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THE IMPACT OF INTERDISCIPLINARY LESSON STUDY ON TEACHERS' INSTRUCTIONAL DECISIONS AND TECHNOLOGY USE

A DISSERTATION APPROVED FOR THE
DEPARTMENT OF EDUCATIONAL LEADERSHIP AND POLICY STUDIES

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TABLE OF CONTENTS

Acknowledgements iv

Table of Contents viii

List of Tables x

List of Figures xi

Abstract xiii

PREFACE 1

CHAPTER 1: INTRODUCTION TO THE PROBLEM

Introduction 5
Purpose 5
Research questions 5
Complexity theory 6
Schools and Technology 7
Technology leadership 10
Leaders and technological innovations 12
Student engagement 15
Lesson study 18
Professional development and technology innovations 21
Examining the problem 24

CHAPTER TWO: UNDERSTANDING THE SYSTEM

Introduction 26
Historical background of the problem 27

CHAPTER THREE: CONCEPTUALIZING THE CASE: INTRODUCTION

Introduction 38
Wellington Middle School 39
Context 42

CHAPTER FOUR: CONCEPTUALIZING THE CASE: DATA ANALYSIS

Introduction 46
Data Analysis Procedures 47
Team Composition – Team One 49
Team One – Year One 50
Team One – Year Two 53

Team One – Year Three 55
Summary of Team One Narrative Analysis 58
Team Composition – Team Two 59
Team Two – Year One 60
Team Two – Year Two 65
Team Two – Year Three 68
Summary of Team Two Narrative Analysis 73

CHAPTER FIVE: CONCEPTUALIZING THE CASE: THE SYNTHESIS OF TWO TEAMS
Introduction 76
Wellington Middle School – The Living Organism 76
Student Learning and Engagement 82
Teacher Learning 84
Instructional Decisions 88
Technology Related Instructional Decisions 95
Technology 95
Technology and Instructional Decisions 98
Time 105
Chapter Summary 108

CHAPTER SIX: EXPLAINING: INTEGRATION OF THE LITERATURE AND CONCLUSIONS
Introduction 109
Lesson study as Professional Development 110
Teacher Learning 114
Technology 117
A New Model for Professional Development 119
Significance of the Study 122
Implications 123
Chapter Summary 126

REFERENCES 128

APPENDICES 145
A. Methodology 145
a. Design of the study 145
b. Research questions 145
c. Population and sample 146
d. Context 147

e. Instrumentation 151
f. Lesson study debrief coding instrument 151
g. Lesson study debrief conversations 153
h. Lesson study observation documents 153
i. Group interviews 154
j. Procedures 154
k. Data Analysis 155
l. Integration of data and knowledge 156
m. Trustworthiness 157
n. Role of the researcher 157
B. Study Timeline 159
C. Lesson Study De-brief Coding Instrument 160
D. Lesson Study Observation Form 161
E. Document Coding Guide 162
F. Final Interview Protocol 163
G. Innovative Technologies: Digital Game Based Learning 164
a. Lesson study and digital game based learning 166

LIST OF TABLES

Table 1 Team One Composition 49

Table 2 Team Two Composition 60

Table 3 Synthesis of teams – student learning and engagement 84

Table 4 Synthesis of teams – teacher learning 88

Table 5 Synthesis of teams – instructional decisions 94

Table 6 Synthesis of teams – Technology 98

Table 7 Synthesis of teams – Technology related instructional decisions 104

Table 8 Synthesis of teams – Time 108

LIST OF FIGURES

Figure 1 Student engagement in academic work 17

Figure 2 Lesson study cycle 19

Figure 3 Samsung Q1 ultra 45

Figure 4 Yearly data organization 46

Figure 5 Data analysis 48

Figure 6 Theme generation 81

Figure 7 Relationships between structure, learning processes, and impact of professional development programs 111

Figure 8 Model for authentic teacher learning 121

ABSTRACT

Schools are complex institutions in which change occurs almost constantly. As each new piece of information is learned, the learner is changed, never to return to the same state they were prior to the act of learning, (Morrison, 2002). This study investigates the impact of interdisciplinary lesson study on teachers' instructional decisions and technology use. The participants in this study are eight (n=8) eighth grade teachers from Wellington Middle School. The teachers composed two interdisciplinary teams with each team having a member from each of the core curricular areas of math, science, English, and social studies.

This study is an instrumental embedded case study (Scholz & Tietje, 2002). This methodology was chosen because it allows for the most accurate level of understanding of each participant in each phase of the study. This is a difficult process due to the magnitude of decisions that are made daily that impact student learning. The Hegelian model of inquiry was utilized because as data are collected, "they are viewed from multiple points of view" (Bhatnagar & Kanal, 1992, p. 32). The data collected in this study will not be decomposed but will be integrated and synthesized. The data and theory interacts within architecture of knowledge integration appropriate for embedded case studies (Scholz & Tietje, 2002, p. 30).

The data sets in this study included lesson study documents, lesson study observations, debrief conversations, lesson study documents, and group interviews. These documents were never intended to serve as a point of triangulation so therefore a narrative analysis of these data sets was required. The narrative analysis for each team

was written up separately and then coded and themed to generate data that could possibly be used to compare or contrast the two teams.

The teachers began to lean on each other more heavily during the period of technological difficulties. When lesson plans were made and the technology did not work, what choices did the teachers make regarding classroom activities for the effected period? Team One chose to focus primarily on the technology and very little on the students and their learning. Team Two provided content-related activities in which the students could learn their curriculum and utilize the new technology at the same time.

The narrative analysis of the team data showed five themes were generated, teacher learning, student learning and engagement, instructional decisions, technology, and time. The analysis of these themes led to the realization that Team Two had a greater increase in teacher knowledge due to the support of a professional learning community.

Implications from this research include those for the building or district administrator. This study found the support of a community of practice or a professional learning community increased teacher learning. Educational leadership professors should consider providing the opportunity for their students to at the very least, simulate these experiences related to the creation of a PLC. Further research is suggested to truly measure the PLC growth in Team Two. It also is recommended that further research be conducted on the use of lesson study to implement technology in the school site.

PREFACE

Schools are complex institutions, steeped with history of country and of self. They are impacted by legislation, the economy, community members, and the effectiveness of the school determines the future of the community. To better understand the school, it helps to understand the community, its history, and the people that comprise it. There are multiple inputs and outputs of information during each school day where in any given day, the phone rings, a grade is recorded, or the doors open, the potential exists for each of these actions to change the future of students, teachers, and the school itself.

Educational research is nothing new. John Dewey realized its significance and its practicality in his work with Chicago Schools. He understood the complexity of the students' lives and the multiple factors that impact their lives. While I don't claim to understand the full impact of all of these factors, it was the knowledge of these elements that led me to my chosen methodology, embedded case study. My professional mentors modeled for me the necessity of honoring one's past and working to move them forward because of or in spite of it. As I worked with lesson study teams, I realized the impact of my participants' past. I realized how it shaped the lens through which they saw their students, their curriculum, and their school.

My background in Chemistry and Biology reminds me that I can't predict the resulting compounds based on what you put in the test tube. You must also consider the conditions in which those elements are placed. Embedded case study is a relatively new research methodology but is a perfect match for this research study because it allows for the investigation into the complexity of the system and the participants. My research study will utilize qualitative data. Embedded case studies allow for multiple sources for

data generation (Yin, 1989, 1994; Scholz & Tietje, 2002), thus making the case "more transparent" (Scholz & Tietje, p. 14). Schools are complex systems consisting of many possible sources of data that makes a valid conclusion based on one type of data very difficult. An embedded case study values the integration of the new data with existing knowledge generated by earlier researchers. "A theory for integrating data and knowledge is necessary. If we stick to mere data analysis, no suitable conclusions can be drawn," (Scholz & Tietje, p. 16).

Different types of knowledge must be integrated, those of both the practitioners (teachers) and the researchers. This type of integration increases the complexity of the data analysis and integration and will increase the need for the use of member checking by the participants as well as peer examination by researchers not directly involved in the data collection (Merriam, 1998). Creswell (1998) recognizes the use of the literature for "layers of analysis in the study and broader interpretations of the meaning of the case," (p. 36).

Scholz and Tietje (2002) "postulate that embedded case analysis should be organized and structured on three levels." These three layers are linked to different qualities of knowledge," (p. 30). The data collected should not be decomposed but be integrated and synthesized. The data and theory interacted within an architecture of knowledge integration appropriate for embedded case studies (Scholz & Tietje, 2002, p. 30). The first layer of data is known as Verstehen or Understanding. This involves case understanding that includes empathy. For the proposed study, these data layer relates to the school system as a whole and the external factors that may affect its operation and its

impact on student learning. For the purposes of this study, this layer will be titled, "The System."

The baseline data generated from the teacher surveys regarding years of experience and technology use as well as baseline student achievement data were utilized in the layer of data and theory titled, "The Case." This layer of data is referred to as Begreifen or Conceptualizing (Scholz & Tietje, 2002, p. 30). This part of the model functioned to "develop a more valid understanding of the case" (Scholz & Tietje, p. 31). This layer of the study includes the history of the problem and its context. This is the layer of the process where the appropriate method of knowledge integration is applied to the data.

The third layer is Erklären, explaining (Scholz & Tietje, 2002). This layer of knowledge integration involves the mixing of two distinct pieces of data, the case data and the existing knowledge base (Scholz & Tietje). This layer of data begins the synthesis of all of the individual pieces of data into codes and themes. The codes and themes were then integrated with the existing bodies of knowledge relevant to this case. The codes and themes generated from this case were integrated with knowledge from the bodies of medicine, natural sciences, education, and social sciences. This process was completed carefully to insure synthesis, yet, due to the ill-ordered nature of the problem, there is no unifying theory or model (Scholz & Tietje, p. 34). For the purposes of this study, this layer will be titled, "Investigation and Integration."

As you read this research, an effort has been made to capture the many factors that impact student learning in the classroom and hope to show ways in which lesson study can assist in maximizing teacher and student learning. Embedded case study is the

vehicle in which the data are set but please realize all of the data are set in the culture of United States' educational system. A system that is responsible for preparing students to be tomorrow's leaders, a system that requires and demands self-reflection.

CHAPTER ONE

Introduction to the Problem

For time and the world do not stand still.
Change is the law of life and those who look only
to the past and present are certain to miss the future.
- President John F. Kennedy

This instrumental embedded case study examines the impact of interdisciplinary lesson study on teacher instructional decisions, lesson design, and reflective practice. "Embedded case study involves more than one unit, or object, of analysis and usually is not limited to qualitative analysis alone," (Scholz & Tietje, 2002, p. 9). Most case studies require the integration of a variety of data and information from a variety of sources to allow for full understanding of the case. These data can be qualitative or quantitative in nature. Embedded case studies apply multiple methods for data generation (Yin, 1989, 1994; Scholz & Tietje, 2002). Schools are complex systems consisting of many possible sources of data, which make a valid conclusion based on one type of data very difficult.

The purpose of this study is to document the impact of interdisciplinary lesson study in secondary classrooms on teachers' instructional decisions and technology integration. Many studies have been conducted on lesson study in elementary schools, yet few cases have documented its use in secondary schools. Most documented lesson study cases have been conducted within one discipline or grade level. This embedded case study documents the process of two cross-curricular middle school teams as they integrate interdisciplinary lesson study within the bounded system of one school, Wellington Middle School and seeks to answer the following research questions:

1. How do two years of interdisciplinary lesson study impact secondary teachers' instructional decisions?

2. What happens to the quality of these instructional decisions when teachers' efforts to implement innovative technology are not adequately supported by the school's technological infrastructure?

Complexity Theory

Schools are multi-faceted organizations. They have characteristics of businesses, nonprofit organizations, higher education, and churches. While each of these facets adds another layer to the organization we call school, school is truly a complex institution of its own. "Complexity comes from the Latin root meaning 'to entwine'; the notion that an organism interacts dynamically with its environment," (Morrison, 2002, p. 5). Fullan (2001) states if schools are to survive, school leaders must understand complexity science. Complexity science allows for the unpredictability with which educators have developed this love-hate relationship. "Complexity theory requires the unpredictable fluctuations and non-average behavior in order to account for change, development, and novelty through self-organization," (Morrison, 2002, p. 7). Schools are organized into grades, departments, and content areas but then self-organization occurs as committees are elected and formed as well as other duties are assumed or assigned. Despite the compartmentalization of the schools, they continue to function as one unit to educate the students in the local community. "In complexity theory a system can be described as a collection of interacting parts which, together, function as a whole," (Morrison, 2002, p. 7).

Regardless of how intricately planned the interactions are between the different parts of a school, no one can ever accurately predict the outcome of the planned events. There are too many variables with the potential to enter the equation. The actions of one

set of pieces effects the other pieces, (Morrison, 2002, p. 9). In a school if one teacher fails to come to work, regardless of the reason, that one teacher decision can impact the students enrolled in his/her class, fellow teachers, the principal, the secretary, and possibly the custodial staff (if things don't go well during his/her absence). One singular seemingly insignificant decision can create ripples that affect many within the school.

Schools are not a new site for research. John Dewey (1938) conducted his own research in Chicago Schools to determine the best ways to meet the needs of the new population in the school system. He utilized qualitative and quantitative data to fully assess the situation and develop a plan. The interactions between schools are complex and the quality of interactions characteristic of a Professional Learning Community (PLC) are also complex. A professional learning community is a group of people learning together (Gunn, Richburg, & Smilkstein, 2007). In a PLC, learning occurs bi-directionally between teachers, teachers and administrators, teachers and students, and students and parents (Schmoker, 2006). Lesson study is a form of professional development that provides a protocol and structure for the student-focused dialogue between teachers and is related to lesson design and instructional decisions (Lewis, 2002). This protocol provides a canvas on which the exchange of professional knowledge can be shown and from which all can learn.

Schools and Technology

Secondary schools are structured for formal student learning to occur between the ringing of the bell that starts and ends the day. As the tardy bell rings, it signals the beginning of class and a battle for student engagement. History is full of stories of note passing, doodling, and daydreaming during class. Research shows that learner

engagement is a critical predictor of student academic success (Brophy & Alleman, 1991; Fredericks, Blumenfeld, & Paris, 2004; Downer, Rimm-Kaufman, & Pianta, 2007). Yet today's learner is different than the students of years past and as a result requires different methods of engagement. Marc Prensky (2001) calls today's learners "digital natives," (p.1). Today's students have never known a world without the Internet or cell phones (Spires, Lee, Turner, & Johnson, 2008). They are used to operating at "twitch speed," (Prensky, 2001, p.3) not the slower pace of textbooks and worksheets used in many classrooms, and he proposes that it is time for these "twitch speed" technologies to go to school.

As these technologies enter schools, a clash of a collaborative interactive culture occurs with the traditional didactic school environment. "Emerging interactive technologies are challenging generalizations from earlier research studies [on learning]," (Bransford, Brown, & Cocking, 2000, p. 14). Senge (1990) recorded an interview with Ed Simon, President and COO of Herman Miller, regarding organizational change. He states, "Our task is to find a new balance. Embracing change does not mean abandoning a core of values and precepts," (p. 349). Balancing change while holding onto core values leaves administrators and teachers in a challenging situation -- facing mandates from federal, state, and local stakeholders and the needs of digitally astute students. The teachers and administrators are clinging to the structures and curriculum of old and students are pleading for the technologies of late. It's a tough position but with strategic efforts innovative technologies can keep the "natives" (Prensky, 2001) from being restless.

Technology in public schools is not new, yet many new technologies are being developed specifically for middle school and high school students. As students gain exposure to these technological advances, in or out of the classroom, the more antiquated traditional classroom instruction seems. As the teacher - learner technology gap increases, the need for the teacher to adjust teaching strategies to meet the needs of the learner becomes evident. As the new technologies are implemented, the need for additional professional learning becomes very clear as does the need for additional teacher supports and a clear vision of how the technology can be integrated to increase student achievement.

The U.S. Department of Education's report on state educational technology strategies and practices (2007) found that a common definition for the term technology integration is missing among site principals. The report states that, "school leaders need guidance in developing the capacity to distinguish between uses of technology for its own sake and uses of technology that add value in terms of student learning," (p. 17). States reported that technology integration was a priority in funding competitive grants. Yet, the lack of a clear definition makes the uniformity of compliance a struggle for project officers (USDE, 2007). The lack of a common definition also causes a problem for leaders as they work to create a shared vision for the implementation of the technology in their school sites.

Schools are encouraged to provide opportunities for their students to develop technological skills to assist in business and research development for their communities, state, and nation. Yet, this task is becoming more cumbersome as time progresses due to increasing mandates, safety concerns, and decreasing budgets. The further a school gets

away from its primary task of educating students, the greater the stress that is placed on local school leadership. Fullan (2003) identifies two types of problems that are imposed on a building principal: self-imposed and system-imposed. Often, one of the system-imposed problems is the absence of a system change strategy. In other words, there is no structure to determine which initiatives enter the system to maximize gains in student learning. The introduction of technology into a system changes the manner in which school is done. Changing the way school is done is difficult and it takes time (Schmoker, 2006) and our students are not patient as we attempt to catch up. Lezotte (2003) defined leadership as "taking followers to a place they have never been and are not sure they want to go," (foreword, ¶6). When it comes to embracing new technologies, teachers aren't sure they want to go into the digital world, but more often than not, they are happy to be there once they arrive.

Technology Leadership

Leadership is not restricted to the principal's office. Professional Learning Communities (PLCs) build leadership among their stakeholders (Lambert, 1998; 2003). A characteristic of PLCs is discourse related to a shared vision of the school community. Once the vision is communicated, members of the community, administrators, teachers, parents, and students work together to accomplish the end goal, increasing student achievement (Schmoker, 2007). In traditional schools, a hierarchical governance structure often exists, known as a loosely coupled system, where there is a clear assignment of tasks to each member of the system (Elmore, 2000). These members are expected to complete their tasks independent of each other and in such a manner so as to not impede the progress of others in that system. As increasing state and federal

mandates are placed on teachers, the individual responsibility for student success increases and each member of the community becomes absorbed in the given task of teaching their subjects which in turn can increase teacher isolation.

In an effort to meet the mandates, many teachers and administrators have begun to seek new technologies or strategies to increase student learning. While many innovations exist with promise of increased student success, there are many decisions made at the local system level that greatly impact the success of the innovations as they are being implemented in the school. These new innovations are seen as potentially having a positive impact on student learning, but it is often difficult to convert the vision for the innovation into action. There are so many distractions to pull the attention and focus of school leaders that it is difficult to be persistent in making the vision a reality. Communicating and making a school vision into existence is tough, but is an attribute of successful schools (Sergiovanni, 2005).

Several studies over recent decades have identified the principal as the main player in the process of school change (Slater, 2008; Fullan, 1985, 1991; Leithwood, 1992). Yet historically, the loosely-coupled industrial model of schooling has seen the teacher being buffered from the outside world by the administrator (Elmore, 2000). As school mandates increase, the role of the principal must change to allow the innovations to pervade the world of teaching and learning instead of occurring on the fringe (Elmore, 2000).

A common reference for administrators in implementing innovations such as technology is the Technology Standards for School Administrators (TSSA). They were published in 2002 by the Collaborative for Technology Standards (International Society

for Technology Education), (TSSA, 2002). "These standards are indicators of effective leadership for technology in schools," (p.3). These indicators include six things that leaders should be able to know and do as related to technology:

1) Leadership and vision;

2) Learning and teaching;

3) Productivity and professional practice;

4) Support, management, and operations;

5) Assessment and evaluation;

6) Social, legal, and ethical issues

(TSSA, 2002).

Each of these six things is important enough to occupy the majority of the administrator's time but each is just a piece of being a technology leader. Technology leadership is just one piece of an effective administrator and an effective school.

Leaders and Technological Innovations

Today's educational leaders are being held hostage by mandates (Elmore & Furhman, 2001; Leland & Kasten, 2002). They are working harder than ever to meet the demands of state and federal requirements being placed on the education system. The system is forcing an environment of compliance instead of excellence (Leland & Kasten, 2002). Many professional conversations and publications, news stories, and personal conversations of adults and children, have included the words, No Child Left Behind or test scores. Despite the mandates from top leaders, the students are pushing from the other end, pleading for innovations (USDC, USDE, NetDay, 2008). "If we had learning games, it would reduce boredom at school, especially in math," (USDC, et al, p. 21). Yet

the teens realized that technology wasn't the entire answer. "Learning needs to be personalized for how an individual learns best. Interactivity was also cited as an attribute needed in learning," (USDE, et al, p. 22).

Attempting to meet stakeholder demands, many teachers and administrators have begun to seek new technologies or strategies to increase student learning. While many innovations exist with promises of increased student success, there are many decisions made at the local level that greatly impact the success of the innovations as they are being implemented in the school. These new innovations are seen as potentially having a positive impact on student learning, but it is often difficult to convert the vision for the innovation into action. Most educational leaders are working hard to have successful schools. It is important to have a good educational system in which to integrate a digital game or new technology (Squire, 2005). Without a good system in which to place the innovation, the innovation is futile. Effective leaders have a vision and drive, are bold, and communicate clearly with all involved in the process. "Adoption of an innovation is a process, not a single act," (Surry & Ely, 2007).

Schools are open systems that respond to external pressures and changes in conditions (Morrison, 2008). Any attempt to relieve stress on one element of the system could potentially create stress on another. As pressures mount due to increased expectations on teachers and student learning, many teachers are not open to the idea of receiving an innovation in their classroom (Donovan, Hartley, & Strudler, 2007). The culture of teaching is steeped with pictures and mantras of chalkboards and desks that compose the educational process. Cultures don't change rapidly (Stigler & Hiebert, 1999) and the culture of schools does not include technology or games (Dodge, Barab,

Stuckey, Warren, Heiselt, & Stein 2008). "As the social group grows more complex, involving a greater number of acquired skills which are dependent, either in fact or belief, of the group, the content of social life gets more definitely formulated for purposes of instruction," (Dewey, 1916, p. 213).

The more formulated a culture becomes; the slower it is to change. School culture is one of isolation (Fullan, 2001) and games can bring people together (Shaffer, Squire, Halverson, & Gee, 2005). Digital game based learning (DGBL) is a huge innovation to implement into classrooms and is one teachers often meet with great resistance (Becker, 2007). Teachers teach the way they were taught (Stigler & Hiebert, 1999). They have years of experience with textbooks and worksheets. They know how to use these tools in a way to promote student learning. Digital games are not in the professional or personal history of teachers. This is a change that is difficult for them to embrace and as a result, resistance builds.

This resistance increases when teachers are not consulted regarding the innovation. "By acknowledging their concerns, change facilitators can provide support throughout the change process," (Donovan, Hartley, & Strudler, 2007, p. 279). By interacting with teachers during the process, open, honest conversations can occur regarding the vision for the innovation and the teachers' concerns. Through these conversations, schools can "create their own identity in their local context and community," (Wheatley, 1999; Morrison, 2008). "The teachers must see their classroom as the focus of new learning," (Slepkov, 2008). "The teachers need to feel important and involved," (Donovan, et al, p. 279) in the process of creating a vision for how digital games will be used in the classrooms and clear expectations for all related to the

innovation (Leithwood & Jantzi, 2008). Their early involvement will possibly slow the start up process but it will speed things up when it is time to implement the technologies in the classroom (McKenzie, 2001).

As teachers become involved in conversations related to the innovation, effective administrators facilitate the process so that in the end, there is a realistic shared vision between all involved - administrators, teachers, parents, and students. Teachers often cite a lack of uncertainty of expectations related to technology use as a reason to resist implementing new technologies (Creighton, 2003). When Digital Game Based Learning (DGBL) is implemented, it is important for the expectations to be reasonable. DGBL is not a silver bullet to fix all of education's problems. "Even the harshest of critics agree we learn *something* from playing video games," (Shaffer, Squire, Halverson, & Gee, p. 105). There are limited, if any, proponents who say all students' learning should occur in a virtual world, but it can enhance the learning processes for students. "Teachers can't be expected to embrace digital games as a tool unless they have a sound understanding of the potential as well as the limitations, and are confident in their ability to use games effectively to enhance learning," (Becker, 2007, p.478).

Student Engagement

One of the tasks of a technology leader is supporting teachers as they work to increase student engagement in their classrooms. Student engagement is often seen as the holy grail of the classroom. It is the quest of many teachers to have students on-task and undistracted by the unavoidable classroom interruptions of visitors or announcements over the intercom. There are many definitions of student engagement (Downer, Rimm-Kaufman, & Pianta, 2007; Juvonen, 2007; Newmann, Wehlage, & Lamborn, 1992;

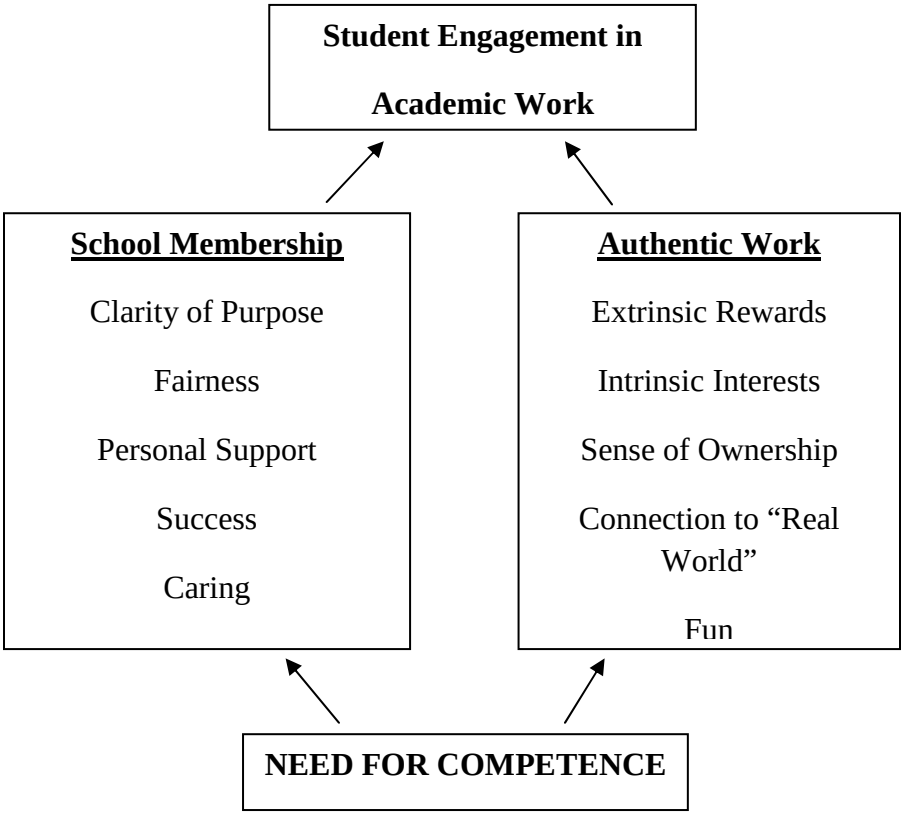
Sciarra & Seirup, 2008; Spires, Lee, Turner, & Johnson, 2008; Willms, 2003). Some are related to cognitive engagement (Newman, et al, 1992), some are related to behavorial (Downer, et al, 2007), and others are related to school engagement (Juvonen, 2007). Newmann, Wehlage, & Lamborn (1992) defined engagement as "active involvement, commitment, and concentrated attention," (p.11) and this definition will be use d for our purposes in this study..

Educators not only lack an appropriate definition of engagement but there is a lack of empirical evidence of the factors that truly lead to student engagement in middle school and high school students (Juvonen, 2007). Juvonen (2007) conducted a study that shows a link between a student's feelings about his/her teacher and their level of engagement. If their feelings were negative, researchers were able to successfully predict discipline and academic problems at the middle school level (Juvonen, et al). A lack of connection to peers or the school and school activities also is a predictor of low student engagement and later, student achievement. Newmann, Wehlage, & Lamborn (1992) found that students' need for competence was a driving force for students' engagement. Humans desire to be recognized as competent and seek approval for our thoughts and actions (Newmann, et al.). Young elementary students demonstrate this in their efforts to answer questions correctly and obey teacher directives and requests. While there is a debate over which drives student engagement, sense of belonging and school participation or student achievement, Newmann & colleagues (et al.) theorize a framework that involves both equally (See Figure 1.). This framework emphasizes the driving force and precursor of the need for competence in both types of engagement.

