Learning from the Educators: Creating a Global Curriculum in a Virtual Space

Dissertation

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By

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Abstract

Between April, 2007 and March, 2008 two teachers, one in northeastern Ohio, the other in Israel, began an uncertain collaboration in the construction of a virtual, technically-mediated interactional space for the conduct of a social studies curriculum for each of their two sixth grade classes. I was centrally involved in establishing the possibility for their collaboration, and then in documenting and analyzing an emergent path, whereby they came to 'tame' the technology, discover its possibilities and limits, trim their curriculum to those realities, and discover still others they had not anticipated.

This research project was initially conceptualized to establish a technicallymediated, visual platform where the teachers could routinely interact to develop teaching and learning strategies for use with their students. Instead of its original focus on curriculum, the inquiry became a descriptive case study of the work of these two teachers. A majority of the studies described in the educational technology literature report occasions that focus on the potential use of the tools as an extension of the classroom, rather than an exploration of how these connective, multimedia technologies encounter actual classrooms and curricula, in the hands of teachers.

Therefore, this project aims to study the practical worlds of two teachers who would be given sustained access to the technically-mediated tools, reliable technical support throughout the study, and the freedom to control their decisions about the pedagogies they were constructing. The findings suggest that teachers, given the opportunity to learn these tools, are receptive to the technologies and innovative in developing learning opportunities for their students within the virtual space, as they negotiate the technically-mediated environments within the practical exigencies of their local classrooms.

Dedication

L'chaim

To Life

Acknowledgements

The support of my beloved husband, adult children, extended family, and devoted friends throughout these years has been an unconditional gift that has sustained me every day of this endeavor. I am privileged to have had parents, grandparents, and a mother-inlaw, all of blessed memory, who each offered invaluable insight and guidance about living in the world and learning to address the challenges and joys we discover every day.

I am particularly indebted to Dr. Suzanne Damarin for her guidance and willingness to accept me as her graduate student. A deep debt of gratitude is owed to Dr. Douglas Macbeth for his resolute and generous efforts in guiding and critiquing me as I worked to complete the dissertation. Without their dedication to excellence and the guidance I have received from numerous individuals throughout my studies at The Ohio State University, I would not have been able to accomplish this very special effort.

I offer a heartfelt appreciation to the two teachers who were the essence of this project. It was their dedication, determination, and continuing efforts to employ the technology for the benefit of their students, as well as themselves, that captures the essence of what teachers do and teaching is about. In this project each participant stepped 'through the looking glass' to discover new friendships, professional communities, and their personal ability to achieve collaboratively much more than they had ever imagined.

Vita

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1988-2002	Executive Committee: Government Affairs Committee of Ohio Jewish Communities
1996-2003	Founding Chairman, Canton; Member of Regional Board for Project 2000 Partnership [Economic/cultural/ educational development partnership of UJC and Jewish Agency] Member of Curriculum Committee for State of Ohio: Standards: Science and Technology Board of Directors, BEST Practices in Education, State of Ohio
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	Member, Timken Regional Campus Project: Technology Development and Implementation Committee for New High School
2005-2007	Co-Chair International Task Force on Higher Education Partnership with Israel

Fields of Study

Major Field: Education

Table of Contents

Abstract	ii
Dedication	iv
Acknowledgements	v
Vita	vii
List of Figures	xiv
Chapter One: Introduction	1
The IBSP Curriculum and the Teachers	4
Teachers' Experience with IBSP Curriculum	7
Distance Learning in Educational Settings	
The Study	9
Recruiting the Teachers	
Designing the Inquiry	
Analytic methods	
The Organization of the Study	
Summary	
Chapter Organizations	
Chapter Two: Literature Review	

Videoconferencing and distance education	
The Problems with Technology in the Classroom	
Professional Development Insights for Technology Training	
Constructivism	35
Situated Learning Theory	
Communities of Practice	39
Communities of practice and education	41
Computer and Videoconferencing Programs	
The Adventures of Jasper Woodbury	44
SELA	45
Chickscope	45
Connecting Constructivist Theory with Educational Technologies	46
Chapter Three: Methodology	51
Introduction	51
Crafting a Methodological Approach	52
Study Design	57
Advances in Technology	57
Technical dimensions	58
Establishing Access	60
The teachers	61
Teacher A	62
Teacher B	63
The Researcher	64
The classrooms	66
Classroom A	66
	(0

Technical support	71
Establishing the platform	
Field Work	
The corpus	
Challenges for the study	
Timeline of study	
March, 2007: Working with Teacher B	
April, 2007: Working with Teacher A	
Working together	
April 25, 2007: First classroom videoconference	
May and summer, 2007	
Finding the flashpoints: Digging in	
Chapter Four: Taming the Technology	
Iceland as metaphor	
Learning from past failures	
What were we building?	
Introducing the teachers to the technology	
The international coffee house	
Learning more about the tools	
In the real world: April 25th	
Understanding the Landscape	
May 14, 2007	
Discovered uncertainties	
May 29, 2007	
Locating the Familiar	
Moving Forward	
Starting again: Problems and strategies	

Reflecting and looking ahead	
February 2008	
Chapter Five: Constructing the Bridge	
What is this research project really about?	
Working together	
Bridge building	
April -May 2007	
Preparing for the videoconference	
The first videoconference: April 25, 2007	
Traversing the bridge	
Preparing for the May 14, 2007 videoconference	
Fatigue and frustrations	
May 8, 2007	155
May 14 and 29, 2007 videoconferences	
The social organization of the room	
Sky's the limit	
June-July 2007: A proposed professional development seminar	
Building trust and working together	
November 2007-February 2008	
The December visit	
Chapter Six: Conclusion	
Traffic	185
Constructing the strategies	
Considering the data	
What was learned?	
Conclusion	

Bibliography	205
Appendix A: Description of Technology	215
Appendix B: Overview of Research Project	226
Appendix C: Transcript Conventions	

List of Figures

Figure 1: Timeline of study	77
Figure 2: Teachers using desktop format	
Figure 3: Teachers using classroom format	98
Figure 4: Click-to-Meet data	217
Figure 5: Click-to-Meet display	217

Chapter One: Introduction

Between April, 2007 and March, 2008, two teachers, one in northeastern Ohio, the other in Israel, began an uncertain collaboration in the construction of a virtual, technically-mediated interactional space for the conduct of a social studies curriculum for each of their two sixth grade classes. I was centrally involved in establishing the possibility for their collaboration, and then in documenting and analyzing an emergent path, whereby they came to 'tame' the technology, discover its possibilities and limits, trim their curriculum to those realities, and discover still others they had not anticipated.

When this study was initially conceptualized, I envisioned the establishment of a technically-mediated, visual platform where the teachers, who were physically situated in two geographically distant communities (northeastern Ohio and the western Galilee region of Israel), could routinely interact, face-to-face, to develop teaching and learning strategies for use with their students. Burbules and Callister (2000) have described such technically-mediated environments as *places in space* where individuals and groups, located in diverse geographical and cultural communities, can work collaboratively.

My intention in crafting this research program was to develop a naturalistic study of the teachers' active engagement and use of a highly sophisticated, technicallymediated virtual space as a tool to support their pedagogical and curricular purposes. Because this study focused on teachers and not students, the teachers were charged with three tasks: Become familiar with the requisite videoconferencing and multimedia programs, use this knowledge to access the virtual, visual platform to routinely discuss their individual teaching activities within their local classrooms, and collaboratively develop future plans with their students for online activities that addressed an existing social studies curriculum the International Book Sharing Program (To be referenced as IBSP <u>http://www.korczakschool.org</u>) they had been cooperatively teaching during the previous four years.

Background for Developing Case Study

Prior to the initiation of the research study, I taught an introductory course in computer science to undergraduate students at Mount Union College. The course has been designed to provide students with an immersive, hands-on experience in using a variety of technology tools. It encourages learners to think beyond the immediate, obvious uses of the technological tools they are using to consider how these affordances could be adopted for practical applications in their everyday lives.

Additional opportunities to work with videoconferencing and supportive multimedia applications have included the development of a four session, online seminar entitled: *Confronting the Roots of Terrorism: Understanding the Other* conducted by members of the academic communities in Israel located at the Western Galilee College and in northeastern Ohio from Walsh University and Malone University. I was instrumental in organizing and facilitating a multi-point videoconference for hospital administrators that demonstrated how the integration of videoconferencing and multimedia technologies could be used as a collaborative tool to expand educational and administrative programs. I also became directly responsible for supporting the use of videoconferencing technologies to connect several IBSP teachers and middle and high school students in Israel and northeastern Ohio for introductory and summative sessions twice a year. All of these experiences were influential in the conceptualization of this case study.

The conceptualization of the study was also the direct result of my work from 1996 until 2003 as the local chair of an international program, Partnership with Israel. This initiative was established by an international agency to connect individuals in Israel, North America and Europe with their professional counterparts in medicine, education, business, social services, and the arts.

One of the educational projects supported by the Partnership with Israel program was an internationally acclaimed social studies/language arts curriculum for middle and high school students known as the Ghetto Fighters' House's International Book Sharing Program (http://www.korczakschool.org). The Ghetto Fighters' Museum (http://gfh.org.il), originators of the IBSP, is located in Akko, Israel. The Ghetto Fighters' House- Itzhak Katzenelson Holocaust and Jewish Resistance Heritage Museum was founded in 1949 by a community of Holocaust survivors, members of the Jewish underground in the ghettos of Poland, and veterans of partisan units to be a place of testimony that would tell the story of the Jewish People in the 20th century in general, and during the Second World War in particular. Locating the research study in an Israeli kibbutz school and a northeastern Ohio school district was a direct result of my work as an educator and my involvement with Partnership with Israel that had previously funded a portion of the Ghetto Fighters' House Museum's educational programs.

The IBSP Curriculum and the Teachers

The IBSP curriculum seeks to provide a context for dialogue and introspection for students as they read a series of books [*Night* (Wiesel, 1972/2006), *The Sunflower: On the Possibilities and Limits of Forgiveness* (Weisenthal, 1997), *Run Boy Run*, (Orlev, 2003/2007), and *The Island on Bird Street*, (Orlev, 1984)] about the experiences of individuals who lived during the Holocaust and survived. The curriculum explores a variety of topics including the effects of racism, violence to others, the implications of the abuse of power, and advocates for the recognition for respect of alternative points-of-view and the development of strategies for living in a civil society. Elie Weisel has characterized the IBSP curriculum as:

The International Book Sharing Project is one of the most innovative exchange programs that I know. Reaching across cultural, religious and international borders, it allows young peers to ponder tolerance and love for another as near as one's own family, friends and community and as distant as strangers halfway across the world. As this exemplary project continues to grow, so too will the sense of hope among our young people living in a dangerous world. It is through such projects that we commemorate victims of injustice and show our commitment to prevent further tragedies. (2002; personal communication to Ghetto Fighters' House Museum)

The IBSP is designed to support access by the students and teachers to reliable, archival data through the Internet and provides additional web access for students and teachers to interact on a secure website that is constantly monitored by professional educators in Israel and the United States who are employed by the Ghetto Fighters' Museum. Teachers who participate in the program are given a rigorous training course, access to substantial curricular resources, and are supported by a full-time liaison that is available to them online, by telephone free-of-charge, and makes one in-class, extended visit to their classrooms during the school calendar year.

The IBSP program addresses educational issues concerned with establishing informed opportunities for dialogue and understanding of diverse perspectives within an established social studies curriculum. The program promotes open dialogue between diverse communities to address a variety of topics such as racism, marginalization of minority communities and the consequences of bullying. The curriculum is designed to encourage dialogue and understanding between students, the development of cooperative projects between classrooms, and to increase awareness for social justice. An additional benefit to teachers is the opportunity for sustained engagement and interaction with professional peers located in previously inaccessible communities.

The IBSP was introduced to teachers in Stark County, Ohio in 1999 and the two teachers involved in the doctoral study, teachers A in Israel and B in Ohio, became involved with the IBSP approximately three years after it was initially established. These two middle school teachers, who had collaboratively taught the International Book Sharing Program from the Ghetto Fighters' Museum in Israel from 2002 until 2006,

volunteered to be participants in my study, and personally facilitated the approval of their school administrators to participate in the research program in accordance with the IRB guidelines. Although I had met both teachers prior to their agreement to participate in this study, I was not well acquainted with either of them beyond the boundaries of limited social encounters that occurred when the Israeli teacher visited her American partner.

In Israeli schools the teachers often 'travel' with their students from grade-tograde for several years. English, as a foreign language, is introduced to students in fourth grade in Israel. Although the Israeli teacher (Teacher A) had taught the IBSP program to sixth graders from her own class several years ago, during the time period of the research project she was teaching fourth graders in the kibbutz elementary school. These students were not proficient in their English language skills and were too young to absorb the content of the IBSP curriculum. Therefore Teacher A decided to work collaboratively with a fellow sixth grade teacher at her school where she could continue her involvement with the IBSP curriculum.

Prior to the 2007 school year Teacher B had been teaching students in a selfcontained sixth grade classroom in a northeastern Ohio elementary school. The school district's building realignment has now placed Teacher B in a middle school where instead of teaching social studies and language arts, she is teaching sixth grade math and science. In order for Teacher B to continue to participate in the IBSP curriculum, she had to team teach with the assigned social studies/ language arts teacher who was not familiar with the IBSP curriculum. Both the Ohio and Israeli teachers had to overcome numerous administrative obstacles in order to continue working together. In spite of these impediments to their continued involvement, Teacher A's and Teachers B's commitment the IBSP curriculum and their desire to provide a contextual space for immediate, visual interaction and dialogue between their students resulted in their decision to work with each other and their colleagues beyond the context of their assigned classes and daily work schedules.

The Israeli teacher (Teacher A) has traveled to the USA twice under the auspices of the IBSP, has been a guest in the home of the American teacher (Teacher B), and has interacted with students and faculty extensively during her visits. In the summer of 2005, preceding this research project, the American teacher visited her Israeli colleague, stayed in her home, and taught in her partner's Israeli classroom over the course of several days.

Teachers' Experience with IBSP Curriculum

Because the two teachers had been previously involved in the IBSP curriculum, they were familiar with its use of selected books to initiate the dialogue between the students and the extensive repository of archival materials that are available to all participants on the museum's website (http://www.gfh.org.il/). The IBSP curriculum as it is currently designed employs the use of a password protected web board to connect teachers and students in classrooms from diverse cultural and religious locations around the world with their Israeli counterparts. In this primarily text based environment students are able to discuss what they have read and are encouraged to consider alternative perspectives about these topics. The teachers use this message board to post guiding questions for the students to encourage them to express their reactions and frequently post additional remarks about their comments. In some circumstances a small number of teachers and students had connected via videoconferencing for an introductory or summative event as a part of the current curriculum. However, until the development of this research project, sustainable, visual connections between teachers and students had not been a focus of the IBSP curriculum.

Distance Learning in Educational Settings

In his discussion of the growth and deployment of distance learning in educational settings, Natriello (2005) has noted Levine and Son's (2003) observation that a consensus about distinctive online pedagogy has yet to emerge. Natriello makes the observation that much of the instructional pedagogies employed in educational settings today follow traditional teaching methodologies and are constrained by the institutions' self-imposed resistance to change. However, in spite of these conditions, he suggests the possibility for revolutionary change exists and can be driven by transforming roles for teachers and faculty, increased opportunities for funding resources and the increasing global interest in access to education.

Luppinci (2007:152) has stated, "Research literature on different aspects of online instruction is rapidly expanding, but most of it consists of anecdotal reports, theoretical articles, and non-empirical research." His extensive review of the literature addressing the use of virtual spaces and technically-mediated instruction for educational applications is primarily directed to the delivery of text based information in distance learning environments. In contrast, this ethnographic, descriptive case study examines the pragmatic use of a virtual, visual space as a means of understanding the work that organizes it.

Furthermore, while numerous web-based curricula and instructional programs are available to educators, much of the development work for these programs has been accomplished by professional curriculum designers and computer professionals, not by the teachers directly engaged with the students. Duderstadt (2001) and Newman and Scurry (2001) have noted in the future, faculty may have opportunities to serve as designers and organizers of learning environments in addition to their traditional roles. Those opportunities were central to the design of this study. In this case study it was the teachers who were directly involved in the development of the pedagogical and curricular decisions and determined how the technology would be used.

The Study

The literature has identified the need for practical exemplars of how innovative, connective videoconferencing and multimedia technologies could be implemented differently by educators. This study placed sophisticated videoconferencing resources in the hands of two teachers and assigned them the task of bringing the tools to a measure of control. Their initial goal was to use the desktop videoconferencing equipment Click to Meet (To be referenced as CTMX platform) to work collaboratively in planning their curricular and pedagogical activities for the IBSP curriculum. The study was intentionally designed to provide the educators with the professional freedom to use this technically-mediated, connective space to develop pragmatic methodologies that were crafted from the teachers' situated, practical experience obtained in working in the real and virtual life worlds they inhabited.

It is a case study in the use of virtual space technology by teachers in actual classrooms. Instead of its original focus on curriculum, the inquiry became a study of the organizational work of these two teachers in taming the technology, building a dialogic bridge for action, and examining the artifacts, the traffic, that were produced as a result of these interactions.

My task, as the researcher, was to organize the study by securing the required equipment, physically establishing the technically-mediated space in both locations, securing the technical support personnel for the teachers, and facilitating the training of the teachers prior to the initiation of the study. Once this was accomplished, my role transformed to observing the teachers' interactions within the context of the technicallymediated space and their actual classrooms, and describing what the teachers were reporting about their work within this virtual classroom space and how they chose to interpret its benefits or restrictions to their teaching and learning goals.

As a result of my previous association with the educational communities in both locations, several individuals indicated their willingness to provide technical support at no cost for the dissertation project. These technical and administrative contacts were particularly beneficial when it became necessary to secure technical support for the teachers in both locations.

Through the use of the digital recording equipment (CTMX platform, video cameras, and audio recorders) that were available in this project, it was possible to record most of the teachers' interactions whether in person or online. Other data that were collected included my personal observations and notes, a log of the daily activities and videoconferencing sessions that occurred with the teachers, the teachers' journals regarding their understandings and reactions about their daily interactions with the technology and each other, and the teachers' reflections about their encounters with the technologies and each other.

Some of the artifacts developed during course of the study represent tangible evidence of the teachers' and students' collaborative efforts. Many of the less tangible examples that became evident over the course of the study encompass organizational tasks for future consideration by teachers who may choose to work in a technicallymediated, visual environment. These include the social organization of the classroom, identified strategies for integrating the technical tools with the curriculum to support collaborative work, templates for collaborative, online professional development seminars using the virtual, visual space, and the formation of a sustained, collaborative professional community of practice.

Recruiting the Teachers

I approached both teachers about the possibility of participating in this study during a visit by the Israeli teacher to her American partner's classroom in 2005. As a result of their initial participation in the IBSP curriculum over the previous four years, the two educators indicated an interest in expanding opportunities for interaction with their professional partners. They were motivated by several factors: The observed benefits to their students during the book-sharing program (IBSP), the opportunity to enhance their knowledge regarding the incorporation of technology in the classroom, their interest in the redesign of a social studies curriculum to accommodate enhanced understanding and interactions between diverse populations, and the experience to participate in a virtual classroom where it would be possible to routinely teach collaboratively with their professional partners.

An additional benefit they envisioned as a result of their participation was the establishment of a face-to-face forum where their students could routinely interact with students across cultural boundaries to discuss the materials they were reading as part of the IBSP curriculum. Because an operative virtual, visual space where the project could *live* was not immediately available to the teachers, it became my responsibility to facilitate its actual construction.

Designing the Inquiry

Assembling the resources for the study became a significant task to accomplish. It encompassed several critical components: Defining and acquiring the requisite hardware and software components to build the platform, securing reliable and knowledgeable technical personnel who would commit to supporting the teachers throughout the case study, and providing the teachers with individual, supportive training in the use of the required media applications prior to the research program's initiation.

I began the process by choosing to use an available software application, Click-to-Meet (CTMX) that had the capability of integrating collaborative multimedia applications with videoconferencing and was available to me at no cost. With the assistance of technical personnel in both locations, I was able to make an assessment of the capability of the available hardware (computers) and broadband capacities and determine whether additional hardware peripherals (such as digital projectors, large display screens, inexpensive desktop cameras and microphones) were currently available to the teachers or would be have to be supplied by the researcher.

Once the technical issues of hardware, software applications, broadband, and peripherals had been resolved, my attention focused on identifying and securing technical personnel in both locations who would agree to support the educators in their efforts to operate the various forms of media. The role of the technical support teams also involved troubleshooting the equipment and supporting the teachers until they were comfortably able to independently administer the technologies that constituted their virtual environments. This process was accomplished through the assistance of the administrators and technical supervisors with whom I had previously worked.

Borko (November, 2004) and Riverin and Stacey (2008) have identified the need for educators to have reliable, local technical support and adequate, sustained training as critical factors in recruiting and retaining teachers who will agree to work with new technologies. I assured the teachers every effort would be made to provide local personnel who would be available to them for technical support.

Establishing a functional, operative space where the teachers could connect and interact was an essential, foundational component of the study. After the *floor* (the technically-mediated, visual space) had been installed on the teachers' computers, I began working with each teacher in their local environments to train them in the use of the hardware and software components they would be using throughout the research project. During this time, the technical support staff also had opportunities to work with the equipment, the teachers, and the researcher.

During these initial exchanges, each teacher began to develop her own understandings about the limitations and possibilities these multimedia tools and the technically-mediated space presented. Once they had become comfortable in establishing their own connections with each other and could independently access the CTMX platform at school or in their homes, the teachers routinely interacted with each other on a daily basis. In the course of these early dialogues and working sessions, the teachers began to critically explore how they would consider using the CTMX platform and multimedia applications as practical pedagogic tools in their classrooms. Eventually, the ideas and curricular tasks they developed were evidenced in a series of specific and concrete artifacts, the *traffic*, which will be described in greater detail in Chapter Six.

