noted in their literature introduction that 21st-century education, in order to meet the needs of the times, should be "more interdisciplinary in nature, including the ability to solve problems and

think creatively"(p. 425). This approach is more in keeping with students' lives outside the classroom. Carrier et al. described "the experiences of a teaching team, two elementary school teachers, a music teacher and a science teacher, as they developed and implemented innovative, interdisciplinary curriculum based on the BioMusic program" (p. 425).

Their research question, which became more focused as Carrier et al.'s (2011) study progressed, was "(h)ow do teachers' newly gained knowledge of BioMusic impact teaching and learning in the classrooms of the music and science teachers?" (p. 427). Issues of "perceptions of their discipline and their partner's discipline" evolved during the study as well as "challenges to the implementation process" (p. 427). A case study method was used that included data collection tools of interviews, observations, and document collection. Data were simultaneously analyzed during collection using a coding technique (p. 427). Results and discussion were presented in narrative form.

Pertinent implications from this study included the following: "(i)nterdisciplinary connections should be more easily implemented in elementary school than middle or high school; high stakes testing has resulted in diluted curricula" (Carrier et al., 2011, p. 432) at all levels; "support is needed from administrators, researchers and parents in the realm of professional development, planning and collaborating" (although BioMusic provided content, materials, feedback, and time for this project, p. 432).

In the second study, illustrating the use of interdisciplinary education, the "idea of music as a memory tool sparked the investigation" (Smolinski, 2011, p. 2). The focus of the study was how to use music in the science classroom. In an elaborate study using

original music for a biology class studying the parts of a cell, soliciting the aid of the choral teacher, along with two other science teachers and students who were not his own, Smolinski (2011) pretested and posttested the students and conducted interviews. The results "suggested that the song served as a learning or study tool and was helpful in terms of test taking, pronouncing terms, learning the cell parts, reducing study time, and making classroom learning easier" (p. 3). Smolinski concluded with the observation that "(t)rying to use music in the science classroom could be outside the comfort zone of many teachers; however, it could also add a new dimension to a classroom and excite students about learning"(pp. 4-5).

Cross-curricular connections is a technique, a method, and/or a design to provide opportunities for middle school teachers, indeed all teachers, to integrate learning among various subjects (Maute, 1992). According to Maute (1992), "This intertwining of disciplines and subject matter reinforces what is taught" (p. 73) as it brings that material more clearly into the focus of reality. In real life, school subjects "are not found in isolation but are constantly interacting with and overlapping each other" (Maute, 1992, p. 73).

It is that constant interacting and overlapping that provides the impetus for integrative and interdisciplinary instruction and procedure. Cross-curricular connections technique is the base, the simple guide to the effective implementation of the successful school-wide unit. Because these units generate enthusiasm and produce excellent learning experiences for both students and teachers, it is essential to examine more closely the

component parts of these experiences and place more emphasis on the day-to-day potential for cross-curricular connections.

Maute (1992) stated that "cross-curricular connections are connections between two or more areas of study that are made by teachers within the structure of their disciplines" (p. 73). As has been seen, curriculum can no longer be limited to what teachers have planned in the classroom, or even to what takes place in the classroom, but must include all facets of the culture and activities of the school. The hierarchy of cross-curricular connections was developed by Maute in 1992. It has stood as the basis for educational cross-curricular connections design, with very few modifications, to the present. Briefly described, scholars have usually illustrated the hierarchy as a pyramid. At the base of the pyramid is the cross-curricular incident and proceeding gradually up the structure find activity, then assignment, followed by unit, and finally at the apex is the event (Maute, 1992, pp. 74-75). That basic incident, that happens more frequently than any other type of connection, is the research topic of this study.

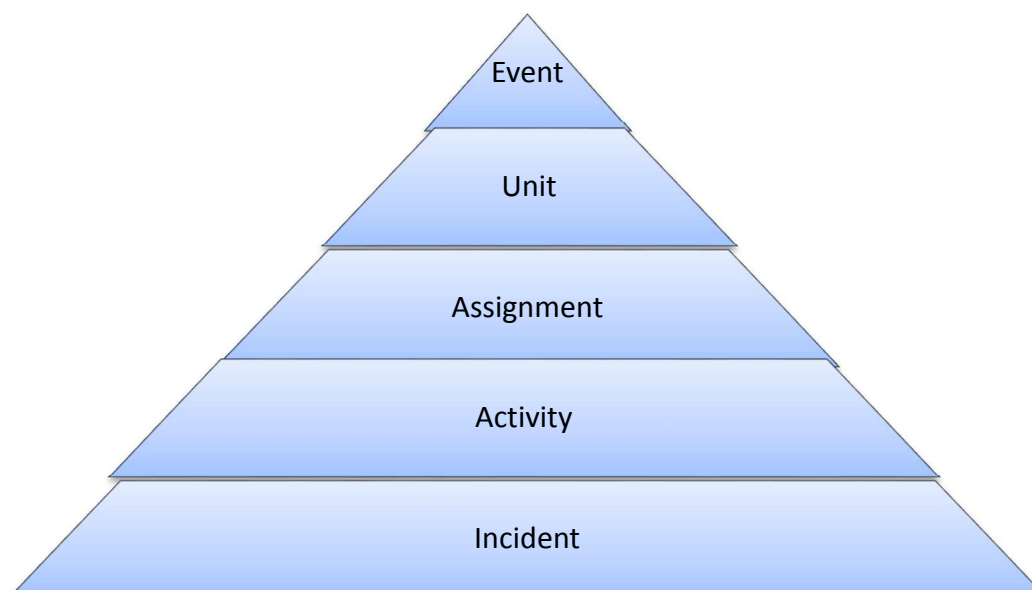


Figure 1. Hierarchy of cross-curricular connections. Developed from “Cross-Curricular Connections,” by J. Maute (1992), in *Connecting the Curriculum Through Interdisciplinary Instruction* (J. H. Lounsbury, Ed.). Columbus OH: National Middle School Association, p. 74.

Van't Hooft et al. (2012), in the presentation of their research using the thinking with data (TWD) project utilized a cross-curricular approach as they implemented data literacy in the middle grades, which further "used an extended *Preparation for Future Learning* (PFL) framework to teach data literacy across subjects" (p. 19). Data literacy is complex and these researchers drew on the National Science Education Standards (NSES) as developed by the National Research Council for the basic skills and concepts to be taught. Included were "the ability to formulate and answer data-based questions; use appropriate data, tools, and representations; interpret information from data; develop and evaluate data-based inferences and explanations; and use data to solve real problems and communicate their solutions" (p. 20).

They looked at the literature and their own middle school situations and realized that data literacy could not be effectively addressed in schools where individual classes were taught in isolation. To their benefit, van't Hooft et al. (2012) found that some Grade 6 mathematics and social studies classes were integrated during at least one unit through the use of data so they thought their cross-curricular plan could be successful in spite of present "middle school organizational structures" (p. 20). Therefore, van't Hooft et al. built their research on Beane's conclusion, which "indicates that a cross-curricular approach to learning may be especially beneficial for students in the middle years" (p 20).

The three research questions for van't Hooft et al.'s study centered on the effectiveness of the TWD project materials and their impact on student learning. The study was carried out, analyzed, and reported using the mixed-methods research approach. van't Hooft et al. used a variety of data collection sources. The analysis of data sources for the purposes of this article were limited to those that directly answered the research questions posed.

Results show evidence of student gains in data literacy skills as well as in mathematics and science. The best evidence of learning of data literacy skills was found during the social studies and mathematics modules. While there was preliminary evidence of learning in science and language arts, potential gains in these modules need to be more closely examined (van't Hooft et al., 2012, pp.19 and 30-31)

"Putting Science Literacy on Display" by Hayman, Happe, and Deniz (2012) highlighted "the opportunity for cross-curricular teaching that links science and literacy

in an authentic and meaningful context" (p. 58). This project was a collaborative effort between a second grade teacher and the school reading specialist, but as the authors indicated early on in their article, this project can be successful in Grades 2 through 8. The end product of this cross-curricular experience was the transforming of the school library into a museum. The topics considered were air and weather and the lessons related to the appropriate Earth and Space Sciences Disciplinary Code listed in A Framework for K-12 Science Education.

As a result of this cross-curricular museum literacy project, the second grade students "acquired science content, as well as made outstanding gains in fluency, comprehension, and reading levels" (Hayman et al., 2012, p. 3). The students were highly engaged and they successfully achieved in both science and literacy" (p. 6).

Barton (2012) in his "Building a better mousetrap offers cross-curricular connections" project saw similar results as he developed and reinforced social studies/history and/or English with science, arts, design, engineering and ecology. Barton's project was with eighth grade students and was carefully detailed in the journal article to develop illustrative and sustainable results in a workable cross-curricular mouse trap.

Relationship Among Leadership, Personality, and Curricular Implementation

Zaccaro (2007) in a study on trait-based perspectives of leadership traced trait aspects back to studies conducted in 1869 when researchers defined the leadership trait as "a unique property of extraordinary individuals whose decisions. . . .change history (p. 6). This definition remained until the 1980s when research challenged trait models. In more

recent research, according to Zaccaro (2007), some studies have linked personality variables to other attributes that predict leader effectiveness (p. 6).

Zaccaro (2007) introduced a related line of research, that of leader types. He made reference to studies "demonstrating how different combinations or patterns of individual differences influence leadership. Several studies examined the distinctions among the 16 types composing the Myers-Briggs Type Indicator . . . across levels of successful and unsuccessful leaders" (p. 12). Further examination of leader types included "differences in problem-solving skills and patterns of career development" (p. 12). In his conclusion, Zaccaro (2007) noted that even though the trait-based approach has a long history, " a consensus about the role of leader traits, . . . their influence, and the determining role of leadership situations has remained elusive" (p. 14).

In an article related to using the Myers-Briggs Type Indicator (MBTI) in social work field situations, Moore, Dietz, and Dettlaff (2004) developed and provided a framework to help field instructors work with a variety of students. The authors stressed that field instructors have to be aware of personality differences, both their own and their students, in order to work effectively in different situations. The Indicator is used as a tool that is used to enhance the experience. An extensive explanation of the types as they relate to social work field experiences is included in the article. "Recognizing differences in personality type that may affect behavior helps field instructors model ethical social work practice, including starting where the client is, assessing needs, accepting differences, and determining strengths "(p. 347).

The use of the Myer-Briggs Type Indicator (MBTI) in the United States Army begins with the statement that "leadership is expected of everyone in the army. . . ." (Hagey, 2009, p. 24). Hagey emphasized that the MBTI is just one of the tools used to make individuals "aware of what motivates them" (p. 24) while allowing for recognition of natural strengths, and optimizing opportunities for personal growth. The explanations and examples used in the article to illustrate each of the scales and preferences of the MBTI are military related and practical for that clientele. Hagey concluded his schema by stressing that "(i)f used correctly and ethically. . . the Myers-Briggs Type Indicator increases self-understanding and appreciation of personal differences in order to improve one-on-one interactions and team success" (p. 26).

Prior research dealt with the structure of schools for adolescent students, the grouping of students by age definition, and the testing of students against predetermined curricular material. Major gaps in the research involve the implementation of cross-curricular teaching techniques that emphasize pragmatic learning experiences related to real-life situations and the impact of teacher personality type on effective implementation. This study was developed to add qualitative experiences to the existing research on cross-curricular teaching as the base upon which to build more successfully integrated interdisciplinary units. The research will encourage educators in the middle school to implement more cross-curricular connections in their class work.

Statement of the Problem

Schools have been instituting too many curricular innovations without adequate teacher preparation and follow-up support, reducing their effectiveness in supporting

student learning. In particular, I discovered there has been little research done with middle school teachers on the implementation and actual use of the incident level of the cross-curricular connections teaching technique. Through the use of professional development and an understanding of personality type, this study revealed more about how teachers effectively and pragmatically integrated the incident level in their classrooms on a day-to-day basis.

Purpose of the Study

The purpose of this case study was to describe the implementation of the cross-curricular connections teaching technique at the middle school research sites and how the teachers perceived the use of the technique and the short- and long-term value. The central phenomenon of the study is the cross-curricular connections teaching technique, as defined by Maute (1992, p. 73).

Conceptual Framework

According to Myers (1984), "Personality type theory is that much seemingly chance variation in human behavior is not due to chance; it is in fact the logical result of a few basic, observable differences in mental functioning" (p. 1). Psychological types are patterns in the way people prefer to perceive and make judgments. It appears teachers are more comfortable teaching from their personality type. Research has indicated that teachers' types do affect how they teach and what they prefer to teach (Fairhurst & Fairhurst, 1995). For the purposes of this study, I analyzed the teachers' perceptions as they incorporate the cross-curricular connections teaching technique at the incident level within their classrooms using qualitative description.

Nature of the Study

Qualitative research is an inquiry process of understanding based on distinct methodological traditions of study to explore a social or human problem. The researcher builds a complex holistic picture, analyzes words, reports detailed views of informants, and conducts the study in a natural setting (Creswell, 1998, p. 15). A case study, qualitative in inquiry, is "an intensive, holistic description and analysis of a bounded phenomenon such as a program, an institution, a person, a process, or a social unit" (Merriam, 1988, p. xiv). The case is a bounded context in which one is studying outcomes. A case can include a wide range of settings. This focusing or bounding of a case initially can be seen as anticipatory data reduction that rules out certain variables while attending to others (Miles & Huberman, 1984). This case study was a single site, instrumental, and the case was dominant. It was a program, a teaching technique, the cross-curricular connections process at its incident level. The rationale for using the case study design was that it best fit the outcomes anticipated. The case study can be used in a wide variety of settings. I reported the case study from a descriptive perspective. This description took into consideration the interpretation of meanings, demographics, and attitudes (Merriam, 1988) as they relate to the cross-curricular connections implementation. Insights determined through the MBTI were an integral part of the descriptive review.

The other likely choice for this study was ethnography. Creswell (1998) defined ethnography as "a description and interpretation of a cultural or social group or system" (p. 58). This type of study is usually extensive and involves the researcher examining a

"group's observable and learned patterns of behavior, customs, and ways of life" (p. 58).

Ethnography is behavioral in nature, and that is not what this study explored.

Research Questions

The research questions in this study were as follows:

1. How did middle school teachers experience implementing the cross-curricular teaching technique, with emphasis on the incident level?
2. How did teachers perceive the use of the cross-curricular teaching technique and its short and long-term value?

These questions have served as a guide to the formulation of direction and method in this study.

Assumptions

The main objectives of this qualitative case study were to present, demonstrate, and explore, through professional development and research, the implementation of the cross-curricular teaching technique at the incident level among teachers in the middle school. Therefore, it was assumed that the teachers participating in this study would be sincere, open, and cooperative in their use of the teaching technique. They would also be honest in their input to interview questions and in the responses on the MBTI instrument. I informed each of the teachers of the interest in exploring experiences with the cross-curricular teaching technique in her classroom and encouraged active participation and integrity.

Delimitations

Simon (2011) stated that delimitations are "those characteristics that limit the scope and define the boundaries of your study. The delimitations *are* in your control." (p. 2). Some examples of delimiting factors might be what one is not doing and why the researcher chose not to do them, the literature not being reviewed and why, and perhaps methods not considered and why. The "why" appears to be a critical component of the explanation.

The aspects of this case study that limit generalizability are these: the original project took place in the spring of 2003 and included middle school teachers in three southwestern Pennsylvania parochial schools. The study was updated in the spring of 2013 with personal interviews of four people, three teachers and one principal of the original sample, who were still engaged in the teaching profession. These teachers taught in the one remaining parochial school in the area. Two of the schools participating in the original study were closed over the years due to the change of demographics in the area.

Second, the schools chosen were parochial schools, that is, faith-based and attached to a local parish. For this study, the schools were Catholic and part of local urban and semi-rural parishes. The teachers were all White women. No public school teachers participated.

Limitations

Simon (2011) defined limitations as "potential weaknesses in your study and are out of your control. . . (y)ou must explain how you intend to deal with the limitations you are aware of so as not to affect the outcome of the study" (p. 2). As noted under

delimitations above, purposeful selection was used to recruit participants in both the original study and in the update or follow-up of information and can be both a delimitation and a limitation. Interviews and observations are subjectively interpreted by nature and can be limitations.

I also anticipated the use of the MBTI as a possible limitation due to the quality of interpretation of the results. Certification through the Center for Applications of Psychological Type was achieved so that this limitation would in some way be mitigated. The MBTI instruments were sent to the Center of Application of Psychological Type for scoring as a validity procedure.

Also there are "purposes and assumptions that (the researcher) brings to the relationship, which you may not be aware of" (Maxwell, 2013, p. 92). Researcher bias is inherently present in any research design. In order to achieve the validity of findings and reduce researcher bias triangulation of data, coding, progressive analysis, and audit-trail were incorporated in the analysis design of this study.

Definitions of Terms

Several definitions of terms used throughout this dissertation are offered to provide a base for understanding the current study.