The PISA, Programme for International Student Assessment, studied student engagement across several countries. The 2000 PISA had a specific research focus of investigating any relationships between literacy skills and student engagement. Willms (2003) in his analysis of the 2000 PISA scores found no correlation between level of school engagement and literacy skills. There were many students with low involvement in school activities but had average to above average literacy skills (Willms, et al). Willms (et al) also found "a large and significant effect on school context and school engagement," (p. 41). When low achieving, low income students attend schools with a

Figure 1.

Student engagement in academic work



Source: Newmann, Wehlage, & Lamborn, 1992, p. 18

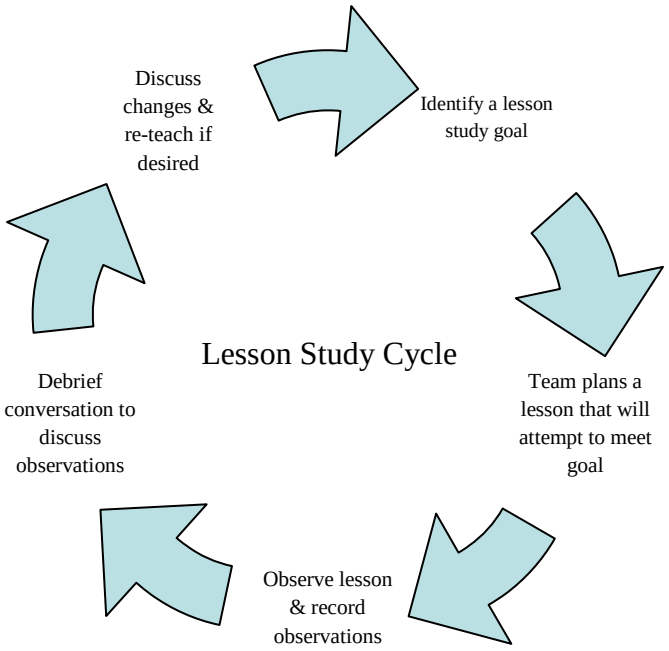
high percentage of their like counterparts, the chance they will become disengaged and experience low achievement increases by ten percent (Willms, et al). The other two school factors that emerged as significant findings were the perceived relationships between students and teachers and the disciplinary climate in the school. When these two factors were positive, they lowered the chances of disengagement and low achievement by five percent and two percent, respectively (Willms, et al). The introduction of technology and appropriate instructional supplies and equipment in the classroom did not seem to have a strong effect on the student's level of engagement.

Lesson Study

As the shared vision develops, so does the need for more information and good professional development. Transformational teachers closely examine the benefits students are receiving from the learning opportunities provided in their classrooms. This can be done through a personal reflective analysis of his/her own practice, professional development, or both. A form of professional development that combines both personal reflection and teacher learning is Lesson study. Chokshi and Fernandez (2002) state "Lesson study is a form of Japanese professional development process that enables teachers to systemically examine their practice in order to become more effective instructors." Lesson study is a cyclical process of improvement until the desired level of student learning is reached (See Figure 2).

Figure 2.

Lesson study cycle



Lesson study could provide a structure for a team of teachers to plan a lesson using DGBL together. As the planning occurs, a goal is set and input is sought from all members of the team. Once the lesson is finished, one member teaches the lesson while the other team members observe. The observation of the team planned lesson facilitates the learning process of all involved. The inclusion of all team members being involved in this process establishes "more effective interventions…for groups of students, given shared purpose, responsibility, and expertise among members of the group," (York-Barr, Sommers, Ghere, & Montie, 2001, p. 15). The shared purpose and responsibility promotes increased communication and support from within the team during the process. While this process may require creative scheduling or the acquisition of substitutes or

parent volunteers, the likely end product of increased collaboration and increased student learning will be worth the investment (Martin, 2002).

Many aspects of traditional education involve the teachers and students working in isolation; however, lesson study is not a private or personal activity. While the benefits have an effect on personal practice, the formal learning is experienced as teams of teachers (Lewis, 2002). Traditionally, lesson study is restricted to teams from either one grade level or one content area (i.e. all math teachers or all second grade teachers). United States educators' opinions of lesson study have waxed and waned over the past two centuries. At times it was viewed as a useful form of teacher development. Records show M.M. Scott took lesson study from the United States as part of a presentation to a teacher training school in Tokyo in 1872 (Willms, 2003). He shared it with the first teacher training school to assist with reading assessments (Willms, 2003). A form of lesson study was also used by John Dewey in Chicago Schools in 1938 to meet the needs of his changing student population (Tashakorri & Teddlie, 2003). The Third International Math and Science Study (TIMSS) study returned the attention of educators in the United States to the practice of lesson study (Stigler & Hiebert, 1999).

Stigler and Hiebert's (1999) analysis of the TIMSS videos of mathematics classrooms found that teaching is a cultural activity. The videos reveal a marked difference between the classrooms of Germany and the United States and those of Japan. Classrooms in the United States depict isolation as its culture. (Fullan, 2001; Stigler & Hiebert, 1999). Isolation is a direct contradiction to lesson study and collaboration. The culture of isolation is not indicative of school reform as is collaboration. Teacher collaboration is recommended as part of school reform (Dufour & Eaker, 1998;

Sergiovanni, 2005). Lesson study is a possible structure to allow collaborations that are focused on student learning to occur. As teachers participate in lesson study, they begin to become focused on the needs of students rather than on teaching. Teachers make close examination of student actions, words, and work which provide detailed evidences of activities that engage students and maximize their learning (Lewis, 2002). The potential exists for teachers to use lesson study to examine the implementation of new technologies in classrooms. This process allows teachers to find effective use of technologies to enhance student engagement and learning.

Professional Development & Technology Innovations

When entering a foreign land one becomes immediately aware of his/her lack of knowledge of the language and customs. This lack of knowledge also breeds a sense of fear and uncertainty. Prensky (2001) refers to adults as digital immigrants. During the implementation of new technologies, teachers may feel like they entering a new land, often against their will. They aren't sure of the benefits of the technology for their students or why they need it. This is a new tool teachers may not use comfortably themselves and are finding themselves placed in a position to teach others. Their concerns are real and valid. "Too often, the focus of traditional professional development is detached from the real concerns of educators and fails to build on their experience and knowledge," (Osterman & Kottkamp, 2004, p.19). "Professional development can provide meaningful content by addressing teacher concerns," (Donovan, Hartley, & Strudler, 2007, p. 278).

Effective professional development is planned using the Concerns Based Adoption Model (CBAM) regarding adoption of the game and the computing

technologies in the classroom (Hall, George, & Rutherford, 1998). "CBAM was found very useful in developing an initial understanding of the innovation and its effects on teachers. CBAM provides a well-developed framework within which to conduct research and incorporate educational computing research into the mainstream of educational research," (Newhouse, 2001, p. 19).

Effective planners of the professional development realize the value of informal education and plan activities to enhance informal learning. Ninety percent of all learning occurs informally (Rosenberg, 2007). While the formal instruction is occurring about new technologies, it is important to realize the teachers need time to process and converse with their colleagues about this innovation. Teachers need time to discuss what they have seen and learned and question how it can be used in their classrooms. "Change is the combined effect of identifying a problem, gathering comprehensive information about the problem, analyzing the data in relationship to our own goals and values, and then actually experimenting with the new ideas and strategies emerging from this analysis," (Osterman, Kottkamp, 2007, p. 178). While the formal experimentation does not occur until they return to their classrooms, the group of teachers assembled at professional development know their classrooms and their students and can plan accordingly. These teachers' discussions allow them to begin to adjust their view of technology in the classroom to more of a realistic one as they learn (Osterman, et al, 2007). "During the time set aside for reflection, it is important for the professional development providers to not function as an evaluator or prescriber,… but a collaborator. This allows the locus of control to remain with the teacher," (Osterman, et al, 2007, p. 186). The result is often an

empowered teacher able to implement the innovation more successfully (Osterman, et al, 2007).

As teachers attempt to experience the innovation as a student, but need the opportunity to problem solve and look at the digital world as a teacher is also a necessity. The opportunity to begin to make the curricular connections between the innovation and their particular content area is valuable. "Adult learners aren't blank slates. New users are always learning computer methods in the context of specific preexisting goals and expectations," (Carroll, 1990 in Christiansen, 2007 in De Figueiredo & Afonso, 2006).

Good professional development is not an event but is a process (Slepkov, 2008). Instructional leaders can support this process by structuring the school day to allow teachers the time to participate in ongoing professional development and collaboration (NSDC, 2007). Bush (1984) found that when professional development includes a coaching component, up to 95% of participants transferred the desired skill into classroom practice," (In SEDL, 1994). Coaching is defined as "follow up attention to help with the at-home implementation," (SEDL, 1994). As the teachers value and develop some competency and confidence in playing the game, their focus will shift to the management of the processes related to the game (CBAM, 1998). Supports will be essential to facilitate dialogue among colleagues as well as assurances that the implementation can be achieved. These types of supports can be provided by the professional development provider in conjunction with the site and district administrators. Time to play the game, planning instructional use of the game, and developing strategies to implement it in the classroom is critical. "If teachers are not provided time to learn, plan, and practice what they have learned, the district's

investments in technology and professional development will fail to produce the intended results for students," (NSDC, 2007).

Examining the Problem

The manner in which lesson study, innovative technologies, and professional learning communities interact are key components of this instrumental exploratory embedded case study design. The case being studied is an ill-ordered problem due to "the inability to define accurately a true beginning state or ending state can't be determined nor can barriers that need to be passed," (Scholz & Tietje, 2002). The case is instrumental because inquiry is vital to the case, that is the case, itself, is not the focus, but furthering the body of educational research and inform professional development providers and educational leaders (Yin, 2003). The researcher is seeking to produce a model to be used to implement Digital Game Based Learning (or other innovations) through the use of lesson study. The Hegelian model of inquiry was utilized because as data are collected, "they are viewed from multiple points of view" (Bhatnagar & Kanal, 1992, p. 32). The data collected in this study will not be decomposed but will be integrated and synthesized. The data and theory interacts within architecture of knowledge integration appropriate for embedded case studies (Scholz & Tietje, 2002, p. 30). The first layer of data is known as Understanding. These data layer relates to the school system as a whole and the external factors that may affect its operation and its impact on student learning. For the purposes of this study this layer will be titled The System.

Baseline data were generated from teacher surveys regarding years of experience, technology use, collaboration, dialogue, and reflection were utilized in the layer of data and theory titled, The Case. This layer of data is referred to as Conceptualizing (Scholz

& Tietje, p. 30). This part of the model functioned to "develop a more valid understanding of the case" (Scholz & Tietje, p. 31). This layer of the study includes the history of the problem and its context.

The third layer is explaining. This layer of data begins the synthesis of all of the individual pieces of data into codes and themes. The codes and themes are integrated with the existing bodies of knowledge relevant to this case. The codes and themes generated from this case are integrated with knowledge from the bodies of medicine, natural sciences, education, and social sciences. This process was completed carefully to insure synthesis, yet due to the ill-ordered nature of the problem, there is no unifying theory or model (Scholz & Tietje, p. 34). For the purposes of this study this layer is titled – Investigation and Integration. The following chapters explain how these layers of analysis were conducted and how these relate to the case being investigated.

This complex methodology is appropriate to allow for the effects of each part of the system to be truly examined and accounted for in this complex system known as Wellington Middle School. Learning is a process of emergence and co-evolution of the individual, the social group, and the wider society (Mason, 2008, p. 21). As we learn we transform into something that we were not only moments before (Mason, 2008), thus the complexity of a school environment where each person is learning and working to become better than he/she was just the day before.

CHAPTER TWO

Understanding the System

"New standards require new pedagogy, instructional organization, and attitudes. If teachers are to change the way in which they teach and think about learning, professional development must change as well." (Massell, Kirst, and Hoppe, March 1997.)

Introduction

The United States educational system is complex. The system is impacted by its own history as well as the economic and social history of the country. Realizing the complexity of the system emphasizes the interconnectedness of the factors of the system. This embedded case study introduces a new type of professional development and communication structures into the school as well as a technological innovation. In order to fully assess the impact of these factors on teacher collaboration and reflection, it is important to consider the relationship between the educational system and the study site. This study's methodology, embedded case study, recognizes this as the first level of analysis in embedded case studies, Understanding.

Educators have always understood their responsibility for student learning, yet, it is only recently that this responsibility is broadened to include teacher learning (Lambert, 2002). Research shows the benefits of teachers' reflective practice (Joyce, 2004; Calhoun, 1994), yet reflection is rarely found in public schools. Not only are the teachers not reflective, they are isolated (Schmoker, 2006). This isolation has been a characteristic of education throughout the modern era.

The opposite of isolation is a culture of collaboration. Collaboration is a vital process for school improvement that is woven into every feature of school culture in professional learning community development and sustainability (Dufour & Eaker,

1998). School improvement is the goal of the Elementary Secondary Education Act, A Nation at Risk, and No Child Left Behind. Increased student achievement is often a goal of professional development (Fullan, 2007). Professional Learning Communities (PLCs) have been recommended as the structure for effective schools (McLaughlin & Talbert, 2001) and they are an important piece in student learning because teaching is a cultural activity (Stigler & Hiebert, 1999). When peers collaborate and focus on student learning student achievement is affected (Sergiovanni, 2005).

Historical Background of the Problem

The problem of isolation is not one that is new to education. In fact, education began in a one room school house with only one teacher. It has progressed to a building with many classrooms and campuses of many buildings, yet teachers remain isolated. The physical layout of the buildings contributes to the isolation (Fullan, 2001).

Historically, the focus of modern education has been on doing the job of education efficiently (Tehie, 2007). Assembly lines were instituted in factories as part of the efficiency efforts (Leland & Kasten, 2002). The thought was that if one person did one job day after day, they would do it well and perfect it. This line of thought moved into the classrooms as teachers specialized and compartmentalized education in the United States into classrooms and content area specialists. The result was teacher isolation (Fullan, 2001). Each piece of the assembly line known as a high school diploma has been isolated by focusing on the task, instead of the product realized at the end. Every good assembly line has a blueprint of the final product and the design of the line is tailored for the item being produced. Yet, the structure of school, as it was instituted by a young American government, lacks a blueprint, even today.

Despite many industrial and technological advances in our society, the manner in which we educate our children is still much the same. In early United States education, schooling consisted of one teacher in one room with many students at differing levels of instructional needs. Despite many school improvement initiatives and professional development models or programs, the structure is the same except this classroom is contained in a building with many classrooms, yet the isolation of the teacher remains unchanged.

Education in the United States found itself in a time when things were changing. "Immigration was increasing. The demands of industry were increasing as were the demands of the public on the claims being made by the schools," (Tehie, 2007, p. 194). The pleading for educational reforms began. The above description could be describing public education in the late 1900's and early 21st Century, yet it is a description of the plight of educators in the late 1800's. Despite reform efforts and initiatives, many things in United States education have remained the same. Yet, to place this research study in the proper context, a review of the system in which it is placed is imperative. This embedded case study (see Appendix A) is set in a secondary school so the review of the educational system will be limited to the history of secondary schooling in the United States.

The common school, known today as an elementary school, was an accepted part of society by 1850. High schools and universities received state tax support as a result of a Michigan Supreme Court ruling in 1874 if that state supported a common school (Tehie, 2007). This ruling was instrumental in the creation of a hierarchical educational system in the United States (Tehie). The need for increased levels of education was

being realized by many families due to the changing complexion and quality of the work force. Few students received a secondary education (public or private) in the early nineteenth century (Tehie). The first American high school was created in 1821 and was known as the Boston English Classical School with coursework consisting of "English, mathematics, social science, science, bookkeeping, navigation, and moral and political philosophy," (Tehie, p. 196).

By the end of the Civil War, many high schools existed. Only a few students desired to further their education by proceeding to a University. Many that began their University studies found they did not receive proper preparation for University academics due to a lack of course offerings at their local high school (Tehie, 2007). In 1892, a close examination of high school curriculum was being conducted by the National Education Association (NEA) and The Committee of Ten (Tehie). "The committee issued its report in 1894 which recommended the curricula be limited to only four areas of study: Latin, modern languages, science, and English," (Tehie, p. 197). This report recommended an alternative plan of study for those choosing to not pursue post-secondary education, but the industrial education movement increased in popularity. This recommendation proved worthy since only "about 50 percent of all high school graduates stated an intent to continue their formal education without delay," (Goldin, 1998, p.350). The students needed an education that would benefit them without any additional learning. The institution of school was faced with one question. How could the needs of both types of students be met within one school?

A debate was developing in United States education. A division was developing among the progressive school of thought between Edward L. Thorndike and John Dewey.

Dewey's educational philosophy focused in inquiry and the social environment of the students. Thorndike focused on the quantification of student progress and the development of criteria to measure their progress (Tehie, 2007). Thorndike worked closely with the Detroit school system and established the use of the IQ test in the system to evaluate students. His view of education has been described as elitist and he considered only people of certain IQ capable of making their own decisions and as a result, they should be placed in positions to make decisions for the others. He utilized a secondary set of curriculum and assessments to be given to those students classified as backward, or those that were not considered capable of making decisions. The battery of assessments used in the Detroit schools ignored language and ethnicity and as a result, the data generated by these assessments led to the creation of the hypothesis that ignorance and race led to poverty and inferiority of other ethnicities (Tehie, 2007).

John Dewey held a very different philosophy of education and its purposes. He (1916) defines education, "in its broadest sense as the social continuity of life" (p. 3) and defines life as the customs, institutions, beliefs, victories and defeats, recreations and occupations," (p. 2). In his perspective, schools are a "superficial means of transmitting information which forms the dispositions of the immature" (p. 4). To test his views, he worked with Chicago Public Schools, later to be known as the Dewey Laboratory School. His definition of life was evidenced in his educational philosophy as he worked to find connections between the content areas and fought the compartmentalization of education (Tehie, 2007). His educational system was focused on the child and his/her development, individual needs of the students, and the need of the educational environment to conform to meet the needs of the students, not the content. These needs were also highlighted

during the great depression as students were often without proper clothing, shoes, and meals. Many schools collected articles of clothing and worked to meet their students' needs and the effects of this tough economic time made educators increasingly aware of the effects of socioeconomic status on a child's academic performance (Tehie, 2007).

Dewey's philosophies and practices were in such stark contrast to the views of the NEA and the Committee of Ten that the Progressive Education Association was developed in 1919. Yet, he became critical of this same organization only nine years later due to its lack of sound social philosophy (Pulliam & Van Patten, 2007).

In 1913, NEA appointed the Commission on the Reorganization of Secondary Education. They published their recommendations in 1918. From their report, "seven cardinal principals emerged: health, command of fundamental processes (reading, writing, arithmetic, oral and written expression), worthy home membership, vocation, citizenship, worthy use of leisure time, and ethical character. The commission also encouraged the development of programs of study around three elements of required courses, specialized subjects chosen on the students' goals, and electives," (Glatthorn, Boschee, & Whitehead, 2006, p. 40). "This was an important report because it led to the freeing of secondary education from the domination of post-secondary educational institutions….and it articulated the need for a comprehensive high school for all students, not just the college bound," (Glatthorn, et al. p. 40).

World War II began September 1, 1939 and the United States joined the war effort in 1941. This impacted society in the United States in many ways, the loss of life, living in a time of war, and the realization that efficiency could result in a negative effect. The negative effect of Hitler's quest for efficiency was seen very vividly by American

soldiers as they liberated concentration camps (Tehie, 2007). World War II also effected legislation in the United States as laws were passed that prohibited discrimination on public contracts based on race, creed, color, or national origin in 1941 and 1943 (Tehie).

Wartime also created an increased awareness of science and the need for scientific literacy. "In 1945, *The Journal of School Science and Mathematics* proposed that the 'scientific method of instruction' endorsed by Edward Thorndike, was the best way to teach students," (Tehie, p. 224). Scientists began to be viewed as men who wear white coats and work in laboratories. Gordon Mork began advocating science instruction for all students including the scientific method. Mathematics instruction was also under great scrutiny and students' poor understanding and knowledge was attributed to the altering of instruction for those students that were "non-college bound" (Tehie, p. 225). As a nation recovering from war and The Great Depression, a need for increased education was seen and felt, but the funding was not as bountiful as the demands.

Schools were lacking equipment, supplies, and qualified teachers, yet the military was demanding their new recruits possess a solid knowledge of science to progress their training and function well in that capacity. Teacher pay was low as were the number of applicants. Emergency teacher certificates were granted by administrations to fill classroom vacancies. As Sputnik rose into the sky, so did the awareness of the need for proper instruction in mathematics and science as did the awareness of color. Focus shifted to discussions of separate but equal and conflicts erupted in many states as demands for desegregation increased. John Dewey (1916) realized the need for the educational institution to "provide something like a homogeneous and balanced environment for the young…The intermingling in the school of youth of different races,

differing religions, and unlike customs creates for all a new and broader environment" (p. 25-26). School desegregation didn't begin to occur on large scale until the passage of the Elementary and Secondary Education Act (ESEA) in 1965. This was a key piece of legislation intended to provide children from low socioeconomic families with the needed school supplies. ESEA also provided allocations of funds for textbooks in public and private elementary and secondary schools (Pulliam & Van Patten, 2007).

The 1960's were a time of many innovative ideas in education. "These innovations included open classrooms, team teaching, non-graded classes and schools, block scheduling, and tokenism (reinforcements for learning)," (Pulliam & Van Patten, 2007). While lasting effects of these innovations are still seen forty years later, many were short-lived and were marked as indicators of the era. Frustrations from the ineffectiveness of the multiple education innovations and declining student test scores resulted in the "Back to Basics" approach to education in the 1970's. In an effort to return to the basics, many high schools decreased their graduation requirements in the content areas of math, science, English, and foreign language. Students' lack of motivation and proper behavior led to teacher frustration. The change in student behavior was attributed to the reduction of assigned homework, the lack of punishment for absences, and the dress code being abolished from schools (Tehie, 2007).

Public Law 94-142 was passed in 1975. This law guaranteed a free and appropriate education for all students, regardless of their physical or mental disability and returned the focus of the school to the child's abilities, not disabilities. The realization that all children have strengths and education should be designed with a focus on student learning was in line with Dewey's platform. Dewey (1916) was an advocate of the

appropriate learning environment being provided for the child. Legislators in 1975 agreed with him and extended his environmental concerns to the creation of an Individualized Education Plan (IEP) for special needs students (Tehie, 2007).

As the 1970's drew to a close, so did the United States' prosperity. The decline experienced in the 1980's was linked to poor preparation of United States' students in the area of math and science (Tehie, 2007). As an increased awareness of the need to improve education occurred, federal appropriations for education decreased. President Reagan cut public school funding in an effort to increase local and state responsibility for the education of their youth (Tehie).

A Nation at Risk was published by the National Commission for Excellence in Education in April, 1983. It recognized the world as a "global village" citing specifically Japanese and South Korean economic developments (National Commission for Excellence in Education, 1983). This report recommended an increase in graduation requirements to include four years of English, three years of science, social studies, and math, and one half year of computers. If a student were college bound two additional years of foreign language would be expected as well. A Nation at Risk spurred a shift in thinking from the number of hours in which a student participates or is present in a class to the number of units a student takes and the quality of instruction that is received (Goals 2000, 1998).

The increase in curricular requirements was followed by demands of increased rigor and time spent on teaching the basics and less focus on other things. Additional requirements were made of teacher preparation programs to provide better prepared teacher candidates. A longer teacher contract was requested as was incentives to attract

qualified students to the teaching profession (Pulliam & Van Patten, 2007). School leaders did not escape the scathing report. The expectation was raised for school leaders and board members to demand excellence within the local school system and to monitor the use of funds to insure primary support for the schools comes from state and local funds instead of federal (Pulliam & Van Patten).

In an effort to increase expectations, the federal government called for increased educational reform at the state level in Goals 2000. "Goals 2000 supports state efforts to develop clear and rigorous standards for what every child should know and be able to do, and supports comprehensive state- and district-wide planning and implementation of school improvement efforts focused on improving student achievement to those standards" (p. i). It called for a clear shared expectation level by administrators, teachers, and community to allow for optimum learning by the student. Goals 2000 also included a student performance component for all ethnic subgroups.

In 1999, *The Teaching Gap* was published (Stigler & Hiebert). This book began as a review of the TIMSS (Third International Mathematics and Science Study) but developed into much more. The TIMSS study examined closely the practices of 231 eighth grade math classrooms. One hundred of these classrooms were in Germany, fifty in Japan, and eighty-one in the United States. The practices of the math teachers in each classroom were examined as well as the performances of their students. As a result of Stigler & Hiebert's analysis, the culture of teaching in each country came under scrutiny. The isolation of United States teachers came to the forefront as did the collegial nature of those in Japan (Newton, 2007). Not only were the Japanese teachers collegial in their practice, they had intentional and detailed conversations focused on student learning.

Stigler & Hiebert's (1999) analysis of the data found a new need for educational standards as well as the need for a change in teacher practice.

This need for change in practice created an increased need for improved teacher preparation and professional development in order to improve education. A focus on accountability for student performance was the basis for the introduction of teachers to state and national standards for content areas (Pulliam & Van Patten, 2007). Teachers had to become educated on the standards and adjust their instruction to meet the needs demanded by the standards. Educators had to develop an increased awareness of the importance of parents' role in education. Goals 2000 mandated efforts to involve them and other community members in the educational process.

In January 2002, the Elementary and Secondary Education Act was reauthorized and renamed the No Child Left Behind Act of 2001. The focus of the legislation was to "close the achievement gap with flexibility and choice, so that no child is left behind" (No Child Left Behind, 2002). This reform-centered legislation created high expectations for state and local education agencies that included mandates for student performance on required standardized assessments. This legislation created a flurry of efforts to create the required assessments and standards focused instruction began to increase as did the associated professional development.

The debate that began with Dewey and Thorndike continues even today. Teachers still follow, at least in some part, the child-centered philosophy in meeting their students' needs. Teachers work to provide students with required materials of paper and pencils as well as a listening ear or emotional support throughout their tenure in education. Yet, the creation of No Child Left Behind in 2001 mandates student testing and creates minimum

student and school performance levels. Financial hardships that occur throughout the life of educational funding also force the focus back to the efficiency model as administrators seek to educate the most students for the lowest cost. Educators struggle to find the balance in meeting the needs of the students and the governmental mandates (Elmore & Furhman, 2001). This is a struggle that fights for teachers' focus and energies on a daily basis and this is a struggle that won't be ending any time soon.

The history of education is filled with images of teacher isolation and traditional instruction. Teaching is a cultural activity (Stigler & Hiebert, 1999) but the culture of isolation is not one indicative of school reform. The cries for educational reform continue to increase in number and volume. Effective teachers have ceased to view the classroom as a "black box" (Yair, 2000) but instead have begun to closely examine =9student engagement and learning. As teachers make close examination of student actions, words, and work, they gather detailed evidences of activities that engage students and maximize their learning and which ones are most successful.

CHAPTER THREE
Conceptualizing the Case

"The most important factor in successful reform is the presence of a strong professional community, in which teachers pursue a clear, shared purpose for student learning; engage in collaborative work; and take collective responsibility for student learning."
(The Progress of Education Reform, 1996.)

Introduction

The process of introducing an innovation or change into a complex system like United States education is complex in itself This study utilizes a framework of professional development, adult learning theory, and professional learning communities to investigate the impact of lesson study and the implementation of DGBL on teachers' collaboration and reflection. Baseline data generated from teacher surveys regarding years of experience, technology use, collaboration, dialogue, and reflection, as well as baseline student achievement data were utilized in this layer of data and theory titled, "The Case." This layer of data is referred to as Conceptualizing (Scholz & Tietje, p. 30) and this chapter will focus on conceptualizing the case of Wellington Middle School.