Analytic methods

My decision to develop this research project as an ethnographic, descriptive case study was influenced by the paucity of studies in the educational technology literature that described the integration of connective technologies with pedagogy to achieve teaching and learning activities that supported collaboration and interaction in active classrooms. In a review of the literature, I discovered a majority of the studies reported occasions where the participants focused on the use of the tools as an extension of their current pedagogical practices rather than an exploration of the integration of these connective, multimedia technologies to support alternative or enhanced teaching and learning opportunities. It was also apparent that most of the studies had not been designed by the educators who were charged with deploying the technology. Therefore, my intention was to develop a naturalistic study, situated in both virtual and real environments, to study the practical worlds of two teachers who would be given sustained, hands-on opportunities to learn to use the technically-mediated tools, provided with access to reliable technical support throughout the study, and the opportunity to control their decisions about the pedagogies they were constructing in using the CTMX platform.

To describe and report the work of these teachers in the course of their encounters with the technology and their interpretations of the puzzles and challenges of its use, I determined a qualitative, ethnographic method would be recommended because it provided a contextual framework that was situated in the practical world of the teachers. In this environment the participants' interactions and their reflective interpretations of what they were doing could be interrogated to discover what they understood about the technologies, their decisions regarding its integration into their pedagogical and curriculum work, and how they made sense of their experiences working with the technologies, each other, the technicians, their students, and me over the course of this fifteen month project.

In an attempt to honor the participants' interpretation of their practices I drew upon the ethnographic methodologies of "thick description" introduced by Geertz (1973). My aim was to interrogate and represent how two teachers experienced their work in this virtual/visual classroom space as they began to understand the possibilities and limitations of its use and worked collaboratively to devise pedagogical and curricular strategies for its implementation. Because it would be technically possible to digitally capture a significant portion of the interactions between the two teachers, the use of video

described by Erickson and Shultz (as cited in Mehan, 1982) became central to the data corpus.

Blumer's (1969/1998) discussion of the core tenets of symbolic interactionism were also instructive in devising a strategy for taking interest in what was occurring and how the teachers made sense of these interactions and events.

People are prepared to act on the basis of the meanings of the objects that comprise their worlds; a process is created where people make indications to one another and interpret these actions; social acts, whether individual or collective, are constructed through a process in which the actors note, interpret, and assess the situations confronting them; and these complex inter-linkages of acts comprise dynamic networks or communities. (p. 50)

Drawing upon these methodological resources, I developed a series of questions to initiate the inquiry: When two educators have an opportunity to work collaboratively in a virtual space how do they act on the basis of the meanings of the objects that comprise their actual world? How do they indicate their needs and interpret each other's actions? What are the processes they engage in to note, interpret, and assess the situations confronting them? Do they establish a community and a network of collaboration and interdependency? What is produced? Finally, how do these teachers make sense of their interactions and collaborative efforts within both the virtual and local classroom settings?

The Organization of the Study

As the study evolved, four topics emerged that served to organize the inquiry and follow the teachers' work:

- Technology- the Floor: What factors would be essential for establishing and encouraging adoption by teachers of a multi faceted, collaborative videoconferencing program in their classrooms? A subset of this category focused on the technical aspects of the project: What hardware, software and broadband requirements would be necessary to establish this virtual/visual platform? If the participating schools had the required hardware components necessary to establish a sustained, virtual connection, who would be responsible for providing reliable and sustained technical support to the teachers?
- Taming the Technology: Would teachers actually be able to interact and work collaboratively in a visual/virtual space? In their discovery of the possibilities and limitations of the technologies, what technical and conceptual adjustments to their project would they make in order for them to proceed in their use of a virtual/ visual classroom space?
- <u>Building the Bridge:</u> How would the teachers work across, and within, the local and cyber communities they were accessing? How would they incorporate the various multimedia tools available to them in the virtual classroom space into the current IBSP social studies curriculum they were teaching? What would they do, how would they negotiate the space pedagogically and individually?
- The Traffic: What artifacts, pedagogical approaches, and curricular strategies would be produced? Would a cyber classroom provide opportunities for the teachers to develop pedagogical approaches that had not previously been available to them? From the teachers' perspective, would the use of a virtual/visual

classroom benefit learning for their students, or not? What examples of their work could the teachers identify to substantiate their claim?

An overview of the fifteen months of the study is provided in detail in chapter three. However, there are distinct mileposts that were developed within each of the categories presented above that serve to organize the study and identify specific periods of interest that will be taken up in subsequent chapters. These mileposts are identified as discrete time periods: [1] Preliminary planning: mid-March-early April, [2] April-May, 2007, [3] June-July, 2007, [4] October-December, 2007, and [5] January-June, 2008.

Summary

The bundling of videoconferencing technology and multimedia applications to produce this virtual/visual space provided the researcher with a unique ethnographic framework for developing a social study of the practical use of technology by two sixth grade classroom teachers located in diverse, international communities.

As the study progressed, the two educators routinely accessed this virtual/ visual space to discuss how they would integrate the topics presented in the International Book Sharing Project curriculum with their use of this connective media. Cognizant of the diverse nature of their students' cultural positions and worldviews, they were able to interact face-to-face to discuss their pedagogical strategies for conducting the actual sessions or helping the students understand how to speak and listen when they were online.

The teachers also used the advantages this connective platform provided to simultaneously access information from multiple sources and collaboratively construct

documents and pedagogical strategies. Blumer's (1969/1998: 50) discussion of the foundational concepts of symbolic interactionism references these processes of noting, interpreting and assessing the acts between individuals and groups as a critical component in the development of networks of interdependency and the formation of communities.

Chapter Organizations

In the forthcoming chapters I will attempt to describe and offer an analysis of how two teachers began their uncertain collaboration in the construction of a virtual, technically-mediated interactional space for the conduct of a social studies curriculum in the practical worlds of their classrooms.

Chapter two introduces the reader to the history of the development of videoconferencing technology and examines the stages of adoption for new technologies in the context of teacher and classroom use. The question, What can we do now that was not possible before?, explores the controversy regarding the exploitation of educational systems and teachers by corporations to purchase expensive equipment without considering how the teachers will learn to implement the technologies, craft pedagogies to integrate the tools into the curriculum, or provide adequate maintenance and support of the equipment. An attempt has been made to offer a pragmatic response to this critique by presenting a series of thoughtful strategies and techniques that have been identified in the literature that explore the stages of adoption required of teachers and educational technologists to integrate the tools into the curriculum.

I present an array of programs that have either been developed by professional designers, educational technologists, or members of university faculty for use in academic settings K-16. The teachers engaged in this study, however, were encouraged to develop their own pedagogical and curriculum strategies for working in a technically-mediated, visual space without the imposition, or intrusion, of any additional authority.

Chapter three introduces the literature that was influential in the conceptualization of the study and the methods used to organize the inquiry and guide the analysis. A discussion of the data collected and how it was obtained and managed is presented along with a detailed description of the construction of the technically-mediated space built by these teachers. There is also an introduction to the teachers and their local professional communities, and a descriptive overview of the research project as it was enacted.

Chapter four will focus on how the teachers tamed the CTMX technologies to a measure of practical and reliable use in their respective classrooms. Although it was often a frustrating journey for the teachers as they began to recognize the technical limitations and constraints of the CTMX platform, this chapter offers the reader a description and analysis of how they responded to these challenges and were able to incorporate these discoveries into the organizational decisions required to accomplish their pedagogical and curricular goals.

Chapter five provides an analysis of the strategies and processes the teachers devised as they continued to work within the CTMX platform to build a bridge of communication, negotiation and collaboration. When the teachers began the study, their limited experience of the CTMX technologies significantly influenced their initial

pedagogical and curricular choices regarding the use of the virtual, visual space. As the study progressed, their use of this platform to interact and craft pedagogical and curricular strategies changed significantly. Several important milestone events, occurring over the course of this fifteen month study, will be presented to describe the progression of the practical organization of the teachers' work and the pedagogical decisions they made to integrate the virtual, visual space with their routine pedagogical practices.

Chapter six considers and describes the technical and pedagogical *traffic* that was designed and constructed by the teachers. Later, as the teachers implemented this pedagogical *traffic* with their students they worked with me to reflect and assess what they had built.

In conclusion, this ethnographic case study aims to provide pragmatic examples of the use of a technically-mediated, visual platform by two teachers as part of their routine, practical classroom work. What the teachers came to understand, construct, and were able to achieve in their attempt to negotiate technically-mediated environments for classroom interaction offers correctives and clarifications to a literature that seldom measures its promises-or achievements-to the practical exigencies of actual classroom teaching.
Chapter Two: Literature Review

Is education experiencing a revolution in its use of technology? Have teachers' routine pedagogical practices been transformed through the introduction of technological tools? Almost two decades ago Strommen and Lincoln (1992) suggested American culture was being transformed by innovative technologies that were penetrating every area of society and aspect of our cultural lives. Today, the same tropes are used to announce new tools, new bells and whistles that promise to transform the way teachers teach and learners learn. This begs the question, if technology offers the potential for transformation, how will these changes be accomplished in the everyday practices of classroom teachers? Specifically, what is required to physically introduce the technologies to classroom teachers, what programs would benefit teachers in adopting the technologies and learning to utilize the accompanying applications, and how do teachers and educational technologists organize the integration of technical tools with pedagogy, curriculum, and the social organization of the room?

This Literature Review begins with the development of videoconferencing and its application within the context of distance education. As a means to examine how new technologies promise to move beyond tool use to full integration of the technology with pedagogy and curriculum, the stages of adoption for innovative technologies are discussed and interrogated to discover how these processes could impact classroom structure and organization, pedagogy, and the formation of community. Technologybased programs, developed by professional designers, educational technologists, or members of university faculty for use in academic settings K-16 and more recent enterprises available on the Internet are presented as examples of the use of the Internet and videoconferencing for classroom instruction in K-16 settings and pre-service and practicing teachers' professional development.

Videoconferencing and distance education

On December 9, 1968 Douglas C. Engelbart and a group of seventeen coresearchers in the Augmentation Research Center at Stanford Research Institute in Menlo Park, California conducted a ninety-minute live public demonstration of the online system, NLS, they had been working on since 1962. During this session the team confirmed the technical feasibility of two individuals located at different sites—Menlo Park and San Francisco—working collaboratively over a shared-screen network with audio and video interface. Additional innovations showcased during this successful endeavor included the computer mouse, integration of hypertext, object addressing, and dynamic file linking. (http://sloan.stanford.edu/MouseSite/1968Demo.html)

For distance educators who had previously been limited to the use of synchronous or asynchronous technologies such as television, videotapes, web boards, and email in their classes, videoconferencing offered obvious pedagogical advantages. Because videoconferencing allows individuals at two or more locations to see and hear each other simultaneously, it accomplishes what earlier distance education programs could not; the opportunity for individuals to engage in real time, face-to-face dialogue with remotely located partners.

Over the past decade incremental changes in bandwidth on the commercial Internet and the World Wide Web have occurred that have significantly reduced the costs of distance education production, expanded access to education for learners, and fostered the integration of formal education into the fabric of everyday life (Harris and Krousgrill, 2008). In their discussion of the integration of asynchronous and synchronous technologies (email, asynchronous threaded discussion boards, live chat boards, telephone, and audio/video conferencing), these authors use the term, *blended environments*, to capture the synthesizing nature of these technologies to establish a virtual space for engaged interaction.

Williams and Baraniuk (2008) have noted the progression of distance education over the past thirty years and acknowledge although "much of the promise of communications technology lies in the ability to bring together remote partners effectively and seamlessly," the medium also provides value to the typical, non-remote student both in and out of the classroom. Today, forty-one years after Engelbart and his team's rudimentary demonstration, videoconferencing has the capacity to provide individuals in multiple locations with a virtual workspace (desktop or classroom) where documents can be constructed, exchanged, and displayed, video is streamed, Internet access is available, and a variety of multimedia functions can be performed.

As early as 1996, Wright and Cordeaux (1996) reported the benefits they had observed of desktop videoconferencing in establishing shared work spaces and opportunities for students to discuss topics in an interactive forum. Harris and Krousgrill's (2008) discussion of the popularity of desktop videoconferencing as it is increasingly being accessed through iChat, Net Meeting, and Skype can serve as an example of how innovative technologies undergo a series of stages to become adopted by technologists and mainstream users. John Naisbitt (1982) identified three stages innovative technologies must negotiate for adoption: "(1) new technologies follow "the line of least resistance" into a new market; (2) users improve or replace existing technologies with the new technology; and (3) users discover new functions for the technology, based on its potentials." Peck and Dorricott (1994) have posited we are just entering this third stage and suggest the question educators and technologists should ask is, "What can we do now that was not possible before?"

Although Hooper and Rieber (1995) offer a similar description of the stages of technology adoption, they make an important distinction between technology in education and educational technology. These authors argue that "*educational technology* involves applying ideas from various sources to create the best learning environments for students" by asking "how a classroom might change or adapt when a computer is integrated into the curriculum. This integration means that the curriculum and setting may also need to change to meet the opportunities that the technology may offer." The authors suggest the organization of the classroom may have to change in order to make it more learner-centered and students and teachers must move beyond thinking of the technology primarily as a tool to "create a partnership, or "community," that nurtures,

encourages, and supports the learning process (Vanderbilt Cognition and Technology Group, 1992).

The distinction is in the manner in which educators choose to use the tools to enhance pedagogy and curriculum. As Papert (1987) and Earle (2002) have observed, in practice computers are frequently employed to maintain the status quo in classroom pedagogy. Tam (2000) suggests, in her discussion of the challenges technology now affords educators in creating constructivist learning opportunities, the introduction of computers into classrooms could provide a shift from "knowledge-as-possession to knowledge-as-construction".

Tierney and Damarin (1998) have described the occurrence of similar transformations they observed during a five year study of students and teachers who were engaged in an extensive technology project in a Columbus, Ohio high school. Students worked in groups organized by topics to access information from books, text, the Internet, and multimedia resources and routinely interact with their team members to evaluate the information they had gathered. The students' task was to collaboratively construct a representation of what they had learned using the multimedia tools available to them. The researchers described discernible changes in the teachers' roles and positions of power within the classroom, the students' engagement with the technologies, and the social organization of the students' work which, through their interactions with each other, resulted in the formation of collaborative communities.

26

The Problems with Technology in the Classroom

In Todd Oppenheimer's *Atlantic Monthly* article, The Computer Delusion (1997) considerable attention is paid to the failure of technology and schools to improve education. It has been noted "that at a cost of more than seventy billion dollars (Microsoft Research, 2004) students and schools have become victims of the false promise of the miracle of computers and the Internet to enhance knowledge construction and foster improved critical thinking. Oppenheimer suggested that when computers are used inappropriately for uninteresting, routine tasks the opportunities for students to develop higher order skills to reason, imagine, and learn to think critically are diminished. He argues the money would be better spent to support art, music, and vocational programs (Nelson, 2004). In this article and a later book, *The Flickering Mind: The False Promise* of Technology in the Classroom and How Learning Can Be Saved (2003), Oppenheimer provides numerous examples of high expectations and disappointing results when computers are placed in classrooms without providing faculty with supportive programs for curriculum and professional development. The author places much of the blame for these failures on the shoulders of large technology companies whom he portrays as "selfinterested manipulators" who have sought to influence "naïve" administrators and "gullible" teachers to purchase their equipment. This is consistent with Wenglinsky's (Dec. 2005-Jan. 2006) citation of Larry Cuban's (1986) observation that "history was rife with examples of schools requiring teachers to use some new, unproven technology in the classroom; computers were just the latest example."

Ely (1990) has identified eight conditions required for the adoption of technology by teachers. These include:[1] Dissatisfaction with the status quo, [2] knowledge and sufficient skill level to use equipment, [3] access to required resources-hardware and software, [4] time to engage with technology and plan for its implementation, [5] rewards-either intrinsic or extrinsic, [6] the opportunity for classroom teachers to become engaged as empowered participants, [7] commitment to the program by administration and peers, and [8] the desire by the individual or group to accept a position of leadership.

Several of these factors are consistent with the conditions Wenglinsky (Dec. 2005-Jan. 2006), Earle (2002), Richardson (2008), Starr (2000), and Borko (2004) have identified that stymie the ability of teachers to adopt technologies effectively. Their findings suggest limited access to appropriate hardware and software, lack of time to learn the technologies and practice their use, lack of administrative support, insufficient pedagogical planning, poor professional development for pre-service and practicing teachers, and the paucity of knowledgeable technical support that is available to teachers in their local school settings inhibit adoption of innovative technologies by teachers.

Consistent with these findings are Earle's observations (2002) that the focus on access to hardware has often been accomplished at the expense of pedagogical process and professional development. Convery (2009) has noted the additional imposition of new forms of technology on teachers by policy makers who are often seduced by the hyperbole of new tools without access to credible knowledge about what is required to successfully integrate them into the classroom. He states that when teachers do attempt to implement these tools pragmatically into the curriculum they risk the fear of being blamed for any failures that might result. Kearsley (1998:49 as cited in Earle, 2002) has identified the lack of technology preparation for teachers as too little, too late and argues for "extensive and sustained practice over years, not one-day workshops." Kearsley (1998:47) further describes technology as the "great siren song of education" and categorizes it as "a distraction (on a grand scale) from what matters most-effective learning and good teaching."

The early adopters and inventors of computer related technologies envisioned a future where tools would be used to accomplish computational and collaborative, connective functions that previously had not been possible. This was the focus of Vannevar Bush's (1945) article, As We May Think. Douglas Engelbart followed in this tradition when he demonstrated the integration of multiple technologies within the virtual space of videoconferencing. This tradition of blending tool with purpose or process to situate the learning and provide relevance to a task was extended by Seymour Papert (1980) in his discussion of microworlds and the practical, yet imaginative use of computer technologies for educational purposes. Papert demonstrated how Logo, a computer language designed for use by teachers and students, could be integrated into the curriculum to develop simple programming tasks for use in the classroom. These activities provided students with the opportunity to identify tasks they wanted to achieve and develop strategies for solving the problems they encountered. Howard Rheingold's (1991) discussion of virtual and augmented realities and Brenda Laurel's (1993) use of technological environments to integrate art, drama and text in real and virtual spaces also

have addressed the benefit of using these technologies to extend the learner's world and represent understandings of information in ways that had not been previously possible.

Wager (1992) has observed "technology is not simply computers...but rather a broader vision of the content and process of learning. The technology of instructional design extends the technology of the machines." At the present time, what has not been broadly achieved in the schools is the ability of teachers to bring these often unfamiliar and esoteric technologies into the realm of practical use in the conduct of their routine pedagogical work. Hooper and Reiber (1995) have suggested in order for this situation to change, two things should occur: Classrooms must change to become "learner-centered" and students and teachers must enter into a partnership with technology to create a "community" that nurtures, encourages, and supports the learning process (Cognition and Technology Group at Vanderbilt, 1992).

In response to the negative critiques regarding the implementation of computers and the systemic use of technology in the classroom, Pea, Gomez, and Edelson (1995), insisted education was far too critical a function in our increasingly global society to continue to delay the implementation of computers within the educational system. Fullan (2000) has acknowledged the increasingly ubiquitous nature of technology in today's classrooms stating, "...the issue is not whether, but *how* we contend with it." As Pea et al (1995) noted in their discussion of the delay in bringing current technology resources and implementation schemas into the schools, one of the most important pedagogical achievements is to fit the tool to the task. Viadero (1997:16, as cited in Earle, 2002) has observed that "like any other tool, teachers have to come up with a strategy or pedagogy to make it work." Viadero's statement captures the essential conundrum between the *tool* and the *process* that teachers, educational technologists, and professional designers of curriculum must address. Earle (2002) has made the observation that the tension in this dialectic has generally resulted in "a case of fitting the curriculum to the computer rather than the computer to the curriculum. Earle (2002) cites Postman's (1992:20) warning that new technologies "alter the things we think about..., the things we think with..., and the arena in which thoughts develop" as a challenge to educators working with technology to consider, "Who's in charge? Who is the driving force?"

Earle makes the argument the answer should be the teachers who use the technology well; it can not be the technology in and of itself. Teachers should be given opportunities to actively participate in the design of pedagogy and curricula programs that provide strategies and knowledge to learners about the acquisition, construction, and integration of information in this technically-mediated context. As Callister and Dunne (1992) have noted, technology enthusiasts often forget machines are tools and become valuable only when a human being organizes their use productively. In response to this discussion, Wager (1992) makes the point that student motivation, prior knowledge, learning strategies, and attitudes about learning in general should be essential factors to consider in the design of a computer program or pedagogical effort incorporating technology.

Professional Development Insights for Technology Training

As the research has indicated, in order for technology to be used as an effective tool by educators in accomplishing the goals of improving teaching and learning, the focus must move from the tool to the process of integrating the computers' applications into the everyday world of the classroom. This process of integrating and internalizing technology use is a very personal endeavor and involves "*preparation* of the teacher (building relationships of trust, helping teachers feel and recognize the power of teaching with technology, personalizing training, and finding out teachers needs, interests, and concerns), *commitment* by the teacher, *following-up* on that commitment by the support team, and resolving teacher concerns arising during the change process" (Earle, 2002). Earle has suggested the focus of integration should be "on the pedagogy-effective practices for teaching and learning" and notes the necessity to develop training opportunities for the teachers that connect the tools they are learning to use with the curricula they teach. In this manner, as Duffield (1997) has suggested, the teachers "face their own fears and struggles with technology and change by taking time to reflect on their own role and professional practice in this process of integration." Bateson (1978:504, as cited in Loi, 2004) has observed "we are not outside the ecology for which we plan-we are always and inevitably part of it".

In his analysis of the use of current media tools to teach online educational courses Greenagel (2002) argues that many programs continue to reflect a transmission model of teaching rather than models of collective engagement in the use of the technologies for critical analysis of information, knowledge construction, and problem solving. In suggesting the design of these curricula should be more responsive in addressing the requirements of the learner, Greenagel identifies the value in using videoconferencing systems, either classroom or desktop, as a means to foster community building and actively engage learners in collaborative problem-solving both synchronously and asynchronously through additional access to email, message boards, and chat systems. Earle (2002) makes the argument the curriculum should be the vehicle for technology integration and educators and technologists must "weave the technology into the fabric of learning; or as Cuban (1986) admonished: Fit the computer to the curriculum, not the curriculum to the computer."

In emphasizing the value he believes networking tools could provide to "fundamentally reshape teacher professional development (TPD) and in turn reform current teaching practices", Barnett (2002) identifies four ways that technically-mediated networks impact TPD: [1] Its use can reduce teacher isolation, [2] foster reflection in practice, [3] influence the adoption and incorporation of new pedagogical strategies, and [4] support the formation of communities of practice. Barnett references Schlager & Schank's (1997) observation there have been relatively few TPD opportunities to "provide teachers with on-going support that is situated in their everyday instructional environment" and the "lack of a mechanism to facilitate *sustained* information sharing and access to distributed expertise such as other teachers, university faculty and curriculum developers". Loucks-Horsley & Matsumoto (1999), in their extensive review of professional development practices, have identified the need for sustained programs, rather than solitary events, that offer teachers opportunities to connect training to relevant pedagogical and classroom practices.