Cross-curricular connections: As defined by Maute (1992), these "are connections between two or more areas of study that are made by teachers within the structure of their disciplines" (p. 73). These connections extend between and among subject areas as well as between and among real life experiences. In other words, cross-curricular connections can be connections between any parts of the formal or informal

curriculum that are made at any time, by adults (teachers in the sample in this study) and/or students engaged in part of the curriculum in about school and expanded to real life experiences (Maute, 1992).

Cross-curricular incident: The concern of the project in this dissertation is at the base of hierarchy of cross-curricular connections (Maute, 1992). The incident happens more frequently than other types of connections and is the most neglected. It is the simple awareness of connections between and among academic subjects, disciplines, and skill areas that also includes connections made between school subjects and real life (Maute, 1992).

Myers-Briggs Type Indicator (MBTI): A paper-and-pencil instrument regarded as a research instrument designed to take Carl Jung's theory of type into practical applications.

Significance of the Study

Middle schools were the site for implementing cross-curricular connections teaching technique. Motivation in instruction in the middle school culture is useful to students, as they tend to exert their own method and mode of learning. Teachers who teach from their own preferred style yet respect their students' learning preferences tend to see improvement and success in the learning experience, thus effecting social change (Fairhurst & Fairhurst, 1995). This study sought to address these needs and to contribute to the store of research that enhances the middle school educational experience.

As the discussions surrounding the implementation of the Common Core Standards for Career and College Readiness continue, contributions from this small study

can add some positive expressions and practical perspectives to the research. The implementation of the cross-curricular teaching technique lends another vista to the already pragmatic emphasis held in middle school education in the United States.

Summary

This chapter presented an introduction to the study of cross-curricular connections at the incident level in the middle school. It provided an explanation of the problem, highlighted the purpose of the study, and included background information related to the characteristics of the study. The emerging research questions were identified. Qualitative case study approach was defined, and the delimitations and limitations pertinent to the study were discussed. In addition, key words were operationally defined, and the anticipated significance of the study was detailed. In Chapter 2, the review of literature will focus on the recent scholarly research and publications that present and analyze the trends in middle school curriculum and education.

Chapter 2: Literature Review

Introduction

Meyer (2011) noted that it has often been said that middle schools serve the students most difficult to teach. The middle school concept came into being in the mid-20th century and is based on the history of schooling that came before it (Meyer, 2011). Meyer (2011) claimed middle school is predicated on the need for more "exploratory experience" (p. 42). The interdisciplinary approach with its cross-curricular implementation became popular in the middle school (Meyer (2011). However, there has been little research done with middle school teachers on the implementation and actual use of the incident level of the cross-curricular connections teaching technique. The purpose of this case study was to describe the implementation of the cross-curricular connections teaching technique in the middle school and how these teachers perceived the use of this technique in its long- and short-term value. The central phenomenon of the study is the cross-curricular connections teaching technique, which is based on what Maute (1992) defined as "connections between two or more areas of study that are made by teachers within the structure of their disciplines" (p. 73).

The research questions served as a guide to the formulation of direction and method in this study. The review of literature was organized by developing an outline highlighting the main aspects of the study. The central topics under consideration included a brief history of education from John Dewey to the present time, emphasizing the middle school setting, curriculum in the middle school, interdisciplinary curriculum, cross-curricular connections teaching technique especially at the incident level in the

middle school curriculum, and how teachers perceived the use of the technique in its long- and short-term value in the middle school.

Various sources of information were selected in the preparation of this review, including scholarly books, journals, dissertations, and online documents. Library collections were reviewed both online through available databases and in person. The many online databases in the fields of education and psychology available through Walden Library were searched, including ERIC, Education Research Complete, and Education Psychology. The key words I used to conduct these searches included but were not limited to the following: *education history* (limited to United States), *middle schools*, *middle school setting*, *middle school curriculum*, *interdisciplinary curriculum*, *integrated curriculum*, *cross-curriculum curriculum*, *cross-curriculum teaching*, *personality traits and theory*, *Myers-Briggs Type Indicator (MBTI)* and its use in education, *current use of MBTI*, and *recent case studies in middle school education*.

Historical Context

In order to study cross-curricular connections adequately, the teaching technique must be placed within an historical context related to curriculum reform. Reform, according to Schubert (1993), "means to reshape, to reconfigure, to make different" (p. 80). However, change does not necessarily mean innovation or improvement. Reformers generally hoped for improvement and in looking at curriculum reform of the past 50 to 60 years, it has to be asked whether the changes or reforming carried out were improvement or not.

Zais (1976), in his comprehensive book *Curriculum Principles and Foundations*, addressed a progression in definitions of *curriculum* from its Latin root meaning *racecourse* through the extended term utilized in most educational circles today. A common usage may include the program of studies within a school; however, specialists in the field prefer to use that designation for the school's subjects and/or course offerings (Zais, 1976). Again, the content of a particular course is often regarded as the curriculum, but this limits the concept to the selection and organization of information that learners are to acquire. Therefore, a usable definition of curriculum, but not without controversy, has evolved to include "all the experiences which are offered to learners under the auspices or direction of the school" (Zais, 1976, p. 8). Included in the definition is that invisible or hidden curriculum which is unplanned, unintended, and often overlooked (Schubert, 1993).

Experiential curriculum had its origins in the work of John Dewey, who referred to his own philosophy, pragmatic in nature, as "instrumentalism" (Dewey, as cited in Schubert, 1993, p. 83). With Dewey, experiential education moved from the psychological to the logical. Interests and concerns revolved around the existential issues that have "plagued people of every cultural and historical setting. Teachers and learners, together, worked on projects to understand more deeply the problems that grow from their lived experience" (Schubert, 1993, p. 83). The disciplines of knowledge became relevant to learners, and these were drawn upon "in eclectic and interdisciplinary fashion" (Schubert, 1993, p. 83). Dewey and other progressive theorists furthered their notions of curriculum reform as emerging from "the philosophizing-in-action of teachers and

learners that is at once democratic, scientific, and integrative" (Schubert, 1993, pp. 83-84).

Curriculum reform has been reformed in the last 60 years, and that reform must be seen in the context of "societal forces, learners, and subject matter (Schubert, 1993, p. 87). Looking at these issues involved curriculum development and the technologies that support it (Wraga, 1997). Societal forces, the political and economic activity of the day, as seen through the eyes of the intellectual traditionalist, may be "looked upon as a possible impediment to realizing a curriculum through the classics and disciplines of knowledge" (Guild, 1994). The intellectual traditionalist suggests that one must pursue a liberal education. The social behaviorist saw societal forces as contributions to research, and the experientialist saw curriculum and its reform based upon and created by societal forces. The curriculum offered a vehicle for advocating for justice by opening up the channels of dialogue for all realms of society (Schubert, 1993). The experientialist, according to Schubert (1993), held that the "learners' interests must be the key to understanding what the curriculum should be and educators and students ought to be cooperative partners in determining the purposes and experiences of learning" (p. 89). The experientialist determined subject matter "more as a process than product, emphasizing the experience of learning more than specific, discrete bodies of knowledge and skills to be acquired" (p. 89). Therefore, learners and teachers who pursued concerns together and developed an understanding of those concerns (p. 89) created and implemented the subject matter or curriculum.

In order to realistically look at the rapidly changing reforms, designs, and research in education and curriculum, the research emphasis is on the teacher as the main or consistent person on whom or in whom any change or changes must be made. In addition to this notion, there is a "commonly held view that the professional development of teachers should be the primary vehicle for teachers to improve their practice" (Lieberman & Mace, 2009, p. 77). In their article "Making Practice Public: Teacher Learning in the 21st Century," Lieberman and Mace (2009) made a case for using professional development opportunities to implement "professional learning communities, center on the study of practice, and incorporate the use of technology" (p. 77). Lieberman and Mace worked collaboratively with teachers in professional development using cohorts, projects, and problems of practice. The knowledge gleaned from this work, along with the goal of improving student learning, needs to become available in order to encourage research that will critique and verify the process. With the rapid advent of "new media tools and social networking web resources," (Lieberman & Mace, 2009, p. 77), networking is readily possible and the possibilities of enhanced professional learning and practice are limitless. Many of the examples used by Lieberman and Mace in the discussions of the cases used in the historical progression toward the development of an online teacher networking and professional learning experience were interdisciplinary and cross-curricular in nature. Some few were conducted in the middle school. One example that stands out involved a fifth grade teacher who wanted to visually represent the diversity of her school community (Lieberman & Mace, 2009). Videotaped

interviews of students, parents, and community members were created into an interactive collage that linked these members to each other.

Lieberman and Mace (2009) expressed that their research with teachers going public with their work have opened up opportunities for learning, not only from their own practice, but also from the research and others who help expand their knowledge. . . Making multimedia representations of practice helps teachers articulate what they know (and what they need to know) and teaches the rest of us about the complexities and layered nature of teaching (p. 86).

Middle School

The middle school will be described in the following section through its setting, and its curriculum and instruction.

Middle School Setting

Educational reform has been extensive and varied since the 1980s beginning with *A Nation at Risk* published by the National Commission on Excellence in Education in 1983. The research and reforms that grew out of this report, however, paid virtually no attention to students in the middle grades, usually defined as grades 5 - 9. Researchers noted that this lack of thoughtful and caring attention is dangerous for the future of our youth and our future as a nation (Jackson & Hornbeck, 1989, MNSA Research Summary #17, Raebeck, 1990).

The middle school, noted Meyer (2011), has often been said to serve students most difficult to teach. The middle school concept came into being in the mid 20th century and is attributed to William Alexander, then chairman of the department of

education at Peabody College of Teachers in Nashville. Middle school is the school "between elementary and the high school" (Meyer, 2011, p. 42). History shows that Alexander was "reacting to the era's academic scare- Sputnik" (p. 42) with more Mathematics and Science curriculum by saying that these middle grade students needed more "exploratory experience" (p. 42) such as drama, journalism, music, and such. However, it seemed that by 1995 when a major study, *The Third International Mathematics and Science Study*, was conducted, middle school statistics showed "poor academic performance" (p. 43).

It is during early adolescence that young people begin to make decisions about their self-worth, the worthiness of others, and the value of education, health, work, and citizenship. Early adolescence is one of the last real opportunities to affect our youths' educational and personal perspectives into the future. The middle grade school, then, is one of the key socializing institutions for young adolescents - a critical turning point, as it were, in the lives of youth. Fundamental changes in the economy, the demographic profile of the nation's children, along with the risks these 10-to-15 year-olds face make the need for change urgent in the middle school (Jackson & Hornbeck, 1989). Thus, middle level reform efforts would do well to focus on assisting schools fit students rather than making students fit schools (Crockett, 1994).

Rockoff and Lockwood (2010) questioned the conclusions of previous studies and set out to provide a more rigorous scientific study that allowed them to track students from New York City schools from grade 3 through grade 8, focusing on middle-school attendance rates, disadvantaged backgrounds, age of students, and class size. They were

unable to find a full explanation to the dip in achievement but they did note developmental psychologists findings that adolescents "commonly" (Rockoff & Lockwood, 2010, p. 74) show "signs of negativity, low self-esteem, and the inability to judge risks and consequences" (p. 74) and these factors in concert with large similar age groups may be a consideration. Their study was quantitative in scope but their research is of value in discussing the education of students in these grade levels.

Almost at the same time, across the country, researchers from EdSource and Stanford University (Williams et al., 2010) conducted a mega study of 303 middle schools in California (p. 1), a quantitative study with findings reported in narrative form. The research question for the EdSource study was "Why do some middle grades schools clearly outperform others on standards-based tests even though they may serve a similar student population" (p. 3)? It appeared the results of this study are in opposition to the New York City study but the demographic is very different. The EdSource study's contribution to the education field consists of their documentation of policies and practices in place in California that "have a significant impact on student outcomes regardless of student background" (Williams et al. 2010, p. 3).

The authors agreed this was a "complicated and comprehensive study" (Williams et al., p. 19) but at least one of their findings was useful to this study. That finding stated: "Teachers with strong competencies, substantive evaluation of their practice, and adequate availability of support, time, and resources work collectively to improve student outcomes school wide and individually to improve instruction". (p. 13). And a correlated implication was that "(w)hen hiring middle school teachers, districts and principals

should consider looking for the kinds of interests, skills, and competencies that principals in higher-performing schools report of their teachers" (p. 17).

Meyer (2011) appeared to have agreed with the results of both these studies, as diverse as they were, and further added that the trend beginning with about the 2010 school year, education statistics showed a "definite reconfiguration of stand-alone middle schools (Meyer, 2011, p. 46) toward "elemiddle" (Meyer, 2011, p. 46) schools, "a new term for K-8 schools" (p. 46). This returned configuration of grades appeared to provide more nurturing care, less violence, and "the academics are at least as good if not better " (p. 46). These recent studies stated implications for future research. The students, however, are still in grades 5 through 8 and need to be educated to take their place in society.

The middle school must fit the student. The purpose and function of middle schools center on the intellectual, social, moral, and physical developmental needs of young adolescents (Clark & Clark, 1993, in MNSA Research Summary #4). It is during these middle school years that young people undergo rapid physical growth, changes in moral reasoning, introduction to social pressures such as early sexual activity, the availability of alcohol, drugs, and cigarettes, along with behaviors of violence often life-threatening (Jackson & Hornbeck, 1989; Meyer, 2011).

The inherent changes of young adolescents are further exacerbated by school environment. The shift from elementary to junior high or middle school often means moving from a small, neighborhood school and the stability of one classroom to a larger, impersonal institution, in many cases at a great distance from home. In this new setting

teachers and classmates generally change as many as six or seven times a day creating real problems for those students who are trying to establish stable peer groups and close relationships from caring and reliable adults (Jackson & Hornbeck, 1989; Meyer, 2011).

The last 30 years has witnessed a restructuring of the middle level grades. Based on two major documents, the middle schools and middle level educators have achieved some guidance and focus as they continue to strive in fostering positive programs, policies, and practices designed to meet the ever-changing needs of young people. The two documents were: *Turning points: Preparing youth for the 21st Century* prepared by the Carnegie Council on Adolescent Development and published by the Carnegie Corporation, Washington DC in 1989, and *This we believe: Developmentally responsive middle level schools* prepared and published by the National Middle School Association (NMSA, 1995). The more recent studies of EdSource (2010) and the New York Study have contributed greatly to the restructuring process.

The goal of middle school education must be to produce young persons who are thinking, productive, moral, caring, and healthy. These students, all students, need the opportunity to grapple with complex ideas and learn to solve problems. In addition, middle school young people must be given the opportunities needed to be committed members in a democracy with participation in public issues that lead to the realization that they are a vital part of a community and a nation (Jackson & Hornbeck, 1989).

Capitalizing on the innate curiosity of young adolescents gave school personnel the opportunity to provide many and varied exploratory programs. The range was endless. Transition programs focused on creating a smooth change of schools for the

young person. This included elementary to middle school, and middle school to high school, providing a range of skills related to psychological adjustment, self-esteem issues, and motivation to learn.

Middle School Curriculum and Instruction

Returning to the generally accepted definition of curriculum presented at the outset of this review, its usefulness in the middle school becomes more evident.

"Curriculum can mean whatever is advocated for teaching and learning. This includes both school and nonschool environments; both overt and hidden curriculums; and broad as well as narrow notions of content - its developments, acquisition, and consequences" (Schubert, 1993, p. 81).

What instructional strategies are most effective in presenting, developing, and organizing and are effective for maximum learning by the middle school student? Several studies have addressed this question. Teague, Anfara, Wilson, Gaines, and Beavers (2012) researched this "complex issue faced daily by middle school teachers" (p. 203). Their study explored "the instructional practices being utilized in core academic subjects in a southeastern state" (p. 203). A mixed method case study using what teachers said about their instruction and instructional practices and what were their actual practices as observed during classroom instruction was used. Teague et al. (2012) summarized their review of literature noting that middle grade students "posses a unique set of needs that call for a unique set of instructional strategies" (p. 208). According to the research reviewed, Teague et al. (2012) concluded that students learn best when together with other students and teachers decide what and how to study: enhance diverse skills and

interests; pay attention to multiple intelligences and learning styles; connect knowledge; and engage in hands-on activities (p. 208).

The data collection strategies for the Teague et al. (2012) study included a questionnaire (quantitative administration of the *Instructional Practices Questionnaire* (IPQ), and qualitative classroom observations, and individual interviews. With the use of the mixed methods approach triangulation of data sources and methods was possible and yielded some "interesting contradictions" (p. 218). The findings noted that the results of the IPQ:

indicated that teachers usually included . . . self-questioning and summarizing, social interaction, hands-on learning, a wide variety of instructional approaches and materials, consideration of students' interests and backgrounds. . . and higher order thinking. The actual use of these practices on a *usual* basis was not found through observation or through teacher interviews" (Teague et al. p. 219).

Teague et al. (2012) indicated that these finding are significant "because even though there is a body of knowledge regarding appropriate instructional methods and practices for middle school students, there is "little information about what is actually happening in middle grade classrooms . . ." (p. 219). Their recommendations stated:

. . . we must waste no time in providing middle grades teachers with the knowledge and skills they need to be effective in teaching young adolescents. Part of making them effective is providing them with a variety of instructional practices that are developmentally appropriate and can fill their teaching tool chests" (Teague et al. 2012, p. 220).