This chapter will assist us as we "develop a more valid understanding of the case" (Scholz & Tietje, p. 31). By definition, a site chosen for a case study is to be a bounded system, a subject or phenomenon is "bound by time or place" (Creswell, 1998, p. 249). This system is one that is ever changing as new people enter and leave, new expectations or mandates are introduced, or teachers gain new knowledge or insights into student learning. While unanticipated factors may be introduced during the course of data collection, once the data have been collected, the system will in fact be a bounded system, due to the lack of ability to recreate the system exactly as it was during the time of data collection. The site chose for this study is Wellington Middle School.

Wellington Middle School

Wellington is a community with a rich history of early settlers and Indian tribes as well as train robberies and farm trade. The community still serves as the center of economic growth for the region. Evidences of oil and natural gas prospecting, charming farm houses, wind turbines, and acres of cattle ranches line the roads entering the community. Wellington sits in isolation in the western part of a Southwestern state in the United States. The closest farming community is fifteen miles away with larger communities 85 miles away. As a result of the community's isolation, the over 13,500 people of Wellington have developed a great sense of self-sufficiency, resiliency, and flexibility which are also evident in the culture of the school.

The schools are located in the center of Wellington. While the schools may not necessarily be considered the center of the activity in Wellington, they are definitely a priority. The community has shown great support for the schools through attendance at parent-teacher conferences and other school activities as well as membership and involvement in the local parent teacher association (PTA) and educational foundation. Their support doesn't stop with their time. The community recently passed a bond issue that totaled more than two million dollars and Wellington Education Foundation has a history of providing over $85,000 in grants to the schools and teachers (Wellington Chamber of Commerce, 2008).

The community has yielded a nice return on their investment. The school has been the recipient of many awards including national recognition for academic excellence and many faculty members have received recognition at the local, state, and national level. The efforts of the teachers have resulted in many students receiving awards at the

state and national level, including National Merit Finalists. As the teachers were celebrating successes, they were celebrating together, alone. Each had a piece in the award yet few had worked together to achieve it.

The site chosen for this study is the seventh and eighth grade center, Wellington Middle School. The community refers to the seventh and eighth grade center as the "south" middle school. It is housed in an older two story building on a campus separate from the "north" middle school which houses the fifth and sixth graders. These two campuses are located very near each other which allows for some sharing of common facilities and staff between the two campuses.

The teaching faculty is one of experience with the average number years of teaching experience being 15 years. Each teacher has a college degree and possesses certification in the area in which they teach. Wellington Middle School has 28 faculty members and 14% of them have advanced degrees. Only a portion of the 28 faculty members were involved in this research study, the eighth grade teachers. There are eight eighth grade core teachers and one media specialist composing two teams of teachers.

The teachers are very active in the lives of their students. Many attend student activities regularly as well as attend church or work as partners in community groups such as 4-H. The teachers spend many hours working, as is evidenced in the creativity of the assignments provided to their students as well as the décor of the classrooms. Many have spent their own time and money to paint their rooms to reflect their personality. The district would have supplied the materials but the teachers appear to gain a sense of satisfaction from it.

> I wanted the room to be bright and cheery when they (the students) come in. White is clean but then my room isn't any different from any of the other rooms. I want them to know this is a place that's different (than other places).
>
> - Suzanne (personal communications, 2008).

Holding to the middle school philosophy, the core content teachers are arranged in two teams with each team serving half of the eighth grade students. The schedule is structured to provide times for the students to receive assistance through "TOPS" time as well as an advisory time. The teachers also have a scheduled period during which they will plan individually and an additional period exists for team planning. When asked about the team time Teacher L responded, "This is a time for us to talk about students and their present issues and figure out ways to help them" (personal communications, November, 2006).

The principal, Mr. Haworth, has been in the district for 29 years and has served as principal in this site for the past 14 years, including the entire three years of this study. Mr. Haworth is a teachers' principal. He is one that leads by example and shares his leadership with the faculty. If the schedule needs to be adjusted to best meet the learning needs of the students, he is willing to supervise very large numbers of students to make that happen (Field Notes, 2006-2008). He is not a person of mandates and directives, but he is a person of high expectations and strong principles. He knows what needs to happen for the students and teachers in Wellington Middle School to be successful and works hard to insure they are.

Wellington Middle School is a primarily Caucasian campus with over 80% of the students assigning themselves with that label. The remaining students are classified

as either Hispanic or Native American. Over forty percent of the students are eligible for free and reduced lunches.

Context

In 2005, the United States Department of Education awarded a $4.2 million Star Schools Grant to the K20 Center at the University of Oklahoma. The purpose of this grant was to explore the effects of digital game based learning utilizing a mobile platform on math and literacy achievement of eighth and ninth grade students. The examination of this integration was done through a partnership of researchers and practitioners through the process of interdisciplinary lesson study.

Wellington Middle School agreed to participate in the larger study, The Star Schools Project. These schools had previously implemented at least three of the ten practices of high achieving schools (O'Hair, McLaughlin & Reitzug, 2000) with the assistance of an OETT grant to schools and professional development provided by the K20 Center staff. These grants awarded $50,000 to schools for technology, $25,000 additional dollars of this award were to be invested in professional development, and $4000 were used for staff release time.

Each of the study schools was randomly assigned by an external third party to a classification of either "control" or "treatment." This random assignment yielded nine schools, eleven teams, classified as treatment, or lesson study and game, and six schools were classified as control, or lesson study only. Both groups of schools participated in lesson study but the "treatment" group would utilize lesson study to study the implementation of digital game based learning in their classrooms during the second year

of the study, 2007-2008. Each of the fifteen schools had at least one team of 2-5 teachers that participated in the study.

Wellington Middle School was randomly classified as a control school. The teachers of Wellington Middle School would participate in lesson study for two years and would work to implement the game during the third year of the study (See Appendix B). Wellington teachers chose to participate in lesson study in their two previously established teacher teams. Each team of teachers consisted of a minimum of one English teacher, one Math teacher, a Science teacher, and a Social Studies teacher (n=8). The decision of which teachers to include was made by the specific school site however it was encouraged to have representatives of each discipline area on the lesson study team.

The two teams of four teachers participated in a four day initial professional development training in the summer of 2006 that provided initial instruction in the basics of lesson study and some activities to promote team building among the teachers. During the 2006-2007 school year, each team participated in three lesson study cycles that focused on process skills. These lessons could focus on data collection or categorizing of items within curricular contexts. Each of the lesson study cycles involved a team planning session to plan the lesson and create an observation document. This observation document contained teacher actions, desired student reactions, as well as an area for observers to write their observations (See Appendix C). The team would then choose which teacher would teach the lesson. While the teacher was teaching the lesson, the remaining teachers, as well as a lesson study facilitator from the K20 Center, would observe the students for evidences of student learning and student reactions as stated by teachers on their observation documents. The team would then reassemble to discuss

their observations and possible modifications of the lesson plan to increase student achievement and student learning.

In September 2007, the teams from the control schools participated in an additional day of professional development. This day of professional development included information on millennial learners and student learning through artifacts as well as additional information on the practice of lesson study. The teachers analyzed their school test scores which were disaggregated by standard and objective. The teachers, within their specific disciplines, discussed trends that occurred across the state of Oklahoma within their content area. The teachers joined their school teams to analyze their test scores as related to their specific school teams. This analysis resulted in the identification of student learning goals to be studied through lesson study. For both Wellington lesson study teams, the goal set focused on a process skill as identified in Oklahoma Priority Academic Student Skills (www.sde.state.ok.us). The two lesson study teams conducted three more cycles of lesson study during the 2007-08 school year focused on the goal set at the summer training. The teams met to plan, teach, and observe lessons and activities related to increasing student achievement in the identified area of need.

During the summer of 2008, the teachers received an additional two and one half days of professional development by K20 Center staff. The first half day of professional development, held in June 2008, involved the operational details of the mobile platform chosen for the study. The platform being utilized in this study is the Ultra Mobile Personal Computer (UMPC), the Q1 Ultra, manufactured by Samsung (Figure 3). This

training session included details of how to use the tablet feature of the device as well as providing manuals to assist them with information about the devices.

Figure 3

Samsung Q1 Ultra



The second two days of professional development, held in July, 2008, focused on the intricate details related to the exploration of the digital game based learning environment to be implemented in their classrooms, *McLarin Adventures*. This training included the rather simplistic details of logging into the game and customizing their player character (their avatar) as well as the more complex details of utilizing the game in their classroom to teach students. The entire Wellington Middle School lesson study team attended the July 2008 training as well as Mr. Haworth and a district level curriculum director. At the conclusion of this training, one of the Wellington Middle School teams left with a definite plan of how to introduce the game to the students and possible ways to incorporate the game into their classroom and utilize it to increase student learning. The other team left with some possibilities but lacked a definite plan for implementation of the technology. Due to the nature of the research questions of this study (see Appendix A); there was no formal discussion of lesson study or the utilization of lesson study in the process of incorporating the game in the teachers' classrooms.

CHAPTER FOUR

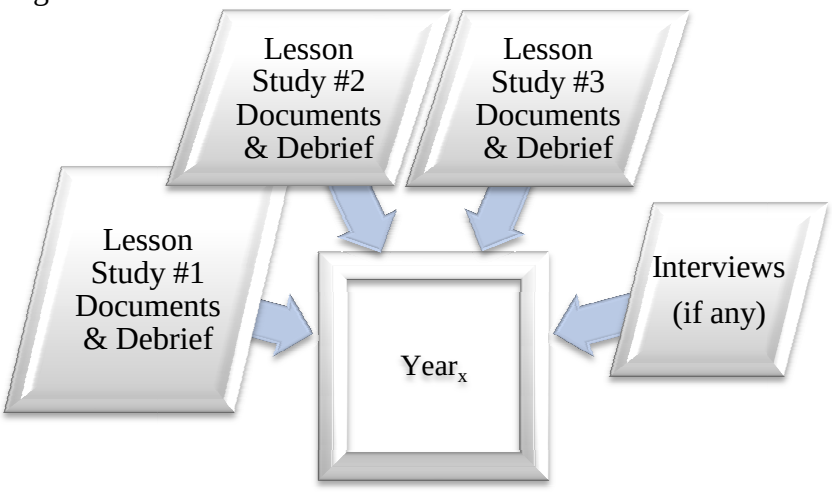
Conceptualizing the Case: Data Analysis

Introduction

This chapter begins to examine the teachers' instructional decisions and technology use as a result of their participation in interdisciplinary lesson study. This chapter will present data collected during the three years of this study. The data will provide a more complete picture of the complex environment in which teachers must make their decisions. The structure for the data analysis was generated from the time frame in which the data were collected. Each set of data were collected during each school year (see Appendix B) and were naturally organized according to the time and the lesson to which it related (see Appendix E). The analysis was restricted to the data generated within a single team within the year it was generated to provide for the opportunity for the documentation of teacher and team growth throughout the study. A coding system was developed (see Appendix E) to allow for the identification of documents according to the time frame in which it was generated.

Figure 4.

Yearly Data Organization



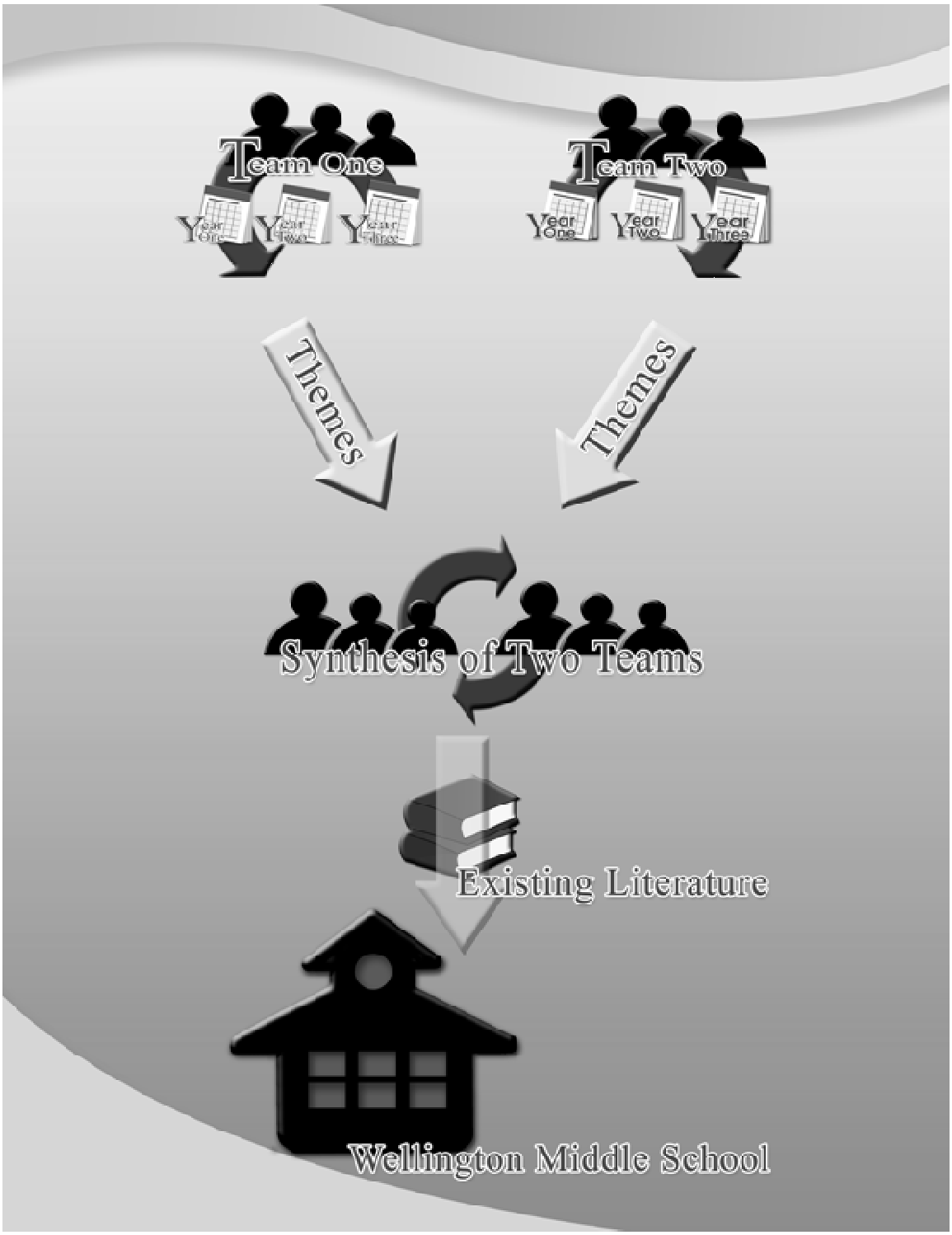
The data collected throughout the life of this three year study was not necessarily the same types of data. The data collected was never intended to be used for the purposes of triangulation in an effort to support the assertion of findings and conclusions. In support of the Hegelian method of inquiry (Bhatangar & Kanal, 1992), each data set was collected to allow for the consideration of the experiences of the teams from every angle in an attempt to understand the impact of teachers' instructional decisions and technology use. It was to "freeze the ongoing moment," (Glaser, 1978, p. 129) as to give the best description of the events occurring at this point in time.

Data Analysis Procedures

Preliminary data analysis began with a narrative analysis of each team's experience with interdisciplinary lesson study. The data for each team within a singular year of study were analyzed using narrative analysis. The analysis was then generated into a narrative form to best document the each team's lived experiences. This process was repeated three times for each team to generate a narrative for each year of the study. Once the narratives for each year were generated, they were analyzed to generate a summary for each year. The complete narratives for each year were then analyzed and codes and themes were generated. The themes will then be discussed and integrated with the existing literature. Each of these data sets were generated from the experiences of the teachers that compose the living organism known as the eighth grade of Wellington Middle School are detailed in the following pages of chapter four.

Figure 5.

Data Analysis



Team One



Team Composition

Team One consisted of four eighth grade teachers representing the four core curricular areas of mathematics, science, English, and social studies. These teachers combined to have a total of 55 years teaching experience. Teacher one, Ginny, was with the project for just a few months due to her diagnosis of a terminal illness. Teacher two, Suzanne, had a total of 25 years experience, with 4 of those being in Wellington. Teacher three, Teresa, has been in Wellington schools for five years but has taught science seven years. Teacher four, Sondra, joined Team One year into the project after Ginny was diagnosed with a terminal illness, and at the conclusion of the research had been in Wellington two years and has a total of fifteen years experience in the English classroom. Brad is teacher five. Brad teaches social studies and has been in Wellington three years, joining after five years of teaching, just prior to the beginning of the Star Schools Project.

Table 1.

Team One Composition.

Teacher	**Subject Area**	**Years Experience**	**Years in Wellington**
Ginny	English	Left after few months	
Suzanne	Math/English	25	4
Teresa	Science	7	5
Sondra	English	15	5
Brad	History	5	3

Year One

Mr. Haworth greeted and escorted the researcher to the classroom on the first day in Wellington. The anxiety being felt by the team was quickly realized. And was not alleviated by the casual choice of attire by the researcher. The clothing was an attempt to signal to the team that lesson study was a learning process and not part of a more formal teacher evaluation system.

The time began with to inquiries about lesson specifics and the one chosen to teach the lesson began to laugh nervously as she explained. As the students entered the room, the smell of sweaty, wet bodies began to overtake the obvious aroma of air fresheners noticed earlier. Many bodies were much larger than the desks they were asked to occupy. As the lesson began, Ginny took her place at the front of the room while the other teachers assumed their places at the rear (Field notes, 2006). The students began to show their anxiety as they looked around nervously at each of their teachers and the researcher as each worked to position themselves inside the tiny rectangular-shaped classroom strategically filled with student desks and eighth graders as to not leave any usable space unfilled.

The focus of the lesson was global warming (Observation documents, T1LS 206). The lesson began with a video highlighting the issue of global warming and its impact on the planet Earth (Observation documents, T1LS 206). While the students watched the video intently, they were hesitant to answer the questions being asked by Ginny. She asked them basic recall questions, yet the students were slow to respond. As Ginny turned her attention to the students' science notebooks and their discussions held earlier in their science class, their level of participation increased. The students were

quick to respond to PowerPoint slides showing graphs the students had created earlier (Observation documents, T1LS 206). The students' participation in the lesson was encouraged by a lack of accountability on the part of Ginny.

> Raise your hand if you heard….. You don't have to say what you heard, just let me know if you heard it, (all hands were raised), (Observation documents, T1LS 206).

The teachers shared the students' lack of engagement. While Ginny was teaching, one teacher sat in the back of the room writing on his individual course lesson plans while another sat dozing off. The third observer was more engaged but was not sure what she was seeing. As a result, the de-brief conversation was not very productive. The teachers focused on their own efforts and lacked team ownership of the lesson.

> I was not sure if you had it on your agenda to …. (Debrief conversation, T1LS206).
>
> I was not involved in that part, you made that decision… (Debrief conversation, T1LS 206).

The teams' reflection on the lesson showed the teachers viewed the students as being engaged. They saw the students quiet and still and therefore, they were engaged (Debrief conversation, T1LS 206). The teachers felt the students' engagement was attributed to an emotional response to the problem. The teachers noted another emotional response to the lesson during the time allotted to a debate on possible actions to lessen the effects of global warming. "The students like to debate," they said (Debrief conversation, T1LS 206). As the formal debrief discussion ended with moans and groans of the time allotted to lesson study, attempts were made to turn the conversation to what they learned and observed that day. Further attempts were made to attempt transfer of their new knowledge to the context of other lessons. Both of my attempts had only limited success.

The team's third lesson continued to focus on student emotional involvement as they selected content related to the holocaust and symbols. As the students began to rearrange symbols, they began to rearrange roles themselves. Then, in the debrief, the teachers shared,

> Timothy was amazing! He is usually unengaged but he was the team leader! (Debrief conversation, T1LS 306).
>
> The lesson was worth it if for no other reason than Timothy, (Debrief conversation, T1LS 306).

The team began to see the potential effects of student engagement. Their eyes became more open to the possibilities of student learning if even for just a brief time. The team referred to this lesson two years later as one of the best experiences of the project (Debrief conversation, T109).

Summary

Narrative analysis of the first year's data showed teacher concerns related to student engagement and ownership. Despite the length of time between the conversations, these same threads continued to reappear. The team was very aware of who was the instructional decision maker. Despite the collegiality observed in the beginning of the training, in the end it was the decision maker that held the power. As the year progressed, discussions changed from I or me to we and us. The team began to plan together, in my presence, in an effort to insure team planning of the lessons. It is unclear at the end of year one whether this intervention served as a catalyst for this shift in ownership of the lesson and the decisions or if it was merely the appropriate time in development.

Teachers discussed student engagement frequently yet grappled with how student engagement is defined. In the beginning, teachers appeared to have defined engagement as students sitting quietly in their seats and doing what the teacher asked. At the end, the team identified emotional involvement as having some key to student engagement. The extent of the emotional involvement was not explored nor investigated any further in year one. Additional lessons were planned in year two providing potential opportunities for the team to investigate the impact of emotional involvement on student learning.

Year Two

Team One identified accessing information as their lesson study goal for the 2007-08 school year. They identified timelines and the organization of data into timelines as a way of providing students the opportunity to learn to access information. As the lesson was taught, teachers witnessed high student involvement, "the students were so absorbed in the lesson, it didn't even occur to them to cheat," (Debrief conversation, T1LS107). The teachers saw the students express joy and pride in displaying their work (Debrief conversation, T1LS 107). Even when the students realized they were not 100% correct, they were eager to correct their original work and their sense of pride seemed to remain intact (Observation document, T1LS107). As students corrected their placement of cards along their timeline, one student placed the Oklahoma land run at the end of the timeline because it was the 100 year anniversary of the event (Observation document, T1LS107). When this information was shared with the team during the debrief conversation, one teacher responded,

> That happens all the time in our classrooms and we just mark it wrong. We never know <u>why</u> it's wrong. (Debrief conversation, T1LS107).

The third lesson study showed a focus entirely on student engagement. The students worked with manipulatives to create their element to assist in accessing information from the periodic table (Observation documents, T1LS307). This activity found students actively seeking information from the periodic table with heads actively moving from paper to wall chart and back. The team felt the students did not show any frustration with the tasks given them and the goal of the lesson was realized (Debrief conversation, T1LS307).

A final semi-structured group interview was conducted at the end of the second year of lesson study.

> Lesson study forced us to have the time to plan and talk, (Final debrief conversation, T107).
>
> If we had not been in lesson study there would have been a lot less communication between team members. It was hard the first year but it's good to see what each person brings to the table, (Final debrief conversation, T107).
>
> Last year we created lesson studies for the goal of lesson study, this year, lesson study fits in with what we do, (Final debrief conversation, T107).

While they valued the time together, it took time away from their other responsibilities. Another mentioned

> The lessons need to be shared with both teams to take advantage of the time and allow both teams to learn, (Final debrief conversation, T107).

The teachers credited lesson study for their focus for the year.

> Lesson study gave us more of a focus and made us more aware of everything we are doing, (Final debrief conversation, T107).
>
> Accessing information is a problem every day not just during lesson study, (Final debrief conversation, T107).

When asked about the possibility of continuing lesson study the team recognized the value of it but also realized the lack of resources to support the process without the outside support of the K20 Center (Final debrief conversation, T107). The team was painfully aware of the amount of time it took to participate in lesson study, (Final debrief conversation, T107). It might be possible to meet, plan lessons, teach them in our individual classrooms, without observers, and then discuss our observations and experiences in teaching the lesson (Final debrief conversation, T107).

Summary

Narrative analysis of year two showed only one recurring theme throughout all of the lesson study conversations, student learning and engagement. The teachers realized the impact of student engagement in young Thomas and his learning experience. They realized the effect emotional involvement can have on student learning. Yet, the student observations and comments were very superficial in nature. They were concerned about their emotions (i.e., are they happy or pleased? Are they frustrated?) and their behaviors, not their learning of content. While they would begin discussing learning, in analysis it was revealed they were really talking about the students' emotional response only – not if it acted as a trigger or induction to learning.

Year Three



There were no formal teaching experiences with *McLarin's Adventures* during the 2008-09 school year, nor were there any attempts to formally observe student learning or engagement related to the UMPCs or *McLarin's Adventures* due to the technological issues crippling the district, the middle school, and this lesson study team. Despite the

teachers' voiced frustrations, the students' possessed a desire to use the devices and *McLarin's Adventures*.

> The kids were just excited to have them (the UMPCs) out; they didn't care what we did with them. They liked writing their name and the UMPC converting it from writing into text. (Final debrief conversation, 2009).
>
> I think they learned from just having them out, calibrating them, and such, (Final debrief conversation, 2009).
>
> We never really got the flow of McLarin's. There were too many tech issues, (Final debrief conversation, 2009).

During a final post-research interview, the teachers were asked about the types of instructional activities they included in their lessons and the types of factors that impact those decisions after participating in lesson study for two years.

> Lesson study makes you think about what you ought to be doing and things you need to do, (Final debrief conversation, 2009).
>
> I learned that sometimes you have to change your teaching style. I learned kids learn better from doing experiments than looking at pictures in a book, (Final debrief conversation, 2009).
>
> I try to choose different activities because different kids learn in different ways, (Final debrief conversation, 2009).
>
> There are a lot of things I'd like to do but I don't have the time to plan or grab a cross-curricular lesson, (Final debrief conversation, 2009).

During our conversation, the teachers were asked about their decisions and choices when the technology failed to support their planned learning activities of the day. After that question, there was a period of silence followed by a few laughs then one brave soul, Suzanne, answered, "We kept trying to make it work," (Final debrief, 2009). Despite their best efforts, the technology issues were beyond their control and needed supports and assistance from outside their building to allow the problems to diminish and

student learning to become enhanced through its use. The teachers attempted more formal and traditional learning activities,

> We tried to go to a math website but the internet was down, (Final debrief, 2009).

The teachers later confided they provided time for the students to play spider solitaire and pinball. They justified their decisions.

> The kids don't have access to those kinds of things and the technology at home, (Final debrief, 2009).

The teachers continued to cite other technology related issues specifically related to their implementation of the devices in their classrooms. The UMPCs were very small in size which was very advantageous from a storage and mobility within the school but it was a disadvantage with regard to the readability of content on the seven inch screen.

> It was difficult for me to read the content on the screen. I am behind on the technology. The kids had to help me, (Final debrief, 2009).

Several factors were mentioned that impact their decisions related to their activity choices but the number one factor mentioned was time.

> It always comes back to time, (Final debrief, 2009).

> We don't have time to collaborate with our team members now, (Final debrief, 2009).

> Our schedules change and our whole plan is gone, (Final debrief, 2009).

When the team reflected back on their experiences with lesson study, they began to see the value of this type of professional development. They learned more from their colleagues than the formal professional development sessions.

> Lesson study was the only time I have ever been able to go into the classrooms of my colleagues. I learned it's OK to stray from the textbook and use outside sources, (Final debrief, 2009).

> It's about learning new stuff or you get left in the dirt, (Final debrief, 2009).

Despite seeing the value of lesson study, they failed to see the integration of this type of professional development into their regular practice.

> Lesson study can't change our practice until we have the time to plan. We have real limitations on our ability to plan with our team. Lesson study was bad, it was so time consuming. We had to plan the lesson and then plan the schedule to make it happen, (Final debrief, 2009).



Summary of Team One Narrative Analysis

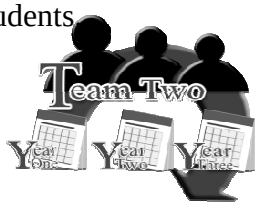
Team One began the journey into lesson study as a team that seemed to be connected to each other despite their apparent differences. The team began with a great consciousness of who made which decision in the team and struggled with having team ownership of the lesson. As the project draws to a close, the team refers to lessons as a collective product and understands the significance lesson study has played in their professional lives. They witnessed the potential effect of active student engagement in learning activities and cited emotional connections as a possible reason for student engagement. While the team is able to see what they have learned from their experiences, they still are unable to see a way to assimilate the practice of lesson study in their professional lives due to a lack of time to participate in it fully.