TPD approaches that have been developed to access these networks and provide a context for working differently can also be found in the Beginning Teacher Computer

33

network at Harvard University, the Students and Teachers Electronic Productivity Systems (STEPS) where in-service teachers can access an electronic network to interact with their peers, content experts, and more experienced teachers, TeacherNet at California State University, One Sky, Many Voices, and the Inquiry Learning Forum (ILF). All of these programs provide a space for teaches to interact; what appears to be missing is the fact that the programs were developed *for* teachers, not *by* the teachers themselves. An additional example of this design organization can be found in the Secondary Teacher Education Project (STEP) that "uses web-based video cases to demonstrate innovative teaching practices (i.e. inquiry-oriented teaching)" (Barnett, 2002). In the TAPPED IN, LabNet, and Inquiry Learning Forum programs as well as other programs previously noted, there is an effort to encourage the formation of communities of practice for sustained teacher interaction.

Gomez, Sherin, Griesdorn, and Finn (2008) have suggested "the pervasive availability of technology allows for new social arrangements in teacher education" through its connective power (2008:117). The authors recommend "technology be used in education to (a) create technically literate professionals, (b) strengthen the practice-theory connection, (c) provide more practice-centered training, and (d) reflect deeply into the scholarship and practice of teaching"(2008:117). They have referenced specific educational technology programs that provide opportunities for pre-service and practicing teachers to work with more experienced educators and faculty in university settings to develop communities of practice. In the Wayne State University project students and faculty developed an online community, "Teachers on the Go," that allowed the learners to observe authentic practices of more experienced practitioners as they worked collaboratively to resolve problems. Additional programs include the Virtual Campus School (VCS) at Montana State University that allows students to remotely observe live, thirty minute teaching sessions and receive immediate feedback in live sessions with their peers and the instructors and the two-way videoconferencing program at Purdue University that connects pre-service teachers to rural and urban classrooms.

These programs require educators to situate learning within a context of relevance and meaning for their students. Many of these discussions and proposals trade on terms and phrases in the contemporary literature such as *constructivist theory, situated learning* and the formation of *communities of practice*, I take them up in the following sections.

Constructivism

Doolittle (1999/2003) has stated "the essential core of constructivism is the belief that learners are involved in actively constructing their own knowledge and meaning from their experiences" (Fosnot, 1996; Steffe & Gale, 1995). A basic tenet of constructivism is that knowledge is subjective; everyone creates her own meaning of any particular experience, including what is heard or seen (Heuwinkel, 1996). Vygotsky (1978) argued for the social negotiation of meaning where learners could test their understandings within a zone of proximal development, mentored by their peers and their teachers. Paul Cobb (1994) has suggested in an article about mathematical development that learning should be viewed as both a process of active individual construction and enculturation into the wider society. He affirms Vygotsky's theory that knowledge is first developed externally and socially as an intermental category and later within the child as an intramental category. Dewey's (1899/1990) insistence in grounding experience in settings of relevance that had utility for the learners' actual world was reiterated by Bruner (1960) in his call for experiences with credible mentors and was referenced by Brown, Collins, and Duguid (1989) in their discussion of situated learning and authentic experience. Driscoll (1994) has characterized constructivist theory as resting on the assumption that knowledge is constructed by the learner in an attempt to make sense of the experience. Constructivist learning environments depend on independent learning contexts and opportunities that use these tools to create collaborative communities of learners unrestricted by walls or boundaries.

Duffy and Jonassen (1992) provide a summary of constructivist understandings by stating: Constructivist epistemology connects real world to experience providing a context to impose our own meaning; there are many ways to structure the world and multiple ways of developing meaning and creating conceptual understandings. Meaning is rooted in experience (Brown, Collins & Duguid, 1989) and there is no singular truth or correct meaning; instead, there are multiple ways of knowing and understanding the complexities of any situation and the experience must be examined to understand the learning that occurs.

Situated Learning Theory

Situated learning theory emerged from the anthropological studies of community and novice-expert interaction collected by Lave and Wenger (1991). It locates, or 'situates' the learner in a context of active negotiation to construct meaning between the knower and the larger world. Brown, Collins, and Duguid (1989) have stated knowledge is situated and is partly a product of the activity, context, and culture in which it is used. They suggest development of an environment for cognitive apprenticeship where information and knowledge can be accessed or constructed within an authentic framework of individuals who are knowledgeable, possess expertise in their craft, and are available to support, but not overwhelm, the attempts of the learner to negotiate within a cultural network to construct meaning and understanding.

Macbeth (1996) argues in his critique of Brown, Collins, and Duguid (1989) that a long tradition exists in social science of studies of the situated organizations of order and structure in meaningful social worlds (e.g. Blumer, 1970, Garfinkel, 1967, Goffman, 1964, Mishler, 1979, Schutz, 1962, and Sacks, 1972). He further argues that situatedness is a "unifying formulation" and can have nothing to do with claims of authenticity. On his account, such claims are entirely moral, and routinely self–referential. (Authenticity tends to be something held by those who write the critique of others, e. g., school children.) He suggests that studies of the local order of everyday worlds reveals them as the "…analytic achievements of the persons who live there," and argues the students in Brown et al (1989) are no less competent practitioners to the situated worlds of school.

Winn (1994) has argued situated learning assumes human action is dependent on the context in which it occurs, a concept Gadamer (1990, as cited in Davis & Sumara, 1997) supports, "...[I]t is not so important that we come to understand who we are and what we do- what matters is that we come to interpret the *conditions* that circumscribe identities and actions." Bruner (1990) has suggested the child participates in a form of cultural geography that is both situated and distributed and "To overlook this situated– distributed nature of knowledge and knowing would be to lose sight not only of the cultural nature of knowledge but of the correspondingly cultural nature of knowledge acquisition." Damarin (1993) has argued "...the acceptance of situated theories of cognition signals a shift from the psychological to the sociological as the social science knowledge base upon which school teaching and learning are theorized and refined" and suggests these theories have the potential to provide a space for alternative voices, often silenced, to be heard" (1993:27). Haraway (1991, as cited in Damarin, 1993) has stated "situated knowledge requires that the object of knowledge be considered as an actor or agent, rather than a passive knowledge resource."

Lave and Wenger (1991) contend that "learning is an integral and inseparable aspect of social practice" (1991:31) and that learning takes place through a process of "legitimate peripheral participation" in ongoing practice. They maintain learning is "situated" and social in character and is understood in the context of continuous activity and social relations. Learning is not the acquisition of information or de-contextualized knowledge; instead, they suggest increased participation in these practices affords the learner an identity that is shared by more experienced practitioners of the community and provides an opportunity for the skills of the novice to improve and expand as they are practiced within this community of experts. This enables the learner to migrate from the periphery to the center of the community. The development of a social identity and the skills that are encompassed in it are brought to fruition by the participation of the learner as an apprentice with the masters in the community providing a zone of proximal development (Vygotsky, 1978) for the learner to progress to eventual mastery. Examples of programs designed to incorporate constructivist and situated theories of learning with technology use can be found in Strommen and Lincoln's (1992) description of the "child-driven learning environment" (CDLE) they developed for their Visual Language Laboratory (VLL). The classroom and the work of the students were open-ended and self-directed. In a four-step process: exploration, conceptualization, production, and post-production the students accessed multimedia tools that enabled them to incorporate sound and special effects to create a public presentation of what he had learned.

Communities of Practice

What exactly is a community of practice? Who belongs and what are the rewards of membership? Wenger, McDermott, & Snyder, (2002) suggest communities of practice are formed by individuals who share common interests, passions or concerns about a topic or problem they encounter. The classic example is the workforce gathering around the water cooler, where members share tacit knowledge about resolving specific problems related to some aspect of their lives in an informal, yet regular, pattern. Communities of practice are described by Wenger, McDermott, & Snyder, (2002) as benefiting the participants by saving time; sharing knowledge (tacit and implicit) that has value; providing access to new knowledge, technologies and efficiencies; and serving in managing knowledge and its mastery. In addition, these communities of practice serve to provide a forum for problem-solving and the possibilities for new opportunities to travel beyond the established boundaries of the current situated experience. Communities of practice have existed throughout history beginning with the discussions around the fire in the cave of prehistoric peoples, the societies (legal and illegal) of the Greek and Roman slaves, the guilds of medieval Europe, and the organized unions and trade groups of Western, industrialized society (Durkheim, 1933). Today communities of practice are found in global networks throughout the world, across boundaries of time and space, and encompass multiple aspects of society.

Wenger (1998:152) argues practice defines a community through three dimensions: mutual engagement, a joint enterprise, and a shared repertoire, and suggests identity is formed through participation, reification and competence. He explicates these levels of competence by describing mutual engagement as the relationship and tension between the individual and the community- a way of being a part of the whole; the accountability to the enterprise shapes our perspective of the world, as doctor, chef, insurance claims adjustor, and the shared repertoire is accomplished through sustained practice that provides for the construction of artifacts, actions and language that organize the community. "In practice, we know who we are by what is familiar, understandable, usable, negotiable; we know who we are not by what is foreign, opaque, unwieldy, unproductive..." (153).

Communities of practice are a context for inquiry about how individuals organize and resolve the dilemmas of their ordinary, taken-for –granted, everyday worlds. Wenger, McDermott, & Snyder, (2002) suggest these communities respond to the requirements of the participants by providing a socially constructed framework where tacit and explicit aspects can be negotiated, and where the prospect of controversy, an effective and vital aspect of knowledge production, can be experienced. "Learning is the process of becoming (and being recognized as) a member of such a community as well as the development of tacit understanding, inherent judgment, and shared identity that comes with participation" (Duguid, 2003). Schutz (1976) describes the stranger's work of moving from the periphery to the center and becoming a member of the community. In addition to the acquisition of tacit knowledge, Schutz addresses the necessity for the stranger to acquire explicit knowledge of the cultural practices of group life (1976:92). Bereiter (1994) has maintained this process of enculturation must occur if an individual is to become a fully engaged member of a community, rather than remain a partially informed observer.

Communities of practice and education

In education, Buysse, Sparkman, and Wesley (2003) cite the work of Englert & Tarrant (1995), Marshall & Hatcher (1996), Palincsar et al, (1998), Rogoff (1994), Stamps (1997), Westheimer & Kahne (1993), Buysse et al (2001), and the special issue of *Teacher Education and Special Education*, 1999, Vol. 22, No. 4 as examples of the current interest and investigation of how communities of practice can serve to increase the understanding of the work of practitioners and provide insight for future professional development and the organization of the culture of school. A particularly important area of research and interest has been the role of the practitioner, situated within a cultural group as an active participant in constructing new knowledge within a framework of negotiation and complexity. Buysse et al (2003) reference the work of Barab and Duffy (2000) in describing how the current use of communities of practice can be distinguished

from previous attempts to introduce the concept of community into research-practice efforts (i.e., community of learners and thinkers, communities of inquiry, learning communities, and knowledge building communities). They note the "development of self through participation in the community" and the importance of legitimate participation as part of a community in that development of self (Barab & Duffy, 2000:35). Hung and Nichani (2002) use the activity theories of Vygotsky in their analysis of learning clubs and communities of practice to explore the value these situated experiences provide for the members in constructing authentic tasks in a socio-cultural environment.

Baumgartner (1999) describes a comparative, case-based ethnographic study conducted in a high school science department with three teachers who created a community of practice organized by their desire to incorporate constructivist, inquirybased pedagogies into their teaching practices. The three teachers developed highly personalized programs that were designed to address the unique requirements of their students. Aviram (2000) describes an action-based research project conducted with teachers, students and members of the scientific community in which eighth graders are asked to solve problems drawn from real life situations by planning and designing actual and applicable solutions. The program employs a variety of technologies to immerse the community of practitioners-the teachers, students and mentors- in developing new forms of understanding and alternative, highly creative responses to real-world scenarios.

Computer and Videoconferencing Programs

This section introduces a sample of technology-driven programs available to educators K-16 for classroom use. Some of these programs have been developed by

professional teams of designers in conjunction with faculty in university settings. Other programs represent collaborative efforts between classroom teachers and faculty in academic settings that were developed to assist pre-service and practicing teachers in learning how to use multimedia technologies. Several programs demonstrate the use of videoconferencing with faculty and students across the K-16 spectrum. Many of these programs claim to access constructivist theory and situated learning concepts in their design and to actively engage the participants in the authentic construction of knowledge. However, what is distinctive about many of these programs is that in spite of the acknowledgement by professional curriculum designers, researchers, and educational specialists of the value of the situated construction of curricula and pedagogical strategies by the participants themselves, most of the programs continue to be formulated without active participation in the design of curriculum or pedagogy by teachers.

Three early projects incorporating constructivist epistemologies and pedagogical practices with educational technology - "The Adventures of Jasper Woodbury" developed by the Cognition and Technology Group from the Vanderbilt University Learning Technology Center (1992), the SELA program developed in Israel by Dr. Gavriel Salomon of Haifa University (2000), Chickscope designed by Drs. Chip Bruce and Umesh Thakkar from the University of Illinois at Champaign-Urbana (1996) will be discussed to develop the linkage and synergistic effects that occur when education incorporates technology in a constructivist framework.

The Adventures of Jasper Woodbury

The Jasper videodisc adventures present a believable story that has interesting characters, a complex and important Challenge, and extensions to a variety of curricular areas. To solve the Challenge, the students use problem-solving skills, mathematics concepts and skills, and information that were presented as part of the story. The program incorporates three models of teaching-basics first, structured problem-solving, and guided generation. It is designed to teach thinking in contexts that are rich in content and incorporates the use of case and problem-based learning to encourage generative and cooperative learning. A seventeen minute scenario is used to present a situated event to the students and provides all the necessary information the learners will need to solve the problems presented to them. This project is designed to encourage students to reach beyond their current levels of knowledge, create understandings, and acquire new skills, particularly in mathematics. The format is visually rich and students reported they found it interesting to view, could relate to the actors involved in the scenario and considered the problems posed at the conclusion were relevant to their everyday lives. The multilayered problems the students are given ask them to consider complex issues and develop multiple strategies for resolving them. In this professionally designed program the students are encouraged to work collaboratively to resolve the stated problems. Mentors are available to assist the students in their search for additional information and encourage the students to reflect on the complexity of the problems (Cognition and Technology Group at Vanderbilt, 1992).

SELA

Aviram (2000) describes how eighth graders are asked to solve problems drawn from real life situations by working individually or in collaborative teams with expertsin-the field to acquire information about the environmental and ecological systems of their community. The students incorporated this information using a simulation model to plan and design actual, applicable solutions that could prevent or ameliorate the current urban blights in a city of the future. These strategies encourage the highest levels of understanding and thinking by asking students and mentors to search for new and creative approaches and incorporate a variety of technological affordances to resolve practical, real-world problems and demonstrate their solutions. The intention of this program is to extend the process of collecting data, classifying and organizing knowledge using traditional methodologies and to begin to employ strategies of problem-solving and event planning that lead to more expressive and robust understandings. Learning is developed through the joint activity of teams drawing upon the strategies for cooperative and collaborative work using a variety of technological products and services.

Chickscope

Chickscope, (a web-based learning project initiated in 1996 by a diverse group of scientists at the University of Illinois) provides educators and learners with remote access, through the Chickscope web site (http://chickscope.beckman.uiuc.edu/) to magnetic resonance images of chicken embryos. The first Chickscope endeavor (1996) was successful in immersing students and teachers into a small scientific community where participants learned how to collect and analyze data, ask questions, and

communicate their findings with others (Bruce, Carragher, Damon, Dawson, Eurell, Gregory, Lauterbur, Marjanovic, Mason-Fossum, Morris, Potter, & Thakkar, 1997; Mason- Fossum &Thakkar, 1997). In-service training sessions were provided for the teachers who participated in this project. Their experiences interrogate issues of class, cultural norms, gender, and race in their analysis of the impact technology has had in providing a social infrastructure for a sustainable community of collaboration and learning.

Connecting Constructivist Theory with Educational Technologies

Salomon and Almog (1998) have noted the reciprocal influences involving technology and educational psychology and call attention to "the design of novel learning environments that follow the new psychological understandings of what good learning (and hence instruction) is supposed to be, the realization which largely depends upon technological affordances" (1998:http://vnweb.hwwilsonweb.com). They suggest these same technological affordances have, in turn, served to challenge psychology to create collaborative environments where the two entities now have an opportunity to combine constructivist theory with the intelligent and effective employment of technology.

Duffy and Jonassen (1992) have stated constructivism provides a context for accessing information as needed to respond to real-world problem solving. Collaborative efforts combine learning theory with instructional design practices to respond to actual needs where learning moves from fixed curricula to more "constructed," responsive environments for development of knowledge by the learner. Salomon and Almog (1998) draw an analogy to Duffy & Cunnigham's (1996) suggestion learning is to be seen as the activities of constructing meanings and understanding within a particular context or situation and Geertz's (1973) description of webs of significance where each piece of information becomes part of a larger, more inclusive understanding.

The students in the Jasper, SELA and Chickscope projects all were involved in accessing information from a variety of resources using an array of technologies. The teachers and students in the Chickscope group used the Internet to access data stored on computers at the National Health Institute server to learn to read the images and determine the development of the embryos. They were mentored by radiologists and scientists who were actively engaged with the students in the reflective process of determining a multitude of issues relating to environment, the health of the mothers, and economic constraints on the production and sale of this product.

Students in Israel in the SELA project were engaged in discussions and data collection that had particular relevance to their lives beyond the classroom. The students and their teachers focused on the ecological issues of pollution, space, and limited resources and their subsequent effect on a growing economy to consider economic concerns in the towns and villages where they lived. These were all real-life issues the students could relate to, discuss with their families and neighbors and had real meaning and significance in their everyday lives. These two projects were grounded in real world situations, the Jasper program was a simulation of a real world scenario and offered students the opportunity to draw upon information given within the context of the exercise; however, it had value to the students because the problems were similar to those they would negotiate and this provided them with the experience of developing skills,

grounded in experience that would enhance their strategies for working in collaborative groups, critiquing their work in a context of negotiation.

Salomon and Almog (1998) argue that "good learning is a process of socially based, active co-construction of contextualized knowledge and webs of relations among its nodes." These examples are similar to the knowledge-building communities of Scardamalia & Bereiter (1994) in their approach to encouraging students to address interdisciplinary, real-world problems, engaging in the exchange of data, the design of multimedia processes to represent their findings for extended periods of time. Frequently, teachers work in teams and the learning becomes an interpersonal process that is highly inter-subjective and transformative.

The literature contains an abundance of references to large, multifaceted efforts to develop educational programs combining technology, pedagogy, and curriculum in a constructivist framework. Harris and Krousgrill (2008) describe several of these projects: MIT's *The Infinity Project* brought high school engineering students in contact with working engineers and academic researchers from several countries and more than thirty-five states to work online in collaborative projects using multimedia hardware and software; the *Knowledge Community-* a collaborative learning endeavor between 10,000 students from Singapore, China, the United Kingdom, and the United States supports comparative problem-based projects that enable and encourage knowledge building and scaffolding; and Connexions (http://cnx.org), an open source platform where educators can access textbooks, learning materials, and courses for downloading and build a networked curriculum. The Global Leap (http://www.global-leap.com) website assists

teachers globally in accessing information about videoconferencing procedures and opportunities.

One of the earliest examples of the integration of videoconferencing technologies and additional multimedia applications is found in Pea et al (1995). In the CoVis project, earth and environmental science teachers and their students were given the opportunity to use desktop videoconferencing equipment that provided shared screens, access to the Internet, high speed workstations, and email to establish a distributed (networked) environment. With the shared screens the students and teachers were able to see exactly what the other user was observing and both sides were able to share in the control of the screens. The project incorporated the use of a scientific visualization program, Spyglass, to transform data into graphs and charts. Students and teachers were also given significant access to experts-in-the-field throughout the study. The goal of the project was to use the technologies as a tool to develop a collaborative space fostering community development where engaged interaction, critical thinking, and knowledge construction could occur. Although much of the equipment used in my study would not have been readily available to the teachers in 1995 without the researchers' intervention and support, it did serve to demonstrate the value access to external resources and the ability to communicate with remote partners could provide for engaged, collaborative knowledge construction and the fostering of professional and student communities of practice.

Although many of the more recent Internet-based projects encourage the users to construct their discourses and interactions within a technically-mediated framework, the actual pedagogical design of the programs and the teachers' decision-making process

regarding how they will use the technology tools at their disposal remain largely controlled by the designers of the programs or the researchers, not the individual teachers engaged in their use. The next chapter describes how two classroom teachers learn to use these connective multimedia tools, come to terms with the limitations of the tools, and discover their ability to tame the technologies to their pedagogical and curricular purposes.

Chapter Three: Methodology

Introduction

As indicated in chapter one, over the course of fifteen months, two sixth grade teachers in classrooms on different continents used videoconferencing and multimedia technologies to establish a technically-mediated, visual space where they and their students could interact. The goal of this research has been to describe how the two educators, positioned in the practical world of their local classrooms discovered the possibilities and infirmities of the technologies as well as their own limitations in its use, applied this knowledge to their pedagogical and curriculum purposes, and produced a strategy for the pragmatic implementation of this technological platform with their students.

In many respects this research project is similar to previous classroom studies describing how technology can be used for collaborative work by educators and their students in local or multiple settings. The studies reviewed in chapter two showed a collection of problem-based scenarios designed to encourage participants to work collaboratively (asynchronously or synchronously) in technically-mediated environments. Yet for many, if not most, of these programs the organization of the curricula is the work of professional curriculum designers and programmers, not teachers engaged in the practical work of the classroom.

In this ethnographic case study a contrasting scenario is presented that recognizes and honors the knowledge and expertise of educators who are located in the everyday world of their classrooms. This study describes how two sixth grade teachers chose to use a virtual, visual environment to craft pragmatic teaching and learning strategies that would address the unique cultural and pedagogical demands of their students. The teachers, who had collaboratively taught the International Book Sharing Program curriculum (IBSP) during the previous four years, were asked to integrate pedagogy with technology. In this case study the teachers became the developers.