Another study of interest in the discussion of middle school curriculum and instruction is that of Howell, Cook, and Faulkner (2013), "Effective middle level teaching, from the middle level principals' perceptions and practices". The study looked at newly hired middle level teachers. The principal is the instructional leader of the school and it is "up to him/her to initiate the steps that are critical for establishing and maintaining the staff and structures that will create a middle school consistent with the key tenets of the middle school concept" (p. 3). A survey method of data collection was used.

The result was the development of a *Framework for effective middle level practices* - a graphic was provided in the article illustrating the framework. Eight constructs were included: (1) developmental spectrum, (2) relationships, (3) classroom management, (4) curriculum and instruction, (5) assessment, (6) content knowledge, (7) organizational structures, and (8) teacher dispositions and professional behaviors (Howell, Cook, & Faulkner, 2013, pp. 4-6 and 16-17). Two conclusions from their extensive study were presented, first, the graphic and explanation of a *Framework for effective middle level practices*, and second, the preparation of middle level teachers in programs that would emphasize the core of the framework. Both of these aspects would make up the design of their middle level school preparation program (pp. 17-19).

Suggestions for future inquiry included a review of "current program requirements, courses, and field and clinical experiences to determine the level to which (preparation) programs infuse the constructs of the framework" (Howell, Cook, & Faulkner, 2013, p. 19). This review included the preparation of other middle level

professionals, such as, administrators and counselors, to determine if they, too, would benefit from a preparation that plays a role in "promoting quality middle schools that meet the complex needs of young adolescents" (p. 19).

In a study linking organizational health of middle schools, using the *Organizational Health Inventory for Middle Schools* (OMI-M) (Hoy, n.d.), to student achievement, Roney, Coleman, and Schlichting (2007) found a moderately positive relationship among five schools in North Carolina that participated in the study. In a mixed method sequential research design, the authors addressed two goals, that of "student achievement and school organization," (p. 289) as found in the 2006 National Middle School Association (NMSA) policy designed to highlight middle grades schools and to raise academics and support for these transitional years (p. 289). The academic curriculum area under study was that of reading. In addition to the information available from the OMI-M index instrument, semi- structured interviews of principals and teachers took place over a two school year span.

Recommendations from the Roney et al. (2007) study included "collegial leadership, academic emphasis, organizational health, and reading literacy" (pp 313-314). The conclusion to their work noted that:

emphasis on academics is the key to increasing student achievement in high-poverty, high-minority schools. The emphasis must occur in the classroom, in administration, and in the community. It must occur in safe, supportive, and positive environments, and it must be communicated as the priority of the school (pp. 314-315).

Interdisciplinary Education

Many of the studies done on interdisciplinary curriculum practices depended on the definition and description as presented by Hayes-Jacobs (1989). "Interdisciplinary curriculum is a knowledge view and curriculum approach that consciously applies methodology and language from more than one discipline to examine a central theme, issue, problem, topic, or experience" (p. 8). Hayes-Jacobs provided some direction in its implementation. She said "(t)he philosophy of the curriculum developer will always permeate the final design" (p. 9). She compared curriculum development and design to the work of an architect. Sometimes in carrying out a project there are unforeseen delays and experiences

(b)ut initially, the architect brings a personal vision to the task. So the more aware of philosophical beliefs the curriculum creator brings to the task, the more likely he or she is going to make responsible design choices that reflect a cohesive and lasting quality in the (attempted) educational experience (Hayes-Jacobs, 1989, p. 9).

Interdisciplinary education has been considered an essential practice in the middle school since the 1960's but the actual implementation of interdisciplinary education continued to fall short of its full potential. The innovations and implementation of interdisciplinary education took many directions and continue to be developed and translated into action as the reform of the middle school continues into the future.

Noting that adolescents present their own unique characteristics and challenges to curriculum planning by their teachers, Robbins and Searby (2013) included parental involvement as a necessary component in the formation and operation of middle school interdisciplinary curriculum teams, the topic of their research. The Hoover-Dempsey and Sandler (2005) model that described three motivations for parental involvement (motivational beliefs, perceptions of invitations, and perceived life context, p. 115) was used as the theoretical framework of this study by Robbins and Searby. "A qualitative multiple case study approach answered the research question: What are the strategies utilized by interdisciplinary middle school teams to effectively involve parents of their students in the educational process?" (p. 118).

Three schools representing "an affluent suburban school, a mid-level rural school, and high-poverty urban school" (Robbins & Searby, 2013, p. 113) were chosen for the study. Parents were included in all aspects of the data collection and from that data determined the emerging themes that were explored, outlined, and analyzed. Even though there were dramatic differences among the three schools, through cross analysis, four common themes were evident. The three effective middle school interdisciplinary teams:

1. Believe that parental involvement is essential to student success.
2. Are open and approachable to parents.
3. Serve as a resource to the parents of adolescents.
4. Approach problem-solving opportunities with parents as a team instead of individuals .(p. 122)

The identified themes allowed Robbins and Searby (2013) to apply their research to the Hoover-Dempsey and Sandler parental involvement model creating a model specific for middle schools that might lead to greater parent involvement in middle schools projects of the future. "The implications for this study may extend to middle school teams, school administrators, and teacher preparation programs" (p. 132), however, the authors made it very clear that the data were limited to these three cases and were not necessarily generalizable to every middle school setting.

Several well developed and clearly explained studies presented in peer-reviewed journals were used as examples of effective interdisciplinary curriculum ventures in the middle school. Language Arts and literacy are viable interdisciplinary approaches across the core curriculum areas. Ediger (2012) offered listening comprehension suggestions that have a broad appeal not only in the school setting but throughout most social experiences. In order to improve listening comprehension, first, the teacher made sure that readiness exists, background information was available, and active engaging experiences were planned. Second, "it is important to avoid repetition when communicating orally" (p. 2). Three, the experiences presented to the students were meaningful, and, fourth, the students must be able to reflect, that is, think about thinking, about what was learned. Fifth, "self efficacy is increasingly inherent if a pupil reinforces in depth learning"(p. 2) and sixth, the locus of control was in the student, that is, the individual was responsible for doing well. Finally, an "appropriate sequence in learning is important within the framework of achieving skills in listening (p. 3). In conclusion, Ediger (2012) stressed the need for the classroom teacher to plan "the lessons carefully to

incorporate quality pupil listening" (p. 4). Varying the activities among the different academic areas was critical along with frequent progress evaluation.

Ciecierski and Bintz (2012) demonstrated the use of "chants and cadences to teach content area material across the curriculum" (p. 22). Chants and cadences were chosen for two reasons: first, Ciecierski and Bintz themselves had used a "variety of musical genres" (p. 23) to teach academic content, and, second, they wanted their graduate student teachers to experience the method so they would use it in their own classrooms. As a prelude to their presentation, these professors called on the history of chants and cadences usage, especially in the military, and the recent advances in brain research to lend credence to their project. The article detailed the demonstration lesson which resulted in familiar chants and/or cadences rewritten in new, original versions. Social studies, mathematics, language arts, and science were core curriculum areas well-represented. The teachers were actually engaged during the lesson specifically in problem solving. Additionally they were creating and sharing new interdisciplinary curriculum resources that they critically evaluated and assessed (pp. 25 -28). The participating teachers found the experience "enjoyable, personally rewarding, and professionally informative" (p. 28). Ciecierski and Bintz hoped that their discussion of the interdisciplinary use of chants and cadences would be a "key to success for other teachers interested in developing and implementing relevant, challenging, integrative, and exploratory curriculum in the middle grades . . ." (p.28).

Pre-service teachers were also exposed to the planning, designing, and assessing interdisciplinary curriculum. In a study Campbell and Henning (2010) collaborated in a

project to determine if "deliberate efforts to integrate social studies and assessment methods courses would facilitate (their) students learning compared to when such courses are taught in isolation. . . "(p. 180). One group of pre-service teachers experienced the interdisciplinary approach in their methods class, the other group had more traditional methods as they prepared their lesson plans. During their three week clinical experience near the end of the term, the pre-service teachers were expected to teach the interdisciplinary lessons they developed. The study was analyzed quantitatively through testing and qualitatively through interviews documenting their students' learning. The results showed that "(T)he percentage scores earned on interdisciplinary units designed by pre-service teachers who received integrated instruction were significantly higher . . . , indicating that their units were better in overall design" (p. 183). However, there did not appear to be any significant difference found in the students' "perceived understanding of interdisciplinary topic, more research is needed to evaluate the effectiveness of interdisciplinary curriculum. . ." (p.183). It was also recommended that "better measures of how children learn and process interdisciplinary problems. . . (p. 184) be used in future research.

Two studies detailed in the background for the study section in Chapter 1 of this dissertation are referenced here for their interdisciplinary context. Carrier, Gray, Wiebe, and Teachout (2011) "examined the experiences of a teacher team: two elementary school teachers, a music teacher and a science teacher, as they developed and implemented innovative interdisciplinary curriculum based around BioMusic" (p. 425). The second study is that of Smolinski (2011) who developed his study around using

music as supplement to the science curriculum From his literature search Smolinski found that "(f)or thousands of years people have used music to transfer information and narrate stories" (p. 2). This thought led Smolinski's research study. Biology students usually find that words used for parts of a cell are unfamiliar and difficult to pronounce but the students "need to master cell-part vocabulary" (p. 2). Therefore Smolinski (2011) composed ten original songs "aligned with state and national science standards" (p. 2) and wrote sheet music appropriate for use by the choral department of his school. In addition, he "recorded an album called Bio-rhythms" (p. 2).

In working with the choral teacher, the biology students were divided into two groups: those who took chorus and those who did not. Over a four-week period, the biology classes were taught in a similar manner, however, the chorus students received the science music and were taught those songs by the chorus teacher. Pretest and posttests were performed along with student individual interviews and focus group format interviews. In the posttest assessment the students who "sang the science music in chorus scored almost ten points higher than students who did not sing the music" (p. 3). Through interviews, the chorus students suggested that the song was used as a study tool and helpful in their test taking experience and said they wanted to continue the use of science music. Smolinski (2011) concluded his article by suggesting other classroom applications for science music along with the caution that although most of his students were "receptive to the music, some student did not like it" (p. 4). Even though it might not be ideal for every student, "it could also add a new dimension to a classroom and excite students about learning" (p. 3).

Science, technology, engineering, and mathematics (STEM) education is the current acronym of choice in the field of interdisciplinary curriculum. Usually an emphasis is placed on one of the core academic areas, engineering is currently popular, as the other core curriculum areas supplement or enhance engineering in an interdisciplinary fashion. Bequette and Bequette (2012) proposed an approach to STEM education that "infuses both the creative process and design thinking into a new iteration of STEM education that adds arts (with a capital "A") to the acronym to make STEAM" (p. 40). Utilizing design can open up creative experiences for "cross-curricular collaboration" (p. 40) as well as providing an opening for non-art education to include art and design in their interdisciplinary lessons.

Bequette & Bequette (2012) made use of the graphic, *Steps of the engineering design process*, that can be found in the science standards of many states (p. 42) as a stepping stone to assisting teachers who were striving to incorporate more engineering concepts in grades K-12. They argued that "the betterment" (p.43) of both the sciences and arts can be achieved through "interdisciplinary work in the arts and sciences with curriculum components that combine aesthetic and analytical modes of thinking" (p. 43). Several uses of area and design in interdisciplinary contexts were discussed. The journal article concluded with a call for more research. Art teachers need to examine the STEM approach in their schools to determine where the arts might fit in especially in problem-based lessons and innovation. That research may ask if STEAM improved education and separated the key components of design thinking in both art and engineering disciplines leading to more integrated and cross-curricular teaching (pp. 46-47).

Cross-Curricular Connections

Curriculum, whether it is thought of as a document or as a cluster of phenomena in a live classroom situation, "should be specific enough to provide focal thrust for the teacher" (Zais, 1976, p. 13). But it should also be as general as allowable for the selection of specific content, technique, and materials "according to the teacher's personality and teaching style, and the students' needs and interests" (p. 13). Cross-curricular connections method develops that opportunity for both teacher and student. At the incident level the opportunities are readily available to overtly include those invisible aspects that somehow get lost in other levels of curriculum development.

Cross-curricular connections is a technique, a method, and/or a design to provide opportunities for middle school teachers, indeed all teachers, to integrate learning among various subjects. "This intertwining of disciplines and subject matter reinforces what is taught" (Maute, 1992, p. 73) as it brings the material more clearly into the focus of reality. In real life, school subjects "are not found in isolation but are constantly interacting with and overlapping each other" (p. 73).

This literature review illustrated how through the years in research and practice, the definitions and views of curriculum have broadened, and so have the possibilities for connections. Curriculum can no longer be limited to what is planned in the classroom, or even to what takes place in the classroom, but must include all facets of the culture and activities of the schools. Therefore, "cross-curricular connections can be connections between any parts of the formal or informal curriculum that are made at any time, by adults and/or students engaged in part of the curriculum in and about the school" (Maute,

p. 76; also in Shymansky, Yore & Anderson, 1999; van't Hooft et al. 2012; Barton, 2012; Serafini & Layne, 2013).

These broad connections allow "students to apply what is learned in one area to another area of study" (Maute, 1992, p. 74) effectively as teachers pointed out these cross-curricular connections. Also, as the students become more and more aware of these connections, they are able to discover them on their own. Learning, then takes on greater meaning as "the original learning is reinforced and the new learning becomes more familiar" (p. 74). Through discovering cross-curricular relationships, students and teachers alike begin to realize that learning, like life, is interconnected in most, if not all, of its experiences.

The Hierarchy of Cross-Curricular Connections (see Figure 1) was developed by Maute in 1992. It has stood as the basis for educational cross-curricular connections design, with very few modifications, to the present. The incident, illustrated at the bottom of the figure, that happens more frequently than any other type of connection, was the research topic of this study.

Van't Hooft et al.(2012) in the presentation of their research, detailed in Chapter 1, using the *Thinking With Data* (TWD) project utilized a cross-curricular approach as they implemented data literacy in the middle grades, which further "used an extended *Preparation for Future Learning* (PFL) framework to teach data literacy across subjects" (p. 19). They looked at the literature and their own middle school situations and realized that data literacy could not be effectively addressed in schools where individual classes were taught in isolation. To their benefit, van't Hooft et al. (2012) found that some grade

6 mathematics and social studies classes were integrated during at least one unit through the use of data so they thought their cross-curricular plan could be successful in spite of present "middle school organizational structures" (p.20). Therefore, van't Hooft et al. built their research on Beane's conclusion which "indicates that a cross-curricular approach to learning may be especially beneficial for students in the middle years" (p 20).

The analysis of data sources for the purposes of this article were limited to those that directly answered the research questions posed:

Results show evidence of student gains in data literacy skills as well as in mathematics and science. The best evidence of learning of data literacy skills was found during the social studies and mathematics modules. While there was preliminary evidence of learning in science and language arts, potential gains in these modules need to be more closely examined (van't Hooft et al., 2012, pp. 19 and 30-31).

STEM education continued to develop the best of interdisciplinary and cross-curricular teaching and learning techniques. Robotics, according to Grubbs, (2013) was one of the projects growing out of STEM that demonstrated its flexibility. Grubbs detailed a classroom project that highlighted one of many examples for technology development to "demonstrate its ability to be a stand-alone subject area that is embedded with mathematics and science standards through interesting project-based STEM units" (p. 12). Prior instruction to this project included an "overview of basic science and math concepts, along with basic skills of working with a breadboard and reading schematics"

(p. 13). After the content knowledge briefing, the technology students were divided into groups of three with the following problem statement and challenge as their guide:

Problem Statement: Littering has become very expensive for cities to control and clean up on a daily basis. With the innovations in technology, cities have requested a bid from engineering companies to design an autonomous robot that can navigate around the city to sweep streets.

Challenge: Students will apply problem-solving methods to plan, design, evaluate, and propose a robotics program. They will construct and design an efficient robot that is comprised of basic electrical components such as resistors, wires, and sensors, that will navigate autonomously through a student-created city using mathematical calculations and predications (Grubbs, 2013, p. 14).

Sharing of a few goals that were basic expectations, the students were given minimal teacher-directed assistance throughout this project. The final component of the process included reflections by the students and a formal presentation of their project. Grubbs (2013) noted that it "was interesting to see how intrigued" (p.16) these middle grade students became towards robotics and real-life problems. Their reflections reached out in many directions from using the robot to clear a town or state to cleaning sports stadiums and other interesting and challenging areas. Grubbs concluded by saying ". . . robotics can easily provide a great method of integration, it is just one of the many projects occurring in technology classes that can be used to build student interest and show them how to apply STEM concepts" (p. 14).