Technology was a large focus the third year of this study. During this year, Wellington Middle School was bombarded with technological issues outside of the scope of this research study that had a direct impact on this study. The teachers attempted to utilize and implement the specific technological innovations related to this project but were unable to do so due to struggles with the district's wireless network and internet connectivity. Before these issues developed, the teachers focused their instructional

decisions on instructional issues and student needs, but time was still a large factor in their final decisions. However, when the technology failed, their definition of instruction expanded to include learning to use computers or playing computer games.

Team One's learning remained focused on the students' behaviors and emotional satisfaction with the activities. Over the three years of the project, there were multiple conversations focusing on whether the students "liked the lesson" (Debrief conversation, LS206). The team is very student focused and truly wanted to meet their needs. Despite their geographical isolation they have driven three or more hours to attend professional development to assist them in their teaching. The team perceived in the beginning as being intricately connected is now even more so. Our final conversation together had some difficult topics to discuss yet they did so with limited hesitation and talked very freely. They have a new respect for their colleagues and their professionalism and enjoyed seeing how they teach and engage students.

Team Two



Team Composition

Team Two consisted of four teachers representing the four core curricular areas of mathematics, science, English, and social studies. A different teacher held the mathematics position each year during the project, so for these purposes that is a dynamic that will be discussed as a variable but each of the person's descriptive data will not be included in this study. Person one, Angela, taught English and has four years of experience teaching English all of which were in Wellington at the conclusion of this study. Jerry has taught 13 years, five of them include teaching social studies at Wellington. He was on the lesson study team the last two years of the project. Leanne

has taught a total of 12 years, with 10 of those being in Wellington. She was a national board certified teacher in the area of science education.

Table 2.

Team Two Composition.

Teacher	Subject Area	Years Experience	Years in Wellington
Angela	English	4	4
Leanne*	Science	12	10
Jerry	History	13	5

* National Board Certified Teacher



Year One

After the first observation with Team One; Mr. Haworth promptly greeted and escorted the researcher down the hall to join Team Two. Although the hall was filled with very polite seventh and eighth grade students and the conversation with Mr. Haworth was pleasant, the researcher couldn't help but feel alone. . As our journey down the long, winding, dimly lit hallways came to a glass door, Mr. Haworth continued his sales pitch for Wellington by saying, "this is the building where the science teachers are located,". It was a clean building in good repair that was well-lit and had nice brightly colored hallways, a stark contrast to the other building. He led me into Leanne's room, introduced me again, and politely excused himself. Being a former science teacher, we were able to discuss generalities about science as informal data collection

began including the scanning of her room of fourteen rectangular tables neatly arranged in rows with two of the matching chairs seated at each table facing the front. Each chair was pushed in completely and the desktops were clean. My eyes were drawn to the ceiling tiles, alternating ones were covered with student artwork, each related to science. Leanne explained the project was to allow the students to identify similarities between themselves and a scientist. The displayed artwork was a representation of those similarities.

Before more conversation could occur, one of the other team members, Angela, entered the room. Both began to explain the lesson to me very quickly as the students began to enter the room. The goal of this lesson was clearly articulated on the front of the lesson study observation document packet. 'to provide opportunities for students to make observations, make connections, react, and interpret or raise questions'. The daily announcements filled the air as the class period began..

The students were being asked to watch a short video clip and record their observations from the video. The students began to position their chairs, loudly and unapologetically, to allow them to have a clear view of the video. As Leanne led a discussion with the students about their observations, many began to debate what they had seen as compared to the others. The students roared with laughter as they watched the video a third time to observe the gorilla they had missed twice in earlier viewings (Observation document T2LS107). The students' reactions continue similarly as they watch two other types of videos in which other obvious things were overlooked by the students. As the video concluded, Leanne began to guide them through a PowerPoint presentation to learn some observation techniques. The students seem to tolerate this

portion of the lesson compared to the earlier activity as they begin to shuffle papers and play with objects as the lesson continued. The students were asked to make notes and then were to respond using a remote from a student response system. The students became very animated as the use of the remotes continued. They began begging her not to change the slides because they were still frantically looking for the answer in their notes. The students had two trials of observation and recall with the second remarkably better than the first. It was so much better, in fact, that the students begged for their second score to "count in the grade book" (Observation document, T2LS107).

The focus of the second lesson was on global warming and problem solving. The students were to solve multiple problems involving animals that lived in polar climates (Observation document T2LS207). The first problem was a traditional math word problem involving penguins. The students solved the problem in groups of three. The students were then asked to use their problem solving skills to move the penguins from one glacier to another (from one end of the hallway to the other). The students moved into the hallway quickly, talking in loud whispers as they received their final instructions and equipment standing in lines by team. The students' loud whispers became very animated loud voices as they cheered and encouraged each other throughout the activity. Each team approached the process very differently yet each one was seeking the same answer (Observation document T2LS207).

The students' responses to both scenarios were as varied as the students in the class. At the conclusion of the period, the students were provided a writing prompt for them to respond that allowed them to assume the role of the polar bear and express their feelings about global warming. The students wrote their responses very quietly. The

responses varied from a list of do's and don'ts for consumers to a student actually personifying a polar bear named Pole R. Bear (Observation document, T2LS207). When the students left class one young man commented, "Yea! That was a good lesson," (Observation document, T2LS207).

When the team met to debrief the lesson study observation, immediately they began to talk of the diversity among the responses of the students. The following conversation occurred during the debrief conversation.

> Leanne commented, I wanted them to see there are different ways to solve a problem. I was really glad the one young man spoke up that didn't use algebra to solve it.

The conversation continued as Angela added,

> It looked as though some were solving the problem in their heads instead of working it out on paper.

Leanne concurred,

> It was good for them to see. (Debrief conversation, T2LS207).

The teachers' conversation continued to focus on the students' application of their newly acquired knowledge.

> The students enjoyed the activity and laughed a lot but they were able to apply it to life inside and outside the school, (Debrief conversation, T2LS 207).

While the teachers' classroom activities are usually active, they are not usually as involved nor do they utilize the hallway as their learning space.

> The students were enjoying it and we didn't hear any negative comments like 'you are doing it wrong', (Debrief conversation, T2LS207).

> The students were using their strengths. I heard one kid say, 'Lucy, you are good like that,' (Debrief conversation, T2LS207).

The students seemed to have an emotional connection to the lesson.

> They felt empowered. One student wanted to go make picket signs and picket on Main Street to stop global warming, (Debrief conversation, T2LS207).

> It was amazing for me to see when they (the kids) have something to do and something they enjoy you don't have any discipline problems, (Debrief conversation, T2LS207).

The third lesson of the first year focused on the holocaust and symbols. The students were asked to recall symbols and their meaning and compare them to modern day symbols. They then shared the information in a think, pair, share (Observation document T2LS307).

> The students used great recall skills. The swastika was something we covered three weeks ago, (Debrief conversation, T2LS307).

The students worked together to match logos to their respective objects before attempting to create their own label to wear.

> The students liked creating their own symbol. They will remember the lesson more. All of them participated and enjoyed it. (Debrief conversation, T2LS307).

> The students were very specific. It was not only what they drew but how they drew it that was important, (Debrief conversation, T2LS307).

When thinking about the lesson, several saw the opportunity to continue the learning by providing the opportunity to create a symbol for their core team.

The first year was filled with many activities for Wellington Middle School but Team Two's year was also filled with active learning opportunities as well. The team worked and planned active learning opportunities for the students but while they were planning, teaching, and observing, they also were learning. They learned that active learning is preferred by the students even before one of the students verbalized that to

them. The team also learned the importance of the students having a level of emotional involvement, a sense of empowerment, and ownership to the content being learned.

Year Two



The September 2007 professional development session refocused the team to one learning objective, interpreting and communicating data and information. This goal was determined by the team after analysis of students' data and the identification of areas in which students scored lower than in other areas. As the professional development ended, the team's learning continued as they left with preliminary plans for their first lesson study to begin examining student learning related to interpreting and communicating data and information.

Student learning began in a class period prior to the actual lesson study observation as they brainstormed the impact of things and events on their lives. The students recalling those brainstormed items and referencing that list was the first task presented to the students. This task was followed with the challenge of listening to a song recording and listing things mentioned in the song that have impacted society. As the song, "We didn't start the fire," began, the students listened intently with their heads down and pencils to paper and began to write quickly. (Observation document, T2LS108). One student responded, "I must be deaf. I heard it but I couldn't write it down," (Observation document, T2LS108). The students shared their list showing they actually heard and recorded many of the things mentioned despite the fast pace of the song shared (Debrief conversation, T2LS108). The song was played again, but this time

as the accompanying video played on the screen. The lists were much more comprehensive when the students could see images related to the words begin sang (Observation document, T2LS108).

During the debrief conversation the teachers were very excited and animated. They were disappointed in the brainstorming list of the students.

> They brainstormed locally, not globally. We should have brainstormed with them more, (Debrief conversation, T2LS108).

> I don't know. I thought the brainstorming helped activate prior knowledge, (Debrief conversation, T2LS108).

> The students can listen! We have proof! They listened and got a lot, (Debrief conversation, LS 108).

> Our students can retain too. They recalled things from an activity at the beginning seventh grade social studies to this class period. This is cool! (Debrief conversation, LS 108).

The teachers expressed concern about the students individually. As they discussed their reactions to the lesson, their thoughts turned to a learner new to the United States in their class. They were concerned about his list and whether the song and lesson transferred to his frame of reference (Debrief conversation, T2LS108). After plans were made to visit with the student, discussion went to the goals of the lesson.

> The visual cues from the video with the pictures hit our objective because the kids got it when they saw the pictures, (Debrief conversation, T2LS108).

> They were engaged, it blind-sided them. It's cool when you can touch kids that think they can't be touched, (Debrief conversation, T2LS108).

The team's next lesson focused on patterns. The lesson began utilizing the classroom performance system, CPS remotes. The students were to respond with the remotes to indicate what would be the next entry to complete the displayed pattern on the

board (Observation document, LS 308). Many were able to choose the correct item but others were confused by the patterns. Some were making it too hard and missing the obvious patterns that were in front of them (Observation documents, LS 308). Once they attempted to solve patterns individually, they were placed into teams to identify the patterns. Most students were eager to have their teammates pay attention and work together to solve the problems, but others were less interested in the puzzles presented. Patterns are definitely something we need to work on, (Observation documents, LS 308).

At the conclusion of the second year, a semi-structured group interview was conducted to investigate the team's impressions regarding lesson study. Due to the length of the third lesson study's debrief conversation, the interview was very brief due to the teachers' time constraints and schedule demands. The teachers commented that lesson study changed the way they teach all the time and it really focused them on the students' reactions to what is being taught (Final debrief conversation, 2008).

The teachers began to see past the class to the individual students during year two. The teachers begin to look at each individual student and his/her learning and enhancers or obstacles to the process. Learning became an overt and public action instead of the private activity it once was. The teachers realized the students were capable of learning and recalling information for an extensive period of time and the value of the method in which information are delivered. Students can learn and remember when information is presented orally but this process is maximized when information is presented orally and visually. If the teachers had been asked if it is better to present information visually and orally, they probably would have answered "yes." Yet, until the teachers experienced the effects of their choices, they didn't truly believe it

or understand it. The teachers, in fact, learned the same lessons as their students. When they experience learning instead of being told, the learning becomes real and significant to the learner. Both the student and the teacher learned lessons that will hopefully last.



Year Three

The focus of year three was the implementation of innovative technology into eighth grade classrooms. The idea behind the professional development was to use lesson study to examine the effectiveness of the technology being implemented on student engagement and learning. However, the district's technology issues prohibited the team's implementation of the technology into their classrooms. This created a stress for Team Two not previously seen by this researcher. Stress was an expected observation from Team One but not from Team Two. Meetings with Team Two have always been serious in nature and focused on the task at hand but lacked a sense of intensity. The meeting at the conclusion of year three was very different. The team looked very tired. Two of the three were scrunched down in their chairs, almost to a lying down position.. The third acknowledged the researcher with a murmured greeting but then continued to grade papers. They sat up quickly and smiled briefly when presented with chocolate candy. When asked about their year of experiences, their countenance changed. Their eyes fell to the table focusing on the empty candy wrappers, and they slouched into their chairs. They really didn't want to talk about it. So, the subject was changed back to lesson study to begin our conversation.

As their minds moved back to lesson study, they began to relax. One teacher, Angela, became very animated rather quickly. Leanne and Jerry were slower to engage. Angela quickly responded,

> Lesson study really changed the way I teach. I find myself wanting to use manipulatives all the time. I want them to physically do something to help them remember. That started for me right after we started lesson study, (Final debrief conversation, 2009).

Leanne, still failing to make eye contact, comments,

> Yeah, it was good to see how the kids worked in a classroom outside of our own. I think it was good for all of us, (Final debrief conversation, 2009).

Angela agrees.

> We were able to combine our strengths when we came together to collaborate and we learned something new. We learned about using timers and music. Yeah, it was all good, (Final debrief conversation, 2009).

They were reminded them about their comments in the beginning about the time that it took to complete a lesson study cycle. They acknowledged their earlier comments but then they quickly added,

> It helped to know there was not a certain way to do things. We had the freedom to do whatever we wanted. We could do it however we thought it was best and you weren't coming in to tell us it was wrong. Plus, we had success. Our early success and seeing our kids learn pushed us. Each time we had to create even better lessons than we had before, (Final debrief conversation, 2009).

Their successes, early and late, were acknowledged and then they were asked about their team's interactions. Leanne responded,

> Well, it's been hard for the fourth team member. They each were here only one year. We have had a lot of bonding moments and they've missed out, (Final debrief conversation, 2009).

Angela laughs as she chimes in,

> Yeah, all that time we spent cutting and gluing. Seriously, it was good to see how English and science could really come together. In the beginning we never thought that could really happen, (Final debrief conversation, 2009).

Leanne commented,

> Yeah, when I think about process skills, I don't just think about how they apply to science. I think about how they apply to all the content areas, (Final debrief conversation, 2009).

Angela continued,

> We were able to integrate all of our areas and focus on our students' trouble areas. It was powerful, (Final debrief conversation, 2009).

The team indicated they didn't continue lesson study this year because they didn't have the time to plan and prepare the lesson.

"I think lesson study did change the way we did things the first two years, but we didn't do lesson study the third year," (Final debrief conversation, 2009).

It was commented that it does sound like lesson study did make some lasting changes though, in the way you think about the skills you teach and the way you teach them. They agreed, (Final debrief conversation, 2009).

The team had become less anxious so the topic of conversation was changed to technology. As the subject was broached, their eyes fell back to the tabletop. Leanne reached out to the middle of the table for another handful of chocolate. Jerry began to doodle on the papers he had in front of him. The team was reassured them that the researcher was well aware of the struggles they had this past year and reminded them of the emails and phone calls we exchanged during the past eight months. They smiled and laughed. They were reminded them that while the issues we discussed were known but

not the details of what life was like here and for the purposes of this study the details are needed. Angela looked up and smiled as if she had a renewed purpose. So, we began the tough conversation. This team is passionate about their students and their learning so the conversation began begin by focusing on the students. They shared that their students loved the environment (*McLarin's Adventures*), especially the boys. They loved being able to go in and chat with their friends. They liked it even with all the problems we had (Final debrief conversation, 2009). They reluctantly admitted to never "really getting to the educational side of things" as far as utilizing the game as part of classroom instruction, (Final debrief conversation, 2009). The technological problems were just too great to overcome. The conversation seemed to flow more freely and they were less guarded with their answers and allowed their feelings to once again rise to the surface.

They began to freely share their frustrations with Wellington's technology department.

> We are just little naïve, gullible teachers. We just live in our classrooms, we don't know. We asked after our training if they were sure our system could handle this. They said it should but we knew then, we knew there would be issues. He never gave us the same answer about whether the system could hold all 175 machines at one time. We knew, but we trusted them any way, (Final debrief conversation, 2009).

> We should have started out smaller. We should have started with five or ten machines instead of trying to put all of them online at one time. You tried to tell us, but we were listening to our tech team, (Final debrief conversation, 2009).

Angela admits,

> It was so bad that I was afraid to use technology for anything. I was afraid that if I used the handhelds for anything I'd mess them up if we were able to get them to connect, (Final debrief conversation, 2009).

Their honesty was appreciated but the probing continued into their thought processes and decision making as inquires were made about what happened in a class period when the technology didn't work.

> In the beginning, we were still positive that we could make it work so we would keep trying often for the entire class period, said Leanne, (Final debrief conversation, 2009).

Angela laughs and adds.

> Yeah, remember when we had the kids going up to the board to make a tally mark how many times we got kicked off the wireless network? (Final debrief conversation, 2009).

Leanne joins the laughter.

> Yeah, it was pretty sad when you'd look up and you'd have all those tally marks up there. It got hard. It was the fear that it wasn't going to work, (Final debrief conversation, 2009).

Angela added,

> You always had a plan B. I always wanted them to do something fun and positive with the technology even if it wasn't what I originally planned. One day I put questions on the board and they answered them in a word document, (Final debrief conversation, 2009).

Lisa agreed,

> You always need a content related back up if you use a lot of technology, (Final debrief conversation, 2009).

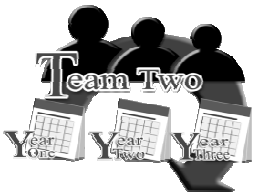
It was January before the technology issues were corrected, at least in part, to allow the students to experience *McLarin's Adventures*.

> I was shocked when we finally got in! I didn't know what to do. I forgot all that I learned from the summer. The tech cadre that was to help us couldn't because they only had about fifteen minutes of training before the network went down that day. So the kids just wandered around and chatted. They had fun, (Final debrief conversation, 2009).

> Yeah, by the time we got in, it was state testing time. We didn't have time for them to play. We had to finish up for testing. It's hard. We just don't

> have that kind of time in a school year for things not to work. We are flexible but not that flexible, (Final debrief conversation, 2009).

The third year of this project was one of great stress for Team Two. They were very frustrated by the school network's inability to support the activities they needed their students to do. At one point it almost sounded like there had been a breach of trust between the teachers and the technology support team. The teachers continued to provide quality learning activities for their students even though the technology didn't support their first choice of plans for the day. The team spent the extra time and effort needed to have two separate plans. The teachers expressed concern regarding the students' attitude toward technology use as they carefully planned activities that will allow them positive experiences in lieu of access to the network. It was a stressful year for the team but they accepted the challenge of being a buffer for the stress and the difficulties for the students so as to not impede their learning.



Summary of Team Two Narrative Analysis

Team Two had a very active three years. They worked hard to provide active learning experiences for their students that were engaging and supported them while they learned new content. Team Two's focus went past the classroom level of observation to individual student observation. They seemed to attempt to visualize the students' learning. The learning of each individual student became very public as the team discussed the effects of their chosen activities and strategies on each student's learning. This was evidenced as the team began to discuss the impact of the cultural undertones of one lesson on a student new to the United States, (Debrief conversation, LS 108). The

team voiced encouragement due to their own successes they were experiencing as they provided quality learning experiences for their students, (Final debrief conversation, 2009).

As the team began to work to implement technology, their efforts were compounded at every turn due to technology difficulties outside of the scope of this study and out of the control of the team members themselves. While this caused stress and frustration for the team, it appeared that it did not impact their decisions related to the opportunities provided for the team. The teachers worked diligently to provide quality content-related activities for those times when the technology was unable to support their chosen learning activity for the day. The teachers showed creative problem-solving as they worked to find activities that utilized technology without relying on internet access or the students' access to the network. While this increased the teachers' consciousness of time, they persisted in their attempts to accomplish the task of implementing *McLarin's Adventures*.

The team was unsuccessful in accessing *McLarin's Adventures* until six months after their professional development on the game and its learning features. As a result, the teachers had forgotten many things about the learning opportunities embedded in the game as well as the basic instructions of how to accomplish the tasks directly presented in the game. The teachers were disappointed and seemed to show feelings of guilt about not being able to use the game in a formal educational manner and did not force the blame for this reality to anyone but themselves. It was explained to them that things are often outside of our control. They agreed, but they appeared to be reflecting on if they had truly done the best they could do.

Just as the learning of the students became visible, so did the learning of the teachers. The teachers "bonded" through the activities related to lesson study but they also grew as individual professionals. They began to see their students as individuals and worked to meet their needs as learners while working to meet the high standards set by the state and federal governments. These three years have been a time for active learning by all involved.

CHAPTER FIVE
Conceptualizing the Case: The Synthesis of Two Teams

Introduction

This chapter discussed the synthesis of the two sets of data generated by each lesson study team (Scholz & Tietje, 2002). Due to the ill-structured, complex real world nature of the problem and case being investigated(Morrison, 2002)the Hegelian type of synthesis was used which involved looking at the data from different perspectives (Scholz & Tietje, 2002). The data collected in this study support this type of synthesis due to the observations, comments, and documents created by each of the individual team members to allow each member's voice and perspective to be clearly documented to allow for a clearer understanding of the case (Scholz & Tietje, 2002). These data sets were collected as research related to normal classroom activities for the purposes of illuminating the experiences of the teachers and as a result do not contain nor generate the same types of data that could be utilized for comparison or contrast. In this study, the participant – observer, actually functioned as an "active agent seeking to learn [about the team's experiences] through each piece of data I collected," (Suzuki, Ahluwalia, Arora, and Mattics, 2007).

Wellington Middle School – The Living Organism

Schools resemble living organisms in many aspects. They 1) require the input of energy, 2) they grow and develop, 3) they reproduce, 4) are made of smaller structures called cells (the name came from the monk's smaller rooms), 5) they sense and respond to the environment, and 6) they react to change (Scott Foresman, 2000). The blueprint for the organism of schools in the United States was created many years ago as was the structure of the DNA molecule that contains the information responsible for the creation

of a new organism. This new organism can only be successfully produced if the DNA molecules are placed in an environment conducive to the complex reproductive processes that must occur after the initial introduction of the two sex cells. Modern research has discovered the introduction of foreign substances during these reproductive processes can have detrimental effects on the resulting organism (Shen, Shuja, Shen, Habib, Toyota, Rashid, & Issa, 2002). In relation to humans, these factors can be chemical, physical, and environmental in nature.

The process of learning in a school can also be impacted by foreign substances like stress or funding shortfalls that enter the learning environment. (Limbos & Casteel, 2008; Downey, Steffy, English, Frase, & Poston, 2004). The task of reproducing highly functioning citizens in a democratic society is a large one. The schools grow and develop in response to the community's economic and social expansion or decline (Limbos & Casteel, 2008). The size of the classrooms may vary room to room and building to building, yet the number of students often is a constant within the system. The manner in which students are educated and the expectations of the faculty, students, and parents fluctuate as the governmental mandates and the climate may vary with each legislative vote related to funding and policy (Elmore & Fuhrman, 2001). The impact of external change within the system varies from being minuscule to exponentially greater than the stimulus that caused the change in the environment (Morrison, 2008). A change in policy or an addition or deletion of a mandate affects each member of the system, teachers and students alike. The level of response can be determined by the individual part of the system. An appendage of the human body reacts to a cut much differently than does the spinal cord and so does each part of a school. This was found in the two lesson study

teams' learning as a result of interdisciplinary lesson study and the introduction of innovative technologies and their response to the external factors that entered the system of Wellington Middle School.

The case being examined is not Team One or Team Two, but Wellington Middle School. Wellington Middle School houses only seventh and eighth grades and has a reported enrollment of over 350 students but the district of Wellington has a total enrollment of over 2500 students according to the 2007 district report card. (Department of Education, 2007). This school has limited ethnic diversity with over 80% of the population being Caucasian, with the remaining students being classified as Hispanic or Native American (Department of Education). Over 40% of the students have been identified as being eligible for free and reduced lunch (Department of Education).

This study is an instrumental case study because our interest is not in the case itself but to add to the body of educational research (Yin, 2003). In order to fully understand the impact of interdisciplinary lesson study on the case of Wellington Middle School, we must integrate the two teams (Scholz & Tietje, 2002). This integration is done by the completion of a narrative analysis (Foley, 2005) of each team's data and they were formally written up in the appropriate manner (Scholz & Tietje).

The Hegelian type of synthesis supported my pragmatic approach to this research (Scholz & Tietje, 2002) due to the nature of the participants in the study. Just as each DNA molecule consists of two strands of genetic information, Wellington Middle School's eighth grade team consists of two teams of teachers that are intertwined in such a way as to produce citizens that are able to enter the next level of society known as high school. As the level of interaction between each of these teams were considered, it

seemed logical to analyze the two accounts to look for cross-sectional codes and themes between the two narrative analyses (Glaser, 1972).

There is no logical reason to assume any differences between these two teams that would constitute an important mediating factor in this study. The teams possess similar teaching experience and each had a change in team members during the life of the project. The students assigned to these teams are consistent with the policies associated with the school that works to create a heterogeneous mix of students across the two teams (personal communications, September 7, 2006). Both of these teams experienced teacher turnover as are commonly experienced in a variety of contexts. For the purposes of this study an assumption is made that these two teams have access to the same resources and supports as would be reasonable within this school context.

Despite the similarities in context, the teams do possess differences. Team One experienced the diagnosis of one of the original team members with a terminal illness during the first year. While a substitute teacher was quickly hired that was certified in the content area, it was a loss that the team had to face and reconcile in whatever manner professionally and personally appropriate for each member. Sondra, the new member to the team, added significant more years of experience to the team but lacked the relationships or the knowledge of Wellington to be much of a contributor in the beginning but her voice and input strengthened as her relationships with team members grew.

Leanne, the science teacher on Team Two, had the longest tenure (10 years) in Wellington and also possessed a national board certification. This was really a factor that could be seen as significant but in the data analysis she did not seem to possess any

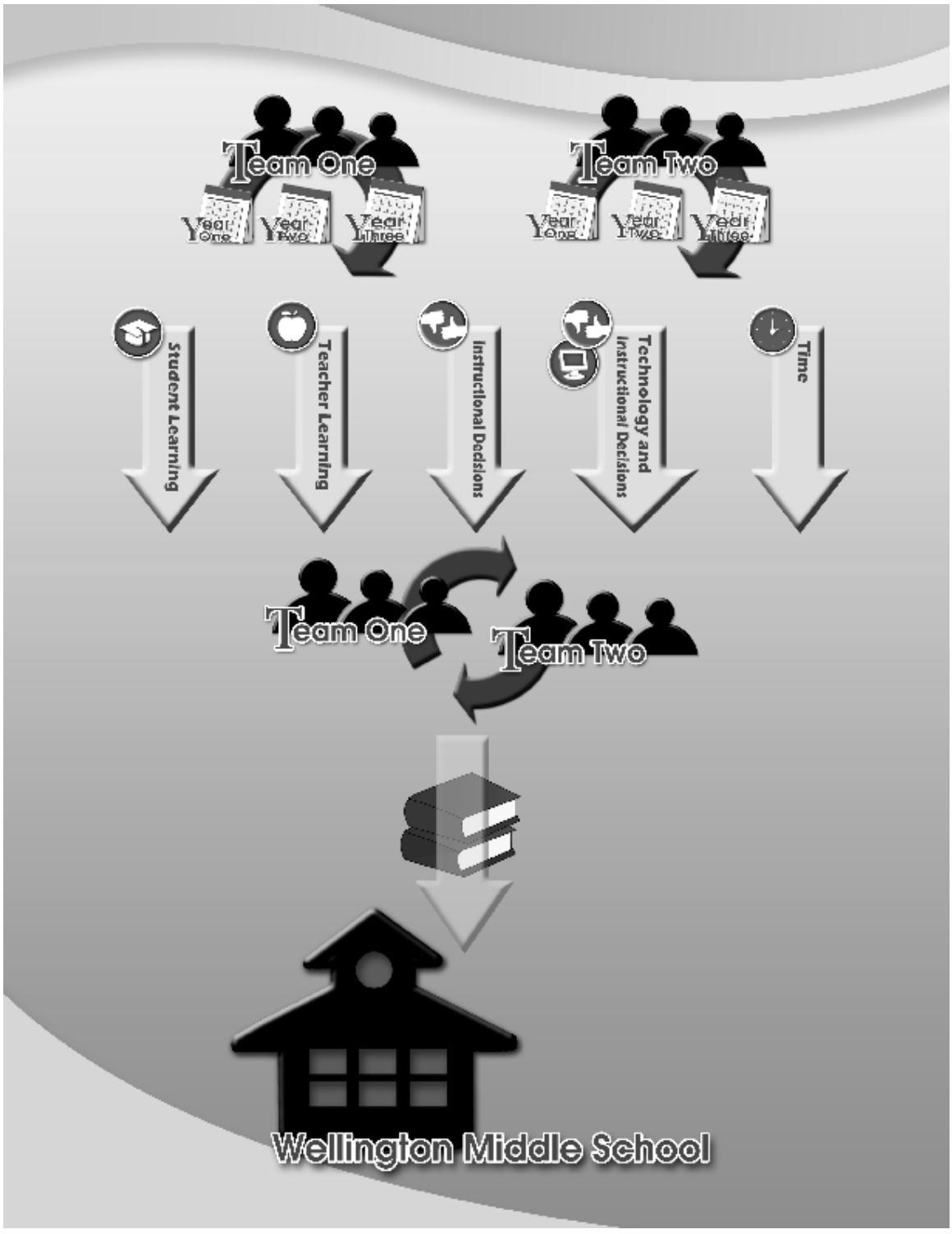
additional power, formally or informally, that would have allowed this characteristic to be of importance to this study.