Crafting a Methodological Approach

As a means of conceptualizing a methodological approach, Blumer's (1969/1998) discussion of symbolic interactionism was instructive. Blumer (in Shepherd, 1970) identified a particular form of inquiry he maintained was essential for an empirical social science. It required

"...a close and comprehensive acquaintance" of the life world being studied, and is the means of developing and sharpening his inquiry so that his problem, his directions of inquiry, data, and analytical relations, and interpretations arise out of, and remain grounded in, the empirical life under study. (Shepherd, 1970:437) Blumer's (1969/ 1998) discussion of the core tenets of symbolic interactionism served as a guide to envision a case study situated in visual, virtual space, where the participants were attempting to communicate and infer meaning through their observed interactions. His tenents included: [1] people are prepared to act on the basis of the meanings of the objects that comprise their worlds; [2] a process is created where people make indications to one another and interpret these actions; [3] social acts, whether individual or collective, are constructed through a process in which the actors note, interpret, and assess the situations confronting them; and [4] these complex inter-linkages of acts comprise dynamic networks or communities. (1969/1988:50)

The theoretical discussions by Goffman (1959, 1963) and Blumer, (1969/1998) regarding the construction of social worlds and the actions of the participants who inhabit them became guides to my instruction in structuring a methodological framework that would take interest in the socially constructed real and virtual worlds of the educators. A consistent theme in the discussion of the organization of social worlds suggests that our life worlds are constituted by the courses of action they achieve. In this context of interaction, we negotiate meaning and construct relationships for continuing interactions and dialogue.

The work of Goffman (1959, 1963, 1967) regarding copresence in a situated environment, the significance of face-to-face interactions (focused and unfocused), the rules of talk, or spoken interaction, and the regulation of conduct as a means of interpreting meaning and developing understanding spoke directly to how I could begin to *notice* what was occurring in the virtual, visual environment the educators would be

53

sharing. Schutz's (1962, 1970, 1972) discussions of the structures of life worlds, how they are experienced by the actors and the significance of the participants' decisions to act both in a face-to-face environment and individually, in addition to his observations regarding the attributes of direct observation, were particularly instructive in helping me consider how I would *notice* and begin to analyze what was observed and reported by the teachers.

Because the ability to capture the interactions of the participants digitally is what these technologies aim to do, the choice to incorporate the methodologies and practices inherent in a qualitative, ethnographic case study became readily apparent. The tasks of thick description (Geertz, 1973), and the work of Lave and Wenger (1991) regarding the development of situated knowledge from an apprentice level to competent usage also became essential resources in forging a methodological strategy to observe, describe and understand the educators' interactions and their practical tasks in assembling this virtual/visual space.

The use of videoconferencing technologies provided the researcher with opportunities to capture online (face-to-face) and offline interactions for the study of the everyday, ordinary occurrences of the participants and their analytic constructions. Frequently during the course of the study, the teachers were asked to reflect and comment on these events. As Macbeth (1998) has suggested, "...the natives are analysts, too." It was essential to the researcher that the study would honor the participants' interpretive practices and what is regular and methodic about them as a guide to the topics for the researcher's own instruction and understanding. The analysis of natural conversation developed by Sacks, Schegloff and Jefferson (1974) and Schegloff, Jefferson, and Sacks (1977), and the classroom studies of Macbeth, (2003) became particularly instructive in the conceptualization of an approach that would describe the teachers' interpretations and interactions.

The work of Mehan (1982), Heap (1982), Payne and Hustler (1980); and Macbeth (1994b) on the organization of classroom lessons and discourse have been useful in analyzing the work of the teachers as they were developing the curriculum.

Several other sources influenced the inquiry. Marshall McLuhan's (1964) formulation, "The medium is the message," directed my attention to his premise that any significant medium of communication had the potential to alter the society engaged in its use. McLuhan (2003) and McLuhan and Powers (1989) envisioned the possibilities of television and visually interactive technologies for establishing encounters with members of diverse and remote communities and argued these technologies had the potential to enhance understanding between the participants and increase knowledge of the "hidden grounds of other cultures." (McLuhan & Powers, 1989: 22)

Wenger, McDermott, & Snyder's (2002) observation that knowledge is dynamic and learners must be engaged in a community-of-practice's activities in order to learn emphasized the value the development of a community-of-practice might provide in this inquiry. These authors have suggested communities respond to the requirements of the participants by providing a socially constructed framework where tacit and explicit aspects of knowledge can be negotiated, multiple perspectives are acknowledged and the prospect of controversy, an effective and vital aspect of knowledge production, can be experienced.

In this study Teachers A and B evidenced these attributes as they engaged in the development of a professional community-of-practice that was located in their real and virtual worlds. Duguid's (2003) observation that "Learning is the process of becoming (and being recognized as) a member of such a community as well as the development of tacit understanding, inherent judgment, and shared identity that comes with participation" was particularly instructive to me as I began to conceptualize the possibilities these spaces could provide for the teachers' collaborative interactions. Charmaz (2000) has noted the compatibility between the theoretical tenets of constructivism and philosophical Pragmatism and the rich, sensitizing concepts found in symbolic interactionism encompassing action, process and the emergence of meaning.

The literatures described above became essential in my efforts to understand how the teachers made sense of their interactions and worked to integrate the assets of the technologies as a means to collaboratively achieve their pedagogical and curriculum goals in both the virtual, visual space and their local classrooms. These foundational guidelines were used to construct an initial framework that sought to explore: [1] *How* two teachers devised strategies to master the use of a technically-mediated visual space and brought its use to a measure of control and purpose in their classrooms; [2] the classroom processes the teachers, who were physically located in distant communities, adapted to move the local worlds they inhabited to this virtual platform; [3] how they communicated and were able to negotiate these meanings to work together; [4] the

56

pedagogical and curriculum strategies the teachers devised; and [5] the tangible outcomes that were produced as a result of these interactions. As the inquiry moved forward, these five areas of interest coalesced into three distinct phases of their work together: *Taming the technology, building the bridge,* and *designing the traffic.*

Study Design

Advances in Technology

It is apparent that a plethora of computer applications, e.g. cell phones, have become increasingly available worldwide. (Baudisch, 2005) Much of this hardware has the capacity to simultaneously support videoconferencing, real time, face-to-face collaboration within virtual environments, file-sharing and the ability to access information from multiple resources. Given these opportunities for access and interaction, users could begin to routinely incorporate into their work and leisure activities multiple forms of media such as email and webcams, IP telephony, collaborative document development, weblogs, discussion boards, Instant Messenger, Power Point, spreadsheets, web pages, the use of avatars in virtual reality, streaming audio and video, and the synchronous and asynchronous exchange of documents. Each of these innovations furthers the development of frameworks for dialogue and collaboration across multiple locations.

In a prior review of the literature to ascertain what teachers felt would be essential if they were to become adopters of new forms of technology in their classrooms, several important factors were noted: [1] The need for the provision of consistent professional development opportunities over a sustained period of time when they were asked to work
with new technologies and computer applications (Borko, 2004), [2] the assurance that reliable technical support would be available if they initiated the use of new technologies in their classrooms, and [3] the lack of time to engage with fellow professionals and form sustained communities of practice (Richardson, 2008),

From the outset, my interests were in the practical development of a face-to-face, technically-mediated platform where interaction and spontaneous discourse could occur between individuals who were located in distant geographic communities. Two examples of videoconferencing identified in the literature became useful: Life in a Fishbowl (http://www.sfusd.k12.ca.us/schwww/sch456/tech/mission-mendo/index.html) describes the work of two elementary school teachers who used videoconferencing to collaboratively teach a language arts curriculum as a means to strengthen and honor the language capabilities and cultural backgrounds of their ESL students. And Scordias, et al (2003) report on an undergraduate course offered at the University of Missouri for preservice teachers demonstrating how videoconferencing could be utilized to provide connective, interactive spaces where it became possible for students and professors to work collaboratively in a virtual/visual classroom environment when they were physically situated in distant locations. In these studies a variety of connective technologies and multimedia applications were brought together to establish a unique category of observable interaction- the virtual, visual space.

Technical dimensions

A critical factor in the success of this research project was the ability to establish a framework where affordable equipment, individual training and on-the-ground technical support could be combined to establish a fully functional virtually visual space for use by the educators at their discretion-either at home or in the classroom. In order to initiate the research program the actual construction of a technically-mediated space for use in this case study became my responsibility. The technical specifications for the hardware requirements and an extensive explanation of the CTMX application are provided in Appendix A.

The role of the technical support personnel in both locations included working with the researcher to become familiar with the CTMX applications, and supporting the teachers throughout the case study in their efforts to use the equipment until they were comfortably able to independently administer the technologies. The technicians were given the appropriate information to access support personnel at Communications III in Columbus, Ohio (where the server for the Click-to-Meet platform (CTMX) was housed) who had agreed to be available for troubleshooting the equipment. When the study began, the opportunity to work with the Israeli technicians at Radvision had not been determined.

In addition to these resources, Teacher B (in Ohio) had limited access to technical staff from a regional county school consortium responsible for addressing the requirements of eighteen school districts. All the technicians had an opportunity to work with a videoconference support team at The Ohio State University for additional trouble-shooting assistance.

The technical personnel were asked by the researcher to be available to the teachers when they were beginning to work with the technologies to provide them with

expertise about the local systems. Neither teacher was aware of the sophisticated technical structure of their local school systems. They had no knowledge of the firewalls, hardware infrastructures and other barriers that could impact and interrupt their efforts during the course of this project. The primary task of the technicians was to support the teachers. In providing this level of support, I hoped the teachers would begin to feel comfortable in using the CTMX platform and gain confidence in their ability to work effectively with the technologies.

The participant/ teachers were promised they would be given extensive training in the use of the hardware and software applications by the researcher during the initial stages of the research program. This required me to travel to both locations [northeast Ohio and northern Israel] prior to the initiation of the study to install the programs on their home and school computers, work individually with each teacher for approximately two weeks to demonstrate how to use the software applications and the CTMX platform, and support them as they began to work with the various multimedia applications it provided. (This process is described in chapter four).

Establishing Access

An essential task in moving the entire process forward, and a critical measure of its ultimate viability, required me to provide the participants, their administrators, and the technical staff with an overview of the vision of the project, and define their responsibilities throughout the life of the project. (See Appendix B) In order to secure maximum cooperation from the local school administrators, they were assured that the required technologies for establishing the virtual classroom project would use existing hardware resources to preserve the integrity of their security programs, and that any additional software or hardware requirements would be provided by the researcher to the participating teachers at no expense to them or the participating schools.

As described in chapter one, through prior relationships with the educational communities of Israel and Ohio, these teachers and schools were involved in the International Book Sharing Program. It was imperative in establishing a trustworthy relationship with the participants that my conduct and approach would honor the cultural dispositions of both communities, promote a climate for candor and honesty, and reflect the highest ethical research standards.

Once the visual, technically-mediated space was established and the teachers had begun to become reasonably comfortable with the technologies, it became feasible for them to begin their collaboration. In effect, there were now three life worlds that had been established-the two local classroom worlds of the teachers and the virtual, visual world where they could meet and begin to work.

The teachers

The two teachers who became the actors in this research project were selfdescribed novices in their use of most computer technologies beyond email and curricular programs available on DVD or the Internet. They were teaching in schools where professional development opportunities to work with computer tools on a sustained basis are limited and access to reliable technical support is generally not readily available. These attributes, frequently described in the literature, have been identified as consistent barriers to a more robust integration of multiple forms of technology use in the classroom. (Borko, 2004)

When the teachers initially began to work with each other to teach the IBSP curriculum in the school year 2002-2003 (four years before their engagement in the research project), their interactions were limited to email, an occasional online discussion using the text based web board provided by the Ghetto Fighters' House Museum web pages, and infrequent phone conversations to plan their joint activities for their students. The deep personal friendship and extensive professional relationship the teachers have subsequently developed was initiated during Teacher A's visit to Teacher B's school in 2005.

Teacher A

Teacher A is a Sabra (born in Israel) and has lived on the same kibbutz with her extended family her entire life. Her parents made aliyah (Immigrated) to Israel from Argentina before she was born. Teacher A speaks fluent Spanish, Hebrew, and English, and obtained a Bachelor's degree in Education and her Master's degree in History and Israeli History. Before she taught students in regular classrooms she was motivated to work with special needs students in order to understand their unique learning requirements. She is the mother of four children, two who have finished their army service and are now working and attending college and two younger sons who are still in middle and high school.

Teacher A tells the story of how she was unaware she was working with a non-Jewish teacher until several months into the first year of teaching the IBSP curriculum in December, 2002 when Teacher B's students sent Christmas cards to their Israeli partners. Teacher B had not realized most Israelis, although secular in practice, do not celebrate the Christmas holiday. Teacher A has referenced this episode to exemplify and reinforce her belief that it is essential for Israeli students and teachers to seek opportunities to work with communities outside of Israel as a means of combating the isolation of their political situation and to expand their knowledge of people and communities who are unfamiliar to them.

Teacher B

Teacher B is Italian-American and was completely unfamiliar with Israel, its history and culture beyond the limited information she had gathered from the media. She had never known anyone who was Jewish prior to her work with the IBSP curriculum project in 2002. Teacher B grew up in a community adjacent to where she currently teaches. She has lived in this area her entire life. Teacher B is the mother of three girls who are grown and is the grandmother of two little girls. In addition to her undergraduate Bachelor's degree in Education and a Master's degree in Curriculum and Instruction, teacher B is also a licensed cosmetologist.

Teacher B began her professional career in a four room school in a rural district teaching second grade, moved to a cosmetology program for one year, and was a long term substitute in a school that had approximately fifty per cent Amish students. She has taught in her current position for most of her teaching career. Teacher B has been an active participant in post-graduate programs involving science and math and during the course of this project spent ten days in Iceland on a geological expedition organized by Kent State University.

The Researcher

I am an American-Jew with an Italian heritage who converted to Judaism as an adult. Both teachers were aware I had worked extensively in Israel for more than ten years as an actively engaged leader of the steering committee for Partnership with Israel. Initially, I thought these factors would be beneficial in establishing a trustworthy and forthright relationship with each teacher. Later in the study both teachers revealed their initial perception of me as a member of the steering committee had made it difficult for them to understand exactly who I was or how I would be able to work with them. The teachers stated they had been concerned about my ability to establish the technicallymediated platform where this research project could live, assist each teacher in learning how to use the CTMX platform, and then relinquish control to assume the role of an observer who did not interfere, or attempt to influence their work.

Their concerns mirrored my own initial reluctance to locate the research project within the auspices of the IBSP program and I recognized there were several issues that had to be addressed and resolved. Because of my role as the local chairperson of the Partnership with Israel program, I was concerned the teachers would feel they were obligated to agree to participate in the study in order to maintain their participation in the IBSP project. I was also cognizant of the emotional and physical investment I was directing to this project. In my lay leadership role I had travelled to Israel numerous times as the facilitator of missions for educators, college and university administrators, physicians, and business leaders. As the researcher, it became imperative that I step back and detach myself from this intense level of involvement with both communities.

It would be unrealistic to assume that given the level of involvement in developing and facilitating the organizational and technical requirements for the research project I could be completely objective about its outcomes. However, during the course of the project, from its very inception, I made every attempt to be as forthright as possible with the teachers, administrators, and technicians about the goals of the study. I carefully explained for the purposes of this project, my goal was to establish the operational space where the study could be enacted; once this was accomplished my role would be to observe. This would allow me to watch and digitally record how the participants interacted with the tools, negotiated their use within the virtual world of the Click-to-Meet platform and their local classrooms, and incorporated these technologies into the IBSP curriculum. My efforts were consciously directed to describing and analyzing the occasions and interactions that occurred over the fifteen months of the project.

As the study progressed, the teachers, technicians, and I reviewed these recorded interactions to further interrogate how each participant made sense of the events and their role in these interactions as they had occurred. Mehan (1982) has noted the use of video and audio provides the researcher with the opportunity to revisit the actions and occasions that have occurred and provides an enhanced measure of validation during analysis. Ultimately, my hope was to describe, from the teachers' perspective and actions, how they had chosen to use the technology and what they had constructed and achieved.

The classrooms

Classroom A

Teacher A currently teaches fourth grade in a kibbutz school and is working in conjunction with a sixth grade teacher on the IBSP project. The students, who are all Israeli citizens, are members of the Muslim, Christian and Jewish communities in the Mateh Asher School District. The Mateh Asher District (http://www.matte-asherregion.muni.il/) and (http://www.nationmaster.com/encyclopedia/Matte-Asher-Regional-Council) encompasses approximately 220,000 square kilometers and is comprised of 5464 students from grades K-12. Its boundaries extend from the Lebanese border at Rosh Ha Nikra, west along the Mediterranean Sea to an area south of Akko almost to the northern suburbs of Haifa and eastward toward Maalot. The students come from kibbutzim, moshavim and small villages as well as the larger towns of Akko and Nahariyah. Fifteen miles to the south of the school is the city of Haifa, ten miles north is Rosh Ha Nikra and the Lebanese border. For most of the students attending this particular elementary school, the Mediterranean Sea is within a short bicycle ride or walking distance from their homes.

In the summer of 2006 during the Second Lebanese War the students and their families endured a continuous onslaught of ketusha rockets for more than a month. During that time, those who were able to leave the immediate area took their families to areas further south that were considered safer. Others, who either chose to remain to maintain essential services or refused to leave for ideological reasons spent much of the month in bomb shelters.

I arrived in Israel to begin this research project in April, 2007, nine months after this event had occurred. To the outside observer, there was no apparent evidence of the hardships or dangers these students and their teachers had endured. Most physical damage incurred during the bombardment had been repaired. However, the tacit effects of these traumatic experiences were very much in play. As it was explained by one of the teachers, this area and its citizenry has been vulnerable to hostile attacks throughout most of its history. Most adults, male and female, have served in the military and are patently aware of the existential threat to the survival of their families and themselves. When school resumed [on schedule] in September, 2007 the teachers worked diligently as a team to address many of the unspoken traumas and realities the entire population had endured by constructing opportunities within the curriculum where students and the educators could confront what they had experienced and begin a process of healing.

Israeli schools begin in September and finish in late June. The teachers and administrators spend approximately two weeks after the students are on summer vacation to evaluate the programs from the current year and make new curriculum plans and adjustments for the forthcoming school year. There has been much realignment of the schools in this region and throughout Israel during the past ten years. The teachers have a much more proactive role in the development of the curriculum and work closely with the school principal to craft programs that are responsive to the requirements of their particular students. It is interesting to note that in some schools, the kindergarten and first grade teachers remain stationary, while the teachers of the second and third grades progress with their students through these grades and rotate back to new students when they have completed the cycle. This same process is used in grades four through six. Middle school and high school teachers are organized by subject areas similar to American schools. Teacher A has been allowed to remain with the same cohort of students for several grades because she has a special needs student who lives on her kibbutz and the parents have asked her to be present in this child's life during these formative years.

This particular elementary school in Israel is part of a three part campus comprised of a students enrolled in a traditional elementary school, children who are autistic, and students with specialized behavioral problems. Each of the schools has a separate building and throughout the week there are scheduled activities encompassing band, music, art, drama and physical education classes where all the students from a particular grade level are encouraged to interact. The culture of the school promotes compassion and civil behavior among all students and faculty. There is a strong emphasis on collaborative, team approaches within the grade level and across the curriculum. The teachers incorporate music, art and drama into all aspects of the curricula as a means of engaging the students and addressing their multiple learning requirements (Gardner, 1993). Teacher A indicated the Israeli schools place a strong emphasis on the individuality of the students. The students are encouraged to develop a level of self confidence that supports their ability to take risks and experience failure within boundaries that protect the overall safety of the student.

Because the classrooms in Israel are very informal there is a significant increase in talking among the students during classroom activities. The students address the teachers by their first names and are given much more freedom to move about the classrooms and the campus throughout the school day. However, Teacher A was quick to note students are fully aware they are expected to listen to the teachers and are responsible for following instructions, demonstrating they have understood the assignments, and completing them on time.

Teacher A noted that Israeli teachers, who recently received a significant raise after a very contentious strike, often feel tremendous support from the parents and principals. Teacher A stated she believes the parents trust her to educate their children and noted the teachers are given the freedom to work collaboratively with the principals to develop and facilitate programs and curricula they determine can be beneficial to their students. A case in point would be the programs previously mentioned in response to the Second Lebanese War.

Classroom B

Teacher B is currently a sixth grade science and math teacher in a middle school in a predominately homogeneous, middle class Christian community in northeast Ohio. The middle school is part of a small, local school district comprised of approximately fifteen hundred students in grades K-12. The sixth grade is housed in the Middle School building that is adjacent to the High School. Both buildings are located on one campus. The school district has many similarities to its Israeli counterpart. It is located in an area that is transitioning from rural to suburban where many of the parents grew up on farms and have a strong appreciation for the land. Teacher B described the community as conservative in its values and identified the strict classroom deportment as a manifestation of the expectations of the parents and other community members for the schools and the teachers to maintain order. In contrast to Teacher A's remarks about working collaboratively with the faculty and administrators to address the particular needs of each student, Teacher B identified a culture of isolation and lack of cooperation between these entities. Currently, Teacher B, who teaches math and science, is working with a sixth grade language arts teacher to cover the materials in the IBSP curriculum. Next year she hopes to be able to coordinate their activities better because, although they share the same planning periods, the language arts teacher has made relatively few indications or requests to work collaboratively with Teacher B in planning the IBSP curriculum activities.

Teacher B characterized the lack of cooperation between teachers as a direct result of the current school culture that is focused on process and discipline procedures rather than how teachers and the school can help the individual child. In response to Teacher A's discussion of the support received by parents and administration, Teacher B commented, "I'm jealous". "I get hurt easy" captures her frustration with the parents' lack of support and willingness to blame teachers when students fail to complete assignments and receive bad grades. She characterized this behavior as a reflection of the lack of respect adults have for teachers and the schools in general and commented that she felt this put increased pressure on the principals to maintain order and focus all efforts on improving the school's scores on the state test results rather than working with the teachers to develop a collaborative spirit. Teacher B stated that in spite of the lack of expressed interest or support from most parents, and the focus on teaching to the test that was pervasive in the current school culture, she would eventually like to change those conditions and focus on the individual student's requirements. For her, the greatest impediment to this goal "...is the lack of time".