Ackerson, Piser, and Walka (2010) reported in their research article titled "Little shrimp, big results: A model of an integrative cross-curricular activity" on an "integrative, cross-curricular lab activity engaging middle school biology students in an exercise involving ecology, arthropod biology, and mathematics" (p.23). Their week-long unit highlighted the use of cross-curricular connections as well as "differentiated learning, and enrichment activities" (p. 23) for their students. A typical science lab experiment was detailed in the journal article. In addition to the lab report, students were asked to collect replicates, create a spreadsheet, and graph the average of each timed data collection. In their algebra class, the students used this data to create graphs using Excel and this led to an introductory statistical class. A scatter plot diagram was generated and students discussed "correlations among populations, temperature, and light" (p. 27). Several other cross-curricular activities were discussed. Ackerson, Piser, &Walka (2010) concluded with reflections on the importance of cross-curricular activities to enhance the internalization of mathematics and science concepts, the future use of robotic and digital tools in these core subjects, as well as the benefits of quantitative and qualitative data collection in a relevant and fun project (p. 28).

In a similar collaboration, this time between teachers of geography and English language, Walshe (2011) explored the ways in which students' understanding of sustainability could be developed using poetry and moving image. First, the teacher trainees worked together to understand how seemingly disparate subjects might be linked. Environmental issues were discussed and then explored through the medium of poetry.

As the teacher trainees experienced this activity, well out of their comfort zone, they were able to translate it to their students in their teaching practice. The cross-curricular activity provided the opportunity to develop an understanding of a "more eco-critical and place-based approach to writing and exploring poetry" (p. 121). Even though this was a one-day experience, the author noted that it did seem to open up ideas and experiences for the teacher trainees "as well as to the potential of cross-curricular collaboration" (p. 121).

Additional studies of interest, described in detail in Chapter 1, included: "Putting science literacy on display" by Hayman, Happe, and Deniz (2012) which highlighted "the opportunity for cross-curricular teaching that links science and literacy in an authentic and meaningful context" (p.58). And Barton (2012) in his "Building a better mousetrap offers cross-curricular connections" project saw similar results as he developed and reinforced social studies/history and/or English with science, arts, design, engineering and ecology.

Myers-Briggs Personality Type Theory

Personality type theory as researched and developed by Katherine C. Briggs and Isabel Briggs Myers offers the theory in practice for this research. The theory is heavily supported by C. G. Jung's theory of psychological types. As Myers (1984) pointed out, Jung in his 1923 book *Personality types* stated that humankind is equipped with two distinct and sharply contrasting ways of perceiving.

One means of perception is the familiar process of sensing, by which we become aware of things directly through our five senses. The other is the process of intuition,

which is indirect perception by way of the unconscious, incorporating ideas or associations that the unconscious tacks on to perceptions coming from outside. These unconscious contributions range from the masculine "hunch" or "women's intuition" to the crowning examples of creative art or scientific discovery (p. 2). With regard to judgment, the basic difference lies in the use of thinking and feeling and the contrasting ways of coming to conclusions. The use of thinking, that is, by a logical process, is aimed at an impersonal finding. Whereas the use of feeling, that is, by appreciation, in the placing on things a personal, subjective value (Myers, 1984).

Teacher personality, in this study, was assessed through the use of the Myers-Briggs Type Indicator (MBTI). The scale descriptors, generally presented, are: Extroversion/Introversion (EI) measures a preference for the outer world of things and people (E) or the inner world of ideas (I). The Sensing/Intuition (SN) scale measures a preference for basing decisions on logical analysis (S) or personal values (N). The Judging/Perceiving scale (JP) measures a preference for an orderly planned life (J) or a flexible spontaneous life (P).

Some teachers naturally make connections in the subjects they teach, helping students to integrate content knowledge across the disciplines as well as with their real life experiences. But it is a known fact that many times children do not see the interconnectedness of science, social studies, mathematics, and language (Avellar-Fleming, 1994). Middle school students can grasp the concepts of percentage in their math class but they may trouble in the department store were a soccer ball is marked down 25%. Teachers can assist students to make these connections at the incident level in

order to bring the interdisciplinary units and events to the level of an ideal, pragmatic, learning experience.

But can researchers really reveal the inner world of teachers? Nicholson (1996) believed that looking into such processes as knowledge, memory, feelings, motivation, problem-solving, and decision-making, some insights became evident into teacher thinking. I would be quick to add personality type as well. Nicholson noted that qualitative research techniques, in their diversity, assisted in illuminating and understanding teacher thinking. Sources of information included teachers' self-reports, interviews, observation, and documents. Their own voice and reflection were the important sources as compared to any other second-hand information. Some efforts to bring teacher thinking into the research realm included narrative, story-telling, biography and autobiography, metaphor, and descriptions of personal construct.

The inner world of teachers could be seen as the way teachers perceived and processed information. In its extended form, the wide aspects of thinking such as planning, decision making, judgment, implicit theories, expectations, and attribution were included. This all followed the assumption that teachers' behaviors were influenced by teachers' thought processes. Further, Nicholson (1996) cautioned that thought processes could not be studied in isolation. Teachers must be viewed as persons rather than as segmented objects. Teaching involved both thinking and practice. This was closely related to teachers' knowledge; such as subject matter, pedagogical knowledge, and curriculum knowledge, which could be formally acquired. The more important knowledge was the one known as personal practical knowledge that derived from

experience and may not be formally expressed. It is, however, the basis for much of the behavior and value that form practice and teaching. To really conceptualize this aspect of teaching, it is necessary to interpret the ways in which teachers make sense of and adjust to and create the educational environment within their schools and classrooms. Research on teaching and thinking should be focused on understanding how teachers make sense of their work in a complex environment. Stuart and Thurlow (2000) picked up on this inner world of teachers concept and conducted an in-depth study of pre-service teachers. The main goal of their study was to look at preparing teachers as change agents by looking first at an understanding of the beliefs that underlie teacher decision making. As Nicholson (1996) proposed and Stuart &Thurlow (2000) concurred: "a growing number of educational researchers have shifted their focus from instructional strategies and teaching behaviors to the beliefs and perspectives that prompt teachers to use these instructional strategies and exhibit these behaviors" (p. 113). Pre-service teachers, and some experienced teachers as well, tended to judge everything encountered on grounds of perceived practicality (Goodlad, as cited in Stuart & Thurlow, 2000). They are concerned with being able to do it and that primarily meant maintaining classroom discipline and motivating students.

Stuart &Thurlow (2000) perceived this utilitarian perspective among their students. The students came to methods classes expecting to learn motivating strategies and techniques for classroom instruction. These professors were interested, however, in how their students would respond to a methods class that focused specifically on the relationships between teacher beliefs and classroom practice.

Would they reflect on their beliefs or would they consider this approach too esoteric and consider the class a disappointment? The Mathematics and Science Elementary Methods class was redesigned to respond to these mentioned questions. The study referenced here presented the students reactions to the learning experiences in the methods class. It described the process used to provoke the reflection required as they pondered the effect of these experiences on their beliefs about the effective teaching and learning of mathematics. The effect of these beliefs on their choice of instructional strategies and teaching behaviors in their future elementary and middle grade classrooms was also examined.

Data collected from the 26 participating students took the form of pre-service teacher interviews, and written responses to journal prompts, mathematics autobiographies, final examination questions, and in-class writing on the teaching and learning of mathematics. Field observations were done in connection with class requirements (Stuart & Thurlow, 2000).

Notations and conclusions of value for this study included the following. Discussion, reading, writing, and practicum assignments led the participants to realize the many beliefs held by members of their methods class, and by children, with regard to mathematics. This was the result of different experiences with mathematics and to different interpretations of those experiences. In addition, the reflection led to perceptions of themselves as mathematicians and how that might influence their own development as teachers. The impact of beliefs on instructional decisions was examined. This included the nature of math and how did they believe children learn. Many of the pre-service

teachers began to rethink some of their original, simplistic beliefs about teaching and learning. It was critical to recognize that teacher beliefs drove classroom practices and those practices have a significant impact on student learning. If pre-service teachers did not bring their beliefs to a conscious level and articulate and examine them, they will perpetuate the status quo. This was unacceptable given that the student population had changed dramatically and that many of the beliefs teachers held were counterproductive to the teaching-learning process (Stuart & Thurlow, 2000).

In addition, a 3-year longitudinal study was planned by Stuart and Thurlow (2000) to determine the effectiveness of these pre-service teachers as they continued in their careers. Do they make an impact as change agents in their schools? Will the reflection began in this methods class continue or will they abandon their beliefs and accept those of the school in which they find themselves, due not to their own reflection, but through unexamined acculturation? They proposed that data would be collected on their classroom practices "to gain a deeper understanding of the factors that contribute to the professional development of the teacher who is a learner-person first" (p. 120).

Zaccaro (2007) in a study on trait-based perspectives of leadership traced that trait aspect back to studies conducted in 1869 when researchers defined the leadership trait as "a unique property of extraordinary individuals whose decisions. . . .change history"(p. 6). This definition remained until the 1980's when research challenged trait models. In more recent research, according to Zaccaro (2007), some studies have "linked personality variables to other attributes that predict leader effectiveness" (p. 6). In his article appearing in *American Psychologist*, Zaccaro argued for four points when considering

leadership attributes. First, frameworks cannot "be limited in their elucidation of central leader attributes "(p. 6).

A second point concerned the integration of leaders' attributes. . . A third point was that trait and attribute approaches must consider and account for situation as a corresponding source of significant variance in leadership. . . Finally, leader individual differences may differ in their relative stability or malleability over time and in degree. . . (pp. 6-7).

Zaccaro (2007) developed his arguments with extensive literature references.

Leader types was a related line of research introduced by Zaccaro (2007). He made reference to studies "demonstrating how different combinations or patterns of individual differences influence leadership. Several studies examined the distinctions among the 16 types composing the Myers-Briggs Type Indicator . . . across levels of successful and unsuccessful leaders" (p. 12). Further examination of leader types included "differences in problem-solving skills and patterns of career development" (p. 12). Future research is needed to relate the leader types to leadership criteria. In his conclusion, Zaccaro (2007) noted that even though the trait-based approach has a long history, " a consensus about the role of leader traits, . . . their influence, and the determining role of leadership situations has remained elusive" (p. 14).

In a journal article related to using the Myers-Briggs Type Indicator in social work field situations, Moore, Dietz, and Dettlaff (2004) developed and provided a framework to help field instructors work with a variety of students. The authors stressed that field instructors have to be aware of personality differences, both their own and their

students, in order to work effectively in different situations. The Indicator is used as a tool that enhanced the experience. Two tables are provided as part of the framework along with "strategies for respecting and responding to type differences and learning to act against preferences to work effectively with students of different types" (p.338). An extensive explanation of the types as they related to social work field experiences was included in the article. "Recognizing differences in personality type that may affect behavior helps field instructors model ethical social work practice, including starting where the client is, assessing needs, accepting differences, and determining strengths "(p. 347).

In a quantitative study used for a dissertation project, Ly (2011) used the Myers-Briggs Type Indicator (MBTI) to assess personality characteristics, along with the *Defense Style Questionnaire* (DSQ) to assess defense styles, to determine the relationship between personality characteristics and defense styles among elementary and middle school teachers. The purpose of the study was to identify the personality characteristics that offered the most predictive values if any in teachers' defense styles. Forty teachers participated in the study. Several statistical methods were used to analyze the collected data. The results of the statistical tests indicated "a statistical significance to support the hypothesis that there was a relationship existing between personality characteristics and defense styles" (Ly, 2011, abstract). Further, the results "supported that age and years of teaching experience were important demographic characteristics correlated with higher adaptive defenses" (abstract).

The use of the Myer-Briggs Type Indicator in the United States Army began with the statement that "leadership is expected of everyone in the army. . . ." (Hagey, 2009, p. 24). Hagey emphasized that the MBTI is just one of the tools used to make individuals "aware of what motivates them" (p. 24) while allowing for recognition of natural strengths, and optimizing opportunities for personal growth. The explanations and examples used in the article to illustrate each of the scales and preferences of the MBTI are military related and practical for that clientele. Hagey concluded his schema by stressing that "(i)f used correctly and ethically. . . the Myers-Briggs Type Indicator increases self-understanding and appreciation of personal differences in order to improve one-on-one interactions and team success" (p. 26).

Kise (2005) conducted a study that examined the "experiences and reactions of a team of four 6th-grade teachers at an urban middle school as they adopted a learning styles methodology based on psychological type, the theory behind the Myers-Briggs Type Indicator (MBTI)" (p. 47). Qualitative data was collected over a 15-month period that included teacher interviews and journals, student focus groups, observations, and student work. The study tracked changes in the teachers' core beliefs about education as well as causes of student failure and barriers to change in an urban classroom (p. 47). The author chronicled her change of focus in the study along with going from "an outside facilitator to being an active presence in the classroom" (p. 47).

In the results and discussion section of her article, Kise (2005) detailed each teacher by name (alias), MBTI designation, and adds a list of strengths as a teacher, education beliefs, and learns best when atmosphere. . . , and finished the detail with a

quote from the teacher revealed through interview. Kise's conclusions from this exercise were "the teachers' strengths and beliefs as educators could be directly linked to their own learning styles; they were unaware that their beliefs were largely the result of how they learned" (p. 51). There was a reluctance to look at change.

Through discussion and commitment on the part of the teachers to change, Kise (2005) changed her study focus to a coaching stance to provide a possible goal of fewer students failing in their classrooms. Consequently the following strategies were developed:

1. A problem-solving methodology was created that contradicted the teachers' beliefs about how students learn and why they fail.
2. Kise coached each teacher in their own learning style.
3. Evidence was collected that contradicted teacher beliefs about why students fail (p. 52).

The strategies were in place for the fourth quarter of the school year. The coaching was intense in that teachers were "trying differentiating lesson plans and implementing 'No More Fs' strategies" (p. 52).

The second set of interview discussions included the MBTI indicator along with motivation and points to remember. The author noted that study evolved into "a study of the process of changing teacher beliefs and classroom practices" (Kise, 2005, p. 56). Therefore the analysis of the data had implications for those providing teacher professional development toward school reform.

Kise (2005) noted that because it is the teachers who are asking to make changes in their practices and beliefs it is necessary to spend interest and attention to their needs. "First, a neutral framework was essential to helping teachers rethink their educational beliefs . . . in this study psychological type served as a common, neutral language for discussing current practices and proposed changes, allowing for reflection and collaboration" (p. 56). "Second, the designers of staff development efforts need to begin with the learning styles, needs, and interests of the teachers. . .(p. 56). Drawing upon the research on psychological type, Kise emphasized the awareness of "definite circumstances, evidence, and procedures that different personality types need before they enter willingly into a change process" (p. 56). Teachers needed extensive coaching first of all in their own learning style before they were willing to risk learning the new and putting it into practice in their classrooms. A third implication for school reform included the examination "of underlying assumptions and beliefs as well as the societal pressures or beliefs in which the school is operating" (p. 56). Kise concluded by saying "if these requirements aren't taken into account when teachers are asked to change their beliefs, the most worthy of reform efforts may never truly be put to the test where it counts - in the classroom" (p. 57).

Conclusion

Chapter 2 developed a review of literature focusing on the middle school, a brief history of its conception, setting, and curriculum. The focus continued with a detailed review of interdisciplinary curriculum as a prelude to the discussions of the cross-curricular connections teaching technique. The review illustrated a logical progression of

development. Based on the importance of interdisciplinary education and the need for cross-curricular experiences in the middle school as the 21st century progresses and educational reform continues, the goal of this study is to contribute to the research base that fills the gap in reform implementation. Kise's (2005) research provided some interest and many recommendations in this regard. The research of Kise's original study proposal sought to examine "the experiences and reactions of a team of four 6th-grade teachers at an urban middle school as they adopted a learning styles methodology based on psychological type, the theory behind the Myers-Briggs Type Indicator (MBTI)" (p. 47). As the study progressed, Kise found it necessary to shift her process to that of "coaching the teachers individually using techniques that met the needs of their psychological type preferences, and used a problem-solving approach aimed at reducing the number of failing students" (p. 47). This shift resulted in a totally different research study but produced several implications for future professional development opportunities and research potential.

The focus of this chapter was to present an overview of research related to middle schools, their setting and curriculum, the importance of interdisciplinary education in the middle school and the positive implementation of cross-curricular connections teaching technique within those classrooms.. The next chapter presents a discussion of methods and rationale related to the case study research conducted. The methodology included strategies used, the recruiting of participants, the collection and planned analysis of data, as well as looking at issues of credibility and dependability, discussed in detail so that replication can be achieved as needed.

Chapter 3: Research Method

Introduction

In Chapter 3, I continue to develop the rationale for a qualitative case study approach through an explanation of the research method selected. The overview includes a brief review of the qualitative paradigm as it relates specifically to case study and the rationale for selecting the case study approach. Continuing the development of the research method, the research questions that guided this study are again noted, along with my role and qualities, the research setting, and participants and their recruitment are formalized. The sequence of the chapter continues with the description of the design, data collection strategies, and data analysis strategies used. Finally, the procedures employed to verify the findings of the study are outlined.

Research Design and Rationale

The research questions in this study were the following:

1. How did middle school teachers experience implementing the cross-curricular teaching technique, with emphasis on the incident level?
2. How did teachers perceive the use of the cross-curricular teaching technique and its short and long-term value?