Each of the team members, with the exception of Leanne, had at the end of the study completed less than five years of experience in Wellington. This presented each of them with the opportunity to begin the new chapter of their lives in Wellington together. None of the team had previously been trained in lesson study nor had the participated in lesson study outside of this study.

Both of the lesson study teams participated in lesson study during the same time period and within the same school. The teachers had the same basic schedule and the same amount of time with which to plan, yet, the approach and result of the team's participation in interdisciplinary lesson study as well as their response to site changes varied (Lesson study documents 2006-2009). As the data from both teams were analyzed, they showed that each of the team's focused on five areas. These five areas were: Student learning and engagement, teacher learning, teacher decisions, time, and technology. These five areas were identified (see Figure 7) as themes and are discussed in the subsequent pages, first as teams and then more formally in the conclusion in an attempt to answer the research questions posed at the outset of this research.

Figure 6.

Theme Generation.



Student Learning and Engagement



Introduction

Both teams expressed concern about student learning and indicated they were watching to see an increase in student learning. Each of the teachers works hard to meet the needs of his/her students and make learning enjoyable for them (Field notes, 2009). Yet, despite the similarities within the teams, the level with which each team explores the phenomenon of student learning varies.

Team One

Team One focused on student behaviors and emotions in relation to student learning. They were focused on the students' emotional response to the lesson and whether or not they liked the lesson (Final debrief, 2009). During one lesson a young man that was normally passive in class assumed the role of team leader. The teachers became very excited at his level of involvement in the activity but very little discussion actually occurred related to his learning (Debrief conversation, LS 306). The team discussed that student even two years later and that "lesson study was worth it if for no other reason than Timothy," (debrief conversation, LS 306). New Oxford American Dictionary (1989) defines engage as "to attract, charm, or fascinate." This definition captures nicely the term related to engagement as viewed by Team One.

Team Two

Team Two's focus on student learning began in their second lesson study of the first year. They began to really examine student work on an individual student basis and evidence of prior student learning. "The students really used their strengths," (Debrief conversation, LS 207). The team began to focus on the reasons students made the

decisions they made instead of the decisions themselves (Debrief conversation, LS 307). The teachers began to realize the students need a level of emotional involvement, ownership, and empowerment to be engaged (Debrief conversations, 2006 – 2009). Newmann, Wehlage, & Lamborn (1992) found these same things in their research related to student engagement. Ramsden (2003) connects high quality teaching and engagement.

> High quality teaching implies recognizing that students must be engaged with the content of learning tasks in a way that is likely to enable them to reach understanding…Sharp engagement, imaginative inquiry, and finding of a suitable level and style are all more likely to occur if teaching methods that necessitate student energy, problem solving, and cooperative learning are employed (Ramsden, 2003, p. 97).

Summary

Both of the teams gained an increased understanding of their students as a result of their participation in lesson study, just at different levels as illustrated in Table 5. One team gleaned many aspects of student learning while the other focused on the affective response (Fredricks, Blumenfield, & Paris, 2004) of the students to the lesson. "Learning needs to be personalized for how an individual learns best. Interactivity was also cited as an attribute needed in learning," (USDE, et al, p. 22).

Table 5.

Synthesis of teams – student learning and engagement

Team One	Team Two
Students' emotional response to lesson	Examined individual student work
Students were pleased with the lesson	Reasons for student decisions
	Recognized need for emotional involvement of students
	Recognized need for student ownership
	Recognized need for student empowerment

Teacher Learning



Introduction

The purpose of lesson study is to provide teachers time to work together to investigate the impact of their instructional decisions on student learning. As a result, teacher learning should be a natural product of this experience. Both teams showed evidences of degrees of learning collectively and individually.

Team One

Team One learned that students' emotional involvement in a learning activity or lesson leads to increased "student engagement" (final debrief, 2009). As a team designated a lesson study goal, they became very focused on it. Team members credited lesson study for their focus and felt as though they met their goal of assisting students as they learned how to access information. When prompted, teachers responded they learned students have an increased level of learning when they are provided with a hands-on-activity. One team member learned it's allowable to gather learning activities or content from sources other than the textbook (final debrief, 2009).

While they did learn factors that promote increased student attentiveness to the task given or even student engagement they remained focused on that one aspect: emotional involvement that generated the desired effect on students. The team continued to try to create lessons that generated the sympathetic or empathetic responses from the students. They never attempted to explore other types of lessons or responses from students during the lessons that were part of this research study or to connect it to student learning. The teachers simply recalled the events of each lesson study with little inference or critical analysis. They merely reported the facts and worked to replicate the student experience in the same manner. The teachers had a moment of learning where they realized students' incorrect answers may represent their conceptions or misconceptions about a particular topic (debrief conversation, LS107). Team One acknowledged their learning but never attempted to explore their new understanding as it pertained to their students. Their level of reflection on their learning lacked a view of improvement (Lasley, 1992) and remained at a simple recall of events. Their reflection and level of learning lacked the consideration of the multiple variables that could have played a part of the lesson (Sparks-Langer & Colton, 1993).

Team Two

Team Two began to explore student learning much deeper than expected. They worked hard to make the private learning of students visible (Crisafulli, 2007). "They (students) looked like they were solving the problems in their heads," (final debrief, 2009). "The students were learning. We have proof." (Debrief conversation, LS107). The team realized an area of student weakness is a weakness outside of lesson study and should be a focus throughout the entire school year, not just during the specific lessons

(Final debrief conversation,2009). Dewey (1916) states that the educator's role is to "furnish the environment which stimulates responses and directs the learner's course," (p. 212). The teachers learned they were able to design a lesson to meet their goals (Debrief conversation, LS 308). The teachers were able to determine some environmental factors that led to student learning throughout the year, not just during formal lesson study experiences. The team members identified students respond more positively when they are active, allowed to use music or video for learning purposes, and when they can personally relate to the content being presented (Final debrief, 2009).

Summary

Team One met in debrief conversations and focused on the observation of the events and specific actions that occurred during the lesson study. They looked for some connections between teacher actions and student actions but without any regard for cause or connection past the affective response of the student (debrief conversations, 2006-2009). While Kipp, Artiles, & Lopez-Torres (2003) "indicate that teachers craft their own knowledge through reflection upon their prior experiences" (p. 249). The team did not create a new understanding that allowed them to "return to their own experience with new eyes" (Hoffman, Kipp, et al, p. 250).

Team Two, however, began to focus on specific evidences of student learning and what promoted student learning. Newmann (1996) talks of the rarity that students of any age are asked to use their prior knowledge to create new knowledge. Team Two realized the value of that when they structured their lessons in such a way that students were activating their prior knowledge and then using that to create new knowledge and skills through their activities. The students were not the only ones that were able to use

their prior knowledge, so were the teachers. The teachers worked hard to create active learning experiences for the students, not realizing that they, in fact, were participating in their own active learning experiences. Loucks-Horsley (1995) claimed "establishing a better connection between learning and doing increases meaning for the teacher and the likelihood of a stronger impact on students," (In Hawley & Villi, 2007). Table 4 contains the specific codes that were generated from each team related to teacher learning.

As stress increased in the lives of these teachers, it appeared that their level of learning decreased. When the technology issues arose and the schedule was changed to disrupt their planning patterns during year three, there were no codes generated for teacher learning from conversations related to the third year. Leithwood (2007) states teachers' feeling of manageability, which decreases teacher stress, is increased when a lack of instructional resources exists. The lack of network and internet access while not a tangible resource was needed to allow the teachers and students to meet their goal for their activities (Final debrief conversations, 2009). "Feelings of stress demonstrably influence teachers' classroom performance," (Leithwood, 2007).

Table 4.

Synthesis of teams – teacher learning

Team One	Team Two
It's OK to stray from the textbook	We were able to see how kids learned outside of our own classrooms
Accessing information is something we really need to work on	It's interesting to see how English and science really do connect. In the beginning we weren't so sure it would or could.
	We picked up things like timers or using music and took it back to our own classrooms.
	Lesson study changed the way I teach. I find myself wanting to use manipulatives all the time.
	I now think about how the process skills relate to all content areas not just mine.

Instructional Decisions



Introduction

Instructional decisions, as categorized for the purposes of this study, are those decisions that relate to curriculum or content being taught and strategies used to deliver the chosen content. However, this category has been expanded to include teacher behaviors as well that are related to their personal level of engagement that were observed related to this study. Teachers make many decisions a day beginning with the decision to go to work, followed by what to teach, how to teach it, and what supports to provide the students while they are learning. Each of these decisions has the potential to impact student learning. The decisions made by these two teams of teachers are listed in Table 5.

Team One

Team One was more comfortable in an environment that was more traditional with students in their desks completing an activity very quietly or silently. The teacher almost always kept his/her position at the front of the room. While a few of their lessons incorporated group work and PowerPoint presentations, the activities that were provided were very structured and all students did the same activities at the same time. Their decisions, even while in the observation role, during lesson study represented their level of engagement, "one teacher worked on his lesson plans while another dozed off," (Observation document, LS106).

The questions that were asked by the teachers remained at the basic recall level with little accountability for the actual knowledge of content (Observation document, LS106). The teachers were aware of the owner of the instructional decisions in the first year (Debrief conversation, LS 206). Despite the teams' reference to the lesson in terms that indicate possession (i.e. we, ours) there was little mention of instructional decisions throughout year two. The comments remained focused on student behaviors and emotions.

Team Two

Team Two began each lesson with a clearly articulated goal in print and the articulation of that goal would be made at some point by at least one team member during the lesson observation or debrief conversation (Lesson study documents 2006-2009). The teachers in Team Two chose to involve the students in highly active learning experiences to further their content knowledge and understanding (Lesson study documents 2006-2009). The teachers sought for the students to have ownership of the

lesson (Debrief conversation, LS 307) and they possessed a concern for all students to learn equally (Debrief conversation, LS108). Team Two used a variety of technology to foster student learning. They utilized PowerPoint presentations to deliver information, but used Classroom Performance Systems, CPS, remotes to assess student learning in a formative fashion (Lesson study documents, 2006-2009). These technologies worked well and assisted the teachers in measuring student learning.

> There are more neural connections from the brain to the ear than from the ear to the brain and 10% of the fibers in the optic nerve run the wrong way. Sense organs do not receive information, they go fishing for it. Learning is an active process, (Morrison, 2008, p. 22).

The teachers of Team Two realized the importance of student ownership and the value of active learning. They were finding evidence of these two things leading to student engagement and it resulted in the teachers increased engagement as well. Learner centered environments focus on the pre-existing knowledge, skills, attitudes, and beliefs of the learner (Bransford, Brown, & Cocking, 2000).

Summary

Both teams began to understand the impact of their individual decisions on their students. They realized the impact of those decisions that were planned and accidental (Davis & Sumara, 2007). Team One focused mostly on the impact of their instructional decisions on the students' emotional response to the activities presented. Although emotion has been documented as a result of engagement (Schweinle, Turner, & Meyer, 2008; Lazarus, 1991) it is only associated to a young adolescent's "optimal experience when paired with other indicators of student learning (i.e., concentration, clarity and pride)" (Schweinle, et al, 2008, p. 127). In fact, many enjoy relaxing and less challenging activities as

opposed to those that are challenging and require intellectual activity (Schweinle, et al). "Leisure activities are not ideal for an educational setting. These types of activities can have a positive result on the students' affect but may not provide an opportunity for student learning," (Schwinle, et al). Although Team One chose to place their emphasis on this measure of student engagement and the value of their instructional decisions, it is not proven to be an accurate measure of student learning in and of itself.

Team Two chose to explore the impact of utilizing a variety of instructional strategies in an effort to foster student learning. Students in Team Two's classes were often active and eager to begin the activities presented. While Team Two's responses also contained a high level of emotion it was not the expression of joy with the lesson. It was a level of anticipation and excitement. These strategies included the use of spaces outside of their formal classroom providing students the opportunity to work within team and self-organize into smaller teams to accomplish a variety of tasks concurrently. Technology was present in many lessons Team Two taught but it was not the main focus of the lesson, it was a teaching tool. The technology was a learning aid for the students or a teaching aid for the teachers.

The observation and reflection on these teacher decisions resulted in the teachers' "construction of knowledge" (Hoffman-Kipp, Artiles, & Lopez-Torres, 2003) over the two years. This knowledge was generated through their experiences in lesson study personally and corporately. "Shea, Murray, & Harlin (2005) noted that school-wide teams often have a wide-angle view of student

achievement," (in Mokhtari, Rosemary, & Edwards, 2007, p. 354). Team Two chose to zoom in to the individual student level of classroom observation focusing on individual student learning, often questioning the impact of their choices on individual learners due to their unique learning needs (Debrief conversations 2006-2009).

The teachers chose to discuss students at a more in-depth level than just the typical teachers' lounge conversations related to student behavior or their lack of compliance with regard to homework or assignments. Team Two related student behavior to the learning opportunities provided them. Newmann, Wehlage, & Lamborn (2002) agree that the quality of assignment plays a role in student engagement. There are additional factors which these teachers also discovered including student ownership of the lesson which is referred to by Newmann (2007) as the construction of their own knowledge.

The team accepted responsibility for student learning or failure to grasp the concepts or reach the goals of their lesson. The teachers discussed how they could support the students in adopting a global view of topics discussed and shared the responsibility for times when students missed the mark (Observations 2006-2009). Fullan (2007) states that "effective schools have a collective responsibility for student success" (p. 38). Team Two's collective instructional decisions were focused on the creation of a learner-centered environment. While learner-centered environment is not a new term, Dewey (1916) referred to it in his early work but it was McCombs and Whisler (1997) which defined it as:

> A focus on individual learners (their heredity, experiences, perspectives, backgrounds, talents, interests, capacities, and needs) with a focus on

> learning (the best available knowledge about learning that are most effective in promoting the highest level of motivation, learning, and achievement for all learners). This dual focus, then, informs and drives educational decision making, (p. 9).

An evidence of collective responsibility is teachers working long hours to improve their practice (Fullan, 2007). Both teams spent long hours planning and working to plan lessons, but the results were very different and so were the lessons learned by the students and the teachers themselves.

Table 5.

Synthesis of teams – Instructional decisions

Team One	Team Two
Emotional response promotes student engagement	Students felt empowered to solve the problem
Students seeking information from other sources was not frustrating for the students	When students have something to do you don't have the discipline problems
Realized students have reasons for making incorrect answers	Students have great recall skills. We covered that skill three weeks ago
Student weakness (team goal) is a problem every day and we need to work on it	The students brainstormed locally, we need to work with them to think globally.
	I thought the brainstorming activated prior knowledge.
	The students can listen! We have proof! They listened and got a lot.
	The visual cues from the video hit our objective because the kids learned more when they saw the pictures.
	Focus on the impact of the lesson on individual student based on their learning needs.
	Our goal is definitely something we need to work on.
	Lesson study changed the way I teach because it focuses me on the students.
	I want to use manipulatives all the time.
	We learned about timers and music, it was all good.
	We had success early, seeing our kids learn and it pushed us to create even better lessons.
	I don't think about process skills just in relation to my content area, I think about how they relate to all subjects.



Technology

The next theme that resulted was technology related instructional decisions. This theme was divided into two pieces to properly analyze the theme. The focus of the technology discussions was specifically the process of implementing *McLarin's Adventures*. *McLarin's Adventures* is a massive multiplayer online game developed to assist students in learning required curricular content. The planned use of the game was on a new form of technology, the Ultra Mobile Personal Computer, UMPC which was a smaller form of a laptop computer. Both teams attended professional development and Team Two even planned a lesson with which to introduce the students to the virtual learning environment. The process of attempting to implement this innovation emphasized to the teachers their varied levels of technological prowess. Technological difficulties related to Wellington's wireless network and internet access were obstacles teachers encountered very quickly.

Team One

Team One focused a considerable amount of time on their personal lack of technology skills and the difficulty they had with the use of the UMPC. "The screen is too small, I couldn't see it," (Final interview, 2009). "My lack of technology skills is a service I can provide to the students," (Final interview, 2009). The teachers unapologetically shared their frustration they experienced in their many attempts to use the game in their classrooms.

The frustrations began with the manner in which the team organized the times and locations in which the students used the devices and played the game. "It wasn't part

of our regular day, we had to go the science building," (Final interview, 2009). The teachers resented the fact their normal teaching plans and curriculum were interrupted to go use the devices and the game. The team had no plan for how to introduce the game to the students or how to integrate it in their classrooms.

When technological difficulties arose, the team's lack of extensive planning became more apparent. "We just kept trying to make it work," (Final interview, 2009). The teachers would have students spend the majority of their fifty minute class periods attempting to go online to use the game. After a few failed attempts, the teachers began to try to provide other alternative learning opportunities. "We did try to go to a math website but the internet was down," (Final interview, 2009). "The students learned by just using the devices," (Final interview, 2009). At the end of the year however, the team did acknowledge they needed a "Plan B" when they planned technology use. They realized it but it was only after so much time was lost.

Team Two

Because the issues related to the technology were not team specific, Team Two also experienced the same issues related to internet access and a lack of wireless network access. But, Team Two's response to these issues differed. Team Two was hesitant to share their frustration but once they began, it flowed. They were frustrated with the technology support team at the district level from the beginning. They felt as though they were betrayed by the technology team. "We are just gullible, naïve teachers. We believed them, even though we knew from the beginning it wouldn't work," (Final interview, 2009).

Team Two, like Team One, was persistent in their efforts to implement *McLarin's Adventures* and use the UMPCs. Team Two, however, saw early in the process the need to have a backup plan when using technology. The backup plan included content related activities that use the technologies but didn't require the unavailable resources that were prohibited due to the network issues. The teachers were very concerned about the students' perceptions of technology use for learning and didn't want the frustration of this process to taint their future perceptions and impressions of using technology (Final interview, 2009).

The teachers realized the students' frustrations with the UMPCs and made accommodations for those. They scheduled time in the computer lab for the students to complete reading tasks in lieu of completing them on the small screens of the UMPCs. Despite the screen size, the teachers saw the potential for use in other ways in their classrooms outside of the game, but, fear was an inhibitor to their use. "I was afraid to use them for anything. I was afraid I'd mess them up once we got into the network," (Final interview, 2009). The team indicated their use of the devices would increase as soon as this study and state testing were completed. The planned uses included editing commercials showcasing students' persuasive speech and web quests among other activities.

Summary

The technology was an anticipated addition to Wellington Middle School but it came amidst district changes in the technological infrastructure. These changes created obstacles that prohibited the technology being used effectively in the classrooms. Both teams worked persistently to make the technology work and to use it in their classrooms.

These efforts failed but how the teams responded to the adversity varied. Team One focused on the technology itself and provided opportunities for the students to use the technology for non-content related activities. Team Two focused on student learning as related to course content and continued to provide quality learning opportunities that included content and process skills as well as the newly acquired technology skills.

Table 6.

Synthesis of Teams - Technology.

Team One	Team Two
It's hard for me to read text on the screen of the UMPCs. It's too small.	We never really got to the educational side of the game.
Teachers are painfully aware of their lack of technologically skills.	We are not techy. We are naïve, gullible little teachers. We live in our rooms.
We tried to go to a math website but the internet was down.	We would just be writing up tally marks about how many times we were kicked out of the game.
You have to have a Plan B.	Need bigger computers for reading things.
The kids feel important when they help me with the technology.	You have to have a backup content related activity if you are going to use technology.
The handhelds will be valuable in the long run.	We should have started with five or ten students at a time, not the entire group.
	I was afraid to use the UMPCs for anything once we got in. I was afraid I'd mess it up.
	Start with the technology guys before school starts. That would help.
	I need to share those documents about game play that had been emailed me so that everyone can have them.

Technology and Instructional Decisions

The complexity that is demonstrated at the school level does not end at the classroom door. The impact of that complexity has an effect on teachers' decisions and student learning more often that many would like (Schön, 1983). What administrators may view as "small changes can produce huge effects," (Morrison, 2002, p. 9). As the teachers began preparations to begin utilizing the UMPC (Ultra Mobile Personal

Computer) and *McLarin's Adventures*, the district technology staff began preparing to install a new wireless network (Field notes, 2009). This installation was planned to be a small change to daily operations in the beginning until computers with wireless access could be purchased. The UMPCs were delivered equipped to access the network and internet wirelessly. This actually became a necessity due to the age of the building and the lack of internet connections that were available in the classrooms (Field notes, 2009). This would be the first type of initiative at Wellington Middle School that had placed a computer in the hands of each student (Field notes, 2009). Both of these changes were viewed as positive and each had the potential to energize students and faculty and assist faculty in meeting the needs of the students. It turned out to have an opposite effect.

Team One

Team One had a mix of technological abilities and preferences. Two of the team members were very technologically savvy and offered technological advice to the others that could make their life easier (Field notes, 2009). The third member would not choose to use technology as her first instructional strategy but would use it with support from others or if she thought it would help her students learn. The fourth person was extremely hesitant to use technology herself outside of basic word processing and this hesitation increased as she contemplated incorporating technology into her lesson plans. The introduction of the new technologies in the classrooms made the teachers painfully aware of their personal lack of technology skills. The skills that were lacking varied from a lack of experience with online chatting and online gaming to the use of PowerPoint for a presentation (Field notes, 2009). "My technological problems are a service I provide to my students. It gives them an opportunity to feel powerful," (Final debrief, 2009).

Another teacher added, “Yes, I’m behind on the technologies, the kids had to help me,” (Final debrief, 2009). Students have grown up with these emerging technologies and adjust to them more quickly than their teachers who are struggling to incorporate innovative teaching strategies in their classrooms (Spires, Lee, Turner, & Johnson, 2008). When the technology issues began to develop, it was not a small change as anticipated by the district, it was a big change.

The teachers found themselves tied to a planned activity that didn’t work and they didn’t have a backup plan. “We just kept trying to make it work,” (Final debrief, 2009). They were not happy about the technology not working but could not formulate another plan between the four of them for another option. Despite the fact the team of four teachers were working with approximately twenty-five students in one room, they were unable to create another learning opportunity for the students. In an apparent attempt to justify their decisions to me they added, “they learned by just using the UMPCs and calibrating them. Besides, they don’t have access to those kinds of things at home,” (Final debrief, 2009). The teachers did eventually begin to attempt other learning opportunities using the computers but those alternatives also required internet access so they too were unsuccessful (Final debrief, 2009). The team never acknowledged ownership for the instructional decisions related to the class time that was dedicated to the use of the technology. They always referred to that loss of time as “they didn’t have it working,” (Final debrief, 2009).

Team Two

Team Two’s affinity for technology was slightly stronger than Team One’s. Two of the team members use technology frequently for personal and instructional

purposes. The other team member has less affinity but uses technology for classroom management purposes but does not utilize it much for instruction. The fourth member changed each year but was not actively involved in the lesson planning or teaching due to coaching related duties.

When inquires began about when the use of the UMPCs in their classrooms began, the team did not begin with the students. Despite encouragement, they began reflecting at the planning stages prior to the introduction of the devices into the classroom. They communicated their feelings of being a victim, "We are just little naïve, gullible teachers. We just live in our classrooms, we don't know," (Final debrief, 2009). In three years of working with them this type of attitude has not been seen. The teachers displayed a lack of empowerment. They were quick to cite their perceived source of betrayal as the technology department. "We asked them (technology department) when we returned from the training if the system could support us all. They said it should but we knew there would be issues. We knew but we trusted them anyway," (Final debrief, 2009).

The team quickly moved from that conversation into their decisions. "We should have started smaller. You told us not to try all the students at one time," (Final debrief, 2009).

> I was afraid to use technology for anything, I was afraid I would mess it up. In the beginning we were so certain we could make it work that we would spend our entire class periods trying over and over again. It was so sad when we were having kids mark tally marks for each time we were

kicked off the network. You'd look up there and see all those marks. (Final debrief, 2009).

After a few unsuccessful attempts the team quickly began to develop a "Plan B" (Final debrief conversation, 2009) and quickly began to discuss curricular based options they put into action when the network would not allow the students to explore the digital environment. The teachers were so aware of their students that they sensed the students' level of anticipation related to the use of the technology. "They were so excited. I didn't want them to not want to use technology. I tried to incorporate the technology into a lesson in some way that didn't require us to use the network or internet," (Final debrief, 2009).

The technology department continued to work to solve the issues and in January, six months after the intended implementation date, the students were able to access *McLarin's Adventures*. "I was shocked!" (Final debrief, 2009). The team looked for support from the technology cadres, a group of students that we had tried to train to serve as technological support, but they were not a source of assistance. The network issues proved to have been such an obstacle that the cadre students did not recall much except the difficulties they experienced. The time lapse between the teachers' professional development and the successful entry of students into the game also proved costly. "I forgot all I learned at the training. The kids just got in and explored and chatted. They had fun," (Final debrief, 2009).

The students' enjoyment of the virtual environment were limited though as the date of state exams were close. The teachers didn't have time for them to

play. “We are flexible but not that flexible. We had to finish up for testing,” (Final debrief, 2009).

Summary

Wellington Middle School was working to become the place that research says teens want their schools to be. They were working to provide online learning opportunities for the students and the Star Schools Project was providing each student a computer (USDC, USDE, NetDay, 2008). They were on the road to meeting the needs of their students. Yet, there was just one small problem, accessing the internet and the wireless network.

The two teams approached the technology interventions differently. One team approached it as an opportunity to meet their students’ needs. The other team viewed it as attempting an innovation in their classrooms but had no expectations for student learning related to the technology. Both teams worked diligently to attempt to use the UMPCs and *McLarin’s Adventures* in their classrooms. Both teams dedicated many class hours to “trying to make it work.” The differentiation between the two teams occurred when the technology wouldn’t support the planned classroom activities. When things didn’t work out and there was substantial time left, the decisions the two teams made were very different. Team One focused on varied levels of technology use. These levels of use included learning to calibrate the touch screen on the computer, playing non-instructional games, and working math problems in notepad (Final interview, 2009).

Team Two provided more content-related and technology-based activities. They used the technology to respond to content-related writing prompts among other things (Final interview, 2009). One of the team's concerns was the students developing a negative attitude toward technology use (Final interview, 2009).

Table 7.

Synthesis of Team - Technology related instructional decisions.