Technical support

As noted in chapter one, the teachers' willingness to implement unfamiliar technologies in their classrooms was conditioned by my assurance they would have reliable and sustained technology support. Therefore, it was my task to identify and secure competent technical personnel in the teachers' local settings to troubleshoot any technical problems for the duration of the project. I understood the need to locate individuals who could provide these services to the teachers would be paramount to the success of this program. It would also become an essential factor in establishing a trustworthy relationship between the teachers and the researcher.

During the time that the teachers were being introduced to the hardware and software, I worked with the local school personnel who were responsible for supporting the technology requirements of their teaching staff. In Teacher A's school there was a computer teacher who was responsible for minimal teacher assistance in addition to her computer lab teaching responsibilities for the entire school. An additional individual, who was a skilled, computer technician and worked part-time at the school, was occasionally available to support the efforts of the teachers. His responsibilities included maintenance of all the hardware in the computer lab and the classrooms, installation of new hardware, trouble shooting and support for the computer lab teacher when called upon to do so. Both of these individuals agreed to be available to support the teachers throughout the research project.

In Teacher B's American school, the principal was the designated technology support staff person. His role, in addition to his full-time requirements as principal, included maintenance of all the hardware in the classrooms, installation of new hardware, trouble shooting and supporting the individual teachers' technology requirements as requested. Although his availability was severely limited, the principal stated he would attempt to support Teacher B's participation in the research project.

Teacher B's local school district could also request technical support from a regionalized county school consortium responsible for addressing the requirements of eighteen school districts. Limited assistance from this entity was available to Teacher B throughout the study, however due to scarce monetary resources and time constraints on the consortium's support personnel, it was severely limited. In contrast to Teacher A's school, no efforts were made in Teacher's district to upgrade any equipment related to this project.

Establishing the platform

The components I chose for constructing the technological 'floor' where this project lived are described in detail in Appendix A. I had supplied the teachers with inexpensive, eyeball cameras. These were connected to computers using high speed Internet connections that were available in their classrooms, computer labs, or libraries. Large screen projections of the visual images, captured on the computer, were displayed through a digital projector on a classroom wall or movie screen. In the autumn of 2007, the Israeli school purchased a flat panel HDTV that eventually was used as the display monitor in the February, 2008 videoconference. The integration of these components with the videoconference client application (Click-to-Meet) established the virtual, visual space where the teachers could work to plan activities for the IBSP social studies curriculum.

Field Work

Once the project's hardware and software were installed on the teachers' home computers and in both school locations, the pedagogical and curricular work was ready to proceed. My role as an active participant in the construction of the technically mediated space and the installation of the required hardware and software to accomplish this goal was modified to occasional support when technical difficulties occurred during the teachers' online sessions. The Click-to-Meet software application made it possible for me to capture the dialogues, documents and video sessions throughout the case study. I used a Sony Camcorder to capture the proceedings on DVD; for additional backup the audio was recorded on a cassette player. Some of the transactions were captured on DVD through the use of a technical bridge operated by The Ohio State University's IT department located at Lord Hall.

Interviews that were not captured on video were recorded on an audio cassette player. A portion of the video data has been stored on a dedicated server at Lord Hall on the campus of The Ohio State University in Columbus, Ohio; additional data has been placed in a secure lock box at a local bank in Canton, Ohio. The password protected data will be retained for three years and then destroyed in accordance with IRB and university policies.

The corpus

The central data materials used in the analysis of this study were derived from my personal observations and notes of the teachers' interactions either virtually or in person, recorded interviews with the participants, videotapes of the interactions between the teachers; and videoconference transcripts. Other data that were collected throughout the research process included journals maintained on-line by the two teachers involved in program, private journals (the teachers kept a diary of their understandings and reactions about their daily teaching), each teacher's personal observations that were shared with the researcher, the interactions with their teaching partners through a variety of media, the artifacts developed by teachers during course of study (web-based and concrete representations acquired from teachers' classrooms and communities), records of informal conversations and interactions, and background information derived from the position of members' own analysis regarding the historical and political framework of the participating communities.

During the course of the case study, I maintained a log of the daily activities and videoconferencing sessions that occurred with the teachers. This record became an invaluable resource in correlating my observations of events with the actual accounts of the sessions recorded on DVD and the teachers' own reports and analyses. The ability to capture details about who was present, what their role was in the event, what happened, how participants expressed their personal reflections about the event and how each

particular event impacted the understandings, interactions and subsequent responses of the participants became particularly useful as a repository of information in working with the teachers to validate what was being described and reported as well as during my personal analysis of the data.

The ability to routinely capture the virtual, online (face-to-face) interactions of the participants in a digital format provided a rich repository of data. Over the life of the study, this data was repeatedly reviewed with the teachers and became a substantial methodological and analytic tool for encouraging the two teachers to provide increased levels of candor about the organization of their social worlds, their local professional communities, and their personal assessments of their interactions with each other. I often asked the teachers to interpret their actions, convey their sense of understanding about what they were experiencing, and explain how they had chosen to incorporate this knowledge into their pedagogical tasks of synthesizing the use of the virtual/visual classroom space with the IBSP curriculum.

The classrooms were replete with artifacts both teachers had developed during this project with their students. Many of these artifacts had been planned on line and then duplicate items were made by the students and completed so that each child in both communities could have them as final projects to display and keep.

In addition to the videoconferencing events the teachers scheduled, they had unlimited opportunities to work synchronously and asynchronously over the course of the fifteen month case study. The teachers frequently spoke to each other on Saturdays by telephone. When these conversations pertained to the research project, Teacher B would call me to report what they had discussed or were planning.

The teachers often informed me by email or phone when they planned to work online. The ability to digitally capture many of these interactions provided valuable data about the explicit interactions, dialogues, and decisions of the teachers during the project. This video record of *how* the teachers worked to build the pedagogical structures they would subsequently implement in the virtual classroom became an invaluable tool in revisiting these events with the teachers to gain further insight regarding their thinking.

Challenges for the study

Part of the difficulty in working with two teachers located thousands of miles apart was the necessity to secure airline reservations and accommodations to Israel at least a month in advance while awaiting IRB approval to initiate the project. Another issue that complicated the process was the fact that in 2007 Easter recess and the Israeli holiday for Pesach (Passover) did not occur simultaneously. From March 26, 2007 until April 11, 2007 both teachers were either on holiday or unavailable. With the close of school in Teacher B's community scheduled for the first week in June there was scant time to waste. I made the decision to work with Teacher B in the American school prior to my departure and then to travel to Israel and repeat the same process until I received the official IRB notification.

Timeline of study

The purpose of this timeline is to provide the reader with an overview of the events as they occurred during this fifteen month study. It introduces the reader to the natural history of the study: The teachers' initial introduction to the CTMX platform they had been asked to learn to use, the journey they embarked upon to accomplish the task of *taming the technology*, the processes they enacted to *build bridges* of collaboration, and the *traffic* that was produced as a result of their efforts. This final category describes examples of explicit artifacts that were produced by the students as a result of the teachers' planning and implementation. It also presents the less tangible account of how the teachers consistently worked to craft pragmatic strategies for integrating the affordances provided by the technologies into their pedagogical approaches to the IBSP curriculum.

The following chart offers a visual overview of the timeline of this fifteen month case study:

Preliminary Preparation: March-April 2007

USA: March 2007

Researcher installs software and hardware Trains Teacher B Researcher travels to Israel

Figure 1: Timeline of study

Continued

Figure 1: Continued

Israel: April 2007

Researcher installs software and hardware Trains Teacher A

Teachers work with researcher to become acquainted with CTMX platform and multimedia applications.

April-May 2007

Teachers work online together using desktop CTMX platform. Teachers explore variety of multimedia applications.

April 25th videoconference

Evaluation and planning sessions occur almost daily online.

May 14th videoconference Teachers continue working together online using CTMX platform.

May 29th videoconference. Teachers take end -of-school break until mid-June.

June-July 2007

Teachers work together online to plan for professional development seminar for Israeli and United States teachers in early July.

Teachers identify limitations of technology and their ability to master the tools for their purposes.

Continued

Figure 1: Continued

Teachers discuss how they will integrate CTMX platform into their pedagogical work during next school year with students. The Icelandic experience proves to the teachers they can control the technology.

October-December 2007

Teachers resume online sessions in October to plan for videoconference in November about play, *Anne Frank*.

Teachers plan for December visit of Teacher A and Israeli art teacher to Teacher B's classroom. Develop art project about *Light* and *Hope*.

Teachers discuss future plans for developing artifact box and Holocaust book online as part of *Roots* project.

Teachers plan for remaining months of school year and develop plans for additional videoconferences in February, March, and April.

February-June 2008

Teachers work online in January to plan for February videoconference. During February videoconference students present December artwork and talk about their artifacts for the Roots project.

Teachers work online in January to plan for February videoconference.

During February videoconference students present December artwork and talk about their artifacts for the Roots project.

Continued

April videoconference is not accomplished due to technical difficulties.

March videoconference continues dialogue between students about IBSP questions and Roots project.

In June teachers have evaluation session with researcher to reflect on the project and how they will use technology to teach the IBSP curriculum and other subjects in the future.

March, 2007: Working with Teacher B

In mid-March, 2007 I began working with Teacher B (the American teacher) to acquaint her with the hardware and software applications that would be used in the project. Because the IRB approval had not yet been received, I was limited to installing the technology and supporting Teacher B's efforts to become acquainted with its applications. During this time no data was collected. However, in my effort to develop a trustworthy relationship with Teacher B, it was important to use this opportunity to be present in her classroom and establish my identity as a professional researcher who was genuinely interested in her engagement with the students.

Over the course of the two weeks we had numerous opportunities to discuss Teacher B's questions about the technology and what I planned to do in Israel. Teacher B shared her impressions of Israeli culture and her previous visits with Teacher A's family and her visits to the Israeli classes. It is interesting to note that on these occasions Teacher B never asked questions about Israeli politics or religion and always framed her inquiries about Israel or Israeli society in terms of its cultural framework.

April, 2007: Working with Teacher A

On April 9, 2007 I traveled to Israel. The day I arrived Teacher A and I had arranged to meet for lunch to discuss the first week's schedule. Although we had tried to develop an agenda by telephone and email prior to my arrival, Teacher A was reluctant to make definite plans. I assumed her focus had been directed to her family and the holidays that had just concluded and did not press for greater detail. When we met, Teacher A immediately told me she was involved in planning a birthday party for her mother on the following weekend. She said I would be welcome to come to the school, but she would be too busy to work with me until the following Sunday. I was somewhat dismayed, but chose not to push her beyond securing an invitation to visit the school campus the following morning to reintroduce myself to the principal (whom I had met previously), become acquainted with the computer lab teacher, and try to begin to install the hardware and software for the project. Teacher A agreed this would be possible and offered to meet me the following morning at the front gate of the school campus. My plan was to repeat the process with Teacher A that had been initiated with Teacher B. In both locations I introduced the teachers and their technical support staff members to the processes required to install the desktop camera, the videoconferencing software [Click-to-Meet] and the required audio and video adjustments that would facilitate the operation of the system. Because of the significant time difference between Israel and the United States (six or seven hours depending on the time of year) cameras and the software applications were also installed on the home computers of the teachers in both locations in order for them to be able to work more comfortably late in the evening or very early in the morning.

As previously stated, technical support for the teachers had been secured in both locations through the cooperation of the local school administrators. In Israel there were two individuals who were available to assist Teacher A. The computer lab teacher at the school offered her assistance and the Microsoft certified technician who, in addition to a full-time position at a private company, had been hired part-time by the school to address major hardware and software issues. He was also a member of the same kibbutz as Teacher A.

At the request of Teacher A I visited this person and his family on the first night I was in Israel to acquaint him with the program and secure his willingness to assist us. I was unfamiliar with the particular kibbutz entrance and made the mistake of driving into the military installation that was adjacent to it. ¹ Although I was not immediately aware

¹ This seemingly benign act served to highlight how an insufficient command of the spoken language and unfamiliarity with cultural norms can result in unanticipated outcomes. During the day most kibbutzim gates are open. At night, the gates are manned by guards and access is permitted only when the individual whom you are visiting confirms you are an invited guest. This can become problematic when a military installation is located adjacent to a kibbutz and the gates are indistinguishable.

this 'testing' was a part of how those with whom I was interacting were assessing my trustworthiness, technical knowledge, and respect for them; in retrospect, over the course of the first week, several events involving Teacher A eventually served to confirm this observation.²

The Israeli school campus is located on a kibbutz that is situated along a major highway that extends from Tel Aviv to the Lebanese border. Entrance to the school grounds is only permitted through a secured gate that is manned by two armed security guards. In order for me to enter the grounds it was necessary for Teacher A to personally come to the gate and verify who I was, why I was asking to be allowed access and how long I would be on the property. As the weeks progressed, the guards became increasingly willing to allow me to enter, but each time I brought equipment or was carrying items into the gated area, I was asked what they were and the guards carefully examined the packages and boxes. Greeting the guards in Hebrew, or any other pleasantries that were exchanged, did nothing to disrupt or dissuade the intensity of their scrutiny.

Although she was very quick to note that she was "not afraid of computers", Teacher A readily admitted she had only used them to connect with her grown children through email and Skype when they traveled outside Israel. When she invited me into her

² There were several occasions during the first few days I was in Israel when various forms of testing occurred. In this instance, I am referring to the importance of conveying to the individuals with whom I was working that I understood how necessary it was to quickly learn the cultural and community rules and follow them. Because of the unique security requirements that are an inherent component of every location, public or private, in Israeli society, I also had to be prepared to demonstrate my willingness to recognize and abide by the same requirements they honored in order to establish a level of credibility and a sense of acknowledgement of the specific rules of engagement for schools, kibbutzim and life as it is lived in general within Israeli society.

classroom on several occasions as the week progressed, it was obvious the computers were obsolete and were not being used. When her students wanted to have access to the Internet they went to the computer lab that was open and accessible to all students even when other classes were being conducted.

Over the course of the next week as I became-acquainted with the faculty and administrators, Teacher A and I began to develop a more open, casual relationship. During the course of the school day, she would visit the computer lab and ask me to show her how to do simple tasks such as making a document in Word, creating a folder, saving a folder and scanning documents to attach to email files. One day as we were working she disclosed:

Teacher A:	Okay. So now I am going to tell you because=
Researcher:	=Okay.
Teacher A:	The mechanic thing,
Researcher:	Right.
Teacher A:	I really need more time; we need to practice. Okay?
Researcher:	Okay, that is <u>very</u> important!
Teacher A:	We need to practice more
Researcher:	Okay, that is what I am here for; that is what we will do.
Teacher A:	Okay! But as long as what you want to know that is how I from
	the point of I don't know nothing.

Almost a week after I had arrived, the entire school had a very moving memorial program to commemorate the Shoah (Holocaust). As we walked back from the ceremony, Teacher A began to ask me how I felt about being Jewish. This was the first time she had brought up the subject and we shared a very forthright discussion.³ After this frank, brief exchange, Teacher A returned to her classroom and I met with the principal to discuss the project and its possible implications for future use at the local level, with other Israeli schools, or in international settings. About midway through the discussion, Teacher A reappeared and entered the conversation. She wanted to know what was being discussed generally, and what had been discussed that was directly applicable to her. As I subsequently learned, the teacher's behavior was encouraged by the principal as a measure of building an open environment for interaction and would not be considered inappropriate within the school culture. I began to feel that I had much work to do to make certain Teacher A recognized I was willing to work within these guidelines and was supportive of this level of transparency.

Working together

Once the hardware and software became operational in each classroom, the teachers had the opportunity to work with the technology individually as well as when the

³ On another occasion Teacher A used the context of the commemorative ceremony for the Shoah (Holocaust) to ask me about my sincerity and affiliation with Israel and the Jewish people. Although Teacher A's parents were not Holocaust survivors, as young émigrés they had chosen to live on a kibbutz that had been founded by survivors from many countries in Europe. Teacher A expressed her sensitivity to the difficulties these individuals had endured and stated forthrightly she was testing me regarding my understanding of how this shaped her identity and that of the Israeli society in general. During our very frank conversation she shared with me that Israelis frequently categorize American Jews as adopters of a romanticized view of Israeli life that is naïve and inconsistent with the realities of Israeli citizens' daily lives. After this disclosure, I assured Teacher A I was aware of her sensitivities and that the Shoah held a very specific meaning for me personally as a Jewish woman and as a human being.

researcher was present in their home and school locations. Before attempting to connect with their partner using the CTMX platform, both teachers had worked with me for approximately two weeks in both settings to become familiar with the programs and the technical requirements of the software. During this time the teachers began to explore the multiple applications that were available to them in the Click-to-Meet software. These applications included simultaneous access to the Internet, the sharing of applications such as a whiteboard, Power Point and streaming video, and the ability to collaboratively construct a document. When it became possible for them to begin to work together online, the teachers attempted to make a simple document by copying and pasting text and graphics from a web page, create short videos with the video camera that could be sent as email attachments, and retrieve a document from their local computer to share and work collaboratively to construct. On one occasion while Teacher A and I were working at her home, she asked a series of questions that clearly indicated how she was beginning to understand the possibilities the technologies could provide for accomplishing tasks both teachers found relevant and wanted to implement.

Teacher A: I have the possibility to write something online and we can discuss about it online. Or I can bring something from a computer and show her, right?

Researcher: *murmurs agreement*

Teacher A: What I did and whatever. And we have the possibility also to go to the website.

Researcher: *murmurs agreement*

Teacher A: To bring it and we can discuss about the website, right?Researcher: *murmurs agreement*Teacher A: Okay.

During the third week in April, 2007 upon receipt of the IRB approval, the teachers connected several times with their partner by videoconference for approximately one hour per session. During this time the teachers' sessions were extremely relaxed and informal. Most of these sessions occurred late in the evening (23:00) for the Israeli teacher and after school (16:00) for her American counterpart. Occasionally, the teachers would connect in the early morning [06:30 US/EDT] when the Israeli teacher was still at school.

At this point in the research project the teachers said they were becoming comfortable in using the CTMX platform and began to discuss how they could start using the CTMX technology with their students. After much discussion the teachers decided to try to conduct a videoconference between their students before I was scheduled to leave Israel. They worked together over the course of several sessions to prepare an agenda that would include student interactions and could demonstrate some of the functions the CTMX software program made possible. (These strategies are discussed in chapters four and five.) They also invited teachers and administrators to observe this event as a means of demonstrating what they were doing in the research project. The date they chose to attempt this session was April 25, 2007.

April 25, 2007: First classroom videoconference

Although the videoconference was successful on many levels, significant problems with the technology became evident to the teachers and the researcher that would continue to confound their efforts to achieve the fully operative virtual space they had initially envisioned. The actual participation in a virtual/ visual space also brought new issues of language, classroom management and culture to the foreground. With this new insight and awareness, the teachers began working to identify procedures and strategies they felt would allow them to proceed using the CTMX software to connect their classes. (These problems and remedies will be discussed in subsequent chapters.)

May and summer, 2007

After three weeks in Israel, I returned to northeastern Ohio on April 26, 2007. At this point in the study the teachers had produced their first classroom videoconference and were working online with each other on a daily basis. Although they continued to express uncertainties about their ability to use the CTMX program, the teachers planned two additional classroom videoconferences on May, 14, 2007 and May 29, 2007 before Teacher B's school year ended. (A full description of these interactions will be presented in chapters four and five.)

Over the ensuing summer months, (Teacher A's school year ended in late June) the teachers continued to work together from their desktops at home to evaluate their experiences to date, organize a summer seminar for their fellow teachers, and make plans for videoconferences in the next academic year. Both teachers continued to work with the equipment in a less structured format and frequently invited the researcher to join them virtually. A portion of the videoconferences and the data they exchanged during the summer was captured on video and audio; the teachers also provided me with additional commentaries and insights about their occasional telephone calls when I was not present.

In July, 2007, the teachers spoke by telephone because Teacher A's home computer was not functional. During that lengthy discussion the teachers began to describe in detail how they wanted to incorporate the virtual classroom technologies into their future pedagogical practices. They spoke about how they were considering changes in their teaching practices during the next school year regarding the IBSP curriculum as a result of the availability of this virtual, visual connective space and their emergent understanding of its possibilities and anticipated limitations.

This was the first occasion when the two teachers actually discussed and began to confront the limitations imposed on them by the current CTMX technology. The teachers were beginning to realize they were attempting to use the CTMX program and its component parts far beyond its design capabilities as a desktop videoconferencing with a small camera and microphone. In response to these limitations the teachers spoke with me and the technology support individuals in their local schools, and began cataloging the additional equipment that would be required if they were to continue with the project. They identified the need for upgraded, faster computers, improved broadband capacity in the Israeli school, and better visual display equipment. In response to what the teachers' had learned, Teacher B shared with Teacher A her plan to seek a grant from a local foundation for a laptop computer (PC) that could provide the required operating capacity to support the CTMX platform. Both teachers agreed that technical support was essential

because, although they were comfortable with their ability to facilitate their personal desktop conferences, when they were working with the students they needed to have a technical personal present to troubleshoot and minimize distractions for the students.

By the time the teachers returned to their classrooms in late August, the technicians from Radvision and Communications III had succeeded in identifying the technical limitations of the CTMX platform and made specific suggestions to upgrade the audio transmission by using multipoint microphones. When the technicians' suggestions regarding the upgrades in equipment were given to the teachers, their response was to immediately begin to plan how they could share this information with their local school administrators to request these and the previously identified upgrades to their hardware and software requirements.

The teachers' experiences over the summer encompassed their successful desktop interactions, a creative collaboration to help Teacher B be present at the birth of her first grandchild while she was participating in a science seminar in Iceland (described in chapter four), and their decisions to actively seek better equipment in order to continue their online activities with their students. I believe the teachers' actions were a remarkable demonstration of how far they had progressed in their understanding of the technologies as tools and their own ability to mange them for their practical work.

Throughout the 2007-2008 school year the two teachers routinely accessed this technological bridge to plan pedagogical and curriculum strategies for teaching the IBSP curriculum. In October the teachers carefully scripted an upcoming November videoconference. The teachers collaboratively addressed a number of issues they had

identified and developed strategies for resolving them. These included the number of students who would participate in each session, the topics they wanted to discuss and how the actual session would be mentored by the teachers.