The purpose of this qualitative case study was to develop, explore, and describe the implementation of the cross-curricular connections teaching technique in the middle school and how teachers perceived its use and its short- and long-term value. The central phenomenon of the study is the cross-curricular connections teaching technique. "Cross-

curricular connections are connections between two or more areas of study that are made by teachers within the structure of their disciplines" (Maute, 1992, p. 73).

Qualitative research is an inquiry process of understanding based on distinct methodological traditions of study to explore a social or human problem. The researcher builds a complex holistic picture, analyzes words, reports detailed views of informants, and conducts the study in a natural setting (Creswell, 1998, p. 15).

A case study, qualitative in inquiry, is "an intensive, holistic description and analysis of a bounded phenomenon such as a program, an institution, a person, a process, or a social unit" (Merriam, 1988, p. xiv). A case can include a wide range of settings. This focusing or bounding of a case initially can be seen as anticipatory data reduction that rules out certain variables while attending to others (Miles & Huberman, 1984). This case study is a single site. The central phenomenon of the study is the cross-curricular connections teaching technique at its incident level.

The rationale for using the case study design is that it best fit the outcomes anticipated. The case study was reported from a descriptive perspective. This description took into consideration all pieces of data as they relate to the cross-curricular connections implementation from the teachers' perspective.

Role of the Researcher

I took on several roles in this study, first of all that of a presenter. I designed a series of three workshops to bring the cross-curricular teaching technique to the teachers participating in this study, including the background, rationale, and demonstration for the

cross-curricular connections teaching technique. During the workshops, I also presented the procedural components of the study, including but not limited to requirements, benefits of the study, time constraints, and confidentiality (Appendix A).

The second role I took on as I collected all the data was that of an observer. In the time interval between Workshops 1 and 2, a period of approximately 4 to 5 weeks, I conducted an observation of each teacher participant in her respective classroom during a class prepared in the cross-curricular connections technique. A matrix guide was prepared for each observation and an arbitrary time limit of 20 minutes was set, but most of these observations were longer. This observation was a prepared lesson and the teacher provided a lesson plan along with a sample of any materials used for that cross-curricular lesson. The guide assisted me as I performed the observation and the memos written during the observation assisted in the selection of the coding themes.

Thirdly, I acted as the interviewer for both one-on-one interviews as well as facilitating two focus groups. Questions were prepared for both experiences as a guide. Ten years later, I again interviewed three teachers of the group that participated in the original study in order to bring the study up-to-date in its data collection.

Finally, I served as the administrator of the Myers-Briggs Type Indicator (MBTI) Form G. The answer sheets, however, were sent to the Center for the Application of Psychological Type for scoring. This was done to provide validity and trustworthiness of the test.

I had no prior or current supervisory or instructional relationship with the teacher participants. Two of the three principals were known to me on a personal level prior to

the project, but this relationship had no bearing on participation. The opportunity for not participating or for withdrawing was emphasized throughout the project and the study and was clearly indicated on each form. My first meeting with the Grades 5 through 8 teachers in the three schools in this project was when I approached them after receiving the permission from their respective principals to solicit their participation. That was a short one-on-one encounter during which time I briefly explained the project and invited them to attend the first workshop. I then met the teachers in the group setting of Workshop 1.

Methodology

Participant Selection Logic

Careful selection of a research site and population helps to ensure the success of a research study. The sample size in qualitative research is typically small, and the sample is selected because it suits the purposes of the study (Gall, Borg, & Gall, 1996). Maxwell (2013) called this "purposeful selection" (p. 97). In this sample, particular surroundings, persons, and programs were selected deliberately to provide information that was relevant to the questions and goals of the study (Miles & Huberman, 1994; Patton, 1990). Maxwell suggested cultivating a relationship that allows one "to ethically gain the information that can answer (the) research questions" (p. 90).

The participants for this case study were principals and teachers from three middle schools—that is, Grades 5 through 8. Two schools were departmental in structure and one school used self-contained structure. The principals and teachers of three parochial schools within the southwestern Pennsylvania area were approached and were

willing to participate in this study. The procedure used to arrive at the final number of participants was as follows. Three principals agreed to give their teachers the educational opportunity and time to be part of this project (Appendix A). Fifteen teachers in the three schools approached were invited by me personally (Appendix A) to participate and to attend Workshop 1 on the cross-curricular teaching technique. After attending the first workshop, five shared physical education and music teachers felt they could not fully participate and chose not to continue. The remaining 10 teachers were very interested; however, when the choice to take the MBTI was presented and explained in detail (Appendix B), one teacher chose not to take the MBTI. She, however, participated in the implementation of the cross-curricular teaching technique in her classroom and was both observed and interviewed by me. Her information is not included in the analysis of this project as it was not complete. She did express her appreciation for the opportunity to participate. The final group of participants in this project included 10 middle school teachers representing all three schools. Ten years later, I again interviewed three of these teachers as I worked to update the data findings of this study. The available sample pool of middle school teachers, the criterion for participation, provided the best information related to the implementation of the cross-curricular connections teaching technique at the incident level.

Data Collection Procedures

In carrying out the data collection requirements for this project, five strategies produced valuable data information during the 6-week period of implementation of the cross-curricular teaching technique at the incident level in the middle school. The

strategies were as follows: observation, personal interview, focus group interview, teacher journals, and the use of the MBTI instrument. Ten years after the initial performance of the study, three teachers were again interviewed.

Workshop

The workshop was the first procedure used. Lifelong learning is a reality, especially in the education field (Peterson,1979). Teachers, in particular, strive to increase their knowledge both in content areas as well as in methods and techniques to improve their effectiveness in the classroom. The workshop was chosen as it provided a structured learning environment for the teachers. The purpose of Workshop 1 was to set the stage and provide the foundation for the research project as well as provide background, rationale, and demonstration for the cross-curricular connections teaching technique. This information was critical to the implementation of the teaching technique. The administration of the MBTI Assessment instrument also took place during this initial workshop. The workshop was both audio and video taped in order to prevent data reduction as well as to be a source of internal validity. This Workshop 1 was done at a spring in-service and was 6 hours in length.

I prepared the script and presented the background, rationale, and demonstration lesson for Workshop 1 utilizing the hierarchy of cross-curricular connections as initiated and outlined by Maute (1992). I also facilitated Workshops 2 and 3, which were more informal in structure.

The workshop was carefully scripted and detailed. Following the first workshop, the teachers began the implementation phase of the project. I was also available both on-

site and through telephone communication to clarify, reiterate, and share additional samples of the incident component of cross-curricular connections.

Workshop 2 consisted of a facilitated focus group interview. The tone of Workshop 3 was to conclude any unfinished data collection needs from the participants, to collect each participant's journal, to debrief the experience, to share the analysis phase to date, to return to each participant her MBTI results, and to express gratitude. The concluding workshop was about an hour and a half again after school.

Observation

Between the first and second workshop an observation of each teacher participant took place as they were teaching a class. As an outsider, an observer "will note things that are routine to the participants" (Merriam, 1988, p. 88). This was the reason observation was selected as one of the data collection tools for this study. A matrix guide was prepared for each observation and an arbitrary time limit of 20 minutes was set. This observation was a prepared lesson and the teacher provided a lesson plan along with a sample of any materials used for that cross-curricular lesson. The guide assisted me as I performed the observation and the memos written during the observation assisted in the selection of the coding themes.

Personal Interview

Between the first and second workshop a personal interview took place. The questions used as the guide to this interview are included in Appendix C. Open descriptive coding was used in the analysis of the data collected. Ten years later, an

updated set of questions, based on the first set, were prepared for the three teachers who were interviewed as part of the update of information (See Appendix D).

Focus Group

The agenda for Workshop 2, which was held on an afternoon after school, in two locations, included a review of the cross-curricular connections technique at the incident level, a focus group interview (Appendix E), and a debriefing of observations. I used my observation field notes, in draft form, as the debrief exercise. The teachers were asked to review the notes for accuracy. The debriefing served to increase the validity and reliability of the data collected. Stake (1995) called this "member checking" (p. 115) that assisted in the triangulation of 'the observers' observations and interpretations" (p. 115). The debrief was also used as a formative experience for the teachers. Very often positive feedback was not obvious and it is the hope of the researcher that the teachers saw practical advantages to the use of the cross-curricular teaching technique in their classrooms.

Journal

During Workshop 1 the teachers were given the journal guide questions (Appendix F) along with a spiral notebook in which to jot down anything they found of interest as they implemented the process, to include questions, successes, and items that presented some reflection throughout. This data collection strategy was not that successful. Some few thoughts were expressed but the teachers felt the experience was time-consuming and cumbersome.

Myers-Briggs Type Indicator Instrument

During Workshop 1 I explained and gave a handout (Appendix B) related to the MBTI Instrument. I initially had planned to administer the MBTI in the second workshop but the flow of Workshop 1 presented the best opportunity for the administration. The nine participants who were willing to take the Indicator were together for Workshop 1 and were in agreement with its administration. Therefore, the instrument was administered by me in the afternoon of the workshop. The form used was MBTI Form G. The instrument booklets were rented through the Center for Application of Psychological Type. Form G Answer Sheets were also used and these were sent to the Center for Application of Psychological Type for scoring.

Data Analysis and Interpretation Plan

Analysis in case study research is on-going and cyclical. For a case study, Creswell (1998) said that analysis consisted of making a detailed description of the case and its setting. He recommended "analyzing the multiple sources of data to determine evidence for each step or phase in the evolution of the case" (p. 153). Merriam (1988) stressed that in qualitative case study research data collection and analysis were a "simultaneous" (p. 119) activity. It is interactive throughout, during which the investigator was concerned with producing believable and accurate findings. She further noted that "validity and reliability in a qualitative case study derives from the researcher's presence, the nature of the interaction between researcher and participants, the triangulation of data, the interpretation of perceptions, and rich, thick description" (p. 120).

I used the following appropriate data analysis procedures for this study: triangulation, open descriptive coding, progressive analysis, MBTI results, and audit-trail.

Open Descriptive Coding

Open coding was used in the analysis of the data collected from personal interviews, journals, and focus groups. A "display format" (Miles & Huberman, 1984, p.80) was prepared using a matrix that details "descriptive data segments around a particular event or experience" (p. 80). The matrix (p. 18, Chart 10a) used words only portraying "short quotes and summarizing remarks" (p.80). These words were then clustered as each pattern or theme becomes evident. The descriptive narrative in the findings section of this dissertation highlighted the clusters.

Progressive Analysis

The data was logged chronologically. Comments, memos, observations, and questions were indicated in the margins of the log. This exercise refined the units initially determined and helped to isolate the more important aspects of the data. A separate running list of major themes that cuts across the data was compiled. The list assisted in synthesizing the information into codes that were "cut and-pasted" into conceptual categories. Devising categories, according to Merriam (1988) was an "intuitive process, but it is also systematic and informed by the study's purpose as well as the investigator's orientation and knowledge" (p. 133).

Categories, few in number, reflected the frequency with which something arises in the data. Also something that was pertinent to one's audience became a conceptual

category along with the unique aspects of the study. Those data that reflect the purpose of the investigation required consideration. Insights gleaned from the participants as they review and "check" the data derived from their classroom implementation experiences assisted in the category creation.

Issues of Trustworthiness

Triangulation involved using multiple investigators, multiple sources of data, and/ or multiple methods to confirm the emerging findings. This procedure established validity in case studies relying on a holistic understanding of the situation to accurately construct possible explanations of the case under study. "Using multiple methods of both data collection and analysis, triangulation strengthens reliability as well as internal validity" (Merriam, 1988, p. 169).

Stake (1995) noted that most qualitative researchers "not only believe that there are multiple perspectives or views of the case study that need to be represented, but that there is no way to establish, beyond contention, the best view" (p.108). Hence the need for triangulation throughout the data collection, analysis, and interpretation stages of the research design.

Methodological triangulation increased confidence in interpretation. Multiple approaches, according to Stake (1995), were likely" to illuminate or nullify some extraneous influences"(p. 114). In a case study Stake noted that "most researchers speak principally of observation, interview, and document review" (p. 114).

Member checking, which was used as part of the agenda in Workshop 2 added another triangulation perspective. Participants played a major role in the case study.

"Although they are the ones being studied, within the context of the program learning and implementation, they can provide critical observations and interpretations, sometimes making suggestions as to sources of data" (Stake, 1995, p. 115).

Summary

The research method detailed in Chapter 3 was for a qualitative educational case study. The central phenomenon of the study was the cross-curricular connections teaching technique. The focus of the study was on the incident aspect of that program on the day-to-day basis in the middle school classroom. It is through the classroom teacher that the case was conceptualized, the data collected and an on-going analysis developed. Multiple sources of information were detailed in the method presented in order to triangulate the data collected as well as provide validity and reliability to the research experience.

The middle school was the site for implementing cross-curricular connections teaching technique. Motivation in instruction in the middle school culture was useful to students as they tend to exert their own method and mode of learning. Teachers who taught from their own preferred style yet accepted and built on their students' learning preferences tended to see improvement and success in the learning experience, thus effecting social change. Chapter 4 will present the findings of this study with an emphasis on the implementation of the cross-curricular teaching technique in the middle school.

Chapter 4: Results

Introduction

The purpose of this qualitative case study was to describe how middle school teachers experienced the implementation of the cross-curricular teaching technique in their classrooms and how these teachers perceived the use of the technique. The central phenomenon of the study is the cross-curricular connections teaching technique. "Cross-curricular connections are connections between two or more areas of study that are made by teachers within the structure of their disciplines" (Maute, 1992, p. 73). There were two research questions in this study:

1. How did middle school teachers experience implementing the cross-curricular teaching technique, with emphasis on the incident level?
2. How did the teachers perceive the use of the cross-curricular teaching technique and its short and long-term value?

I have reported the case study from a descriptive perspective. This description took into consideration the interpretation of meanings, demographics, and attitudes (Merriam, 1988) as they relate to the cross-curricular connections implementation. Chapter 4 contains five major sections: setting and participants, data collection, data analysis, and evidence of trustworthiness, along with a summary of findings as they related to the research questions of this study.

Setting and Participants

In this section, I described the workshops that provided an introduction to and explanation of the cross-curricular teaching technique the participating teachers were to

implement, with emphasis on the incident level, within their classroom structure. Their experiences and perceptions involved in this implementation were the data collected during this study.

Workshops Supported Technique Implementation

I delivered a workshop to provide a structured learning environment for the teachers. The purpose of Workshop 1 was to set the stage and provide the foundation for the implementation project and to provide background, rationale, and demonstration for the cross-curricular connections teaching technique. This information was critical to the teachers' implementation of the teaching technique. The administration of the Myers-Briggs Type Indicator Assessment instrument (MBTI), Form G, also took place during this initial workshop. For the research study, the workshop was both audio and video taped as a source of internal validity. I conducted the first workshop at a spring in-service and it was 6 hours in length. I prepared the script and presented the background, rationale, and demonstration lesson utilizing the hierarchy of cross-curricular connections as initiated and outlined by Maute (1992). The scripts contained the explanation and rationale of the cross-curricular connections teaching technique, a demonstration lesson, along with a packet of accompanying materials and handouts.

During Workshop 1, I also explained and gave a handout (Appendix B) related to the MBTI Instrument. I had planned to administer the MBTI in the second workshop but the flow of Workshop 1 presented the best opportunity for the administration. The nine participants who were willing to take the MBTI were together for Workshop 1 and were in agreement with its administration. Therefore, I administered the instrument in the

afternoon of the workshop. The form used was MBTI Form G. The instrument booklets were rented through the Center for Application of Psychological Type. Form G Answer Sheets were used and were sent to the Center for Application of Psychological Type for scoring. The timing of scoring by the center led to the scores being provided to the teachers toward the end of the project. Following the first workshop, 10 teachers began the implementation phase of the project. I was also available both on-site and through telephone communication to clarify, reiterate, and share additional samples of the incident component of cross-curricular connections. I observed the teachers after the first workshop, as explained in the data collection section below. I also facilitated Workshops 2 and 3, which were more informal in structure and offered during the teachers' after school time.

Workshop 2, which was held on an afternoon after school in two locations, included a review of the cross-curricular connections technique at the incident level and opportunities for teachers to review the notes from the classroom observations. Workshop 2 also included a facilitated focus group about how the teachers were doing with the implementation of the teaching technique, and these focus group data became part of the research study. I used Workshop 3 to collect each participant's journal, to debrief the experience, and to return to each participant her MBTI results, and to express gratitude. The concluding workshop was about 90 minutes, again after school, and was held in two locations.

Participants

The setting and participants for the collection of data followed the scheme as outlined in Chapter 3. I selected a purposive sample of middle school/middle grade principals and teachers, involved in teaching Grades 5 through 8. The original project took place in the spring of 2003 and included middle school teachers in three parochial schools in southwestern Pennsylvania in the United States. The study involved interviews in 2003, and I re-interviewed three of the original teachers in the spring of 2013. These teachers taught in the one remaining parochial school in the area. Two of the schools from which the original participants were drawn were closed over the years due to the change of demographics in the area. The schools chosen were parochial Catholic schools: that is, faith-based and attached to local urban and semi-rural parishes. The teachers were all White women.