Team One	**Team Two**
The kids felt important when they helped me and others with the technology	We aren't 'techy.' we are gullible, naïve little teachers, we live in our classrooms
It was hard for me to read the screen – it was too small	We never really got to the educational side of things
They learned by just having them out and calibrating them	In the beginning we just kept trying when it wouldn't work
They learned by playing pinball and solitaire, they don't have access to that at home	We asked the tech director in the beginning if our system would support all of us – we knew then it wouldn't work but we trusted him
I learned I want to incorporate more technology	You must have a content-related activity as a back up when you use technology
Teachers should have a backup plan when using technology	The students need larger computer screens for them to read for any length of time
We tried to go to a math website but the internet was down	I needed to get all of those documents out of my email and put them into a shared file for everyone to use
We used notepad to do math problems	If it doesn't work, the one day activity becomes a two day activity and there is no time for that
	We used the computers for the students to write responses to questions that I would put on the board. I wanted them to not develop a bad attitude about using technology.

Time



The inertia hardest to overcome is that of perfectly good seconds.
- Martin H. Fischer

The fifth and last theme that resulted from the data analysis was time. The teachers on both teams were very time conscious as it related to many aspects of this project and their professional lives. The findings related to the other four areas were markedly different between the two teams. The fourth area of time, however, showed similarities. Both teams expressed being very mindful of the quickly approaching dates of student assessments that were mandated by the state and federal governments. Time was looming so eerily around them and was a driving factor in many of their instructional decisions.

Team One

Team One based many of their instructional decisions on the constant factor of time. During the first two years of the study, time was only mentioned during the informal conversations after a debrief conversation when the team members would mention their frustration with the amount of time involved in the process of lesson study (Field notes, 2006-2008). One teacher even confessed her guilt with not planning each lesson using the lesson study protocol before she realized that was not a grant expectation (Field notes, 2007).

Year three, however, found the team more time conscious than ever before. The team cited time as their major challenge and continued to say that the only way lesson study could impact their practice was if they were given the chance to plan (Final debrief, 2009). Hawley & Sykes (2007) agree that effective

schools provide time for teachers to collaborate and problem solve. The team continued to lament about a lack of time to collaborate and plan including the loss of their regularly scheduled planning periods due to schedule changes (Final debrief, 2009). When asked about their instructional decisions, the team again based their decisions on the time allotted to the unit being taught and its relationship to the testing date.

Summary

Team One expressed concern regarding the time restrictions placed on their schedule by outside sources. However, they never discussed options for using the time they were given differently. Although many of the required elements of a successful teacher were present, the limiting factor was also present, time. Time available to plan, prepare, and teach held both the teacher and students captive in a small cell bordered by testing dates and lost instructional and planning times. Time lost is never able to be regained. Creativity can often minimize that loss but Team One lacked the resourcefulness to rise to an empowered state to provide quality learning opportunities for their students and the time moved on.

Team Two

While Team Two faced the same struggles as team one regarding time and the external restrictions placed on planning time due to schedule changes, the tone in which Team Two referred to these changes was different. Team Two found creative ways in which to overcome these obstacles. They still voiced a lack of time to plan and cited the physical placement of their classrooms on campus as an impediment to collaboration.

Yet, they began to collaborate via instant messaging, cell phones on their way to or from school, and email. The lack of available time to deliberate their actions and plans necessitated the creativity.

The team also related time concerns to the technology issues they experienced. They reiterated the need for realistic back up plans in case the technology does not work. The difficulties created a real awareness of the loss of instructional time due to the technology issues. The result was an abandonment of attempts to implement *McLarin's Adventures* because "we don't have that kind of time," (Final debrief conversation, 2009). While they were aware of the time loss, the team didn't mention time placing any limitations on their instructional decisions.

Summary

Team Two realized their frustration with the lack of time being allotted to plan, yet was resourceful in their accommodation of their reality through the use of technology. While technology was the very thing that created a large part of their frustration, it was also the very thing to which they turned to alleviate their frustration. The team conversed using cell phones, email, or instant messaging. The same creativity witnessed in their lesson study observations continued to be a characteristic of this team and they continued to persevere regardless of the restrictions placed on their scheduling by outside sources.

Table 8.

Synthesis of Teams – Time.

Team One	Team Two
Schedules change for a day and our planning is gone	If you plan a web quest and it doesn't work then a one day activity becomes two.
Only way lesson study can change our practice is if we are given time to plan	We are flexible but not that flexible.
No time to plan with other team members	We don't have that kind of time.
A lot of things I'd like to do but no time to plan or grab a cross curricular lesson	Little planning in teams except for phone, email, or IM
Time you have to teach determines the activities you use	Physical separation keeps us from planning, too.

Chapter Summary

Wellington Middle School was the site for Team One and Team Two. Despite similar administrative support, technological issues, and planning time, the manner in which these two teams approached the problems related to technology varied. Team One focused on teacher related issues and the problems of the technology. Team Two focused on student learning and continued to create opportunities for learning despite the issues that arose.

The synthesis of the two teams revealed five themes, instructional decisions, instructional decisions related to technology, time, student learning and engagement, and teacher learning. The teachers that composed each team learned something new that shaped the manner in which they taught their students. Yet, just as each student in their classrooms works and learns in a different way or at a different speed, so did the teachers. Each of them learned of ways to engage the students and motivate them to learn, one team just seemed to learn more quickly and deeply than the other.

CHAPTER SIX

Explaining: Integration of the Literature and Conclusions

Introduction

Chapter six discusses the results of the study as well as integrate these results with the existing educational literature (Scholz & Tietje, 2002). Limitations of the study, implications for practitioners, preparation programs, and future research are also included. To investigate the meaning of the findings, the data from both teams were integrated with the existing literature base to explain findings and arrive at conclusions of this study.

This embedded case study maintains the integrity of the methodology in the aspect that this study is interdisciplinary. There is not a singular unifying theory that can support or summarize the findings of this study. Just as aspects of each layer contribute to the educational processes and structures in Wellington Middle School, aspects of the selected theories illuminate and add meaning to the case and ultimately greater understanding.

The complexity of this case and the nature of the emergent design of qualitative analysis (Creswell, 2008) resulted in the research findings being very different than what was anticipated in the outset of this study. The direction of the research was altered based on the data generated and an effort to honor the voices and experiences of the participants in this study. The themes generated in this study work together to answer the research questions. The questions are answered by the themes in conjunction with one another but not in isolation. Just as one factor in a school may affect many others, so do the generated themes.

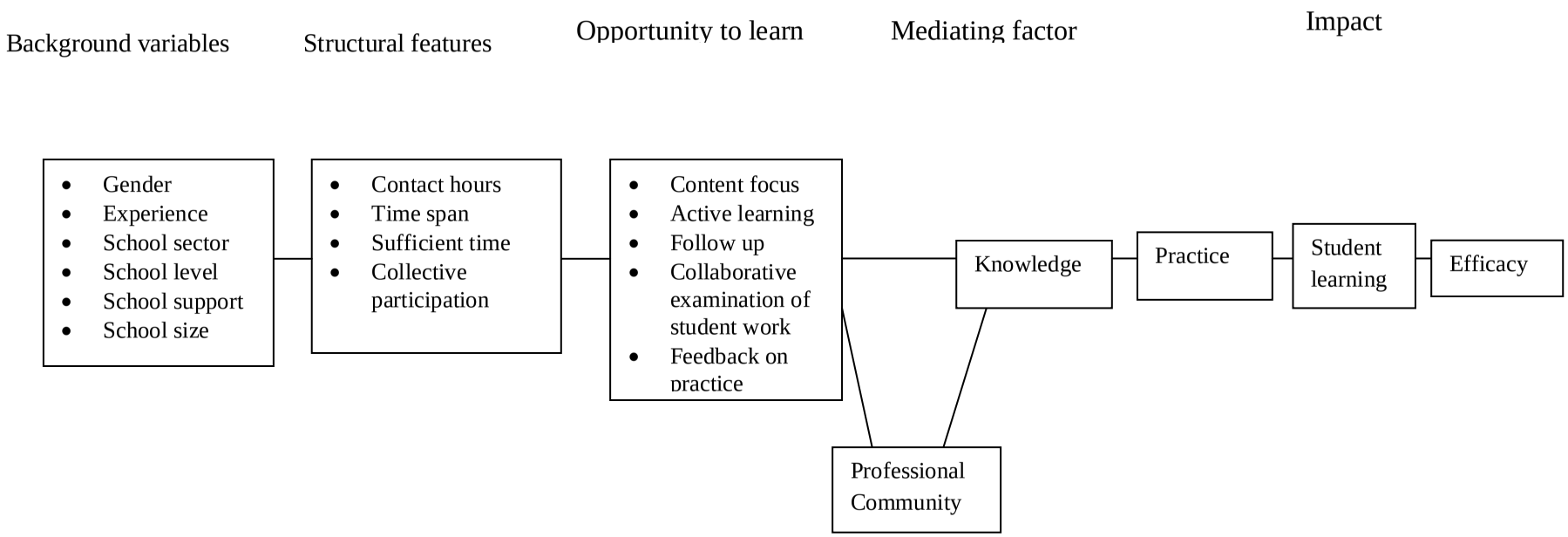
Lesson Study as Professional Development

Amidst the shuffling of papers, grades, and textbooks is the demand for and need for the teachers' own need for professional competence (Newmann, Wehlage, & Lamborn, 1992). This need for professional competence often sends the teacher seeking opportunities for professional development. Professional development varies in the type scope and nature and so do the results of these learning opportunities (Fullan, 2007). A 2009 study by the National Staff Development Council found that participating in professional development does not automatically translate into teacher learning. Ingvarson, Meiers, and Beavis (2005) examined the impact of professional development programs on teachers' knowledge, practice, student outcomes, and efficacy. They created a conceptual framework to guide their evaluation (Figure 3). The team identified "background variables which included gender, experience, school sector, school level, and school size," (p.5). The first two background variables are also variables in this study but the teams were found to be heterogeneously mixed according to school policies and years of teaching experience. The school factors were controlled due to the purposeful selection of the two teams being at one school site, thus eliminating that variable.

Lesson study met the expectations with regard to the structural features. The contact hours of formal professional development measured the time the teams spent in activities related to the professional development itself. The time the Wellington teams spent in the stages of lesson study met and far exceeded Ingvarson, Meiers, & Beavis' (2005) definition more than 20 hours with the total time spanning two years which also exceeded Ingvarson's (et al) expectations of six months. Yoon, Duncan, Lee, Scarloss, &

Figure 7.

Relationships between structure, learning processes and impact of professional development programs



Source: Ingvarson, Meiers, and Beavis (2005).

Shapley (2007) found that five of the six studies on professional development that had an impact on teacher practice and ultimately student achievement had significant contact hours (30-100 hours) spread out over six to twelve months. The Wellington teachers participated in 32 hours of professional development during the first summer with two subsequent summers of at least twenty hours of professional development. Each of these summer sessions were preparation for the actual teacher learning sessions that would occur during the three lesson study cycles that would involve an additional four or five hours per cycle over the course of the school year.

The extensive amount of time teachers participated in professional development as well as the context in which it was placed had an impact on the teachers' learning. It seems to have sped up the process in which the new learning was transferred to their classroom practice. Changes were seen in practice and teacher learning during years one and two, it was long enough for these teachers to experience new learning and change in their teaching practices and instructional decisions with the support of a COP.

Lesson study continued to meet the teams' definition of quality professional development when related to the *The Quality of Professional Learning Index* (Ingvarson, Meiers, & Beavis, 2005) which included the factors of content focus, active learning, feedback, and ongoing support (Sparks & Loucks-Horsley, 1989). While Ingvarson's research (2005), like this study, indicated teachers actively involved in examining their practice and comparing their students' learning to their perceived potential have an increased learning experience as a result of the professional development. This research differed from their study in that their study did not include any professional development that included the ongoing support and feedback. Slepkov (2008) found teachers need the

support of written and oral communication as well as classroom visitation while they are acquiring new skills and recommends this for any type of "transformational change by teachers" (p. 99). The very nature of lesson study includes these basic skills as teachers write their own lessons, record their observations; discuss them in their teams with external support and feedback at each stage of the process. Jacobson and Battaglia (2001) state the transformational changes for teachers are dependent on the teacher being part of the process of setting identifiable goals and working towards them. The team chose their own emphases as the team grew and developed and as they watched their students grow and exhibited characteristics of new learners.

Mezirow (1985) identified self-reflection as one of the three types of professional development. An increased emphasis is being placed on this type of professional development to see learning related to pedagogy, content knowledge, or classroom practice (Slepkov, 2008; Bella, 2004; Osterman & Kottkamp, 2004; Danielson, 2002). Wei, Darling-Hammond, Andree, Richardson, & Orphanos (2009) found as "research deepens our understanding of how teachers learn, scholars have begun to place greater emphasis on job-embedded and collaborative teacher learning," (p. 8). The design of lesson study includes a structure which allows for a time for group and personal reflection. This reflection can be compromised, however, as a result of a lack of available time for teachers to engage in such activities. While the participants in this study did not specifically relate their lack of planning and meeting time to reflection, this is commonly a piece that is omitted in an effort to prepare for the next day's classroom activities. The lack of time would be categorized in the structural features of the professional development impact model (Ingvarson, Meiers, & Beavis, 2005). Time was

compromised due to scheduling adjustments made by school officials outside of Wellington Middle School which resulted in the teachers' two blocks of planning time to being divided into time at the beginning and at the end of the day instead of two consecutive blocks.

Teacher Learning

Both teams experienced new insights into the impact of their instructional decisions as a result of their participation in lesson study. Analysis of the two teams revealed, however, that Team Two experienced a greater level of learning than Team One. Despite the uniformity of conditions presented to the two teams, the impact of the professional development resulted in different teacher practice. Ingvarson, Meiers, & Beavis (2005) showed the mediating factor in the impact of professional development is the presence of professional community (see Figure 3). Team Two had a greater sense of collegiality and community than Team One. Team Two's conversations were unguarded and light, although always focused on student achievement and learning. Team Two's interactions seemed natural. The interactions of Team One were the opposite. The interactions were forced and deliberate and a sense of stress was most usually felt. The participants in team one consistently chose their words very carefully. The primary focus of team one seemed to be around the teacher and his/her responsibilities. They were excited when students showed or shared emotion but emotion remained the focus of their observation. Their observations of students remained at the surface level and as a result, so did Team One's learning.

While collaboration is seen as a vital process for school improvement and an important feature of professional learning communities (Dufour & Eaker, 1998) it is not

enough to just collaborate. The collaborations must be focused on student learning (Sergiovanni, 2005) and the participants actively involved in their own construction of knowledge (Hoffman-Kipp, Artiles, & Lopez-Torres, 2003). In a PLC, learning occurs bi-directionally between teachers, teachers and administrators, teachers and students, and students and parents (Schmoker, 2006). In this context, the PLC exists within a team of teachers so the interactions being observed are limited to those between teachers. This smaller presence of community is referred to as a community of practice (Laksov, Mann, & Dahlgren, 2008; Lave & Wenger, 1991). This community of practice (COP) increases in strength as they work to develop a shared vision for student learning (Cate, 2004; Wenger et al, 2002)

Community of Practice is a term often used to describe a group of professionals working and interacting together. Peer interactions in and of itself isn't enough and "isn't automatically good," (Fullan, 2008). Wenger (1998) classifies the type of successful interactions that occur in a COP as being related to mutual engagement (the way members engage and respond to each other and establish relationships), joint enterprise (how members understand the community and accept responsibility for it), and shared repertoire (the ability to utilize available resources to accomplish the team goals). The repertoire for the purposes of this study could be considered the transfer of a new skill into his/her teaching practice. Laksov, Mann, & Dahlgren (2008) expanded Wenger's definition to pertain specifically to teaching. "If a community of practice around teaching is established, teachers will not only evaluate their teaching and invent new ways of organizing teaching and learning, but also will reflect on their practice and share their ideas of new ways to share learning," (Laksov et al, 2008, p. 124).

Team One participated in the professional development and met the expectations of the external granting agency, but they did not invest themselves in the process. Their interactions were no different than the observations of the students in those first lesson study observations. They were compliant. They did what was required. They did what was expected. They didn't invest. When they were finished meeting with me, little reflection or application of new learning transferred to their classrooms or personal practice. With regard to a COP, their interactions would be restricted to the mutually engaged level. They interacted with a focus on student learning for the purposes of this project but failed to assimilate their new knowledge into their active practice.

Team Two engaged in the professional development. They met and discussed opportunities they plan to provide for students. They collaborated and determined a goal and then planned accordingly. Each observation began with the creation of an observation document that included a team goal for the lesson. Their collaboration was focused on their actions and decisions and their impact on the students. The team mentioned many times in the debrief conversations or interviews their application of their learning outside of the formal lesson study opportunities. They were aware of their new learning and the assimilation of their pedagogical choices and instructional strategies into their practice. While discussing the assimilation there was also the mention of support. This support came from within the team itself, within the COP. They shared their individual knowledge with each other, realizing each other's strengths and expertise so that all could grow. This support came in the sharing of resources, emotional support as one attempted to integrate a new strategy on their own, or the time to plan together and discuss the impact of the attempt on student learning. Again each of these occurred

outside of the lesson study experiences but were created by this experience. Laksov, Mann, & Dahlgren's (2008) definition of a COP around teaching is exhibited in Team Two. They began to invent new ways to teach students and organize their instruction and reflected on the effects of these changes on student learning. They had a shared understanding and shared experiences that continued to develop (Martin-Kniep, 2008) the COP.

Technology

Support by members of Team Two continued as difficulties arose and they attempted to integrate innovative technologies into their classrooms. The team continued to work together to successfully integrate the technologies. They worked to provide quality learning opportunities for the students even when the technology would not support their first choice of instructional strategies for the day. The team worked in tandem as they facilitated communication with the external granting agency and the technology directors. Each member of the team seemed to physically, emotionally, and professionally share the burden of the attempted and failed integration of the new technologies.

While Team Two still had the support of each other, the difficulties and the fractured trust relationship between themselves and the technology support team was paramount. The team's feelings of helplessness echoed throughout their interviews. It seemed as though the lack of trust with the technology team deeply affected their feelings of security. Maslow's (1943) hierarchy of needs speaks to an individual's need for security and the importance of meeting that need for proper learning to occur. The lack of security was displayed by fear. The teachers were afraid to use the devices for tasks

that were technologically simple and were not impacted by the network issues. The fear of impacting any perceived progress toward rectifying network issues crippled the team. They felt helpless and out of control. These feelings of lack of control buried their learning deep under their struggles and strife to reclaim their feelings of control of their classroom instruction. The team that once was perceived to be at the top of Maslow's hierarchy (1943) had slid to near the bottom. They were grappling once again with needs of security and esteem. Their team members met their social needs as each seemed to receive comfort from the fact each was experiencing the difficulties together. Team One's efforts were limited geographically to the science teacher. All teachers were to come to her room to allow their students to use the technologies. No attempts were made to integrate *McLarin's Adventures* in any other classrooms. The teacher controlled the availability of the resources, the scheduling of their use, and supervised the efforts of the integration. Even when she was out on maternity leave, she still coordinated these activities from home which added to the frustration of the other teachers and increased the burden of the time requirements related to the study. With the exception of the science teacher, Team One lacked ownership of the process and remained captive by the series of events that occurred around them and to them.

Team One attempted to justify their technology related instructional decisions by the students' lack of computer access at home. Considering individual differences is an important facet of teachers' instructional decisions the reality of what is perceived is also relevant. The United States' 2000 Census found that 65% of homes have computers and 40% have internet access. While there are corresponding differences in these figures related to income, according to these figures, most of the students have access to a

computer outside of school. The teachers were basing their decisions on erroneous assumptions about their students. Lesson study has the potential to allow teachers to develop an increased understanding of their students Team One failed to do just that. Despite the teams' collaboration related to school structure issues such as scheduling or purchases, Team One lacked the skills to discuss their instructional decisions and student learning. As a result, they were unable to examine the impact of their instructional decisions on student learning. One of the important differences in this process experienced by Team One was the support provided by the COP that developed and grew among Team Two that failed to grow in Team One. This support was instrumental in the processes of lesson study and allowed meaningful conversations to occur that could yield new information.

A New Model for Professional Development

Professional development in most schools is designed and completed to meet the state requirements, but there is little or no consistency or uniformity to the manner in which it is delivered. Teachers register for professional development sessions based on a flier received in the mail, not working toward their personal professional development plan that is aligned with the vision for the school. "The National Staff Development (NSDC) council ran a series of ads in *Phi Delta Kappan* (2004) decrying the ineffectiveness of most professional development," (Sparks, 1998 in Schmoker, 2006). The NSDC recommends replacing the traditional professional development with the structure of a professional learning community (PLC) (Schmoker).

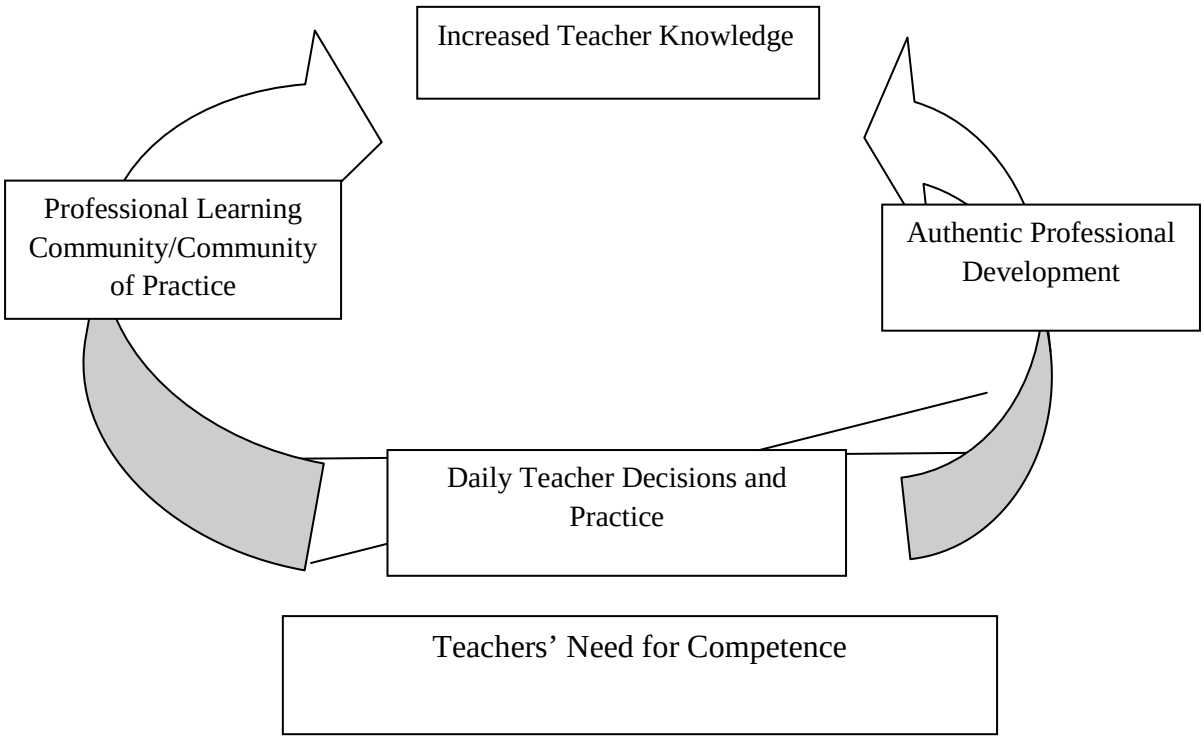
In a professional learning community, teachers realize their own strengths and share those strengths with others. Lesson study is a form of professional development

that will allow teachers to work together and learn from each other as they utilize their strengths and work to meet the needs of their students (Stigler & Hiebert, 1999). In lesson study, the teachers learn to focus their observations on student learning and behavior and record the actions of students as they interact with the lesson (Lewis, 2002). Teachers begin to realize the importance of professional development and the needs of their students that may have been hidden behind the curriculum being presented. This form of collaboration is reciprocal. As they collaborate, social norms for the team are established and these times become a pathway for teacher change and improved instructional practice (Printy, 2008; Sagor, 1995). As the norms are established and honored, the expectation can very well extend to the students and community members that are involved in the visioning process and slowly the culture of the school will change (Fullan, 2001). As a by-product of the teachers actively learning, the children's environment is enriched and learning is achieved for all (Sagor, 1995). Learning for all is more aligned to what Dewey and Jefferson had envisioned (Dewey, 1916; Pulliam & Van Patten, 2007), an environment created for the purpose of facilitating student leraning.

The two teams from Wellington learned very differently despite the uniformity of the opportunities provided them. The mediating factor (Ingvarson, Meiers, Beavis, 2005) was the absence of a community of practice. The result was a team of teachers that were compliant with requests and the expectations of the granting agency but failed to intellectually engage in the professional development. To address the findings of this study, a model for teacher engagement in professional development is developed (See Figure 8).

Figure 8.

Model for Authentic Teacher Professional Development



Adapted from: Newmann, Wehlage, and Lamborn, 1992; O'Hair, McLaughlin, and Reitzug, 2000; Morrison, 2002.

Teachers realize the need for their professional competence. This realization could be the result of the political, local, or social climate related to education or it could be the result of individual analysis of student assessments. The realization of lacking content or pedagogical knowledge could result from a casual conversation with a colleague. This realization is an important catalyst for professional learning. "Teachers must believe that serious engagement in their own learning is part and parcel of what it means to be professional and they must expect to be accountable…," (Printy, 2008, p. 196).

The value of authentic instruction to student learning has been documented over the past twenty-five years (Kolb, 1984; Newmann, Wehlage, & Lamborn, 1992; Smith, Lee, & Newmann, 2001; Yoon, Duncan, Lee, Scarloss, & Shapley, 2007). Some researchers have begun to consider the need for authentic professional development but this research supports the development of a model for increasing teacher knowledge through his/her authentic participation in professional development. This model acknowledges the complexity of the school environment and the potential of the external factors to inhibit the professional growth of teachers. Just as the DNA molecule codes for the growth of an organism, each element of this model can be used as an indicator for the potential of change in teachers' knowledge and the application and assimilation of the new knowledge to benefit students in their classrooms.

Significance of the Study

The United States' educational system has established new levels of expectations for all involved in the system including professional development providers. U.S. officials have tightened restrictions on governmental fund use on professional development lacking appropriate research documentation related to its effectiveness. Lesson study is one type of professional development from which teachers benefit but lacks research to allow federal fund use for its support and implementation. This study is significant because it analyzed two teams' three year process of participating in interdisciplinary lesson study culminating with the intended use of lesson study to examine the integration of innovative technologies. The participants in this study were from the same school site thus eliminating many barriers that would prevent cross-team analysis and synthesis of data generated as a result of this study.

This study combined Newmann, Wehlage, & Lamborn's (1992) model for authentic student engagement with O'Hair, McLaughlin, & Reitzug's (2000) IDEALS model, and Mason's complexity theory model (2008)to create a model for increased teacher learning. This model deepens the understanding of the professional learning community as how it could actually serve as a mitigating factor in teacher growth and development. Professional learning communities have been documented as a need for student learning (O'Hair, et al, 2000) but have not been researched in relation to lesson study or teacher learning.

This study also documents teachers' instructional decisions when their planned activities are not adequately supported by the school's technological infrastructure. The teachers were in a position in which immediate decisions were made that directly impacted student learning. This research indicates that when teachers are supported within a COP, they are more likely to use their newly acquired knowledge about student learning to make quality decisions that can continue student learning despite the obstacles related to technological issues.

Implications

Just as expectant mothers are encouraged to swallow prenatal vitamins to assist with the creation of an environment that is optimal for the growth of the new child, school administrators are charged with the same task regarding the school environment. This environment will not be free of teacher irritants or change but it has the potential to be one possessing support, collaboration, and a spirit of optimism instead of despair. Each teacher in this study assumed the role of a learner being presented with a problem and the resources with which to work cooperatively with others to develop a solution.