The teachers developed plans for the December visit of Teacher A and the art teacher to Teacher B's northeastern Ohio classroom. The three teachers decided to introduce an art project incorporating the concept of light as a message of hope and communication. They wanted to establish this template for future projects for the IBSP curriculum in order to demonstrate how the CTMX platform could be used to provide a virtual classroom space for engagement by students in multiple locations. This interaction was particularly important for all the teachers and students because it provided everyone with an opportunity to discover how language is heard and understood differently within various cultural groups.

Finding the flashpoints: Digging in

Over the fifteen months this case study was enacted, there were several revealing moments that illuminate *how* this project evolved. Conceptualized as the work of *taming the technology, building the bridge* and *designing the traffic*, they emerged as the central sites for inquiry and analysis. *Taming* refers to the work whereby the teachers were able to surmount their initial fears and insecurities regarding the technologies and come to an understanding, personally and collectively, *they could manage the tools*. It wasn't an easy journey for them. In fact, it was one of the most difficult aspects of the entire project. Their taming is taken up in chapter four.

Once the teachers began to understand the technology and its limitations, they worked collaboratively to construct projects and organize their videoconferencing sessions to accommodate these discovered limits. Their organizational work is characterized in *Building the Bridge*. This dynamic process was intimately intertwined and connected to the previously identified task of the teachers to bring the technology to a measure of control and practical use. These tensions, discussed in chapter five, resulted in an enfolding process that was continually evolving and occasionally became exhausting to the teachers.

As a result of the teachers' increasing ability to work effectively with the CTMX technologies to plan and execute the programs they developed, there were numerous artifacts that were developed during the fifteen months the project was enacted. These artifacts, the tangible and often intangible evidences of what was produced have been referenced as the *Traffic*. Examples of the intangible, more subtle strategies they constructed can be discovered throughout the study; they are particularly evident in the preparations the teachers produced for the February, 2008 videoconference, described in chapter five.

The use of videoconferencing in combination with multimedia applications to establish a virtual, visual space is not unique to this study. As evidenced in the literature and demonstrated in the CoVis project developed by Pea et al (1995), the use of technically-mediated, visual environments to connect teachers and students from diverse locations for collaborative work has been increasingly adopted by educational technologists and members of the educational community. The introduction of innovative technologies is often touted as a panacea for educational transformation and the enhancement of current teaching and learning practices. What appears to be missing from the literature, however, are practical, locally situated examples of the actual work of teachers who attempt to adopt these technologies and integrate them into their pedagogical practices.

The questions this naturalistic study seeks to address are along these lines. They are: Given the opportunity to work with connective, multimedia videoconferencing tools, what strategies did the teachers construct to master the use of a technically-mediated visual space and bring its' use to a measure of control and purpose in their classrooms? How did the teachers work together to negotiate the integration of their local worlds with the virtual platform and what pedagogical and curriculum strategies did they construct as a result of their interactions using the technically-mediated space as both a workspace for planning and a virtual classroom?

Salomon and Almog (1998) have suggested what is actually required for new learning practices and environments to develop are "a number of major shifts –a conceptual and cultural shift from teacher-led instruction to an interactive community of active learners" and movement "from a highly structured curriculum to an emerging, often improvised one …"(1998: <u>http://vnweb.hwwilsonweb.com</u>). This naturalistic study attempts to describe the actual practices of two teachers who chose to introduce the use of a technically-mediated, visual platform into the practical world of their classrooms. What the teachers learned about the tools and their ability to bring them to a measure of control has direct implications for beginning to realistically determine how the virtual spaces
these technologies establish might provide a contextual platform where 'major shifts' could be carefully considered and constructed by the participants actually involved in their use.

Chapter Four: Taming the Technology

Iceland as metaphor

The work of taming the CTMX technologies and integrating them into the curriculum was the practical organizational task for the teachers and the project. These tasks involved learning to actually use the hardware and multimedia applications, thinking about how these applications could be used pedagogically within a virtual, visual space, and understanding their-limitations. Although they had worked together for the previous four years in teaching the International Book Sharing Program (IBSP) webbased social studies program, the teachers recognized there would be difficulties in trying to conduct their exchanges and planning sessions in a new and unfamiliar technically-mediated, visual space. The teachers reported they were concerned about their ability to master these unfamiliar hardware and software components, but were willing to try. As Teacher A so aptly said, "I'm not afraid; I had no idea what was going on."

In the summer of 2007, four months into the research project, a seemingly unrelated event occurred that displayed the teachers' efforts to *tame* the technology and bend it to their purposes. Teacher B had been selected to travel to Iceland for a science seminar for elementary and high school teachers before she discovered that the family's first grandchild would be born sometime in late July, while she would be attending the seminar. Her dilemma was evident, and both teachers then devised a plan for incorporating the technologies they had been using during the research project to connect Teacher B with her family during the birth. Teacher B coached her husband, an engineer, in using the photographic capabilities of the cell phones and digital camera to transfer pictures via email as the birth was occurring. This enabled her to be present in the delivery room via cell phone and speak with her family as the entire birth evolved. At a later time, Teacher B transferred the pictures she had received to Teacher A and spoke with her by cell phone to relate her elation at becoming a first-time grandparent.

Although the teachers were not working within the Click-to-Meet (CTMX) platform, their use of cell phones and email with graphics constituted another form of interaction in virtual space. The knowledge the teachers had acquired as a result of their experiences in using the technically-mediated, visual platform (CTMX) provided them with the confidence to adapt the materials at hand to their own practical purposes. The results of their persistent determination to actively address the challenges imposed by the technologies were now being evidenced in their ability to craft realistic, practical solutions within their immediate life worlds.

Learning from past failures

The strategies the teachers devised to connect Teacher B with her family were the direct result of previous technology failures they had experienced and the subsequent solutions they had devised. Prior to July, both teachers had endured months of frustrations in trying to work with the technologies. Although the CTMX technologies were not available to Teacher B in Iceland, both teachers' previous experiences with the

CTMX platform and the knowledge they had acquired coalesced into a toolkit of competencies and strategies they could access to accomplish their teaching and learning goals. In this scenario the teachers, removed from the professional tasks they had initially been asked to address, were proving to themselves they had begun to master the technologies and were capable of bringing them to a measure of control. In July, as this experience evidenced, the curtain of fog began to lift. This convergence between the ordinary worlds of the teachers and the virtual space they devised was a benchmark moment in the study. It represented an identifiable transition by the teachers from neophyte to a level of competence in their approach to the technologies that is similar to the pathway described by Lave and Wenger (1991) regarding the progression from apprenticeship to more experienced levels of competency.

Perhaps, as we began the project, it was more beneficial for the teachers not to be aware of the technical barriers that had to be overcome. However, as the person responsible for actually establishing this operational space, my immediate goals were to establish a viable platform in both locations, support the teachers' efforts to learn to use the CTMX software, and acquire competent, reliable local technicians to assist them in their efforts. ⁴Without an operative, technically-mediated, visual platform where the teachers could interact, there would be no possibility for this case study to proceed.

What were we building?

The essential components of the technological floor for this project had to provide teachers and students with reliable access to the Internet where they could synchronously

⁴ Neither teacher was aware of the sophisticated technical structure of their local school systems. They had no knowledge of the firewalls, hardware infrastructures and other barriers that could impact and interrupt their efforts during the course of this project.

exchange information, interact face-to-face with individuals in distant locations, stream video, and simultaneously construct documents incorporating a wide variety of graphical artifacts. In an effort to locate the study in the practical world of current classrooms, this study was designed to combine equipment that was currently available in each local school with accessible, affordable upgrades such as inexpensive eyeball cameras with audio capability.

In Israel, when the project started in April 2007 Internet access through ADSL (a high speed telephone line used for Internet access) was provided by the kibbutz where the school was located. In the United States, the schools had T1 cable access provided through their county-wide consortium technology center. The computers available to Teacher A were Dell Pentium IV's; Teacher B's classroom computers were Apple/Macintoshes. But the CTMX software supported PC's only. This obstacle to hardware compatibility was circumvented by providing Teacher B with a Sony Vaio Pentium IV laptop owned by the researcher. Teacher B used her own desktop PC at home with a T1 upgraded connection capable of providing faster Internet speed. I supplied the teachers (no charge) with inexpensive, eyeball Logitech cameras capable of supporting audio and video. The cameras were connected to computers using high speed Internet connections that were available in each teacher's home, Teacher B's classroom, and Teacher A's computer lab. When videoconferences were conducted with the students, large screen projections of the visual images captured on the computer were displayed through a digital projector on a classroom wall or movie screen. In the autumn of 2007, the Israeli school purchased a flat panel HDTV and used it as the display monitor. These

hardware options provided the teachers with the flexibility to use the desktop format for individual or small group interactions and the HDTV or digital projector during classroom videoconferencing sessions.



Figure 2: Teachers using desktop format



Figure 3: Teachers using classroom format

Introducing the teachers to the technology

In March 2007 when the required hardware and software applications were initially installed on Teacher B's home and school computers, Teacher B indicated to me her anxiety about managing the technologies and being able to actually remember how to perform each step. In an early session with Teacher B in her home, I introduced the video/audio software available on the Logitech camera to her and she practiced making short videos she could send to her daughters. Teacher B took notes as a security measure against forgetting critical procedures and suggested her anxiety was primarily derived from her sensitivity to criticism and embarrassment within her local school culture. I worked with Teacher B in school and at her home for the last two weeks in March. During these sessions she practiced logging in to the CTMX platform site, making the necessary audio and video adjustments on the camera, and working with the multimedia applications it provided.

In early April, when I arrived in Israel and repeated this portion of the training process with Teacher A, her concerns about her ability to work competently with the technologies became immediately evident and are captured in the following dialogue:

Teacher A:	Okay, now we are in my home and I am trying to run all the new
	equipment. In a few days, I will be the professional.
Researcher:	That is right.
Teacher A:	Maybe I can give a lecture on it, to guide*Laughs*
Researcher:	Record video. Okay? If you wanted to take a video
Teacher A:	Okay.

- Researcher: So there you are. Alright, now remember that this gives you, see this icon right here?
- Teacher A: Okay =
- Researcher: =Okay. ... now you can go and you get your thing and you can make a video. Same thing at school. Okay? Your kids can make a little video and email it to each other.
- Teacher A: Okay.
- Teacher A: This I have to click for the camera, Okay?
- Researcher: Now click it. Double click it. Now there is your whole toolbar. Now, click that.
- Teacher A: Okay. Now, if we want to start, I have to click here?
- Researcher: Yeah. Record video; means make a video.
- Teacher A: Yeah, but I have to click it now? =
- Researcher: =<u>Yeah</u>. You have to click it so you are going to do it again.
- Teacher A: Okay. Of course... yeah. So... now, where I stop?

Researcher: You click stop.

Teacher A: Ahh... that is it. The same

While the teachers were working individually with me I encouraged them to access the CTMX platform and attempt to work with the multimedia applications it provided. These included access to the Internet that could be synchronously viewed in all locations connected through the CTMX program, the sharing of applications such as a whiteboard, Power Point and streaming video, and the ability to collaboratively construct a document from multiple locations. As a strategy for supporting and encouraging the teachers to practice using these new technologies, I encouraged them to make a variety of documents, add graphics, make short videos and email them, and begin to connect with me or other individuals in their school using the CTMX platform to discuss topics of interest to them.

In spite of their initial anxieties, both teachers quickly recognized they could login to the Click-to-Meet (CTMX) conference software application with relative ease, use the desktop camera's software to create a short video and email it, and began to explore the more sophisticated CTMX software applications.⁵ Within a short period of time, both teachers stated they were becoming marginally comfortable in working with the required hardware and software components.

During this initial stage of the study, the technologies were still novelties to the teachers. Teacher A took great delight in making short videos with her fellow teachers and encouraged them to email the videos to friends extolling the virtues of this new technology now at their disposal. She was particularly interested in demonstrating this technique to the ESL teacher who was a personal friend. After Teacher A's demonstration, the Israeli teachers began to discuss how they could use this with their

⁵ The videos the teachers made were essentially short soliloquies relating the fact they were able to make a video email message. Once Teacher A and the Israeli ESL (English as a Second Language) teacher became comfortable making the videos and emailing them to each other, they recognized the value this technology could provide for promoting dialogue and interaction between their students. The ESL teacher observed that for her students, developing videos for their partners about a question or topic would be an excellent tool for enhancing their ESL skills.

The teachers worked collaboratively to teach each other how they could use the CTMX platform to access the Ghetto Fighters' House Museum's (GFH) website and synchronously view the displayed pages, locate and retrieve additional websites, share the podium (term used to describe how individuals request permission to share the screen being simultaneously viewed through the CTMX platform), save the documents they had made and practice retrieving them, and use the textbox to write messages they could capture and print.

students in both the IBSP curriculum and as a tool for encouraging their students to use their English language skills to make short videos and exchange them with their friends. (In the Israeli schools the teachers often work collaboratively to reinforce pedagogies they feel will benefit students.) As Teacher A began to become increasingly familiar with the CTMX software, she indicated an enhanced understanding of what the technologies could provide to her that until now had not been possible. She characterized her growing awareness of the possibilities as, "…ideas began to fall like rain. They became oil to my wheels."

The international coffee house

Once the IRB approval was received, the teachers began using the CTMX platform to connect with each other almost daily. They brought their coffee cups to their computers and established their own International Coffee House where they could freely interact. On most occasions, because I was in Israel, Teacher A invited me to her home and I was able to observe the teachers as they discussed how they would prepare lessons to teach the IBSP curriculum and prepare their local students for future videoconference sessions.

In an early online session, the teachers searched the archival site provided through the Ghetto Fighters' House Museum web site (http://www.gfh.org.il/) to locate graphics and information that were applicable to the IBSP curriculum. Because the Internet sites were simultaneously visible to both of them, they could discuss the merits of the site and each teacher could request control (share the podium) to cut and paste information to a text document they were synchronously developing online. The CTMX platform allowed the teachers to simultaneously view the document they were constructing, discuss what they wanted to change, and immediately incorporate these modifications into their work. The teachers frequently made pedagogical suggestions to each other about what to do with the students during the sessions based on what they were learning about the CTMX platform's capabilities.

In one session Teacher A made a suggestion about using maps of Ohio, Israel and possible locations the students in both classrooms might visit over their summer vacations. The teachers had been locating various sites on the Internet as a beginning point for introducing the students to what would be possible for them to do using CTMX platform:

Teacher B: Alright...okay. (Nods head)

Teacher B: We could probably even show the Ghetto Fighters' page.

Teacher A: Alright. Yes...

Identification of a time period that could be mutually convenient for the students and teachers to work online was a significant barrier for the teachers to overcome. As the teachers continued to use the technologies, they often remarked that the virtual, visual space was becoming increasingly transparent to them. On one occasion the teachers decided to try to connect by themselves without the presence of additional technical support. They were successful, and after the session Teacher A called me to report, "The NASA team has landed!" She reported that during this conference, when the connection momentarily failed, Teacher B called Teacher A on her cell phone and walked her through the process to reconnect. Teacher A was successful and the teachers resumed planning for their first videoconference with the students scheduled for April 25, 2007. Generally, the planning sessions lasted about an hour. Beyond this length of time, both teachers often complained of fatigue. These planning sessions were the teachers' first taming field.

The teachers continued to express their sense of vulnerability regarding their ability to effectively use the technologies. As Teacher A said, "It's the mechanics thing. You need much more time...need to practice." Teacher A encapsulated both teachers' anxiety about using the tools when she described her fear of technology and her preference for paper and books on the shelf. "For me, I am uncomfortable, we belong to the 'old age'... we don't trust the technology. People like us, don't feel comfortable with technology." She further explained her sense of this digital divide between her students and herself by drawing an analogy to the classroom work of creating folders and the children's questioning about why they had to physically place papers in a folder when they already had the work saved on their computers. As she stated, "It's a way of dealing with computers. Children are thinking differently about how to represent information and knowledge." In order to continue to build a sense of trustworthiness about the project and convey genuine interest in their concerns about the technology's performance, I felt the issues the teachers were voicing had to be resolved in a timely fashion. In response to the teachers' anxieties I repeatedly explained that the research project had been designed to provide support for them from the researcher, their local technicians, and the Communications III support team in Columbus, Ohio where the server housing the CTMX program was located.⁶ What they were not aware of at this time were the additional technical resources that would be brought to this effort on their behalf.

Learning more about the tools

Prior to the study, the teachers' experience with videoconferencing had been limited to two events (introductory and summative) per year. On these occasions the equipment was controlled by technicians from a local college (Israel) and the countywide school technology consortium (US). The teachers had not been responsible for facilitating the technical requirements of the sessions. In contrast, during this case study the teachers were required to take an active role in learning how to use the technologies and actively control them during the classroom videoconferences. These early sessions were instructive to the teachers on several levels: They had to learn to use the equipment and began to experience both failure and success, they were required to draw conclusions

⁶ As noted in chapter three, the technical support teams I had recruited had agreed to participate in the research project to the best of their time limitations and expertise. All participants were provided with the required contact information for everyone involved in the technical support of the project including the support personnel (who had agreed to be available for troubleshooting the equipment) at Communications III in Columbus, Ohio where the server was housed. In addition to these resources, all members of the technical team were informed they could access the OIT Telecommunications & Networking team at The Ohio State University for additional support with specific audio and video problems.

and make evaluations of these experiences, they had to develop strategies to accommodate the use of the technologies, they had to test their strategies on themselves and in the real world with students, and finally, the teachers had to reconcile their previous expectations of what the technologies could do with the realities and limitations they had discovered.

The CTMX platform made it possible to capture what the teachers were doing as they listened and adapted to each others' requests, suggestions, and ideas. Before the project began, the teachers had primarily spoken with each other by phone or email; now it was possible for the teachers to see one another, read facial expressions and gestures, hear the inflections in the voices of their partners, infer meaning from these observations, and construct responses based upon what they had observed. Blumer (1969/1998), Goffman (1959/1967), and Schutz and Luckmann, (1989) have argued that these characteristics are the bedrock of developing understanding and establishing real connections between individuals and communities.

Often, when the audio delivery was not fully comprehensible or delayed, the teachers were particularly frustrated. This was more of a problem for Teacher B because she generally waited for Teacher A to stop speaking before replying. As a result of the transmission delays, Teacher A often initiated her talk before she had actually heard Teacher B. Teacher A was working on the visual cues Teacher B was giving (i.e. nodding her head in agreement) as an indication she had completed her talk without actually hearing her completion.

A representation of how the teachers identified limitations with the technological tools they were using and worked collaboratively to resolve them can be found in the following example. [The teachers had just connected using the CTMX platform; as they initiated their session they were making minor adjustments to the camera and audio settings. This practice had become part of their routine behavior before each session.]

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Teacher B: Teacher A, can you put your camera lower? I can't see your face...just your eyes.
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(Delay...screen freezes...Teacher B waits.)

Teacher A: It's very humid here.

Teacher B: (Teacher B nods to Teacher A and resumes speaking after she begins to hear what Teacher A is saying.) Is that right? It's warm here...about ninety degrees Fahrenheit, not that humid.

Teacher A: We are living in the jungle. (Teachers laugh)

(Teacher B's computer freezes, she goes off-line and attempts to reconnect.)

Teacher A: Where is Teacher B?

Researcher: She will reconnect.

- Teacher B: (Reconnects) I understand... (frame freezes)
- Teacher A: (Asks technician in Israel who is present for help with echo in audio.)
- Teacher B: Do you have echo?
- Technician: You are getting interference...I don't know where it is coming from.

Teacher B: Sound coming through clearly, so is picture. I'm hearing you...maybe it will get better, let's just keep going.

To mitigate frustrations, Teacher B developed several strategies for accommodating these delays and overlaps which she described to the researcher.

Teacher B: When, when it was really exhausting I think, to sit down at the computer and, and wait for her to respond, and then for me to respond. _____ and I would lose ____. Usually can figure out what she's saying and she can figure out what I am saying. You know,*laughs* when neither one of us want to be rude so, you know, you are waiting to see who is going to go next, so we probably need to work something out that way. And I have been trying to do it visually. I have been trying to shake my head yes when she is talking to let her know; that has helped a lot. She, uh, when we were working out our problems, when you weren't there, she was typing on there.

Researcher: But the (text) box is beneficial.

Teacher B: Yeah. And then, too, the other thing I think she doesn't realize and I don't have that problem because, you know, my family is not at home. But I don't think she realizes the background noise.

During a planning session just before their April 25, 2007 videoconference, Teacher B shared her strategies for dealing with audio delays and interruptions of talk with

Teacher A: (1) speak slowly and distinctly; (2) use words that can be understood by non-English speakers; (3) wait until you actually hear what the other person is saying and they have completed their talk before replying; and (4) Remember there can be a delay and the other person has to wait to hear what you are saying. Both teachers decided to introduce these ideas to their students by encouraging them to practice speaking clearly and slowly using small words and waiting until the person speaking had come to completion. Before the first classroom videoconference, the teachers shared these strategies with their students. Teacher B explained her ideas to her class using the following metaphor:

Teacher B: ...(one)way street...voice only goes one way...and get to the end of the street...the road has to be clear. Same way coming our way...road has to be clear. If both people end up talking at same time it's like a head-on collision...nobody goes anywhere. They don't hear us, and we don't hear them. So you need to pause, and wait...and give them time for the voice to get over there and then for them to respond.

As the teachers listened and adapted to each others' requests, suggestions, ideas, and the technology, they were usefully discovering what was required and the adaptations they would have to make to the limitations imposed by the technologies if they were going to successfully use this virtual, visual space for face-to-face interactions. Because of their successes in working together and resolving these initial disruptions, the teachers decided they were comfortable in moving forward with their plans to use the CTMX platform and multimedia tools with their students in the videoconference they had scheduled for April 25, 2007, the last day I would be in Israel.

In the real world: April 25th

My intention in locating the research project in the practical world of the teachers was to use hardware and high speed broadband connections for Internet access that were currently available in both school locations. Each school was equipped with digital projectors to display computer screen images on a classroom wall (Israel) or movie screen (USA). But because the CTMX application is primarily designed to work as a desktop communication tool, its limitations for use in a classroom setting became immediately evident when the teachers attempted their first videoconference involving students.

The teachers' careful planning for this initial event included student nametags that would be visible to their onscreen partners and having each partner pair introduce themselves and briefly tell something about their families. In each class one student would locate their school on the Google map and then go to a previously book marked website to tell more facts about each location. Teacher A's students would share the video they had made about their school and their kibbutzim. If time permitted, the session would conclude with a discussion by the students about the "postcard project" they had collaboratively created earlier in the school year.