I had no prior or current supervisory or instructional relationships with the teacher participants. Two of the three principals had a personal connection to me prior to the project, but this relationship had no bearing on participation. The opportunity for not participating or for withdrawing was emphasized throughout the project and the study and was clearly indicated on each form. My first meeting with the Grades 5 through 8 teachers in the three schools in this project was when I approached them after receiving the permission from their respective principals to solicit their participation. That was a short one-on-one encounter during which time I briefly explained the project and invited them to attend the first workshop. I then met the teachers in the group setting of Workshop 1.

The procedure used to arrive at the final number of teacher participants (10) was as follows. Eighteen people were approached to participate in the workshops and the implementation project. The three principals gave their teachers the educational opportunity and time to be part of this project. The 15 teachers in the schools were invited personally to participate and to attend Workshop 1 for detailed information. After attending the first workshop, the five shared physical education and music teachers felt they could not fully participate and chose not to continue. The remaining 10 teachers were very interested in the project, which included the workshops, the observations, and the opportunity to take the (MBTI); one teacher chose not to take the MBTI at this workshop but did take the indicator at a later date. All of these 10 teachers agreed to be interviewed for the study and grade level and MBTI information about them are included in Table 1. Ten years later, I again re-interviewed three of these teachers as I worked to update the data findings of this study.

Table 1

Participants

| Pseudonym | Grade Level | MBTI designation |
|-----------|---------------|--|
| Robin | Middle School | ESFJ Extraverted Feeling with Sensing |
| Florence | Middle School | ESFJ Extraverted Feeling with Sensing |
| Natalie | Middle School | INTJ Introverted Intuition with Thinking |
| Mary | Middle School | ISTJ Introverted Sensing with Thinking |
| Catherine | Middle School | INFP Introverted Feeling with Intuition |
| Kate | Middle School | ENFP Extraverted Intuition with Feeling |
| Connie | Middle School | ENFP Extraverted Intuition with Feeling |
| Monica | Middle School | ENFJ Extraverted Feeling with Intuition |
| Darlene | Middle School | ENFJ Extraverted Feeling with Intuition |
| Carol | Middle School | ESFP (I hand scored her Indicator after she took it later than the other participants) |

Data Collection

The data collection procedures used in this study included 10 individual interviews, two focus groups interviews held in two locations, and journals the teachers were asked to keep as they experienced the project. A follow-up-date procedure was individual interviews of three of the original participants 10 years later. In addition, the MBTI instrument results were used to help me describe the participants.

Personal Interviews

Between the first and second workshops, I observed each teacher participant as she was teaching a class. I observed a prepared lesson and the teacher provided a lesson plan along with a sample of any materials used for that cross-curricular lesson. A matrix guide was prepared for each observation and an arbitrary time limit of 20 minutes for the observation was set. The observed class was audio recorded and memos were written on the observation guide. These observations formed the basis for the prepared questions in the personal interview.

I interviewed each of the 10 teachers between the first and second workshops using the guide to the interviews included in Appendix C. The interviews were audio recorded with the permission of the participants. Ten years later, an updated set of questions, based on the first set, was used to interview three teachers who were interviewed as part of the update of information (See Appendix D). These interviews were also audio recorded. Each interview was approximately 30 minutes in length.

Focus Groups

The agenda for Workshop 2, which was held on an afternoon after school in two locations, included a review of the cross-curricular connections technique at the incident level and a focus group interview (See Appendix E). The teachers were also asked to review my researcher's notes of the observation for accuracy. The debriefing served to increase the validity and reliability of the data collected. Stake (1995) called this "member checking" (p. 115) that assists in the triangulation of the "observer's observations and interpretations" (p. 115). The debrief was also used as a formative experience for the teachers. The debrief allowed the teachers to see the practical advantages in the use of the cross-curricular teaching technique in their classrooms.

Journals

During Workshop 1, the teachers were given the journal guide questions (Appendix F) along with a spiral notebook in which to jot down anything they might find of interest as they implemented the process, to include questions, successes, and items that presented some reflection throughout. This data collection strategy was not that successful. Some few thoughts were expressed, but the teachers felt that the experience was time-consuming and cumbersome. Therefore, while I had originally planned to analyze these data, I found them insufficient to be useful in answering the research questions.

Data Analysis

Analysis in case study research was on-going and cyclical. For a case study, analysis consisted of making a detailed description of the case and its setting by

analyzing the multiple sources of data to determine evidence for each step in the evolution of the case (Creswell, 1998). Merriam (1988) further stressed that in qualitative case study research, collection and analysis of data are "simultaneous" (p. 119) activities. It is interactive throughout during which the investigator is concerned with producing believable and accurate findings. Therefore I used progressive analysis that included descriptive coding and comparative analysis and kept an audit trail.

Progressive Analysis

The suggested guidelines offered by Merriam (1988), Miles & Huberman (1984), Yin (1989), and Maxwell (2013) provided a workable analytic approach. The steps I included in this progressive analysis phase included open descriptive coding, unit delineation and category construction, theme selection, and speculation. The purpose of this case study was to study the experiences and perceptions of teachers in the implementation of the cross-curricular connections teaching technique, with emphasis on the incident level, in the middle school. The results sought to add useful insights into the effective use of the cross-curricular incident as the base upon which to build more successfully integrated interdisciplinary units.

A column matrix, similar to the one described by Miles & Huberman (1984, pp. 80 - 81) Chart 10a (p. 81) was used to code data. This matrix took descriptive data, words or phrases, and separated them among participants. The procedure allows for data reduction and for refining themes. I used the personal interview questions (Appendix C) as a guide and noted the main nouns and verbs used in the responses to come up with the major themes delineated in the results section of this study.

The significant themes derived from the personal interview questions were: comfort with cross-curricular connections teaching technique, application of cross-curricular connections, cross-curricular incidents in lessons, and difficulties related to time constraints encountered in planning, preparation, and implementation. As noted above, the first draft set of transcribed data was given to the participants as part of Workshop 2 for their review and member checking for accuracy. This draft included predominately the classroom observation transcripts.

Comparative Analysis

I collected and analyzed data from and through interviews and observations, along with the focus group experiences, all of which were descriptively coded to come up with significant data themes. Documents such as lesson plans, handouts, and class-used materials verified the themes.

Audit-Trail

An audit-trail is a detailed explanation of "how the study was conducted, how data was collected, how categories were derived, how decisions are made throughout the inquiry, and how the findings are derived from the data" (Merriam, 1988, p.183). These elements are described in this chapter to allow other researchers to replicate the study. The audit-trail I established sought to enhance the reliability of the data collection and analysis phases of the study and illustrated a logical chain of evidence in the findings. In this study, the chain of evidence gave credence to the findings regarding the teachers' effectiveness of consciously implementing cross-curricular incidents in the day-to-day teaching and learning of the middle school.

Evidence of Trustworthiness

Maxwell (2013) stressed that a main emphasis of qualitative research is "how you will rule out specific plausible alternatives and threats to your interpretation and explanations" (p. 124). Therefore, I triangulated my data among observations, documentation, personal interviews, focus group, MBTI results, and follow-up interviews to determine if explanations might emerge from the different sources or if they were aligned. All of these data areas were descriptively coded to come up with significant themes. "Triangulation strengthens internal reliability as well as internal validity" (Merriam, 1988, p. 172). The MBTI results were another lens through which the results were analyzed. Member checking, as used in Workshop 2, added a critical interpretation to the findings and reduced researcher bias. The need for triangulation was essential throughout the data collection, analysis, and interpretive stages of the research design (Stake, 1995).

During the data collection portion of this study, I followed the protocols as set up in Chapter 3. I used the purposeful-participant selection rubrics in order to minimize bias. I reminded the participants, both verbally and on each participant form, that their participation was voluntary and they could pick and choose their participation or even withdraw from the study if they so wished. I also made sure all interviews and the focus group were handled consistently. I had a prepared schema of questions that were used for each interview and group (see Appendices E, C, and D). I transcribed and coded all data using a matrix similar to Miles & Huberman's Chart 10b (1984, pp. 80-81). Throughout

the data collection and analysis process I used specific word descriptions utilizing the personal interview questions as an outline to produce the emerging themes.

I included detailed descriptions of the school research sites as well as brief descriptions of the 5th through 8th grade classrooms. The results of this study were pertinent only to the participating teachers and schools, however, with the acceptance of the national Common Core Standards and their recommended use of cross-curricular instruction, these results might be of interest to some middle schools.

The use of data collected from the follow-up interviews confirmed both the validity and dependability of the data. As I coded the three participants interview responses I was able to build on my previous knowledge as I verified themes and added another theme, that of creativity, to the data analysis. This on-going analytic exercise allowed me to be more objective and to identify trends that assisted a solid triangulation of information.

Results

In this section of Chapter 4, I presented the findings as related to the research questions that drove the study. The results were arranged initially in the order of the progressive analysis of data. Findings from the analysis of the original interviews and observations along with the focus group experience were followed by analysis of the documents. Finally, the results of the analysis of the three follow-up interviews resulted in an additional theme. For the last section of the results, I triangulated the results of these three steps into a common set of themes. The significant themes derived from the personal interviews data included: comfort with cross-curricular connections, application

of the teaching technique, cross-curricular connections in lessons, and the difficulty related to time needed in planning, preparation, and implementation of the teaching technique.

The focus group yielded the additional theme of creativity. The follow-up interviews validated these themes.

Initial Interviews and Observations

The significant themes derived from the analysis of the initial interviews and observation data included: comfort with cross-curricular connections, application of the teaching technique, cross-curricular connects in lessons, and difficulty of time constraints in planning, preparation, and implementation. Responses to each interview question guided the presentation of the themes that emerged.

Comfort with cross-curricular connections. Personal interview question one was: The lesson you presented today using the cross-curricular connections teaching technique - with what part of that lesson were you most comfortable? Most, that is 9 of the 10 teachers, felt comfortable with the areas of the lessons that were in their expertise. The teachers who presented literature pieces as their core lesson plans for the observation were able to extend the connections to other subjects or to current event happenings. For example, Connie presented a critique lesson on the *Tale of Two Cities*, which the 8th grade students read and delved into lightly as the teacher knew they would go into the literary discussion in depth as high school sophomores. The critique centered on the historical aspect of the novel and was a teacher lead discussion. Connie's comfort level in the class was evident in the back and forth discussions from the students. She explained

that she expects them to "take hold" of the discussion and she builds on the student responses. In the observation, I witnessed many of the students recommend drawing the final activity of the lesson. Even though art and music were not Connie's strengths, she planned to allow the students to be creative in their "culminating activity." Connie stated that she "uses the cross-curricular teaching technique all the time - maybe even subconsciously - geography and mathematics were very evident in the preparation and presentation of this lesson."

Monica developed her social studies lesson to the crisis of the Middle East as well as to biblical Old Testament events and geography that formed the 6th grade religion curriculum throughout the school year. Monica noted her enthusiasm for the cross-curricular teaching technique saying that she does this "almost naturally and this technique verified her teaching method." Connie and Monica were representative of the teacher participants.

Application of cross-curricular connections. Interview question two was: What cross-curricular connections incidents did you plan into today's lesson? The teachers reported that the more spontaneous the cross-curricular connections were, the more interesting they were to the students. That view was expressed by both teachers and students. Robin related an episode that occurred in her class. The class was discussing the lesson about World War II. One student added an anecdote about his grandfather that helped to solidify the understanding of the concept of rationing as it occurred during World War II for the students This added to the presentation as well as providing interaction among the students. Robin noted that sometimes these kinds of interactions

among the students can be time consuming but proved to be a learning experience for the students.

Carol prepared an elaborate social studies supplementary lesson for her students on making a Native American quilt using patterned paper. I noticed many obvious cross-curricular incidents during the class and both teacher and student referenced them. The lesson was the culmination of the Native American unit just studied. The students researched various symbols that were representative of the Native American tribes and culture they studied. Carol added to their list with information she knew. The required preparation needed to work on the hands-on part of the lesson involved shapes (mathematics), design (mathematics and art), complimentary colors (art), cultural knowledge (social studies), and design of the quilt (engineering).

The lesson on conflict resolution prepared and presented by Florence and noted earlier evolved into a lengthy classroom discussion and a role play. Florence shared that this was her class's favorite way to express their understanding of a concept. The students had a good sense to bring in current events as they master the lesson presented. These two cases are consistent with others that I witnessed and are examples of the emergence of the application theme.

Cross-curricular connections in lessons. Interview question three was: Do other cross-curricular connections, especially incidents, become obvious to you as the lesson developed? How do you treat these incidents? Kate, as with all of the other teachers, had "no problem" with this aspect of the cross-curricular teaching technique. She "subconsciously uses her own and past experiences continually in class." In addition,

because the school is so small and she has a good rapport with the other middle school teachers, she "knows what the other teachers are doing and constantly pulls in that information into her lessons." She felt it reinforces the information for the students while being cross-curricular for her. The students understood the connections and through this experience they see that all of life is really connected in many different ways. Sometimes this can be time consuming but well worth it. Monica agreed with her and said that oftentimes her lesson plans are not so detailed but she "had it in her head. The wheels are always turning relative to connecting things in her class."

Connie expanded her response to this question and she felt that if the middle grade teachers in her school would work together as they prepared their classes they could "pull in on a topic and produce more connections for their students." The other teachers also expressed similar statements about the necessity of working together to make these connections more alive for their students. These observations led into the next theme regarding time constraints. Working together on connections among the subject areas may help to alleviate some of the timing problems as well as bring about a better understanding of subject connectedness among their students.

Time constraint in planning, preparation, and implementation. Personal Interview question four was: What difficulties did you encounter in the planning, preparation, and implementation of today's class as you consciously noted cross-curricular connections incidents? Catherine, along with Florence, Darlene, and Mary, encountered time constraints. Catherine reported that if one brings in too many connections the students "get excited about things" and you run out of time. Catherine

further said there is just a "certain amount of time allotted to teach a concept" however, Catherine expressed "...enthusiasm for the technique. I want to give the kids something relevant like current events, newspapers, and generated activities. I bring up topics that are pertinent to what we are studying." Catherine needed more time with the class and more time to plan. Florence liked to "incorporate up-to-date resources that makes the story alive for the kids." She also felt she was unable to incorporate as much as she wanted in a lesson. Natalie asked "how in-depth should I go in a lesson?" Oftentimes she brings in things the students found interesting the next day, as for example sign language, which was discussed and illustrated in today's lesson. Natalie also said that "with the internet these days there is so much more information available." She tried to expand her lessons as much as possible.

Even when asked about other difficulties and concerns, the discussion would revert back to needing more time. Robin wanted more instruction in the technique. She also asked about the MBTI results and expressed an interest in improving her teaching in general once she knows her MBTI Type. Several teachers noted that they "learn with the kids" as the result of a connection made in class. It "helps me to be aware of bridging in other subject areas" Carol said. Florence noted that instead of planning the connections she "likes when the connections come naturally from the students." She, too, was concerned about the time element and often "cuts off" the student if he/she tends to get afield or she feels she was not able to incorporate a connection with the lesson. The time needed for planning appeared to be the overarching concern for all 10 teachers.

Focus Groups

As explained above, the focus group sessions in both locations were the longest agenda piece in Workshop 2. The review of the transcripts of the teacher observations led into the discussion points as the suggested guide questions (Appendix E) for the focus session. The guide questions were: In what ways are you becoming more aware of cross-curricular connections in your teaching preparations? Should cross-curricular connections not be present in your planning, do you consciously note connections as they occur? In what ways? Do you feel comfortable with the cross-curricular connections teaching technique both in your planning and in your teaching? Discuss. And, did you work with a team in order to produce the lesson plans and lessons for this research? If so, what was your experience? If not, what were circumstances or attitudes that prevented you?

Throughout the discussion, all the teachers expressed many of the ways they were becoming more conscious of cross-curricular connections in their teaching preparation as well as when these connections spontaneously came up in their lessons. One of the teachers related her experiences in a mathematics class which dealt with sales commissions.

The calculation of commissions, of course, was the Math piece. I was comfortable in relating a personal experience of an Avon lady coming to my door and trying to sell me a series of items that provided a greater commission for her. The students picked up on this and brainstormed car salesmen, hardware, and real estate. The lesson eventually evolved into investments and interest and led into both me and

my students having to do some research. It was a great cross-curricular teaching experience.

During this discussion, several of the teachers fed off each other and said they "bring in current events in just about every subject." Other teachers agreed and said "current events are easy cross-curricular incidents to illustrate a concept- especially if it something the kids are aware of or you can make them aware of. It sparks their interest and often they will do research to add to the class discussions." The reading teacher agreed with the literature teacher who said "current events often makes a classic literature selection come to life if it can be related to something happening right now." All of the teachers agreed they were more conscious of the incidents and made note of them for themselves and for their students. One of the teachers concluded "advancing their repertoire of cross-curricular incidents, helped me to be aware of bringing in other subject areas."