When teachers become learners, they recognize the need for relevant learning. Teachers speak of it occasionally when discussing professional development, yet few realize their frequent frustration with current professional development is due to a lack of relevance to their practice. The model for authentic teacher professional development recognizes two significant roles for the administrator as: 1) to foster the growth of a PLC and 2) to work with teachers to create structures that can facilitate growth and prohibit the presence of things that can inhibit the desired level of growth.

This model assists principals and superintendents in defining their role as an instructional leader that has often been a quagmire for leaders as they work to meet a nebulous definition and expectation from school board members and state and national leaders. Just as the Wellington teachers worked to create an optimal learning environment for their students to experience a well crafted lesson, administrators are obliged to provide comparable learning opportunities for teachers.

Aspiring school leaders can benefit from instruction and experiences during their preparatory programs that prepare them to foster this type of school environment in which teacher learning can become an expected daily occurrence instead of a special event prior to the beginning of school. Administrators profit from acquiring observation and communication skills similar to those acquired by the teams at Wellington to assist them in spurring teacher reflection, collaboration, and action. As these skills are acquired further research could be completed to investigate the role of these communication skills in the fostering of a PLC.

A PLC includes all stakeholders, one of which is the technology team. The technology team in this study had a dramatic impact on the teachers' implementation of the new innovations. This study illustrates the importance of a strong, positive relationship between the teachers and the technology team. It is recommended that at least one member of the technology team participate in the professional development to act as a liaison between the teachers and the technology department.

Areas of further research include secondary interdisciplinary lesson study in a traditional high school climate. This study indicated the presence of a community of practice within the team as enhancing the growth of the individual teachers as well as the team. While qualitative data have been analyzed for the purposes of this study, the presence of a COP or PLC can be further documented and analyzed through the use of quantitative data to verify the presence of the PLC in the school setting and its effect on teacher growth. As the technological issues are removed from the school site, future research would be to examine if the teams utilized lesson study protocol to investigate the implementation of technological innovations.

This study was conducted in a rural setting. While the researcher made efforts to increase the transferability to other schools in other contexts, additional research is needed to see if the findings in this study are consistent with those in other settings. However, if the reader sees him/herself in a setting similar to these described in this study, he/she could consider these findings transferable to his/her setting.

Both teams experienced the loss and gain of teachers throughout this life of this study at a rate that is expected for this context. Additional studies are needed to explore the impact of teacher turnover on the formation of COPs.

Teacher preparation programs can assist aspiring teachers with formally introducing them to lesson study and providing them with opportunity to engage in the practice. This additional instruction and activity could be easily introduced during methods classes. These experiences will accelerate the development of communication skills for the teachers to engage in reflective professional dialogue focused on student learning. These changes also can affirm novice teachers as they work to develop the art of self-reflection and examining student work.

Due to technological issues at Wellington no model was able to be created for the use of lesson study to examine the effective implementation of technology. This is an area worthy of future study to assist teachers as they work to meet the needs of students in the 21st Century.

Chapter Summary

In the final chapter of this work, the manner in which interdisciplinary lesson study was experienced by two teams was integrated with the existing literature. While both teams experienced learning, one team experienced in-depth investigation into student learning processes. The team's comprehensive inquiry into their students was facilitated through the creation of a community of practice (COP). This community of practice was one that was focused on student learning and the results of their instructional decisions on their students. The community of practice served as reinforcement for teachers as they progressed on their journey to increased knowledge. The COP remained intact as teachers battled technological issues that prohibited the implementation of new technologies and thus the creation of the model originally intended to be created as a result of this study. Despite these issues, the teachers continued to support each other and

communicate with each other as they continued to make good instructional decisions in the face of adversity. Wellington Middle School is one example of the support teachers can receive from a community of practice as they learn together to improve student instruction.

REFERENCES

Adcock, A. (2008, February). Making digital game based learning work: An instructional designer's perspective. *Library Media Connection*, 56-57.

Bangeman, E. (2008, January 24). Growth of gaming in 2007 far outpaces movies, music. Retrieved December 6, 2008 from http://arstechnica.com/news.ars/post/20080124-growth-of-gaming-in-2007-far-outpaces-movies-music.html .

Barab, S., Dodge, T., & Ingram-Goble, A. (2008). Reflexive play spaces: A 21st Century Pedagogy. Paper presented at the 2007 American Educational Research Association Annual Meeting in Chicago, IL. Paper retrieved October 9, 2008 from http://inkido.indiana.edu/aera_2007/rps_barab22-small.pdf

Becker, K. (2007). Digital game-based learning once removed: Teaching teachers. *British Journal of Educational Technology , 38*(3), 478-488.

Bella, N.J. (2004). *Reflective analysis of student work: Improving teaching through collaboration.* Corwin Press: Thousand Oaks.

Bhatnagar, R., & Kanal, L.N. (1992). Models of enquiry and formalisms for approximate reasoning. In L.A. Zadeh & J. Kacprzyk (Eds.). *Fuzzy logic for the management of uncertainty* (p. 29-54). New York: Wiley.

Bransford, J. D., Brown, A. L., & Cocking, R. R. (2000). *How children learn: Brain, mind, experience, and school.* Washington, D.C.: National Academy Press.

Brophy, J., & Alleman, J. (1991). Activities as instructional tools: A framework for analysis and evaluation. *Educational Researcher , 20* (4), 9-23.

Bush, R.N. (1984). Effective staff development. In making our schools more effective: Proceedings of three state conferences. San Francisco: Far West Laboratory.

Caffarella, R., & Merriam, S. (2000) “Linking the Individual Learner to the Context of Adult Learning,” In A. L. Wilson and E. Hayes (eds.), *Handbook of Adult and Continuing Education*. San Francisco: Jossey-Bass.

Cate, J. (2004). *Evolution of a High Achieving School: Building community through learning, leading, and practices.* Norman, OK: University of Oklahoma.

Cate, J., Vaughn, C.A., & O’Hair, M.J. (2006). The 17-year case study of an elementary school’s journey: From traditional to learning community to democratic school community. *Journal of School Leadership, 16,* 86-111.

Chokshi, S., & Fernandez, C. (2004). Challenge of Importing Japanese Lesson Study. *Phi Delta Kappan, 85*(7), 520-525.

Christiansen, E. (2007). Space as a learning context: The role of dwelling in the development of academic reflection. In A. D. De Figueiredo, & A. P. Afonso, *Managing learning in virtual settings: The role of context* (pp. 84-97). Hershey: Information Science Publishing.

Corporation for Public Broadcasting. (2003). *Connected to the future: A report on children's Internet use.* Retrieved October 15, 2008, from http://www.cpb.org/stations/reports/connected/connected_report.pdf

Creighton, T. (2003). *The principal as technology leader.* Thousand Oaks: Corwin Press.

Creswell, J. W. (1998). *Qualitative inquiry and research design: Choosing among five traditions.* Thousand Oaks: Sage Publishing, Inc.

Creswell, J.W. (2008). *Qualitative, Quantitative, & Mixed Methods Approaches.* Thousand Oaks: Sage Publishing, Inc.

Crisafulli, M. (2007). *Teacher Voice.* In J. Pollock, Improving student learning one teacher at a time (p. 55-58). Alexandria: Association of Supervision and Curriculum Development.

Danielson, C. (2002). *Enhancing student achievement: A framework for school improvement.* Association for Supervision and Curriculum Development: Alexandria.

Darling-Hammond, L. (1998). Teachers and teaching: Testing policy hypotheses from a national commission report. *Educational Researcher, 27*(1), 5-15.

Davis, B., & Sumara, D. (2007). Complexity science and education: Reconceptualizing the teacher's role in learning. *Interchange, 38*(1), 53-67.

Dewey, J. (1916). Democracy and education: An introduction to the philosophy of education. New York: The Macmillan Company.

Dodge, T., Barab, S., Stuckey, B., Warren, S., Heiselt, C., & Stein, R. (2008). Children's Sense of Self: Learning and meaning in the digital age. *Journal of Interactive Learning Research , 19*(2), 225-249.

Donovan, L., Hartley, K., & Strudler, N. (2007). Teacher concerns during initial implementation of a one-to-one laptop initiative at the middle school level. *Journal of Research on Technology in Education, 39* (3), 263-286.

Downer, J. T.,& Rimm-Kaufman, S. E., & Pianta, R. C. (2007). How do classroom conditions and children's risk for school problems contribute to children's behavioral engagment in learning? *School Psychology Review, 36* (3), 413-432.

Downey, C.J., Steffy, B.E., English, F.W., Frase, L.E.,& Poston, W.K. (2002). *The three-minute classroom walk-through: Changing school supervisory practice one teacher at a time.* Thousand Oaks: Corwin.

DuFour, R., & Eaker, R. (1998). *Professional learning communities at work: Best practices for enhancing student achievement.* Bloomington: National Education Services.

Elmore, R.F., & Fuhrman, S.H. (2001). Holding schools accountable: Is it working? *Phi Delta Kappan, 83*(1), 67-72.

Fine, M. (2007). Expanding the methodological imagination. *The Counseling psychologist, 35*(3), 459-473.

Foley, D. (2005). Elusive prey: John Ogbu and the search for a grant theory of academic disengagement. *International Journal of Qualitative Studies in Education 18*(5), 643-657.

Fredericks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research , 74*(1), 59-109.

Fullan, M. (2001). *Leading in a culture of change.* San Francisco: Jossey-Bass.

Fullan, M. (2003). *Changing forces with a vengeance*. New York: Routledge Falmer.

Fullan, M. (2003). *The moral imperative of school leadership.* Thousand Oaks: Corwin Press.

Fullan, M. (2007). Educational reform as continuous improvement. In W.D. Hawley & D.L. Rollie (Eds.) *The keys to effective schools*: *Educational reform as continuous* improvement. Thousand Oaks: Corwin Press.

Fullan, M. (2008). The six secrets of change. San Francisco: Jossey-Bass.

Gee, J. P. (2003). *What video games have to teach us about learning and literacy.* New York City : Palgrave Macmillan.

Gee, J.P. (2005). Learning by design: Good video games as learning machines. *E Learning, 2*(1), 5-16.

Glaser, B.G. (1978). Theoretical sensitivity: Advances in the methodology of grounded theory. Mill Valley, California: Sociology Press.

Glatthorn, A.A., Boschee, F., & Whitehead, B.M. (2006). *Curriculum leadership: Development and implementation.* Thousand Oaks: Sage Publications.

Goals 2000: Educate America Act. (1998). Retrieved July 26, 2008 from http://www.ed.gov/G2K/index.html

Goldin, C. (1998). America's graduation from high school: The evolution and spread of secondary schooling in the twentieth century. *The Journal of Economic History, 58*(2), 345-374.

Gros, B. (2007). Digtial games in education: The design of games-based learning environments. *Journal of Research on Technology in Education , 40*(1), 23-38.

Gunn, A.M., Richburg, R.W., & Smilkstein, R. (2007). *Igniting student potential: Teaching with the brain's natural learning process. Thousand Oaks: Corwin Press.*

Hall, G. E., George, A. A., & Rutherford, W. L. (1998). *Measuring stages of concern about the innovation: A manual for use of the SoC questionnaire.* Austin: Soutwest Educational Development Laboratory.

Hannafin, M. J., & Hill, J. R. (2007). Epistemology and the design of learning environments. In R. A. Reiser, & J. V. Dempsey, *Trends and issues in instructional design and technology* (pp. 53-61). Upper Saddle River: Pearson.

Hawley, W.D. ,& Rollie, D.L. (2007). The keys to effective schools: Educational reform as continuous improvement. Thousand Oaks: Corwin.

Hawley, W.D ,& Valli, L. (2007). Design principles for learner-centered professional Development. In W. D. Hawley & D.L. Rollie (Eds.). *The keys to effective schools: Educational reform as continuous improvement* (p. 117-138). Thousand Oaks: Corwin.

Hawley, W.D., & Sykes, G. (2007). Continuous school improvement. In W. D. Hawley & D.L. Rollie (Eds.). *The keys to effective schools: Educational reform as continuous improvement* (p. 153-172). Thousand Oaks: Corwin.

Hoffman-Kipp, P., Artiles, A.J., & Lopez-Torres, L. (2003). Beyond reflection: Teacher learning as praxis. *Theory into practice,42*(3), 248-254.

Hord, S. (1994). Staff development and change process: Cut from the same cloth. *Issues about change.* Austin: Southwest Educational Development Laboratory. Retrieved June 14, 2007 from www.sedl.org/change/issues/issues42.html

Hord, S. (1997). *Professional learning communities: Communities of continuous inquiry and improvement*. Austin, TX: Southwest Educational Development Laboratory.

Ingvarson, L., Meiers, M., & Beavis, A. (2005). Factors affecting the impact of professional development programs on teachers' knowledge, practice, student outcomes, and efficacy. *Education Policy Analysis Archives, 13,*(10), 1-28.

Jacobson, S.L., & Battaglia, C.F. (2001). Authentic forms of teacher assessment and staff development in the U.S. In D. Middlewood & C. Cardno (Eds.) *Managing teacher appraisal and performance: A comparative approach* (pp. 75-89). London: Routledge Falmer.

Juvonen, J. (2007). Reforming middle schools: Focus on continuity, social connectedness, and engagement. *Educational Psychologist, 42*(4), 197-208.

Kelly, F.S., McCain, T., & Jukes, I. (2009). Teaching the digital generation: No more cookie cutter high schools. Thousand Oaks: Sage.

Kiely, R., Sandmann, L.R., & Truluck, J. (2004). Adult learning theory and the pursuit of adult degrees. *New directions for adult and continuing education. (103),* 17-30.

Killion, J. (2003). Solid footwork makes evaluation of staff development programs a song. *National Staff Development Council 24*(4), 14-26.

Kinshuk, Sampson, D. G., Isaias, P., Spector, J. M., & Schrum, L. (2007). Special issue introduction: A critical view of technology-enhanced learning and instruction in the digital age. *Journal of Research on Technology in Eduation , 40*(1), 2-38.

Knowles, M. (1984). *Andragogy in Action.* San Francisco: Jossey-Bass.

Holton, E. F., & Swanson, R. A. (1988). *The Adult Learner: The Definitive Classic in Adult Education and Human Resource Development.* Houston: Gulf Publishing Company.

Kolb, D.A. (1984). *Experiential learning: Experience as the source of learning and development.* Englewood Cliffs, NJ: Prentice-Hall.

Laksov, K.B., Mann, S., & Dahlgren, L.O. (2008). Developing a community of practice around teaching: a case study. *Higher education research and development, 27*(2), 121-132.

Lasley, T.J. (1992). Promoting teacher reflection. *Journal of Staff Devlopment, 13*(1), 24-29.

Lave, J. & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* Cambridge: Cambridge University Press.

Leithwood, K., & Jantzi, D. (2008). Linking leadership to student learning: The contributions of leader efficacy. *Educational Administration Quarterly, 44*(4), 496-528.

Leland, C.H., & Kasten, W.C. (2002). Literacy education for the 21st century: It's time to close the factory. *Reading and writing quarterly 18,* 5-15.

Lewis, C. C. (2002). *Lesson Study: A handbook of teacher-led instructional change.* Philadelphia: Research for Better Schools.

Limbos, M.A.P., & Casteel, C. (2008). Schools and neighborhoods: Organizational and environmental factors associated with crime in secondary schools. *Journal of School Health, 78*(10), 539-544.

Lincoln, Y., & Guba, E. (1985). *Naturalistic inquiry.* New York: Sage.

Loucks-Horsley, S. (1995). Professional development and the learner-centered school. *Theory into Practice, 34*(4), 265-271.

Martin, R. (2002). *The responsibility virus*. New York. Basic Books. In *Michael Fullan* The moral imperative of school leadership. Thousand Oaks: Corwin Press.

Martin-Kniep, G.O. (2008). *Communities that learn, lead, and last: Building and sustaining educational expertise.* San Francisco: Jossey-Bass.

Mason, M. (2008). "Complexity Theory and the Philosophy of Education." In Mark Mason (eds.) *Complexity theory and the philosophy of education.* Oxford: Wiley-Blackwell.

McCombs, B.L., & Whisler, P.T. (1997). *The learner-centered classroom and school Strategies for enhancing student motivation and achievement.* San Francisco: Jossey-Bass.

McKenzie, J. (2001). *Planning Good Change.* Bellingham, WA: FNO Press.

McLaughlin, M.W. & Talbert, J.E. (2006). *Building school-based teacher learning communities.* New York: Teachers College Press.

Merriam, S., & Caffarella, R. (1999). Learning *in Adulthood: A Comprehensive Guide.* San Francisco: Jossey-Bass.

Merriam-Webster Online Dictionary (2008). Retrieved July 27, 2008 from http://www.merriam-webster.com/dictionary/community.

Mezirow, J. (2000). "Learning to Think Like an Adult: Core Concepts in Transformation Theory." In J. Mezirow and Associates, *Learning as Transformation: Critical Perspectives on a Theory in Progress.* San Francisco: Jossey-Bass, 2000.

Morrison, K. (2008). "Educational Philosophy and the Challenge of Complexity Theory." In Mark Mason (eds.) *Complexity theory and the philosophy of education.* Oxford: Wiley-Blackwell, 2008.

National Academy of Sciences, National Academy of Engineering, &Institute of Medicine. (2007). *Rising above the gathering storm: Energizing and employing america for a brighter future.* Washington, D.C.: National Academies Press.

National Commission on Excellence in Education (1983). *A Nation at Risk.* Retrieved July 26, 2008, from http://www.ed.gov/pubs/NatAtRisk/index.html

National Staff Development Council (2007a). Standards: About the standards – quality teaching. Retrieved on June 14, 2007 from www.NSDC.org/standards/qualityteaching.cfm

National Staff Development Council (2007b). Standards: About the standards-resources. Retrieved on June 14, 2007 from www.NSDC.org/standards/resources.cfm

Newhouse, P. C. (2001). Applying the concerns-based adoption model to research on computers in the classroom. *Journal of Research on Computing in Education, 33*(5), 15-23.

Newmann, F.M. (2007) "Improving achievement for all students: The meaning of staff shared understanding and commitment." In W.D. Hawley & D.L. Rollie (Ed.) *The keys to effective schools: Educational reform as continuous improvement.* (p. 33-49). Thousand Oaks: Corwin Press.

Newmann, F., & Wehlage, G. (1995). *Successful school restructuring: A report to the public and educators by the Center on Organization and Restructuring of schools.* Madison, WI: Center on Organization and Restructuring of Schools.

Newmann, F. M., & Wehlage, G. G. (1993). Standards of authentic instruction. *Educational Leadership, 50*(7), 8-12.

Newmann, F., Wehlage, G. G., & Lamborn, S. D. (1992). *Student engagement and achievement in American secondary schools.* New York: Teacher College Press.

Newton, X. (2007). Reflections on math reforms in the U.S.: A cross national perspective. *Phi Delta Kappan 88*(9), 681-685.

No Child Left Behind (2002). Retrieved July 26, 2008 from http://www.ed.gov/nclb/landing.jhtml

O'Hair, M. J., McLaughlin, H. J., & Reitzug, U. C. (2000). *Foundations of democratic education*. Orlando, FL: Harcourt, Inc.

Oklahoma State Department of Education. (2004). *Oklahoma School Report Card.* Available online at http://www.sde.state.ok.us.

Osterman, K. F., & Kottkamp, R. B. (2004). *Reflective practice for educators.* Thousand Oaks: Corwin Press.

Oxford English Dictionary (1989). (2nd Ed.) Oxford: Oxford University Press.

Partnership for 21st Century Skills. (2008). Retrieved October 17, 2008, from http://www.21stcenturyskills.org/index.php?option=com_content&task=view&id=82&Itemid=185

Pew Research Center. (2008). Teens, video games, and civics. Pew Internet and Research Project. Retrieved September 16, 2008 from http://pewresearch.org/pubs/953/teens-video-games-and-civics.

Picciano, A. G. (2006). *Educational Leadership and planning for technology.* (4th, Ed.) Upper Saddle River: Pearson.

Prensky, M. (2001). Digital Natives, Digital Immigrants. *On the Horizon , 9* (5), 1-6.

Printy, S. M. (2008). Leadership for teacher learning: A community of practice perspective. *Educational Administration Quarterly , 44* (2), 187-226.

Pulliam, J.D., & Van Patten, J.J. (2007). *History of education in America.* (9th ed.). Upper Saddle River: Pearson Education.

Ramsden, P. (2003). *Learning to teach in higher education.* (2nd Ed.) London: Routledge.

Richardson L. (1998). Writing: A method of inquiry. In N. Denzin and Y. Lincoln, eds., *Collecting and interpreting qualitative materials,* (pp. 345-371). Thousand Oaks, CA: Sage.

Rosenberg, M. (2007). Knowledge management and learning: perfect together. In R. A. Reiser, & J. V. Dempsey, *Trends and issues in instructional design and technology* (pp. 166-272). Upper Saddle River: Pearson.

Sagor, R. (1995, April). Overcoming the one-solution syndrome. *Educational Leadership*, 24-27.

Schlechty, P. C. (2002). *Working on the work.* San Francisco: Jossey-Bass.

Schmoker, M. (2006). *Results now.* Alexandria: Association for Supervision and Curriculum Development.

Scholz, R.W., & Tietje, O. (2002). *Embedded case study methods: Integrating quantitative and qualitative knowledge.* Thousand Oaks: Sage.

Schön, D.A. (1983). *The reflective practitioner*, New York: Basic Books.

Schweinle, A., Turner, J.C.,& Meyer, D.K. (2008). Understanding young adolesecent's optimal experiences in academic settings. *The Journal of Experimental Education, 77*(2), 125-143.

Sciarra, D. T., & Seirup, H. J. (2008). The multidimensionality of school engagement and math achievement among racial groups. *Professional School Counseling, 11*(4), 218-228.

Scott Foresman (Eds.) (2000). Science. Glenview, Illinois: Addison-Wesley.

Senge, P. M. (1990). *The fifth discipline: The art & practice of the learning organization.* New York: Doubleday.

Sergiovanni, T. (2005). *Strenghtening the heartbeat: Leading and learning together in schools.* San Francisco: Jossey-Bass.

Shaffer, D. W., Squire, K. R., Halverson, R., & Gee, J. P. (2005). Video games and the future of learning. *Phi Delta Kappan, 87*(2), 104-111.

Shea, M., Murray, R., & Harlin, R. (2005). *Drowning in data? How to collect, organize, and document student performance*. Portsmouth, NH: Heinemann. In K. Mokhtari, C. A. Rosemary, & P.A. Edwards. (2007). Making Instructional Decisions Based on Data: What, How, and Why?. *The Reading Teacher, 61*(4), 354-359.

Shen, L. , Ahuja, N., Shen, Y., Habib, N.A., Toyota, M., Rashid, A., & Issa, J.J. (2002). DNA methylation and environmental exposures in human hepatocellular carcinoma. *Journal of National Cancer Institute,94,* 755-761.

Slepkov, H. (2008). Teacher professional growth in an authentic learning environment. *Journal of Research on Technology in Education, 41*(1), 85-111.

Smith, J.B., Lee, V.E., & Newmann, F.M. (2001). *Instruction and achievement in Chicago elementary schools: Improving Chicago Schools.* Chicago: Consortium of Chicago School Research.

Southwest Educational Development Laboratory. (1994). *Staff development and change process: Cut from the same cloth.* Retrieved June 14, 2007, from SEDL: www.sedl.org/change/issues.

Sparks, D., & Loucks-Horsley, S. (1989). Five models of staff development. *Journal of Staff Development, 10*,(4). Retrieved July 27, 2008 from NSDC: www.nsdc.org.

Sparks-Langer,G.M., & Colgon, A. (1991). Synthesis of research on teachers' reflective thinking. *Educational leadership, 48*(6), 37-44.

Spence, D. J., & Usher, E. L. (2007). Engagement with mathematics courseware in traditional and online redmedial learning environments: Relationship to self-efficacy and achievement. *Journal of Educational Computing Research,37*(3), 267-288.

Spires, H. A., Lee, J. K., Turner, K. A., & Johnson, J. (2008). Having our say: Middle grade student perspectives on school, technologies, and academic engagement. *Journal of Research on Technology in Education , 40*(4), 497-515.

Squire, K. (2005, August/September). *Changing the game: What happens when video games enter the classroom?* Retrieved October 10, 2008, from http://www.innovateonline.info/index.php?view=article&id=82%20&action=article

Stake, R. E. (1995). *The art of case study research*. Thousand Oaks, CA: Sage.

Stigler, J. W., & Hiebert, J. (1999). *The teaching gap.* New York: The Free Press.

Surry, D. W., & Ely, D. P. (2007). Adoption, diffusion, implementation, and institutionalization of instructional innovations. In R. A. Reiser, & J. V. Dempsey, *Trends and issues in instructional design and technology* (2nd ed., pp. 104-111). Upper Saddle River: Pearson.

Suzuki, L.A, Ahluwalkia, M.K., Arora, A.K., & Mattis, J.S. (2007). The pond you fish in determines the fish you catch: Exploring strategies for qualitative data collection. *The Counseling Psychologist, 35*(2), 295-327.

Tashakkori, A., & Teddlie, C. (2003). Handbook of mixed methods in social & behavioral research. Thousand Oaks, CA: Sage Publications.

Tehie, J.B. (2007). *Historical foundations of education*. Upper Saddle River: Pearson Education.

U.S. Census Bureau (2001, September). *Home computers and internet use in the United States: August 2000.* Retrieved June 29, 2009 from http://www.census.gov/prod/2001pubs/p23-207.pdf.

U.S. Department of Commerce, U.S. Department of Education, NetDay. (2008). *Visions 2020.2.* Retrieved October 10, 2008, from http://www.ed.gov/about/offices/list/os/technology/plan 2004/site/documents/visions_20202.pdf

Wei, R.C., Darling-Hammond, L., Andree, A., Richardson, N., Orphanos, S. (2009). *Professional learning in the learning profession: A status report on teacher development in the United States and abroad. Dallas, TX. National Staff Development Council.*

Wenger, E. (1998). *Communities of practice. Learning, meaning, and identity.* Cambridge: Cambridge University Press.

Wenger, E., McDermott, R., & Snyder, W.M. (2002). Cultivating communities of practice. Boston, MA: Harvard Business School Press.

Williams, L.A. (2006). *The Relationships of technology integration and high school collaboration through the development of a professional learning community: A mixed methods study* Norman, OK: University of Oklahoma.

Willms, J. D. (2003). *Student engagement at school: A sense of belonging.* OECD Publishing.

Wilson, A. L. (1993). "The Promise of Situated Cognition." In S. B. Merriam (ed.), *An Update on Adult Learning Theory.* New Directions in Adult and Continuing Education, no. 57. San Francisco: Jossey-Bass.

Yair, G. (2000). Educational battlefields in America: The tug of war over students' engagement with instruction. *Sociology of Education, 73*(4), 247-269.

Yin, R. (2003). *Applications of case study research* (Second Edition ed.). Thousand Oaks: Sage Publications.

Yin, R. K. (1989). *Case study research: Design and methods.* Newbury Park, CA: Sage.

Yin, R. K. (1994). *Case study research: Design and methods* (2nd ed.). London: Sage.

Yoon, K.S., Duncan, T., Lee, S.W.-Y., Scarloss, B., & Shapley, K. (2007). *Reviewing the evidence on how teacher professional development affects student achievement.* (Issues & Answers Report, REL 2007- No. 0333). Retreived May 20, 2009, from http://ies.ed.gov/ncee/edlabs/regions/southwest/pdf/REL_2007033.pdf .

York-Barr, J., Sommers, W. A., Ghere, G. S., & Montie, J. (2001). *Reflective practice to improve schools: An action guide to educators.* Thousand Oaks: Corwin.

APPENDIX A

METHODOLOGY

For this instrumental embedded case study, multiple data sources were collected. These data sets were organized into sets based on the time at which the data were collected. The data included lesson study observations and debrief conversations, teacher group interviews, and teacher created observation documents. The qualitative data included this study are lesson study observations and debrief conversations, teacher created observation documents, and teacher group interviews. In addition to these primary sources of data, secondary sources of data included school demographics data which assisted in the description of the case.