The broadband and ADSL connections were severely strained because the videoconference was occurring during peak usage hours in Israel (after school had finished and during the workday) and while schools were in session in the United States.

This caused the video and sound transmission to become choppy at certain points. This intensified the teachers' anxiety, as principals, colleagues and observers looked on. In Teacher A's classroom, the ambient lighting was too bright and interfered with visibility; in Teacher B's classroom, the lighting was too dim. The microphones embedded in the cameras captured all background noises and made it difficult to hear the participants clearly. More importantly, the cultures of the classrooms were very different. In the Israeli classroom the noise level was so high that the American students were unable to hear what was being said. Yet in spite of all these impediments, the teachers and students prevailed and, for more than an hour, worked together to interact, display the video the students in Teacher B's class had produced, and present their work to each other. As the session came to a close, many of the other teachers and administrators who were observers in Israel were in tears. One of the sixth grade teachers in Israel spoke of how powerful these tools could be in helping their students connect to the international community. Although the actual videoconference had been far from perfect, the teachers realized they had accomplished many of their goals; the moment was theirs to own.

This initial experience contained several frustrating moments for both the researcher and the teachers. As soon as I had returned to the United States we met online using the CTMX platform to evaluate the videoconference. As a result of this first experience, the teachers thoughtfully constructed their 'list of essentials' if they were going to seriously consider incorporating videoconferencing and a virtual/visual space in their future classroom work. The teachers recognized how critical reliable technical support would be if they were going to pursue these sessions. They reiterated the

importance of having technical support during these sessions so that they could work with the students without the additional burden of addressing technical requirements they were unprepared to remedy. They recognized the value of the CTMX platform as a dialogic, connective tool for their students, but voiced greater concerns about the management of their classes and the wasting of time that would occur if the technologies did not work properly. Teacher B was particularly concerned about possible criticisms of her efforts if these difficulties were not resolved. Over the course of the following days the teachers continued to meet online to discuss how they intended to proceed. The 'list of essentials' they carefully crafted reflected what the teachers had personally experienced during their use of the CTMX platform to this juncture and what would be necessary for the project to continue. The list included:

- Need for knowledgeable technology support to be available during large group sessions
- 2. Work with smaller groups to avoid noise and confusion
- In Israel, conduct videoconference in darker room to avoid washout effect;
 US classroom was too dark.
- 4. Need for increased broadband capacity and/or more powerful computers to avoid pixilation of screen and improve sound transmission
- 5. Need for students to speak slowly and distinctly using small words, short sentences, and clear language everyone can understand
- Need to recognize delay effect in sound and video transmission-must wait to speak.

7. Students wanted to see more of their partners' classroom; need to have camera pan room occasionally or plan introduction by students of the classroom space.

The relevant technologies to be addressed were both material, and social. In early May, 2007 after several weeks of using the CTMX technologies, I asked Teacher B what she had learned from her experiences with the CTMX platform and if she thought these technologies could be applied in other subject areas. Although Teacher B's response was less specific than I had hoped, she disclosed that, through her interactions with Teacher A and the students within this medium, she recognized several factors: The technology offered definite possibilities for using the technologies in other curriculum areas; the need for greater organization and planning before each event; and the necessity for each participant to work with the technological tools as a means of alleviating anxiety about their competency in using the CTMX platform.

Researcher: Uhm, could you see this technology being used in other subject areas?

Teacher B: Oh, yeah. I think so.

- Teacher B: Yeah, so, I can see it being used in other areas. I think it would take a little more creativity and a lot more planning. You know, like the video conference, we really weren't too worried about it.
- Researcher: No.
- Teacher B: Yeah, I was nervous too. I always am nervous about it, but I just knew that it would, you know, we would go from one to the other.

Now in the past we planned, okay, I will say this first and you will say that and then we will go from here to there, you know. But now that we are a little more comfortable with it and we know that it can go, you know, by itself....and that was okay.

Researcher: Uhm how did you get comfortable with it?

Teacher B: Using it...Yeah, using it...and Teacher A too.

Understanding the Landscape

The teachers reported to me they believed their fluency in using the technologies was improving. They decided to conduct two more videoconferences with their students before Teacher B's school closed at the end of May and began planning a series of programs and class exercises they felt comfortable in implementing with their students. Meeting daily the teachers continued to practice accessing the Internet, creating and sharing documents online, and displaying video through the CTMX system. When some of their ideas were not easy to implement, they devised alternative strategies to accomplish their goals. In one instance, when the teachers were trying to tell each other the names of the students who would be speaking in a future videoconference, the audio was not clear and they decided to use the text box on the CTMX screen to write the names. After they completed the task, each teacher printed out the complete list. When Teacher A's children placed instant messaging programs on her home computer that interfered with the CTMX program, she quickly figured out how to temporarily disable the programs during her videoconference sessions with Teacher B.

Over the course of the next two weeks the teachers connected daily to plan for two large group videoconferences scheduled for May 14 and 29, 2007. The teachers decided the conference on May 14th would focus on the Israeli students' recent trip to the Ghetto Fighters' House Museum. The Israeli students would present a video about their trip and share their impressions of what they had seen. The teachers wanted this session to be conducted by the students and especially did not want interference from adults when the students were reporting what they had seen or how they made sense of the emotional experience of visiting the Museum. Both teachers decided to prepare two or three questions from the IBSP curriculum for their students to discuss as a summative activity.

May 14, 2007

On May 14, 2007 the teachers made their connection using the CTMX platform with the anticipation they would be able to conduct the classroom videoconference with few difficulties. Unfortunately, for more than forty-five minutes the volume bar on Teacher A's computer refused to stay in place and it became almost impossible to hear what her students were saying. Teacher A realized that by manually holding the bar in place, the audio level would be sufficient for Teacher B's students to hear. However, holding in place was difficult to do; frequently, the student holding the bar with the mouse would allow it to slide to the left and the volume would diminish making it impossible to hear what was being said. The student would realize what had happened, repair the problem, and the audio would be restored. Although both sides had excellent video transmissions, the teachers and students' ability to interact was severely constrained. The computer teacher in Teacher A's school was present for this session; however, she was unable to correct the audio problem beyond the previously described solution. In spite of these difficulties the teachers used their cell phones to allow the students speak to each other. When the volume issue spontaneously cleared, the participants were able to hear one another, discuss some of their questions with their partners, and the session was completed. Unfortunately, because of all the audio failures, the Israeli students were unable to display the video they had prepared of their recent trip to the Ghetto Fighters' House Museum.

Discovered uncertainties

At this point in the research, in spite of the often frustrating disruptions with the technology, the teachers were becoming increasingly comfortable with their ability to operate the actual technology tools. As Teacher A began to grow in her comfort with the tools and her competency to use them, she reported she was discovering the technical limits of the computer teacher's skill in her school. Although this individual was extremely willing to support Teacher A's efforts, she quickly acknowledged her abilities were limited to specific areas and she was not knowledgeable enough about the CTMX software and its interface with the hardware to provide sufficient technical support to Teacher A. The more experienced Microsoft certified technician who had agreed to support Teacher A was not available because of scheduling conflicts with his full-time job. Teacher A was reluctant to insist that he make an effort to be present because of her close association with his family as members of her kibbutz. Unfortunately, by this time I

had returned to Ohio and was only able to assist Teacher A through the CTMX platform or by cell phone. Although it was possible to provide limited support to Teacher A online for most of the interactions between the teachers, Teacher A's worst case scenario regarding insufficient technical support was becoming a reality; other solutions had to be immediately considered.

As a means to provide the level of support that I had promised the teachers at the outset of the project, I contacted the videoconferencing unit at The Ohio State University with whom I had worked during previous videoconferencing efforts. This division has the capacity to join a videoconference and monitor it to make assessments regarding the video and audio outputs. Using this resource was an ideal way to determine what steps could be taken to remedy the problems the teachers were encountering. I also asked the support technician at Communications III who was hosting the CTMX software on their server to enter the videoconference to provide additional expertise and support.

One additional resource was available to the teachers. Radvision, the company that had developed the CTMX technology, was located in Tel Aviv, Israel approximately one hour away from Teacher A's school. They were invited to observe the videoconferences as an additional means to provide possible solutions for some of the problems the teachers were encountering. Radvision was also asked to try to locate an individual who would agree to be available to support Teacher A by cell phone when she encountered technical difficulties. My purpose in making this request was to honor Teacher A's desire to speak directly to the technical support staff in Hebrew when she was under stress rather than trying to understand instructions that were being given to her in English. A simple example of this was the fact that the wording on her screen appeared in Hebrew and was located from right to left. On the American desktops, the program appeared in English and was written left to right. So a simple direction, "Click on the word in the left hand corner" had to be translated and reinterpreted or it would immediately be misunderstood. The personnel at Radvision agreed to support Teacher A and offered to locate a support technician she could call. On May 29, 2007 during the last videoconferencing session with the students, a series of unplanned events occurred that captured the intersections between the technical demands of the work they were doing and the value of practical, ordinary knowledge.

May 29, 2007

The Ohio State University technical team recorded the event and several Israeli technicians from Radvision joined the videoconference. The video transmission was excellent for everyone. All the participants: the two classrooms, Ohio State University, and Radvision were receiving video; Teacher B's classroom was not able to receive audio although the other sites were receiving audio from Teacher B's classroom. Because it was possible for everyone to see each other through the multiple windows on the CTMX site, the teachers and students could observe the discussions and interactions of the Radvision technicians as they attempted to resolve the audio problem for Teacher B and remove the echo they were hearing on Teacher A's site. The Israeli students were able to understand what the technicians were saying to Teacher A in Hebrew and several of the students became actively engaged in following through on their instructions to her. The Radvision technicians directed the teachers in both locations to perform a series of simple tasks such

as moving the speakers away from the computer to avoid the echo effect, checking to make certain the correct audio provider and settings had been selected, making adjustments on the camera to provide clarity for the picture, and offering instructions about loading documents and setting up the video to show it. The only site that could not receive Teacher A's audio was Teacher B. Therefore, there were opportunities for the students, as well as the teachers, to ask questions and become fully engaged in the technical process with the Radvision and Communications III technical staff. The students in Teacher B's classroom were actively engaged in this process because although they could not receive audio from Teacher A's site, they were receiving audio from the Radvision site and could understand the technicians when they spoke to them in English. When they heard the technicians speak to each other in English from the various sites and watched their Israeli student partners work with the teachers, Teacher B's students became immediately involved in trying to help her.

The teachers decided to use the text window to communicate with each other and allow their students to type the questions they had prepared about the books they had read. Several students had worked together in each class to develop a question for their counterparts. The Israeli students typed the question in the text box and the American team answered it by speaking aloud. This process continued until each group (approximately four or five) had asked one question and received a response. When the students finished this sequence, they began asking each other about where they would spend their summer vacations using the same process to communicate. Earlier in the semester Teacher B's students had made paper mache´ masks; they painted one half of the mask with symbols representing their American heritage and Teacher B had mailed the masks to Teacher A. When the Israeli students received the masks, each student had completed their partner's mask with symbols of their own heritage. The Israeli students wanted to show Teacher B's students the face masks they had just completed and share the significance of their symbols with their partner. Students in both classes moved to the microphone and spoke to each other with little disruption. During this conference the students were much quieter, behaved well, and the teachers were able to move to the background as facilitators rather than being directly involved in the exchanges. A particular concern of both teachers had been how their students would react if the technology failed to work properly. As the teachers had indicated to the researcher earlier, they were fearful of criticism by colleagues and supervisors for wasting time and neglecting more important learning activities. In fact, the exact opposite soon became evident.

Several days later when I had an occasion to discuss how the teachers regarded the technical problems they had encountered with the audio during the two most recent classroom videoconferences, Teacher B remarked that she had been fearful Teacher A was so stressed she might not want to continue the project. In her class the students had been enthralled with the scenario and several students had written letters about what had happened.

Teacher B:You knew that she was probably frustrated after last Friday, or lastTuesday. She might have called and I might not have been here.

I'm not sure if she had called me. I think I was just trying to avoid it.

- Teacher B: You know, I just feel like and I understand that she's in a different...and maybe her kids react a little bit differently. My kids sort of go with the flow and blew it off.
- Researcher: They were really, really good.
- Teacher B: Yeah, for them to sit there all that time.

Researcher: That was an hour, you know.

Teacher B: Yeah, and they did and=

Researcher: =They were kind of intrigued. You know, what was interesting was, did you hear their response?

Teacher B: No I didn't.

Researcher: When Audrey=

- Teacher B: =couple of them wrote a couple letters=
- Researcher: =came on and started talking, and they saw the dialogue going back and forth and it was clear and they really got excited about that. Did you see that?

Teacher B: You mean when the boys...?

- Researcher: Right. When they could actually hear and see and it was in sync.
- Teacher B: My back was sort of to them and I was busy typing and all that *laughs* and just hoping that there wasn't anything too disastrous going on around me.

When I spoke with Teacher A the next day she confirmed the technical difficulties with the audio had been enormously frustrating. However, when she realized she had the option to receive support from Radvision and she received a call from their technician, she was encouraged to continue because she realized she had several venues of support available to her. Teacher A was quick to acknowledge the benefit she believed the students and the teachers could derive in witnessing actual technicians assess problems, attempt to solve them, and work to provide technology support. She stated her belief these interactions were positive learning events that gave everyone a glimpse of how the technicians worked collaboratively to resolve actual problems in the real world. Teacher A said the students understood they were witnessing the interactions of knowledgeable individuals trying to resolve issues that were important to everyone.

During the course of this session the teachers and students had observed individuals telling one another in a variety of languages that they did not fully understand what was happening. The teachers watched as the technicians spoke to the students and included them in the dialogue and were not afraid to say they were not certain how to remedy the problems. Much of the information and techniques the teachers acquired during these sessions were practical strategies they could use in the future to resolve recurrent difficulties. It was information that, until the teachers had actually experienced working in the medium and encountered specific problems, would have been ignored.

These events served to validate the promises made to the teachers about technical support and made an enormous impact on both of them. The technicians assured the teachers, after the videoconference was finished, they would talk among themselves and

email their suggestions to the teachers, local school technicians, and the researcher. At this point the teachers realized they had a wealth of technical resources available to them and could actively participate in dialogues with the technicians to resolve some of the problems. The teachers were beginning to find their feet.

Locating the Familiar

The teachers were beginning to discover how things worked. As participants engaged in the work of taming the technology, they were in a unique position to produce a sober assessment of what could be realistically accomplished rather than the 'imagined or hoped for' scenarios often supplied to adopters of new technology programs. Building on their experiences so far, the two teachers began to reflect on the value of the knowledge they had already accumulated during this process. Much of this information, rather than being technical, was grounded in the intuitive, practical experience of teachers who had spent many years adapting to change and synthesizing strategies to accomplish their pedagogical goals in the context of their local classrooms. As the teachers became more comfortable with their deployment of the technology, the technology became increasingly transparent. The teachers were beginning to think of the virtual space as an extension of their local classrooms. It was becoming familiar to them. They believed they could control it. Now it was time to incorporate these understandings about the technology tools that were grounded in their own, personal experiences and insights to address the development of pedagogical and curricular strategies for their students

Moving Forward

As the school year was drawing to a conclusion, both teachers noted their increasing sense of exhaustion and decided to limit their sessions to occasional interactions until early July when Teacher A's school year would be completed. During these informal sessions the teachers began to focus on particular aspects of the CTMX experience that were now becoming apparent and had to be considered. The teachers acknowledged the need to re-make the social organization of their classrooms during the sessions with the students.⁷ Teacher B shared her ideas with the researcher by stating:

Teacher B: I think that I would probably set up some sort of rotation of kids.
You know, we'd have to, actually, become very organized with it.
Which, I think in the past, we probably have been when we have a video conference. We would actually have to have like a schedule of this is, you know, this group this week. You know, like, if they have five computers, or I have five; whoever has the limited number. You know, you would work together, you know, for a week.

Researcher: Okay.

⁷ Because of the seven hour time difference between the Israeli and American classrooms, Teacher A had to request and receive permission to pick up each child from their home to bring them back to school for the conferences. This required approval from the principal and parents as well as additional expenses for the buses or taxies and the security guards. The principal and parents supported her efforts to have the students participate in the videoconferencing sessions and Teacher A had received these concessions. However, she was concerned about justifying these expenses if the technology did not work properly and the students were not able to connect. When Teacher B asked why Teacher A' students went home after dismissal rather than just remaining at the school, Teacher A explained the school did not provide meals for the students; therefore, she had decided to allow the students to bring their lunch to school and eat before the videoconference as a means to reduce additional costs.

Teacher B: I think I would probably do that. Rotate, you know, rotate a certain number of kids ...well, or once a week. I am not sure. We would have to come up with it.

Teacher B also noted her concern about issues of control and access given their students' increasing comfort in the use of the CTMX technology and their discovered ability to make connections to external classroom sites. Teacher A did not view this as a problem. Both teachers were also beginning to think about how iChat and other instant messenger programs might be used by their students to interact in small groups at school and home. Areas of continuing concern to the teachers were the fatigue they felt when the volume control was not working properly and the need to establish turn-taking procedures during the interactions between themselves and their students. (Sacks, et al, 1974)

Starting again: Problems and strategies

In the fall, after their Icelandic experience, the teachers resumed their weekly interactions using the CTMX platform. The teachers indicated to me they thought the technology was becoming increasingly transparent to them. During an online conversation in late October, Teacher A casually remarked that, given her increasing comfort in her ability to manage the CTMX technologies alone, perhaps at some point she could teach Teacher B's students and Teacher B could teach hers. At the time, neither teacher pursued the comment and it was quickly forgotten, or so it seemed. The teachers continued working online to discuss the timeline for introducing the IBSP curriculum to a new group of students; prepare for a November videoconference to introduce the students 126 to each other and discuss the play, *Anne* Frank Teacher B's students would attend, and finalize plans for the December visit to Teacher B's classroom by Teacher A and the art teacher from the Israeli school.

From the outset of the study a recurrent topic during the teachers' planning sessions was how to reduce the background noise from the Israeli classroom. The teachers decided one possibility for resolving this issue would be to limit the number of participants in the videoconferences to four students. Teacher A suggested she would to choose four students who would participate in the next session and email the list to Teacher B. Teacher B suggested, rather than emailing the names, they could write them on the screen using the white board, make a text document, or use the text box on the screen. This would allow Teacher B to match the American students with their Israeli counterparts and both teachers would prepare the students for the videoconference. In another planning session in early November after Teacher B's class had attended the play, *Anne Frank*, the teachers discussed how they would incorporate this activity in an upcoming videoconference.

- Teacher B: Remember when. You know how you said that my kids should write a letter to your kids? About them seeing *Anne Frank* and what they know about the Holocaust and all of that?
- Teacher A: Yes.
- Teacher B: I have an idea, we can go ahead and type it but we're gonna also...I think we can, now that you've got the program up and running, you know, and I do. Why don't we have the kids do it, you just

keep maybe, your kids after school, like maybe one group of kids after school one day and then I'll keep the same kids on _____ Then they could talk like that, they could actually talk to each other like we're doing.

- Teacher A Okay. ..try it.
- Teacher B: Uh huh.

Teacher A: I think after _____those who know English.

Teacher B: Oh, that's true.

- Teacher A: We would have to suggest what they're going to speak about.
- Teacher B: Right. Well, I just thought, you know, maybe that would be an easier number to manage.

The decision to limit the number of students who would participate also served to reduce the transportation costs involved in bringing the Israeli students back to the school after they had been dismissed. Since many of Teacher A's students actually lived on the kibbutz housing the school, they could attend the session although they were not actively participating. In Teacher B's classroom all the students were able to observe the session because it was occurring during their regularly scheduled class. The reference to *noise* by the teachers encompasses more than the distractions caused by the cacophony of multiple voices. The teachers were developing strategies for managing the interactions of the students when they were interacting in the virtual, visual space. They were incorporating their knowledge about delays, overlaps, and audible background distractions to establish

practical methodologies they could routinely employ during these videoconferencing sessions.

When the actual classroom videoconference occurred, the teachers learned an invaluable lesson about the value in testing their equipment before actually using it. Prior to going live for the session, Teacher B had muted her sound, and in the rush of the moment as the actual videoconference began, she forgot to un-mute it. It took several minutes and a cell phone exchange between the teachers before they resolved the problem. This experience was an invaluable lesson; remembering to check the audio and video settings before a conference would now become an essential component of the ordinary classroom routine for future videoconferences. It also demonstrated how much progress the teachers had made in working with the technologies. Both teachers had acquired enough confidence and experience in using the technologies and the CTMX platform to work without technical support. When problems did occur, they what they had observed the technicians do earlier, analyze the problem and try an array of strategies to resolve the difficulties.

Reflecting and looking ahead

In December, 2007 while the Israeli teachers were visiting Teacher B's classroom, Teachers A and B met in my home for an evaluative session to discuss what had been accomplished over the course of the previous eight months. The discussion revealed many of the teachers' initial concerns regarding the technical aspects of this case study. It encompassed a range of topics including their initial skepticism regarding my promise of technical support as well as their concerns about how they would be trained to
use the technologies, whether they would be able to learn to use the CTMX platform, the amount of time this program had consumed in their extremely pressured lives, and the extent of the freedom they had been given to enact this project.

An important topic that had significant relevance for the teachers' willingness to engage in the study did not surface until the teachers' December meeting in my home. It involved their initial skepticism of my reasons for doing the study, particularly what I expected from them, or wanted them to do. Because the teachers were close friends and often spoke with each other by telephone on Saturdays, they had discussed their concerns about doing "what I wanted them to do" many times. The teachers told me they had been excited to have an opportunity to work closely with each other, but remained skeptical of my motives because they were not accustomed to being given opportunities to work with technologies in such a relaxed and engaged format. Therefore, despite my project descriptions, our innumerable face-to-face discussions; and informal exchanges about what might be possible, they had interpreted these initial, "hands-on" sessions as being "not well organized and ill-defined".