Another theme, that of creativity, emerged as the discussion continued. The teachers discussed their use of media in their classrooms and how they creatively enhanced their lessons with a film clip, hands-on experiences, newspaper and magazines, internet features, and unit development out of a series of incidents. I was able to witness some of these creative experiences during my observation time in the individual classrooms.

A question regarding working together fueled a discussion on the pros and cons of the middle grade teachers working as a team in their preparation for this research project. It appears the two city schools were able to do some group work or two teachers were

working together as, for example, the mathematics and science teachers. This was possible because these two schools exchange classes throughout the day and working together is a part of their regular experience. The semi-rural school had self-contained classes and the opportunity for group work was not available. However, all the teachers agreed it would be an ideal setting and something they could strive for in the future. The focus group discussion confirmed the emergent themes from the individual interviews: comfort with cross-curricular connections, application of the teaching technique, cross-curricular connects in lessons, and difficulty of time constraints in planning, preparation, and implementation, with the addition of creativity as a fifth theme.

The major concern expressed by a majority of the teachers in the focus group remains that of time constraints, both on the part of preparation of the lessons as well as how to direct the students, time wise, as they see and share the cross-curricular incidents within their classes. This concern verified the difficulty expressed during the individual interviews. All of the teachers also agreed that working together as a middle school group would allow for more cross-curricular options that they would be able to build into their lessons plans. The result would increase awareness among their students of the importance and utilization of the technique.

Follow-Up Interviews

After a lag in time between initial data collection and my efforts to complete the study, my committee suggested that I seek out a few, even just one, person(s) involved in the initial research and re-interview them. The new data would extend the data collection and analysis process to include teachers' more contemporary practices. I was able to find

four persons (one principal and three teachers) still in the education profession who participated in the original study. I went in person to the principal who was amenable to allowing her teachers this interview opportunity if they were willing. She spoke with the teachers, called me to say they were willing, and we set up a convenient date.

The three teachers were:

| | | |
|--------|---------------|---|
| Sally | Middle School | She did not take the MBTI 1 - 8 Spanish Teacher at the time of the original study |
| Monica | Middle School | ENFJ Extroverted feeling with intuition |
| Carol | Middle School | ESFP (hand scored indicator) |

The interview questions are found in Appendix D and were based on the original set of questions. Each participant's interview was audio-taped, with her permission in a face-to-face interview setting. I also took hand written notes during the interview. The audio-tape was transcribed. The same type of matrix, Miles & Huberman's (1984, pp.80-81) Chart 10a (p.81), was used in the coding of these three interviews and the same themes delineated to determine if the analysis results fits in these categories or if additional or different categories emerged.

Question 1 dealt with the continued use of the cross-curricular teaching technique and what part of that technique the teachers were most comfortable with using. Sally, who now teaches reading, English, and Spanish immediately said she uses the cross-curricular teaching technique constantly as she teaches Spanish reminding her students

that it "this way in English and that way in Spanish." At the time of the interview she was teaching prepositional phrases in both her English and Spanish classes relating the proper usage to the students' reading assignments. Sally noted she even finds a broader base to relate across the curriculum. She related telling the students how health relates to their everyday life along with the correct spelling of health-related words. For spelling she "always connects words to lessons in other subjects." Sally's examples also answered question 2 which asked for examples of cross-curricular connections in recent lessons.

Monica taught science and mathematics in grades 7 and 8 while Carol taught language arts and social studies. These two teachers worked closely together as they prepared and implemented their respective class lessons. Carol noted that she was teaching the book *Anne Frank* in literature and was developing World War II historically in both world and American History along with the Holocaust in a cross-curricular fashion. The students were creating a scrap book in which they have to find five other sources besides their basic text and write text to explain the learnings they achieved. Within the scrap book they are using concepts developed cross-curricular in literature, social studies, and art.

Monica noted that she "is always flexible and looking for connections." She shared an extensive project she just completed with grades 7 and 8 through the Challenger Space Center during which the students made use of computer programming, Skype, wrote up their results with a power point, and evaluated real-time information through a computer program. She explained in detail how she related cross-curricular

connections to the students and also expected them to notice and make note of the connections.

The examples from the three teachers illustrated creativity as they expressed their comfort, willingness, and risk to continue their use of the cross-curricular teaching technique. They did admit it took a lot of work and time to prepare and implement these lessons. Carol especially said:

The time element involved in preparation and teaching today is so much greater than it was 10 or 15 years ago. Families are so scattered and the children have so many after school activities that as a teacher one cannot depend on homework to get work done. It has to be done in class which takes more time and creativity on the part of a teacher.

Both Sally and Monica said something similar during their interviews. Again the theme of time constraints came up in the interviews as a major difficulty in implementation. The questions used as a guide in the interview were broad enough to give teachers the opportunity to discuss the technique from the technical aspect but also provided the opening for the teachers to tell their stories of successes and difficulties in implementation.

Summary

Chapter 4 contained five major sections: setting and participants, data collection, data analysis, and evidence of trustworthiness, along with a summary of findings as they related to the two research questions of this study. The results of the findings were arranged according to the major themes that emerged from the coding and analysis of

data from observations, documents, personal interviews, focus group, MBTI results and follow-up interviews. The themes were: comfort with cross-curricular connections, application of the teaching technique, cross-curricular connections in lessons, difficulty of time constraints in planning, preparation, and implementation, and creativity.

Research Question 1: How did middle school teachers experience implementing the cross-curricular teaching technique, with emphasis on the incident level? The teachers shared several implementation experiences:

- nine of the ten teachers felt comfortable with the areas of lessons that were in their expertise.
- comfort was expressed in back and forth discussions from the students upon which the teacher could build.
- spontaneous cross-curricular connections appeared to be the most interesting to both teacher and student.
- the main over-arching concern in the implementation of the technique was that it is time consuming in both preparation and implementation.
- working together in a team atmosphere alleviated some of the time constraints and provided opportunity for more detailed and timely connections.

Research Question 2: How did the teacher perceive the use of the cross-curricular teaching technique and its short- and long-term value? The participants' perceptions of use and short- and long-term value of cross-curricular teaching techniques were:

- even though an area was not in the teachers' area of expertise, all of the teachers encouraged their own and their students' creativity as they researched together those aspects of a specific lesson.
- several of the teachers expressed enthusiasm for the technique as it came "almost naturally. . . and verified (their) teaching method."
- short term value was in the spontaneous use of the cross-curricular connections to solidify a concept in a current lesson.
- long term value was that three of the teachers continued to consciously use and enhanced the cross-curricular technique in their teaching experiences over the past 10 years.

Chapter 5 presents an interpretation of these findings, implications from the results, some practical applications of the study in the light of the national Common Core Standards, recommendations for future research, along with suggestions related to social change.

Chapter 5: Discussion, Conclusions, and Recommendations

The central phenomenon of this descriptive, qualitative case study is the cross-curricular connections teaching technique. "Cross-curricular connections are connections between two or more areas of study that are made by teachers within the structure of their disciplines" (Maute, 1992, p.73). The purpose of the study is to describe how middle school teachers experienced the implementation of the cross-curricular teaching technique in their classrooms and how these teachers perceived the use of the technique.

Two research questions guide the project:

1. How did middle school teachers experience implementing the cross-curricular teaching technique, with emphasis on the incident level?
2. How did the teachers perceive the use of the cross-curricular teaching technique and its short and long-term value?

The technique, with emphasis on the incident level, was studied through its planned implementation in three middle schools. Very few studies have been conducted on the incident aspect of the cross-curricular teaching technique, and even fewer have studied its implementation at the middle school level.

Ten purposive sampled middle school teachers from three urban and semirural Catholic schools participated in the original study. These participants attended workshops that supported the implementation of the technique. Data for the study were collected through individual interviews, two focus group sessions, and journals the teachers were asked to keep. In addition, documents such as lesson plans and classroom handouts and materials were referenced as the individual interviews were based on a classroom

observation of the teacher's cross-curricular connections implementation. Several follow-up interviews were also conducted. The data analysis process was ongoing and cyclical. I used progressive analysis, comparative analysis, and audit trail.

Chapter 5 includes a summary and interpretation of the case study's findings, along with implications and recommendations for middle school curriculum developers, administrators and teachers, and general educational researchers. The chapter begins with an overview of why the study was initiated, how it was done, a reminder of the research questions used, and a brief summary of the findings. This is followed by a discussion of the interpretations and conclusions arrived at from the findings. This discussion leads into how these findings are related to the review of literature found in Chapter 2. Implications follow for future research as well as social change, including the current use of the Common Core Standards for College and Career Readiness, usually referenced as Common Core Standards, which were not in use at the beginning of this case study.

Summary of Findings

The observation notes, classroom documents, interview transcripts, and focus group discussions were descriptively coded using a selective word coding matrix procedure. Using the progressive analysis of data research technique along with triangulation, the following significant themes surfaced from my data: *comfort with cross-curricular connections; application of the teaching technique; cross-curricular connections in lessons; difficulty of time constraints in planning, preparation, and implementation; and creativity*. Creativity surfaced during the focus group experience. The follow-up interviews validated these themes.

The findings that addressed the first research question were as follows:

- nine of the 10 teachers felt comfortable with the areas of lessons that were in their expertise,
- comfort was expressed in back and forth discussions from which the teacher could build,
- spontaneous cross-curricular connections appeared to be the most interesting,
- the main over-arching concern in the implementation of the technique was that it is time consuming in both preparation and implementation, and
- working together in a team atmosphere alleviated some of the time constraints and provided opportunity for more detailed and timely connections.

The findings that addressed the second research question were as follows:

- all of the teachers encouraged their own and their students' creativity as they researched together unfamiliar aspects of a specific lesson.
- several of the teachers expressed enthusiasm for the technique as it came "almost naturally. . . and verified (their) teaching method."
- short term value was in the spontaneous use of the cross-curricular connections to solidify a concept in a current lesson.
- long term value was that three of the teachers continued to consciously use and enhance the cross-curricular technique in their teaching experiences over the past 10 years.

Interpretations of Findings

This study was based on Maute's (1992) hierarchy of cross-curricular connections. The hierarchy is illustrated as a pyramid (see Figure 1). At the base of the pyramid is the cross-curricular incident. It is this incident, which happens more frequently than any other type of connection, that was the topic of the current study. Proceeding gradually up the structure, one finds the activity, then assignment, followed by unit, and finally, at the apex, is the event (pp. 74-75).

The teachers who participated in this study were taught the cross-curricular teaching technique through a workshop designed to support its development and implementation. This professional development drove the conceptual framework of the study in that adult learning processes were used during the demonstration workshops that initiated the use of the technique in the teacher participants' classrooms. As the literature review in Chapter 2 illustrated, the definitions and views of curriculum have broadened as have the possibilities for connections. No longer is curriculum limited to what is planned or takes place in the classroom but must include all facets of the culture and everyday life as well as those connections made in formal or informal circumstances (Maute, 1992).

The middle school level was chosen as the site of the implementation of the cross-curricular teaching technique. As van't Hooft et al. (2012) noted in their middle school implementation of the TWD project utilizing mathematics and social studies classes, cross-curricular teaching can be successful, as I found in my study, in spite of the structures present in middle schools. Van't Hooft et al. reached back to Beane's research

conclusion, which indicated "that a cross-curricular approach to learning may be especially beneficial for students in the middle years" (p. 20).

The teachers in my study also expressed the benefits of the cross-curricular technique in their classrooms most particularly in the comfort expressed in the back-and-forth discussions from the students on which the teacher could build and, therefore, expand student learning experiences. For example, Connie's critique lesson on the *Tale of Two Cities* centered on the historical aspect of the novel that included a teacher-led discussion incorporating the back-and-forth discussion from the students. Connie was comfortable as she expected the students to "take hold" of the discussion and she built on the student responses. Marricott (2014) more recently urged such reflection on both the part of the teacher and student as they focus on learning and use the questioning as a part of the gathering and collecting of information. Connie certainly understood the inquiry aspect of teaching as explicated in Marricott's work as she implemented the cross-curricular teaching technique in her classroom.

As Maute (1992) explained, through this basic cross-curricular connections technique teachers develop knowledge of the importance of structured academic school work as it relates to and is used in their own and their students' day-to-day living. The follow-up interviews in this study further solidified the finding that the teachers found this technique useful, and the three teachers interviewed again enthusiastically detailed how they had continued to use the technique consistently. The Common Core Standards, which were not in use at the time of this study, emphasize the importance of cross-

curricular connections and even require curriculum connections for the expected application of the concepts included in the guidelines.

Two studies corroborated the findings that nine of the 10 teachers who participated felt more comfortable with lessons that were in their areas of expertise. According to Carrier et al.'s (2011) examination of the experiences of a team consisting of an experienced music and science teacher and Smolinski's (2011) study of music as a supplement to the science curriculum, teachers who work in their areas of expertise express a comfort and enthusiasm as they work on interdisciplinary cross-curricular projects.

In addition, teachers' comfort and enthusiasm appeared in a detailed laboratory activity described by Ackerson et al. (2010). They engaged middle school biology students in a week-long intensive exercise involving ecology, arthropod biology, and mathematics. Cross-curricular connections as well as "differentiated learning and enrichment activities" (p. 23) were highlighted in the findings of the week-long exercise. The cross-curricular experience through the Challenger Space Program that Monica explained in her follow-up interview excerpted in Chapter 4 further emphasized the findings theme of comfort both in teacher area of expertise as well as in the theme of enthusiastic back-and-forth discussion from students upon which the teacher can then build and enhance learning. Maute (1992) pointed out such teacher enthusiasm, stating that greater meaning takes place as both teacher and student "learning is reinforced and the new learning becomes more familiar" (p.74). Students and teachers alike make realistic learning that is interconnected as is life, in most if not all, of its experiences.

The participating teachers found that preparing and implementing an effective cross-curricular lesson was time consuming. Working together with other teachers in a team atmosphere alleviated some of the time constraints and provided opportunity for more detailed and timely connections. Recommendations from two large studies, one from EdSource (Williams et al., 2010) and the other from a New York study (Rockoff & Lockwood, 2010), reinforced the need for middle school teachers to work together as much as possible to capitalize on the strong competencies of peers and to utilize practice and support. This collective working together would improve student outcomes school wide as well as individually improve over-all instruction.

Adapting time honored best practices in teaching to the Common Core Standards era are helpful exercises that can help teachers continue to implement cross-curricular teaching. For instance, Robb (2013) examined teacher professional development in the areas of "instructional and independent reading practices that have worked for their students" (p. 13) but which need an open look for improvement in both cross-curricular teaching and the implementation of Common Core Standards. As teachers work together in preparing and implementing curriculum, the use of differentiated cross-curricular instruction within the various disciplines makes the connections more alive for their students. According to Robb, "Differentiation . . . asks teachers to know their students. . . so that they can respond to individual needs and provide task and learning experiences" (p. 14) that are effective for each student. Even though Robb's study was from the reading instruction perspective, the takeaways can have a universal application. Professional development is one way to enhance teacher performance, and second, integrate especially

the best practices of formative assessments, writing about reading, independent reading, and using selected texts for instructional reading, all of which assist in more dynamic cross-curricular teaching lessons.

STEM, or science, technology, engineering, arts, and mathematics (STEAM) programs have often used the cross-curricular teaching technique as well as team teaching and/or planning and teaching across the disciplines. Bequette and Bequette (2012) made use of the graphic, *Steps of the Engineering Design Process*, found in the science standards of many states (p. 42) as a stepping stone to assisting teachers to incorporate more engineering concepts into their lessons. Educators in the schools called for more research to determine where the arts might fit in especially in problem-based lessons and innovation. Several of the teachers in my study used art, design, and music as they built their cross-curricular lessons. In a few cases, the students were so involved in the planning of connected lessons that they suggested cross-curricular ideas for demonstration and evaluation.

Findings regarding the second research question illustrated that even if a disciplinary area was not in the teachers' area of expertise, all of the teachers encouraged their own and their students' creativity as they researched together the aspects of a specific lesson. This allowed the teachers to capitalize on the innate curiosity of adolescents. Teague et al. (2012) explored the instructional practices utilized in core academic subjects by middle school teachers. They summarized their review of literature noting that middle school students "possess a unique set of needs that call for a unique set of instructional strategies" (p. 208). According to the research reviewed, students learned

best when together with other students and when teachers decided what and how to study, enhanced diverse skills and interests, payed attention to multiple intelligences and learning styles, connected knowledge, and engaged in hands-on activities (p. 208).

While media literacy did not frequently surface in the interviews with teachers, those implementing cross-curricular methods should consider the effects of media literacy on middle school students (Redmond, 2015). Mobile media technologies were main features in the lives of many middle school students and were the ways students access "local, national, and global information via social, political, and entertainment outlets" (p. 10). Because of this increased interaction with media, it was necessary to help students develop and responsibly use the 21st century digital world. The findings that address the second research question in this study pointed to the long-term use of the cross-curricular teaching technique in the middle school. Monica, in her second interview, related her Challenger Space Unit Project which made use of varying media and encouraged its use by the teachers and students who participated in the cross-curricular project.