Design of the Study

The study utilized a pragmatic approach to the research. The participants in this study are school teachers. One of the primary concerns of the researcher was to minimize the burden being placed on the teacher as a result of the research. The data collected in this study was what was appropriate and would best depict the phenomenon being observed. The qualitative data generated were chosen because words were the best descriptors of teacher and student learning through classroom observations, lesson study cycles, and focus groups.

Research Questions:

1. How do two years of interdisciplinary lesson study impact secondary teachers' instructional decisions?

2. What happens to the quality of these instructional decisions when teachers' efforts to implement innovative technology are not adequately supported by the school's technological infrastructure?

Population and Sample

The population studied was eighth and ninth grade teachers with the specific population being those eighth and ninth grade teachers who participated in the 2005-2008 United States Department of Education Star Schools Project. There were sixteen schools and 93 teachers represented in the targeted population. The findings from the two years of pilot study found schools performing at different levels. For the purposes of this study a purposeful sample was chosen from the population. "Every case should serve a specific purpose within the overall scope of inquiry," (Yin, 1994; Scholz & Tietje, 2002). This sample consisted of two lesson study teams observed to be performing at differing levels within one school site, Wellington Middle School. The differing levels were determined based on two years of team meetings and observations in the practice of lesson study. This school site had eight participating teachers (n=8) that composed two teams of teachers. This site was chosen to eliminate the numerous variables associated with comparing school teams between two different school sites or districts. Wellington Middle School houses only seventh and eighth grades and has a reported enrollment of 372 students but the district of Wellington has a total enrollment of over 2500 students according to the 2007 Oklahoma state report card. (Oklahoma Department of Education, 2007). This school has limited ethnic diversity with over 80% of the population being Caucasian, with the remaining students being classified as Hispanic or Native American

(Oklahoma Department of Education). Over 40% of the students have been identified as being eligible for free and reduced lunch (Oklahoma Department of Education).

Context

Year One

First impressions are often lasting. The researchers' first impressions of Wellington Middle School stayed until the very last day of this research project. Despite the length of this study and the variety of learning experiences, their focus and view of learning was not adequately seen until the final stages of analysis. The first time Wellington Middle School was observed was during the initial four day professional development for the STAR Schools Project. A large group entered the meeting space laughing and talking rather loudly. They stood out because the hilarity came from a rather diverse group, young, old, male, and female, and the reaction of other project staff. Some of the staff rushed over to hug and greet them engaging in further animated conversations. As they entered it could be sensed that each person seemed to be intricately connected to the others.

The subsequent four days confirmed the first impressions. While each seemed to approach the professional development and activities very differently, there was a bond, a special bond between each of the eight teachers. This bond seemed to pass generational boundaries, content areas, and differing skill sets and areas of expertise. They worked together and supported each other as they worked corporately and personally to assimilate the new knowledge being presented to develop a vision for lesson study in Wellington. The principal, person nine, was as much an integral part of this group as each of the teachers. His comments and thoughts carried no more weight

than any of the others. The team worked to brainstorm ideas and shape their understanding and preliminary plans for lesson study in Wellington.

As the four days drew to an end, the living organism seen as Wellington Middle School seemed to separate into it two parts, each a mirror image of the other. While they were not identical in appearance, their function was similar, but their products were different, much like the work of my left and right hands. The basic functions are the same but the finer skilled actions are better with my dominant hand, the right. Each team of four worked separately with additional input from Mr. Haworth, the principal.

Year Two

The second year officially began with two days of professional development in September 2007. The purpose of this professional development was to provide teachers an opportunity to analyze their student data to identify areas in which their students need to improve and utilize one of those areas as a focus for lesson study for the upcoming school year. The areas of improvement were to be narrowed to one goal for the upcoming school year through collaborations with other project teachers from across the state. The data were analyzed in three different settings and among three diverse groups. The first conversation was with like content area teachers from across the project. The second analysis was completed while collaborating with teachers from a dissimilar content. The third analysis occurred within the school team. The team identified four lower areas of test scores 1) accessing information and research, 2) reasoning skills, 3) analysis and evaluation, and 4) data tables and interpretation. After extensive deliberation of the team, each team identified a goal for the 2007-08 school year. This goal was to be the focus of lesson study for the upcoming year.

The third year of this study focused less on lesson study and more on the integration of technology into the classrooms. The technology being integrated was a UMPC, an ultra mobile personal computer, and a digital game based learning adventure, *McLarin's Adventures*. The discussions with the district leaders began very early. The preliminary conversations with Mr. Haworth began in January of 2008 at a meeting in which he had an opportunity to participate in a round table discussion with other administrators that were presently incorporating these two technologies in their local site. Mr. Haworth was an active participant in that discussion and was actively seeking information and inquiring as to the best practices other schools had realized related to these two technological innovations.

Year Three

In July 2008, two days of professional development were held. The focus of these two days was to provide training specific to the UMPC and *McLarin's Adventures* and to offer suggestions as to how best integrate both innovations into teachers' classrooms. The professional development was led by the Professional Development Director for the project along with the Director of Gaming for the project. Additional teacher support was provided by a teacher that had implemented the technologies in her classroom during the prior school year. The teachers seemed to struggle a bit with the use of the UMPC despite the supports being provided during the professional development. Teachers were encouraged to begin developing a lesson in which to introduce the students to the UMPC. This Wellington team had some ideas for a lesson but had no formal lesson idea mapped out.

The conversations continued in the summer of 2008 when both project directors met with the district technology coordinators. They discussed requirements of the network and the basic management of the devices as related to shipping, unpacking, and inventory of the devices. The technology coordinators for Wellington were knowledgeable and polite but were slightly concerned due to the installation of an entirely new wireless network for the entire district over the summer. He indicated that the middle school network should be completed far before we need the devices to be connected via the wireless network. The technology team had a great plan to control the inventory and delivery of the devices to the teachers in a timely manner. We left the meeting sharing the technology team's concerns about the wireless network but we were optimistic that things would go well.

In August 2008, we began attempting to schedule appointments to come and provide supports to the teachers as they begin using the devices and *McLarin's Adventures* in their classrooms. We were told by Mr. Haworth that the wireless system was not yet installed at the middle school and we would need to wait. We did wait and finally in September, they were able to begin to use the devices in their classrooms. We arrived to provide support and the wireless network crashed. As a result, the use of the devices for that day was cancelled due to the network inoperability. We continued to battle the wireless network and access to the internet throughout the life of this phase of the project allowing the teachers very few times in which to use the devices and *McLarin's Adventures*.

This is a narrative analysis of the growth of these two lesson study teams. While this narrative does not begin at the initial coming together of these individual teachers

within Wellington, it does begin at the teams' initial experience with lesson study. The DNA of each of these living teams is similar with each having the structures, within the environment of Wellington Middle School, to code for student growth and achievement. However there are many factors that have the potential to impact to what extent the students grow and learn. It is the exploration of these factors and the teams' collective and individual reaction to them that we will investigate.

Instrumentation

Lesson Study Debrief Coding Instrument

The lesson study debrief coding instrument was developed by Dr. Kathy McKean at Oklahoma Technical Assistance Center. A need for this instrument was discovered during the pilot year of the study. The instrument was developed between the pilot year and year two of the study. The instrument proved to be trustworthy for the purposes of collecting qualitative data related to lesson study observations and debrief discussions.

The instrument is a simple three column chart (See Appendix C). Each of the columns is labeled with either a smiling face, a line, or a frowning face. This simplistic system was utilized as opposed to a Likert scale due to the inability of the facilitators to assign a numerical value to the qualitative statements and observations being generated as a result of the lesson study. It also assisted with the norming of observations done by the multiple lesson study facilitators involved in the Star Schools Project. A comment or observation would be listed as a smiling face if it met at least of the following criteria:

- Student-focused
- Reflective of practice

- Probing into teaching methods and decisions
- Inquiring into student needs

A comment or observation would be categorized as a frowning face if it met at least one of the following criteria:

- Teacher-focused
- Teacher-directed comment to a colleague
- "I" statements
- Focusing on the lesson or PASS Objectives
- No discussion or knowledge of learning objectives for the lesson

Comments or observations were coded as a line if they did not meet any of the criteria for either of the before mentioned categories.

This study utilizes several types of instruments that generate qualitative and quantitative data, often simultaneously. This was a purposeful choice on the part of the researcher to best understand the case being examined from different points of view, realizing each type of data collected has strengths in its own right (Tashakkori & Teddlie, 2003). Questionnaires are quick to administer and respondents have the perception of anonymity. Interviews and focus groups are time consuming and reduce the possibility of the participants' anonymity. Yet, interviews provide the opportunity to gain in-depth information from the participants. Observations allow the researcher to see what the participants actually do in the setting of the classroom, yet the trustworthiness of the observer is an issue. The embedded nature of this case study demands the use of all

available data to fully explore the case, therefore, both types of data will be utilized (Scholz & Tietje, 2002).

Lesson Study Debrief Conversations

The lesson study debrief conversations were one of the two primary qualitative data sources. The debrief conversations would occur immediately after the teaching of a research lesson. The conversations would follow a strict protocol and would focus entirely on the students interactions with the content presented during the research lesson. This protocol dictated that the teacher of the lesson speak first and report on his/her experiences as the teacher of the lesson and his/her observations of the students. After the teacher concludes his/her initial remarks, the observing teachers share their observations and comments, followed by the external lesson study facilitator. Once all observations are shared, then protocol is followed again focusing on lesson design or instructional choices that they may need to change to increase student learning. The proposed changes would be based on the data gathered during the teaching of the research lesson. The salient points were recorded on the three column debrief coding instrument described earlier.

Lesson Study Observation Documents

The lesson study observation documents were created by the teacher lesson study teams in preparation for the teaching of their research lesson. These observation documents were created on a four column template. The teachers would list their teacher actions and decisions in the first column of the form. The second column would include any supporting items the teacher may need for that portion of the lesson. The third column listed desired student actions as a result of the teachers' instructional decisions.

The last column was for observations made during the research lesson and was completed by the observers during the teaching of the lesson.

Group Interviews

The teacher group interviews were led by the lesson study facilitator at the conclusion of each year of participation in the study. These interviews were semi-structured and consisted of open-ended questions used to prompt teacher thinking as related to lesson study and its implementation in their classrooms.

Procedures

Permission was obtained from the Institutional Review Board for the study. All teachers were given informed consent forms. All students in the classes of the participating teachers were given assent forms and their parents were asked to complete the informed consent forms due to the age of the students being below eighteen years. The *Star Schools Teacher Survey* was administered at the initial Star Schools training in 2006 and was administered to each new member to the Star Schools Project.

The lesson study observation form was created by the teachers on the lesson study team in preparation for the teaching of the research lesson. The teachers would complete the first three columns including teacher actions, any supporting items, and the desired student actions before the teaching of the lesson. During the lesson the third column, observations, would be completed by the observers of the students during the lesson. All lesson study observation forms were collected by the Lesson Study facilitator at the conclusion of each lesson.

The lesson study debrief coding form was utilized beginning in the 2007-08 school year based on pilot results from the 2006-07 school year. This form was used at

each of the three lesson study debrief conversations held by each team during the 2007-08 school year and during the site visit debrief during the 2008-09 school year.

The teachers were asked to participate in the group interviews at the end of the third lesson study cycle for each school during the 2006-07 and the 2007-08 school year. The final group interview was completed February, 2008.

Data Analysis

The qualitative data were analyzed primarily through document analysis and narrative analysis (Richardson, 1998; Cate, Vaughn, & O'Hair, 2006). The data were collected over three school years and thus were analyzed based on the time period in which it was collected (see Appendix B). The data for each team were organized according to which lesson the data were collected and according to which school year the lesson occurred. Each lesson included teacher observation documents, observer notes, de-brief conversations, and the lesson study facilitator coding instrument. The transcripts for some of the sessions that were audio or video taped across the life of the project were also analyzed.

After the data were organized into each set based on the time period in which the data were collected, the researcher begin to analyze each of the documents using narrative inquiry focusing on the topics that were discussed in each time frame by color coding adhesive paper and placing it on a chart according to topic and time frame. This process was repeated across each of the three years of the study and across the six possible lessons that were taught. Each team was analyzed separately looking for patterns or trends that occurred over the three year period that would possibly enlighten the researcher's understanding of their instructional decisions. The documents were then

analyzed by a university professor and another university staff member familiar with lesson study to provide inter-coder reliability.

Participants in the study were asked to verify the accuracy of the transcripts and notes using member checking. The comprehensive member checks of all three parts, the researcher, the knowledgeable other, and the case members itself, are required to "provide evidence of credibility" (Lincoln & Guba, 1985, p. 374).

After each team was analyzed and written up individually then the narrative of the data analysis for each team was analyzed to look for similarities and differences in the instructional decisions and teacher learning during the three years of the study. After these similarities and differences were noted on the narrative, then a formal analysis was done to provide a more complete picture of the decision making processes of secondary teachers during interdisciplinary lesson study and as they attempt to integrate innovative technology.

Integration of Data and Knowledge

The data collected in this study were integrated with the existing body of knowledge. This integration was completed by the integration of the generated themes with the existing literature to illuminate the case and add meaning. The data and the appropriate existing literature from a variety of disciplines were utilized to compose final conclusions and implications.

Trustworthiness

The researcher in this study is very close to the grant project. It proved to be very beneficial to this research because of the relationship that began and grew through the continued contact with the teachers and administrators in the school site selected. This relationship yielded greater access to the teachers but the trustworthiness of the data collected is a concern. The participants were reminded of confidentiality at multiple times throughout the research study. The teachers signed new informed consent forms each year and at each signing were reminded of their protected identity, even to the researcher, and they had the right to not participate in the study. To insure trustworthiness, member checks were utilized throughout the qualitative data collection process as well as during the assigning of codes and themes and the findings from the study.

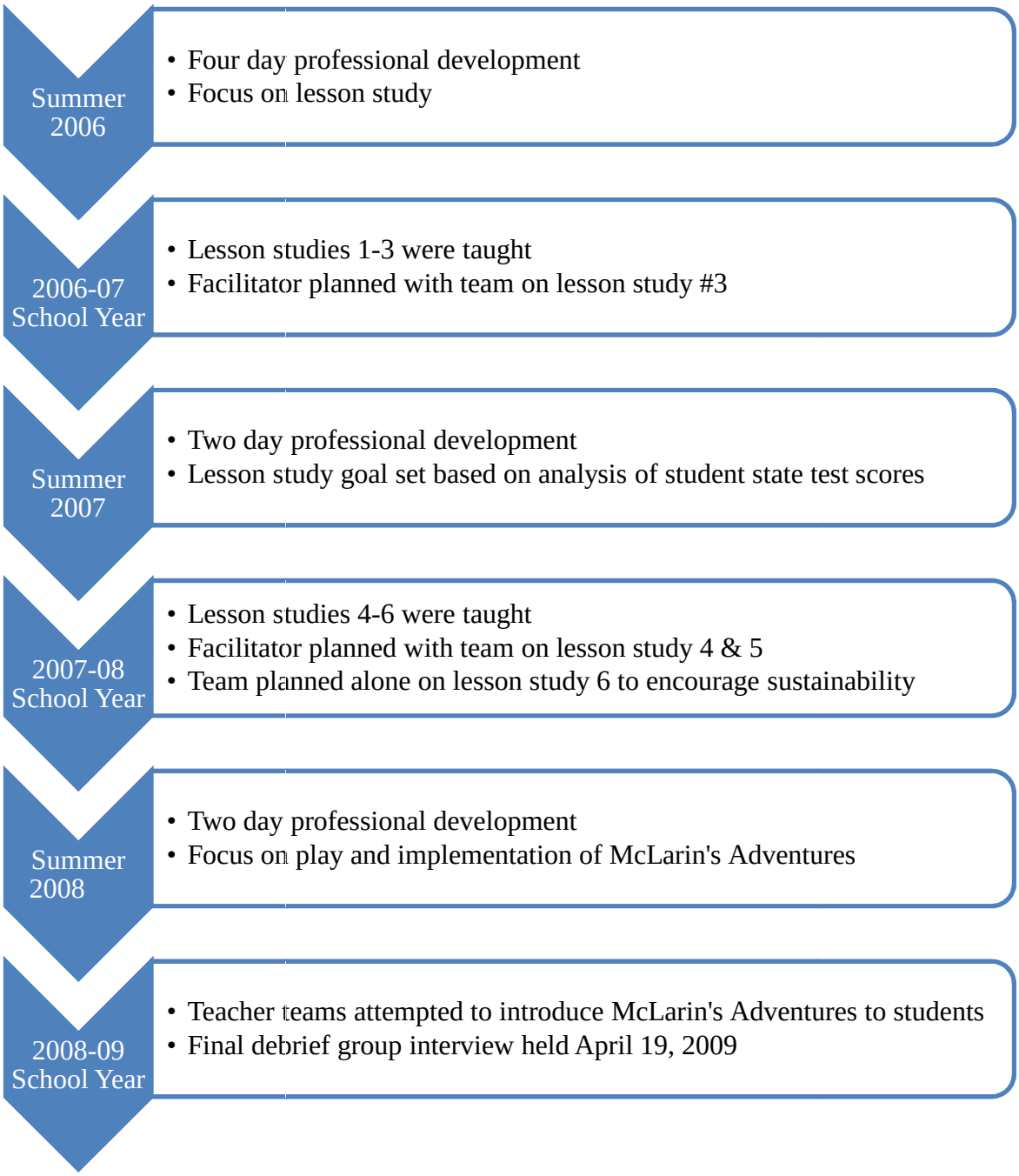
Role of the Researcher

The data collected in this embedded case study is of a qualitative nature. In qualitative studies, the researcher is the instrument for the data collection. As a result, the researcher must be aware of his/her role. The researcher in this study was the Director of Professional Development for the Star Schools Project. As a result, the researcher worked with the participants of the study for three years. As a result of this interactional resonance, the researcher must be classified as a participant observer. Although "participant observers don't generate deeper, more compassionate meanings than passive observers," (Stake, 1995, p. 104) this does raise a concern related to trustworthiness. Member checks were utilized as well as the bracketing of personal biases and any preconceived indications of the researcher were critical to the study.

The researcher has a history of being involved in education. She spent fifteen years in education as a high school science teacher and high school principal. She received multiple types of professional development that contributed to her varied experiences. The experiences of the researcher provided a sense of knowing to the participants as the interactional resonance occurred throughout the study.

APPENDIX B

STUDY TIMELINE



APPENDIX C

LESSON STUDY DE-BRIEF CODING INSTRUMENT

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APPENDIX D

LESSON STUDY OBSERVATION FORM

Teacher Actions	Desired Student Actions/Reactions	Classroom Observations

APPENDIX E

DOCUMENT CODING GUIDE

The coding guide was restricted to team data and identified the number of the lesson completed by the school year in which it was taught. The data were also identified by Team One or Team Two. Examples of data set coding are below:

T1LS308 = Team One, lesson study 3, School Year 07-08

T2LS207 = Team Two, lesson study 2, School Year 06-07

Observation documents are illustrated in Appendix D and were prepared during planning sessions. The third column of the form was completed by observers during the time in which the lesson was taught.

APPENDIX F.

FINAL INTERVIEW PROTOCOL

Teacher Semi-Structured Interview Protocol

1. Thinking back to your experiences with lesson study, how would you describe your experiences with lesson study?

2. Did you face challenges in lesson study? If so, what were they? What things helped you through the lesson study process?

3. Did you learn anything as a result of participating in lesson study?

4. Has lesson study changed the way your 8th grade team(s) interact as you plan to assist students as they achieve success? If yes, how? If no, why not?

5. Did you see these changes affect your interaction with your principal or other grade level teachers?

6. Has lesson study changed the way you think about teaching and learning? If so, how?

7. Think about your lesson plans you have written for this week. How did were daily learning goals for students decided?

8. How are specific classroom activities chosen?

9. What steps are taken if a student has difficulty learning a particular concept?

10. I realize that the use of McLarin's Adventures in your classroom was a struggle. What happened when the plans for the day included the use of the game but the technology didn't support those plans? What happened during the remaining class time? How were the activities decided upon?

11. Is there anything else that you want to share or add to the information you've shared with me?

APPENDIX G

INNOVATIVE TECHNOLOGIES: DIGITAL GAME BASED LEARNING

This study discusses the potential use of digital game based learning in middle school classrooms. While the primary focus of this research was not the innovation in and of itself, the need existed to supply some supporting information related to digital game based learning (DGBL) for the readers of this work to assist with the scaffolding of the research provided. The following is a brief discussion of the literature and its application to this study.

The use of DGBL in classrooms ignites a passionate conversation regarding the effects of technology on student engagement. The 2000 PISA study indicates there is not a correlation between technology and student engagement. Yet, many would argue that today's technologies are very different. In 2000, most technologies in classrooms were limited to a computer, if a teacher was fortunate he/she may have four or five computers in their classrooms, a computer lab, a television, and a VCR or laser disc player. It could be hypothesized that these types of technologies did not have a large effect on student engagement because the teachers were the ones operating the technologies. The students were still often the passive receiver of knowledge outside of the occasional keystroke or mouse click.

Today's technologies are different and so are students' views of technology. The United States Department of Commerce (USDC), the United States Department of Education (USDE), and NetDay have published a report, *Visions 2020.2: Student views of transforming education and training through advanced technologies*. This report is an investigation into themes generated at a student event discussing students' views on the

future of education. In this report, 55,000 students responded and 8,000 of those responses were investigated further to assist with this report (USDC, USDE, NetDay, 2008). From this report, we know that students are using technology, accessing the Internet, and using these tools to do their homework (Corporation for Public Broadcasting, 2003). The students have definite opinions about the types of technology they want to see added to their classrooms. They indicated they needed small, multifunctional computers that don't require typing and are part of the physical desks in the classroom (USDC, et al). The students are concerned about equity, voicing that each person needs a computer, "like a laptop" with high speed, safe Internet access (USDC, et al, p. 13). Students want their schools to look like the world in which they live (Spires, et al.). It's taking time for schools to get to the minimum technology expectations, but the minimum expectations aren't good enough (Partnership for 21st Century Skills, 2008). In order to "prepare students to be competitive, the nation needs to have an 'NCLB plus' agenda that infuses 21st century skills into core academic skills," (Partnership for 21st Century Skills, 2008). Reaching students may require the release of the antiquated technologies of televisions and VCRs and grasping the potential of the Internet and digital technologies.

Among the digital technologies entering classrooms are video games. Video games have been a part of teen culture since the introduction of Atari and Pong. Computer games were introduced with very simple DOS commands and pillbox. Today games are a large part of teens' lives. Video games saw the largest growth in revenue (28.4%) during the 2006-07 year, outpacing the movie industry's less than two percent increase and music's estimated decline of ten percent

(http://arstechnica.com/news.ars/post/20080124-growth-of-gaming-in-2007-far-outpaces-movies-music.html). The Pew Internet Project reported that 97% of teens, ages 12-17, play computer, web, portable, or console games (Pew Internet & American Life Project, 2008). Video games are one of the attempts to engage students and imitate their reality in their classrooms.

While innovative technologies and digital games in the classroom are exciting to consider and even more exciting as they become a reality, these games can't be useful without teachers. Students are calling for transformed classrooms. Classrooms where isolated facts are no longer exchanged for a grade but are useful places in which students acquire tools they can use to be functional in the world (Barab, Dodge, & Ingram- Goble, 2008). These classrooms are often prohibited by those that make the decisions that create these classrooms, the teachers. The teachers must have the capacity to invite and support digital games into the classroom and support the students as they use them to learn desired content. Successful schools are those that are as inviting and supportive of the innovations as the teachers themselves (Martin-Kniep, 2008).

Lesson Study and Digital Game Based Learning

While all may not view technology as a favorable addition or classroom strategy, detecting signs of student learning and an effective classroom environment is a valuable skill for teachers. "Unless educators become fully aware of the factors that foster student achievement in diverse class settings and with different tools, their attempts to make such technologies available may prove futile," (Spence & Usher, 2007, p. 284). Technologies are most apt to be effective when teachers provide direction and structure, (Edwards, 1991; Behave, 1995; in Spence, et al). Instructional designers are concerned

with designing online or technology-based learning experiences and skillful teachers are equally concerned with designing the environment in the classroom so students can find both to be engaging and intellectually stimulating to promote student learning (Shaffer, Squire, Halverson, & Gee, 2005).

As teachers participate in lesson study, they become more aware of the elements that are important to the learning environment. Effective classroom environments have great similarities to effective DGBL environments. Learner centered environments focus on the pre-existing knowledge, skills, attitudes, and beliefs of the learner (Bransford, Brown, & Cocking, 2000) and the learners' need for competence (Newmann, Wehlage, & Lamborn, 1992). It is essential for teachers to understand that not all students begin at the same place of knowing. Effective video games provide training areas known as sandboxes and fish tanks (Gee, 2005) that allow students to learn any prerequisite skills they may be lacking before beginning formal game play that is filled with consequences. "In education, students that don't make the required amount of educational progress are considered rejects on the assembly line and are pulled out and sent through again," (Leland & Kasten, 2002). In games, a safety net is built in for remediation, re-teaching, or additional practice as needed throughout the environment, much like the real world in which we live. Recent efforts in differentiating instruction have resulted in teachers refocusing to the needs of each individual student within the context of the larger class (Newmann, 2007). In the game environment, "students are provided with the ability to customize their learning experience from the beginning and throughout the game," (Gee, 2003).

Effective classroom environments are also knowledge centered, focusing on an integrated understanding of all curricular areas, (Bransford, Brown, & Cocking, 2000). "Knowing where one is in a landscape requires a network of connections that link one's present location to the larger space," (Bransford, Brown, & Cocking, 2000, p. 139). To have success in the game, gamers need to know how their knowledge fits in the larger world. To be successful, a player needs a clear understanding of the goal of the game and how their present task fits into the framework of the game world. Good authentic instruction connects the content being learned and the outside world (Newmann, Wehlage, & Lamborn, 1992). While students may not able to see their physical position in relation to their future, they should be able to see the relevance of what is being taught and learned to the world outside. "Basic skills are not learned in isolation or out of context," (Gee, 2003, p. 137). Incorporating games into classrooms helps the world of school become more like the world students experience outside of the classroom. It's a world in which students can learn and create to prepare them for their future.

Learning environments that are well designed are centered on assessment (Bransford, Brown, & Cocking, 2000). An assessment centered environment "provides opportunities for feedback and revision and what is assessed must be congruent for one's learning goals," (Bransford, Brown, & Cocking, 2000, p. 140). An effective game also provides frequent and quality feedback (Gee, 2003). This feedback is in the form of failed tasks or the lack of acquisition of magical powers or coins. These assessments provide data for the student to perform self analysis and alter their actions and choices to increase their knowledge or skill to become more successful.

The fourth feature of effective learning environments is the sense of community (Bransford, Brown, & Cocking, 2000). The environment should have shared norms, values, and expectations for behavior and performance. This sense of community can be present within the formal classroom, the school, district, or the larger community itself. This same sense of community is witnessed in video games. There are expected behaviors and ways to behave within the culture of the game depending on the task (Gee, 2003). A person playing a game learns quickly how to move, how to achieve powers and acquire new skills to accomplish tasks and move to the next level. If they are unable to learn these things individually, conversations will occur and may include tutorial examples from other more successful players to aid in their success. The culture spreads quickly, teen to teen, without aid of the formal written word or meaningful intervention.

The learning environment plays an important role in effective student learning and engagement. These environments are difficult to create or sustain without effective leadership at the site and district level. The effective administrator works to extend the effective learning environments from the classrooms into the school. This is done through the creation of a shared vision of learning and community. Students' vision of learning and schools includes new technological innovations being introduced to their classrooms. Although the vision of learning may be altered as innovations appear, the leader is careful to protect the shared vision and sense of community as well as its members. The sustaining of a community or an educational innovation requires dedication of all involved and supports during the implementation process. Teachers can explore the impacts of DGBL on student engagement and learning using the structures

provided in lesson study. All are important in creating a learning experience for students that will prepare them for a technology -- filled life after high school.