Several of the teachers in this study expressed enthusiasm for the cross-curricular teaching technique and indicated that it came almost naturally and verified their teaching methods. Barton (2012) found the same in his description of a project to build a better mousetrap. Barton's cross-curricular connections developed and reinforced social studies/history and English with science, the arts, design, engineering, and ecology as the project produced a workable mouse trap.

Harris & Fitzgerald (2014) also found benefit of cross-curricular techniques in their expansion of the creation of 3D cardboard prototyping into a cross-curricular project for the common core era. Cardboard prototyping helped students grasp an understanding of how "complex mechanical objects are designed and created from orthographic projections" (p. 30). Harris & Fitzgerald had students "practice calculating surface area and volume" of sample prisms, cylinders, and cubes, and then created a 3D replica. The demanding exercise reinforced the integration of mathematics, art, and engineering, as did Barton's project.

Limitations of the Study

The original research project took place in the Spring of 2003 and included three urban and semirural Catholic middle schools in southwestern Pennsylvania. Therefore this small study was pertinent to these schools alone. The study was updated in the Spring of 2013 with personal interviews of three teachers found from the original sample who were still engaged in the teaching profession and now taught in the one remaining parochial school in the area. Two of the schools participating in the original study were closed over the years due to the change of demographics in the area.

Maxwell (2013) pointed out that the researcher brings unintended purposes and assumptions to a project. Researcher bias is inherently present in any research design and study. In order to achieve the validity of findings and reduce researcher bias, I used coding, progressive analysis, and audit-trail to triangulate the analysis of findings in this study.

Recommendations

Although this small study produced information of value only to the schools and teachers who participated, its findings may add to the body of literature exploring the use of the cross-curricular teaching technique as developed in interdisciplinary learning units. Based on the findings of the study, the following may be a few recommendations for action:

1. The teachers expressed a comfort in the back and forth discussions from students upon which the teacher could build. Experiences in free discussion and/or directed discussion techniques should become part of professional development focused on the dynamic implementation of the Common Core Standards for College and Career Readiness. Through these experiences teachers could build more interesting lessons for their students.

2. Opportunities for middle school teachers to work together as a team in lesson planning and project preparation. Working together uses the talents and expertise of the members of the teacher team and therefore aligns more cross-curricular experiences for the students. The time needed to prepare a cross-curricular class can be overwhelming if the teachers need to prepare it individually. Teaming in some way among the middle school teachers guarantees more productive cross-curricular classroom experiences while maximizing the use of preparation time.

3. Research into and experimentation in various team forming and team building experiences can be helpful.

4. Encouragement on the part of both teachers and students into nonfamiliar cross-curricular areas can provide opportunities for knowledge growth and a use of latent creativity. Both teachers and students blossom as a result of the opportunity.

Implications

The short term value of the cross-curricular connections technique is in the spontaneous use of the incidents to solidify a concept in a current lesson. Long term value saw three of the teachers who participated in the original study continuing to consciously use and enhance the cross-curricular technique in their teaching experiences to the present day.

Social Change

The cross-curricular teaching technique has evolved since it was presented by Maute in 1992. At the time of this study it is an integral part of the Common Core Standards. Looking for the incident as the students develop their understanding of a basic concept is now a required component of the standards. More research is needed and will be done by university studies as classroom teachers strive to implement the various cross-curricular components of the standards.

The three teachers interviewed in 2013 continued to consciously use and enhance the cross-curricular teaching technique in their teaching experiences over the past 10 years. With more research and study of the technique, its value as an integral part of a teachers' repertoire of teaching techniques will be justified.

Conclusion

As schools and teachers strive to effectively implement the Common Core Standards for College and Career Readiness in order to bring the students in the United States up to the level of high producing and intellectually proficient countries, more consideration will be given to the use of the cross-curricular teaching technique. This case study was designed to report on and to analyze how middle school teachers experienced implementing the cross-curricular teaching technique, emphasizing the incident level, and how they perceived the use in its short and long-term value. Documentation of middle school teachers in three parochial schools found its successful implementation at the time of the study and its continued use as an acquired teaching technique by teachers after long term use. With the advent of the Common Core Standards, the cross-curricular teaching technique can become well used by teachers in the middle school and is evidenced in others' research, including Bequette and Bequette (2012), Teague et al. (2012), and Barton (2012). The cross-curricular teaching technique can be explored and validated in future research. As implementation becomes more wide spread, social change could be made as American students reach and exceed academic prowess on the world stage.

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Appendix A: Research Information Sheet

(This information sheet was prepared for the initial meeting with principals. The meeting with the principals took place at the beginning of the school year in order to secure their permission for research among their teachers. A similar sheet detailing required procedures was also given to the teacher participants.)

Qualitative Research Case Study to be conducted by Sister Melita M. Penchalk—
doctoral candidate at Walden University, Minneapolis MN, member of the Sisters of St.
Basil the Great.

This proposal is the culminating phase in research conducted in the field of education by Sister Melita Penchalk over a period of approximately six years. The emerging research question for this study presently reads as follows: Will teacher personality type have an influence on the implementation of the cross-curricular connections teaching technique? If it does, how will personality type influence that implementation by teachers in the middle school?

Background information:

"Cross-curricular connections are connections between two or more areas of study that are made by teachers within the structure of their disciplines" (Maute, 1992, p. 73). This program evolved out of the use of interdisciplinary units at the middle school level. Teams of teachers involve students and generate enthusiasm for learning.

Exact time arrangements will be negotiated with anticipated time schedule as teachers need to look more closely for other ways to integrate learning. In so doing, less emphasis is placed on occasional large units, and more emphasis is expended on the day-to-day potential that exists for cross-curricular connections. This day-to-day use of

cross-curricular connections is the core for the case study research proposed here. Myers-Briggs personality Type Indicator (MBTI) will form the lens through which the data collected will be analyzed. In developing the cross-curricular connections on a day-to-day basis, teachers, will see, understand, and using the teaching techniques with which they personally feel most comfortable, and, in so doing, can provide positive reinforcement to students' own learning styles (Fairhurst & Fairhurst, 1995).

People are different and developing a conscious awareness of these differences through the intertwining of subject matter not only reinforces what is taught, but also more closely resembles life outside the classroom. It is in "real life" where subjects are not found in isolation, but, rather, are constantly interacting with and overlapping each other (Maute, 1992).

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Participation requested:

Teachers of grades 5, 6, 7 and 8 in (School names removed) for an approximate six week time frame during the 2001-2002 school year as close as possible to the beginning of the school year.

Participants requirements: (see note at beginning of this Appendix entry)

Consent Form as required by Walden University for participation in approved

research.

Four (4) Workshops of approximately one (1) hour each. These workshops will be arranged to coincide with already planned Faculty Meetings and/ or at other convenient times. Perhaps the workshops could be arranged for one (1) location alternating the sites among the schools?

Myers-Briggs Type Indicator Assessment will be administered to each participant in the second Workshop. Scoring will be done by the Center for Applications of Psychological Types, Gainesville FL. The results of this assessment will be used for data analysis only.

Lesson Plans to reflect cross-curricular connections teaching technique in at least one subject area.

Minimum of one (1) observation by the researcher of each teacher in his/her own classroom during a class prepared in the cross-curricular connections technique.

Journal-- guide questions will be provided.

Group Interview near the conclusion of the experience. This interview will form the content of one workshop.

Other:

Workshops will be audio and video taped for research analysis.

Observation experiences will be audio-recorded unobtrusively - again these recordings will be used for research analysis.

The benefits to participation include:

- the advancement of research in the field of education and most especially the continued enhancement of middle schools research.

- the cross-curricular connections teaching technique provides opportunities to relate "school" work to "real life" experience.

- this technique is present in the classroom daily but often the teacher is unaware of or fails to make these connections.

- the integrating and overlapping of subject matter evoke enthusiasm for learning among students.

- teacher comfort level in presenting subject matter permits students to make cross-curricular connections and bring these insights to the attention of fellow students as well as the teacher.

- assists in the evolution of teaching methods that provide motivation in instruction in the middle school culture.

- cross-curricular connections teaching technique helps teachers to reach students with various learning styles.

- students can apply what is learned in one subject area to another area with ease when teachers make cross-curricular connections.

Compensation:

Certificate of Participation signed by the researcher and principal -- for the professional development file of each teacher.

Appropriate books on Myers-Briggs Personality Type Indicator and its uses in education-- for the Faculty Library of each participating school.

Confidentiality:

All regulations of confidentiality will be observed. The specifics will be outlined on the participant's Consent Form. Sister Melita Penchalk will keep in contact

with the respective Principal by phone and/ or visit in order to arrange the research needs so that a minimum of disruption to school, teacher, or classroom will occur.

Appendix B Script for Overview of Myers-Briggs Type Indicator Prior to Administration
of Instrument Workshop 1

During this workshop the Myers-Briggs Type Indicator (MBTI) instrument will be administered to you. The information derived from this instrument will be used by the researcher. It will form a part of the analysis of data received through your participation in this research project as you implement the cross-curricular connections teaching technique in your classroom paying close attention to the incident level of that implementation. You will not have to concern yourself with anything regarding this instrument beyond taking it. Be assured that all information, as indicated on the Consent Form you signed, will be kept with the utmost confidentiality. The information received as a result of the objective scoring of this instrument will be shared with you at the conclusion of the project.

For a few minutes I would like to give a very brief overview of the MBTI instrument and the type theory that it tests for those participants here who may not be familiar with it. Some of you may have taken the MBTI under other circumstances and may be quite familiar with its use. This instrument is the most widely used model of human personality. It is not considered a "pure" psychological test nor is it psychiatric in nature. It is an instrument used as a guide when personality plays a role in the determination of relationships in various manners. It is one of the best known personality type instruments in the world and has been translated into many languages. Presently it is used extensively in career counseling, couples counseling, and organizational team building, as well as in education and in business. In additional studies utilizing the MBTI

in leadership, occupation selection, and determination of one's spiritual path have realized continued success to the present time. My own experience with the MBTI is in my religious community leadership, in the selection of persons to work together in education committees, and in the understanding of personality in general has convinced me of the effective use of it. Within education it is helpful in explaining why certain approaches to instruction and learning work for some people and not with others. These reasons aided in the selection of this instrument to use in the analysis stage of this project.

If we just look around at each other in this room we can say that each of us is different from the other. If we know one another even very slightly we can say that each of us has a unique personality. And it is in that uniqueness that persons are able to express, and we are talking about the education field, both as teachers and learners, whatever is needed to execute an ideal learning environment.

Personality theory as used here in relation to the MBTI is built on the function type theory of personality of Carl Gustav Jung. Jung said that people are different in basic ways even though they all have the same multitude of instincts to drive them from within. One instinct is no more important than another. Jung was a Swiss psychiatrist and psychologist who developed the field of analytical psychology and his teaching and research has influenced many fields of study such as anthropology, philosophy, theology, and education. Jung saw his theory as an aid to self-understanding. Isabel Briggs-Myers took that theory and worked with it through her own research and study along with those persons who worked with her and refined a procedure for determining type in individuals which opened up the theory of personality type to research.

The merit of type theory is that it enables everyone to expect personality differences in particular people and to cope with the persons and differences in constructive ways. Briefly put, personality theory states that much seemingly chance variation in human behavior is not due to chance; it is in fact the logical result of a few basic, observable differences in mental functioning.

Isabel Briggs-Myers developed the internal processes of extraversion and introversion along with Jung's four psychological functions of sensing or intuition, and thinking or feeling, and supplemented these processes with a perceptive or judging process. Without going into extensive details concerning the determination of personality using this theory, Myers took all these considerations under advisement along with the auxiliary process of the traits and split each of these types into two, thus producing sixteen types. Synthesizing the insights offered by personality type knowledge, it makes possible a logical explanation for a variety of simple human differences, for complexities of personality, and for widely different satisfactions and motivations.

Type theory is dynamic and describes the development of preferences throughout a person's lifetime. Type is defined by determining each of the four preferences individually. There are many things that you as a teacher cannot control. But you are able to control the development of personal skills and teaching style. Among many considerations such as your college courses, the encouragement from your principal as to how to teach; that teaching style is influenced by the resources available, and the techniques to which you are exposed. All of this is subjected to the influence of your personality type preferences. Cross-curricular connections is a teaching technique that

you are putting into practice in your school and in your classroom; through your personality.

It is expected that you will answer the guide questions honestly as you journal your experience in putting the cross-curricular connections teaching technique to use in your classroom. Each of you could conceivably relate to the implementation differently and that will make a really worthwhile and educationally valuable research experience. Talk about how comfortable you feel in seeing those incidents and in pointing them out to your students. Express how difficult it was for you to connect mathematics with anything in the curriculum. Complain about the art teacher who would not cooperate with you as you dreamed of wild book covers on your students research reviews. All of these and more make up this research case study and the analysis of it as this researcher ponders the influence of personality type in the implementation of the incident level of cross-curricular connections in the middle school by its teachers.

The questions in the MBTI are not important in themselves, but they do indicate basic preferences. There is no right or wrong to these preferences. They simply produce different kinds of people who are interested in different things, are good in different fields, and may often find it hard to understand each other. Answer these questions as your preferences indicate now.

The MBTI you will be taking in a few moments will be scored by the Center for Application of Psychological Types. This will provide an objective scoring for the instrument and the Center provides a computer print out of basic scoring services and analysis. This print out will contain information that will be used in the analysis of this

study. The print out will be given to you during workshop four so that you can use it for yourself in your future experiences particularly in the classroom. The information will be a positive experience for you.

(The Myers-Briggs Type Indicator will be administered by the researcher. The total time for taking the instrument is approximately 45 minutes and instructions are included with the instrument. The instrument can be self-administered therefore the instructions are very straight forward. The instruments for use here will be rented through the Center for Application of Psychological Types and returned to that Center for scoring. Basic Scoring will be requested.)

Appendix C: Personal Interview - Guide Questions

Each teacher will be interviewed by the researcher. The interview will take place either face to face or on the telephone. This interview will occur between the first and second workshops.

The questions are designed to clarify or to enhance the cross-curricular connections teaching technique presentation made during the initial workshop. This interview also gives the teachers an opportunity to ask questions relative to the implementation of the technique in their classrooms.

The questions presented here are merely guides for the interview process.

1. The lesson you presented today using the cross-curricular connections teaching technique -- with what part of that lesson were you most comfortable? Discuss.
2. What cross-curricular connections incidents did you plan into today's lesson?
3. Did other cross-curricular connections, especially incidents, become obvious to you as the lesson developed? How did you treat these incidents?
4. What difficulties did you encounter in the planning, preparation, and implementation of today's class as you consciously noted cross-curricular connections incidents?
5. Are there other questions or concerns you have as you continue to implement the cross-curricular connections teaching technique at the incident level in your classroom?

Appendix D: Personal Interview - Follow-up Guide Questions 10 Years Later

The questions are built on the Personal Interview Questions in the original Proposal and are designed to connect with the original project and to bring discussion to the present or to the later teaching years of the participants.

The questions presented here are merely guides for the interview process.

1. You participated in the original project, has the use of the cross-curricular connections teaching technique become a part of your teaching today especially as you begin to implement the English Language Arts Common Core Standards in your classroom? What part of that technique are you most comfortable in using and why?
2. What cross-curricular connections incidents did you use in a recent lesson? Explain.
3. Have other cross-curricular connections, especially incidents, become obvious as you develop your lessons? How do you treat these incidents?
4. What difficulties have you encountered over the subsequent years of your teaching career as you plan, prepare, and implement cross-curricular connections in your classes?

Appendix E: Focus Group Interview Guide - Workshop 2

The focus session interview will take place near the end of the research experience. Any questions that represented concerns among the teachers and surfaced during the personal interview will be addressed to the group at large.

See Personal Interview- Guide Questions (Appendix C)

Questions during the group focus interview might include:

1. In what ways are you becoming more aware of cross-curricular connections in your teaching preparations?
2. Should cross-curricular connections not be present in your planning, do you consciously note connections as they occur? In what ways?
3. Do you feel comfortable with the cross-curricular connections teaching technique both in your planning and in your teaching? Discuss.
4. Did you work with a team in order to produce the lesson plans and lessons for this research? If so, what was your experience?
If not- what were circumstances or attitudes that prevented you?

Other questions and probes may surface during the focus group session as it evolves in workshop 2.

Appendix F: Journal Guide Questions

Workshop 1

Please detail at least one class session per week. If possible make some type of notation for each day's cross-curricular connections teaching technique lesson. This journaling can be done in concert with your lesson plan.

1. The lesson you presented today -- with what part of that lesson were you most comfortable?
2. Explain the variety of teaching methods used during today's class.
3. What cross-curricular connections incidents did you plan into today's lesson?
4. What other cross-curricular connections, especially incidents, were you conscious of during your presentation?
5. How did you note these connections to your students? Briefly describe.
6. Were your students able to point out additional cross-curricular connections during today's lesson? Briefly note.