In contrast to their assumptions, my intention had been to carefully explain each step of the process in order to develop a very relaxed, immersive approach to their training, and provide them with a transparent model of the goals for the research project. It was my intention to encourage the teachers to use the CTMX platform to talk about what they were doing, ask questions as ideas occurred to them, and apply what they were learning to the pedagogical tasks they were devising for the IBSP curriculum. By December, the teachers had come to a very different conclusion:

130

- Teacher A: And the thing that you give us thirty, three hundred, sixty=
- Teacher B: =Days____
- Teacher A:
- Teacher B: Oh, three hundred and sixty degrees.
- Teacher A: Degrees.
- Teacher B: Okay, you know...degrees
- Teacher A: To do whatever we want
- Teacher A: Freedom=
- Teacher B: =Yeah=
- Teacher A: =Absolutely
- Teacher B: *murmurs agreement*
- Teacher A: I could take it whenever I want. You never interrupt. You don't say "Oh, maybe this". Never. I, I just thought about it just now. You never say "Maybe you can do this, maybe you can...or maybe Teacher B. Never.
- Teacher B: No.
- Teacher A: Well, ____technic thing. But we never get involved. It's _____=
- Teacher B: =It's a little bit like Teacher A gives her class. You gave us the freedom=
- Teacher A: =And that's=
- Teacher B: =To do with it what we want=
- Teacher A: =For me, for me, it's, it really helps me to...to fly

Both teachers stated that prior to this experience, learning how to integrate new technologies into their current pedagogical practices had not been a priority for them. They were adamant that with the demands placed on their time during the school day and afterwards, there was little motivation on their part, or by their cohort teachers, to attempt to learn new technology programs. Teacher B expressed her sentiments, with Teacher A's concurrence, by stating,

We've been doing it...the old way... so long, so...you know...the new technology is okay...we've been teaching without the new technology all these years... we can continue without it unless we have the time...during the day. After school you're just too tired.

The teachers reiterated their early skepticism regarding the promise of technology support that I had made to them and how they had been encouraged by my efforts to provide alternatives to support their technical needs. Teacher B commented that based on her previous experiences with the technicians in her school, "I really never expected...you know...to have...my tech people to come in and stand by me...and help me... I just knew it wasn't gonna happen."

The professional development programs involving technology these two teachers had experienced prior to this research program had provided them with limited opportunities for 'hands-on' interaction during the introductory sessions and in most instances the teachers had not received further support or instruction to practice what they had experienced. Both teachers remarked that it would be beneficial in the future to have the opportunity to leave their classrooms during the regular school day to receive instruction in the use of new technologies. They also wanted time to practice using the tools and for working collaboratively with other teachers to create new teaching and learning practices incorporating these tools. The teachers' comments are consistent with the findings described by Borko (2004). As this discussion progressed the teachers began to draw comparisons between what they had anticipated would occur in the study and what had actually happened. Teacher B's comment, "Teachers have to be willing to fail." captured her appreciation for being encouraged to work with the CTMX technologies in an atmosphere without fear of retribution or criticism and where failure and risk-taking were viewed as positive opportunities to learn from your mistakes.

By December 2008 the teachers were beginning to realize they could drive the car. They had been engaged in the research project for more than eight months and were beginning to become much more comfortable in responding to unexpected technical challenges. As Teacher B said, "...when it doesn't work... try a couple of things." Their ability to accommodate to the limitations of the CTMX platform, whose idiosyncrasies they now understood in much greater detail, was evidenced by their willingness to break the connection and immediately reconnect if the video and audio transmissions were inadequate. The strategies they had devised for smaller groups of students: speaking distinctly, slowly, and using small words; and waiting for delays in turn-taking before responding were now becoming routine practices for the students and teachers during their videoconferencing sessions. More importantly, the teachers had begun to bring practical pedagogical tasks to the virtual worlds they were accessing. Through these interactions and exchanges of ideas, they were 'stepping through the looking glass' and

demonstrating how they had begun to organize encounters between the virtual and real worlds they inhabited.

After the Israeli teachers returned to their school in December the Hanukah and Christmas holidays for both communities prevented the teachers from further interaction until mid-January. During their discussions in December, the teachers had decided to have four new pairs of students who were already working as partners in the IBSP project speak about their specific drawings they had begun as part of the art project. In late January the teachers decided they were ready to hold a videoconference where the students in each location could discuss the art project about *Light* that had been introduced during the visit in December. Because they now understood how important it was to hold practice sessions to test the hardware and software components they would use during the videoconference, the teachers chose to meet online from their schools several days before the scheduled February videoconference. The teachers did not have technical support present at this session. They immediately encountered difficulties with the sound transmission and the following dialogue captures the measures they enacted to resolve the situation:

Teacher B:	Teacher A, can you hear me Can we do this another
	day?
Teacher A:	I can hear you but it's a bit garbled.
Teacher B:	Do you want to wait for another day? Why?
Teacher A:	Why?
Teacher B:	Because I can not hear you at all.

Teacher A: I don't like to give up so easily.

- Teacher B: I don't know what to do except have the kids say hi to each other or just have them type to each other which will take a long time.
- Researcher: Teacher B we can hear you a little bit.
- Teacher A: Check to see if the record side of the sound card is on the microphone=
- Teacher B: =but we cannot hear you at all. I can have a few kids do this but not all of them. It is still not working

What is evident in this exchange is how both teachers supported each other when they experienced technical difficulties and momentary frustrations. As a consequence of their combined experiences, growing sense of empowerment, and their willingness to be persistent in resolving these difficulties, the teachers decided to work together from their homes later that evening. When they did successfully connect from their desktops that night, they finalized their plans for a February videoconference.

February 2008

Most of the activities for this February videoconference session had been planned in December. However, in addition to their teaching agenda, the teachers' primary objective for this session was to use this opportunity to assure themselves they could successfully teach a class using the virtual platform. For this reason, they specifically requested the researcher not to be present and assured me they would provide a video of the entire proceedings. Several technical and organizational factors had changed in the Israeli school.

Teacher A moved her students into the school library where she now had access to a new dual core, Dell computer with a much faster operating system. The CTMX platform was now displayed on a HDTV screen using a Realtek high definition sound card that provided much better sound capabilities and the Microsoft technician from Teacher A's kibbutz was able to be present to assist her during this conference. In contrast, Teacher B continued to use the same equipment she had previously used during the project and did not have any technical support personnel present.

The teachers later reported to me the videoconferencing session had been a resounding success. As they had promised, I received a DVD of the entire session and could observe that the students and teachers were able to see and communicate with each other, remembered to speak slowly and distinctly using easily understood phrases, and the teachers were able to concentrate on guiding and mentoring without distractions from the technology. During the videoconference the students spoke with their partners about their art work and why they had chosen to represent the idea of light in a particular manner.

Teacher A: Here's student E (Israeli) that works with Student H (USA).
[Students come to microphone and can see each other. Both girls are holding hand painted signs with their names clearly visible to the camera]
Teacher A: Tell her shalom=
Student H: =Hi.

Teacher A: Student H, before we start with art work...do you want to ask Student E something?

Teacher B: Tell her you don't remember, you have to look at it first=

Teacher A: =okay=

Teacher B: =Yeah, she has to see it.

[Student E holds up artwork of two girls. Both girls have painted hearts.]

Student E: I paint heart...and you paint heart, too.

Student H: Okay...yeah

Student E: I painted a...a color of light and=

Student H: light, and=

Student E: =you...paint the same...color.

Teacher B: Ask her why she chose red.

Teacher A: Why did you choose red for your heart?

Student E: Because heart is red.

It is interesting to note that in this videoconferencing session where the teachers had been completely free to organize their students' interactions there was less open dialogue displayed between the students than had previously occurred with these same students in November. The teachers were directing the students in their interactions and in some cases, limiting the dialogue. When I asked the teachers about this, they indicated they were focused on making certain the technology performed well in order to provide time for as many students as possible to interact. Therefore, they had intentionally been actively engaged in directing the students' interactions rather than permitting more spontaneous interaction.

The teachers continued to use the CTMX platform during March and April, 2008 and encountered few technical problems. Their efforts were primarily directed toward supporting the students' development of a Holocaust book project (this topic is developed in chapter five), the artifact box project, and supporting the efforts of the "Oscar team"⁸ as they continued to capture the events in and out of school depicting the daily lives of the Israeli students. On the occasions when the technology failed to perform, both teachers felt they were competent in making adjustments or deciding to terminate the session and, when it was necessary, called each other on their cell phones to decide how they would proceed. As the school year and the case study came to an end, the teachers had already begun to discuss how they would use the CTMX platform earlier in the next school year and what improvements and upgrades in the equipment they would request from their principals. Teacher B was able to purchase a used desktop PC from her husband's company with the capability to support the requirements of the CTMX program. This computer provided better speed and improved the sound and video

⁸ The Oscar Team had been established by Teacher A prior to the origination of the case study. Teacher A had identified several students who were not motivated to participate in the IBSP project and wanted to find a way to include them. She decided to encourage these students to be the film crew to depict the classroom events that occurred regarding the implementation of the IBSP curriculum. This included the occasions when Teacher A's students received the boxes and letters from their overseas partners, the responses they expressed in English to their partners on the video, and the work the students were doing to make new projects they could send to their American partners. The Oscar team filmed all the events and holidays that occurred in the Israeli school. At the end of the year, they worked with a professional videographer, who was another student's father, to edit the video, add voice-over narrations, and subtitles. When the video was completed, it was uploaded to an Internet site and I formatted it as a DVD to share with Teacher B and her students.

capabilities of the CTMX program. Teacher B continued to use the digital projector and movie screen that was available in her classroom.

The teachers were pleased to note they had discovered their use of the virtual/visual space satisfied state and national requirements for technology use. However, both teachers stated although they were enthusiastic about the possibilities they now understood these technologies hold for teaching collaboratively and the possibilities they provided for their students to interact in distant communities, working within a virtual, visual space would not be something they would choose to do on a daily basis. The teachers explained their assessments were based on the additional time they believed was required to prepare students to work together because of language limitations, the differences in time because of geographical locations and the accommodations to scheduling this necessitated, and the demands their local curricula and state standards imposed on any extra time they would have to devote to additional projects.

Instead, they suggested its ideal use would be as part of a well-scripted curriculum that provided teachers and students with occasional opportunities to engage with students when they were studying a topic of mutual interest to all parties. This was captured in Teacher B's remarks to me when I asked her if the teachers would use the CTMX platform or a variation of it on a daily basis.

Teacher B: Well, I am not sure we would be able to use it on a daily basis. But it would get to the point where the kids could come in, turn on the computer, and meet up with their person. You know, without our, with just us facilitating, rather than absolutely having to be there. And with the kids with technology, they can do it. They can do it better than we can do it, you know? And they are not inhibited. You know, you show them once or twice and they will just hop in and they will do it. They'll be fine.

The teachers described their involvement with the research project as having a "life of its own" that provided them with an instant connection to each other. Throughout the project the teachers repeatedly stated their determination do whatever was required to make these technologies perform adequately in order for them to be able to interact and provide a forum where their students could interact and accomplish their work. The numerous adaptations and strategies the two teachers produced to tame the technology included amending the social organization of the worlds they inhabited for those fifteen months. The pedagogical and curriculum programs the teachers constructed within this virtual space will be addressed in the following chapter.

Chapter Five: Constructing the Bridge

What is this research project really about?

From the very inception of this research project, while I was working with each teacher in her local setting, the question, "What is this research project really about?" repeatedly entered the conversation. As the review of the literature suggests, for educators and educational technologists who are actively engaged in the practical work of the classroom, most encounters with technology are framed in terms of the individual's ability to master the tools, or *taming* the technologies. In this study Peck and Dorricott's (1994) question, "What can we do now that was not possible before?" marks a new problematic: How do media and pedagogy converge to establish alternative methodologies for teaching and learning.

Over the course of their professional careers, our two teachers have received numerous top down, direct-training technology workshops. In this study, although they were provided with a description of the formal proposal as part of the IRB process (translated into Hebrew for the Israeli teacher) that explained the goals of the study and what their roles as participants would entail, the real question they were asking originated from their expectation that a proscribed, step-by-step process would be delivered over the course of the inquiry. I explained that the research project had been designed as a constructivist, activity-based program to provide a technically-mediated, visual platform where it would be possible for them to work together face-to-face, and make use of it as they saw fit. There would be no gatekeepers; no one would monitor their interactions, or dictate what they were to do. During the study they would be provided with the training to navigate the Click-to-Meet (CTMX) platform and the multimedia components they would be using; however, they would determine how to work together to discover the implications this medium could offer within the International Book Sharing Program (IBSP) curriculum or in other subject areas.

Both teachers were encouraged to take small steps to learn and experiment with the technologies available to them. They indicated they were initially satisfied with the proposal and my answers to their questions about it. However, as they later revealed, they were not sufficiently acquainted with me, or comfortable with my instructions, to indicate their continued uncertainty about exactly what it was they were supposed to be doing. The teachers' initial reluctance to believe they were being invested with the authority to make the pedagogical and curriculum decisions is significant to note. Based on their experiences as professional educators in public schools, both teachers later indicated to me it was particularly difficult for them to believe they were being granted the freedom to control an activity of this scope without interference from external sources such as their principals, parents, or the researcher.

The teachers soon discovered they were working in unchartered territory. As Teacher A described their role, they were the NASA team venturing out into unfamiliar worlds:

142

"...And I really want to add, and I feel good that I don't know. I figure, well, that's the way. By the way, teachers, the most important thing for teachers is to, meanwhile, to feel how is it not to know things? Feeling that they don't understand... you don't know... you have to learn. It's so important to being this feeling."

The teachers' challenge in this project would be to develop the technical strategies and practical designs that would serve their pedagogical and curriculum purposes in the virtual and real spaces at their disposal. As the project progressed, both teachers began to discover professional freedom can impose its own constraints.

Working together

Once the CTMX platform was operable and it was possible for the teachers to connect with each other, they began to explore some of the functions this combined videoconferencing/ multimedia platform could make available to them. The CTMX technology is designed to allow multiple users to login and have a visual image of each site displayed on the screen. The platform supports streaming video, white boards, document displays such as web pages and Power Point, Internet access, and permits individuals in multiple locations to be involved in the synchronous construction of a document. In this environment participants have the ability to perform several actions simultaneously. The teachers discovered how one person could login to an Internet site to access a particular link and it would be actively displayed on all the sites. Each site's participants would have the ability to access external links to discuss how they might want to incorporate this information into their practical work. They could Google their

143

local communities using Google Earth or Google Maps to locate their schools and display local landmarks, use the drawing tools to circle a particular location, and display additional information in an adjacent window.

Although they had worked collaboratively for four years prior to the study, many of the pedagogical ideas they had envisioned had not been actualized because of restraints imposed by time, postal delays and inefficiencies, and geographic barriers. Now, with the readily available access of the CTMX platform, the teachers could work online, face-to-face to develop strategies and create new instructional opportunities. Teacher A expressed her emerging sense of what might be possible when she said: "So, in that moment I start thinking what can I do? All right... and then, when we were at school and you show me, you know, the possibility to add a web, to add a document, the thing like that, so it gives oil to my wheel." Teacher B made a similar observation about the value working face-to-face provided for brainstorming ideas when she commented, "... [we] roll off each other as far as ideas go...wheels start turning ...you almost resent the rest of the things you have to teach".

Bridge building

In chapter four, several significant technical mileposts were presented that described how the teachers' mastery of the tools and their sense of its limitations evolved. As they encountered the technologies, they frequently struggled to develop a realistic assessment of how the CTMX platform could be organized for the benefit of their pedagogical practices. In this chapter, two mileposts that were previously introduced (April -May 2007 and November 2007-February 2008) and an additional milepost from June-July 2007 will be discussed. These are *bridge building* mileposts. They are places where we can see *what* the teachers were doing, across the virtual space, and *how* they worked collaboratively to redesign the bridge for their practical and pedagogical purposes.

The first milepost describes how the teachers worked to design the initial videoconferences during the first six weeks of the study. It is interesting to note the contrast between the structure of the activities and pedagogical approaches they developed for the first classroom videoconference, which were conditioned by their collaborative experiences with the IBSP curriculum and the strategies they later produced as they became more confident in working within the CTMX platform.

The second example, occurring in June and July, 2007, represents the teachers' developing mastery of the technologies and their emergent realization the CTMX platform could be deployed as a tool for establishing online, international communities-of-practice with their colleagues. In this section, the teachers used the CTMX platform through their desktops to plan a summer seminar for their fellow teachers. Although the teachers continued to express skepticism about the reliability of the technology, they were beginning to demonstrate greater confidence and control in their use of the actual tools and focused primarily on the organization, logistics, and implementation of the actual presentation.

The final episode captures two events-the planning that occurred online in the autumn of 2007 and an offline, face-to-face meeting between the two teachers and the researcher when the Teacher A visited Teacher B's American classroom in December, 2007. When the teachers were in the same room, they sketched out the teaching and

learning strategies they would use for the following semester to teach the IBSP curriculum using the CTMX platform.

April -May 2007

In late March 2007 until mid-April, while waiting for IRB approval, each teacher had worked privately with the researcher to become familiar with the multimedia tools. Their initial experiences with the technologies were relatively successful and, once the IRB approval was granted, the teachers frequently worked together without additional support from their local technical support personnel. As they became more comfortable with the technologies and their ability to mange them improved, the teachers decided they wanted to conduct a classroom videoconference with their students. The date they chose to hold the videoconference was April 25, 2007, the last day I would be in Israel.

Several factors shaped their decision to use the CTMX platform and its multimedia components for an initial classroom event at such an early stage in the study: (1) The teachers were using the CTMX program on their desktop computers with relatively little difficulty; (2) They had a sense of personal trust with each other that had evolved over several years of collaborative activity and personal friendship; (3) Teacher A was receiving technical support from her local school computer teacher and the researcher who was still in Israel; (4) Teacher B was comfortable in connecting through the CTMX platform or cell phone to resolve any technical difficulties; and (5) The teachers were anxious to use this platform with their students to accomplish a series of summative activities for the IBSP curriculum they were currently teaching.

Preparing for the videoconference

In their preparation for the anticipated launch of this new pedagogical tool, the teachers invited me to observe their work in a series of planning sessions. Their purpose was to try out several of the applications available to them through the CTMX platform in order to decide what they could use for their first classroom videoconference. The teachers logged on to the CTMX platform, adjusted the audio and video settings on the camera, accessed the Internet, and began to construct a webliography (a document that has active links to websites they could use with their students). They practiced sharing the podium and allowing each other to be in control of the primary site, writing messages in the text box, book-marking specific sites, and creating documents they could access and display during the videoconference.

The teachers decided the students would wear nametags that could easily be read on the screen, state their names, introduce themselves, and briefly tell something about their families. A designated class spokesperson from each class would locate their school on the Google map and then go to a previously book marked website to tell more facts about each location. Once this had been accomplished, Teacher A wanted to share the video her "Oscar Team"⁹ students had made about their school and their kibbutzim. This tape was a montage of the holidays and celebrations the students had participated in over the course of the school year. It also gave the American students an opportunity to see

⁹ Prior to the actual research project Teacher A had developed a strategy to encourage several of her male students to become more actively engaged in the classroom work involved with the IBSP curriculum. She suggested to Teacher B that she was going to develop an *Oscar* team. These students would be responsible for videotaping a variety of events at the school including classroom events involving the IBSP curriculum, holiday programs and celebrations at the school, the Ghetto Fighters' House Museum (GFH) visit later in the spring, and additional scenarios about their lives they could share with their American cohorts. Teacher A had access to the required equipment; more importantly, one of her student's fathers was a professional videographer who had agreed to work with the students, help them learn how to edit the film, add sound and titles, and bring their efforts to a presentable form.

where their Israeli cohorts lived, who their family members were, and what the various communities-moshavim, kibbutzim, and small towns actually looked like from the students' perspective. The teachers decided the session would be concluded with a discussion by the students about the postcard project they had collaboratively created earlier in the school year. ¹⁰

By the time the actual videoconference was to occur, both teachers realized they had planned far too many activities and decided they would introduce the students, show the videos, and try to have the students discuss their postcards. Although they had practiced doing each of these activities, neither teacher had a realistic understanding of what could be achieved or how long it would take to execute their plans in this virtual environment. However, what was evident was the fact they were comfortable in their planning. The evening before the event, Teacher A called Teacher B by telephone and, in an attempt to alleviate their anxieties about the unknown aspects of what would happen, they decided to rehearse their plans using the CTMX platform in one last, late night session from their home, desktop computers. The next morning Teacher B arrived at her school an hour early (07:30 EDT-14:30 Israeli time) in order for the technicians and the researcher to make a test connection. It was successful and everyone was satisfied the videoconference could proceed as planned. ¹¹

¹⁰ Over the previous month both teachers had worked with their students in their local classrooms to develop postcards (brown 5x7 cards with black ink) that were made by each partnered group comprised of two students. On one half of a card the American student had depicted her understanding of a word or phrase about the Shoah (Holocaust) that she and her partner had identified from the book they were reading and had discussed on the IBSP web board. When Teacher B's class had completed their half of the cards, Teacher B mailed the partially completed cards to Teacher A. In Israel, Teacher A's students completed the unfinished side of the card expressing their personal understanding of the same word or phrase. Since there had not been an opportunity for the students to discuss their cards face-to-face, the teachers realized this was an excellent opportunity for the students to explain what the words and their drawings represented.

¹¹ It is important to note because of the persistent lack of time during the school day, international time differences (seven hours), and two back-to-back Israeli holidays before the initial classroom conference was to occur, the teachers had not attempted to rehearse

The first videoconference: April 25, 2007

As an observer in both classrooms before this event, I had witnessed numerous examples of the teachers' use of constructivist, collaborative methodologies in their classroom practices. However, for their first videoconference session the teachers chose to script a very structured, linear program that carefully controlled the actions of the students. I interpreted their decision as an indication of what they currently understood about the CTMX platform's applicability for their pedagogical purposes. Much later in the study, during our face-to-face session in December, when the teachers were demonstrably more comfortable with the technologies and with me, I questioned them about this early observation.

The teachers told me that until the first classroom videoconference occurred, they had experienced and understood the CTMX platform primarily as a dialogic space for their own interactions without extraneous pressures from their administrators. It was a private space. From a professional perspective during the first videoconference, the teachers stated they were interested in demonstrating to their cohorts and administrators their enthusiasm for using the CTMX platform as a connective platform for collaboration and knowledge construction with the students. They wanted to use the technology to showcase what the two classrooms had been able to accomplish, through their existing collaboration in teaching the IBSP curriculum. They also stated they were just beginning to get a sense of the CTMX platform's potential as a collaborative tool for bringing students together to interact and share information.

using the technologies in the classroom location and were unaware of the possible technical difficulties that might occur.

In anticipation of the heightened interest the teachers believed this activity would generate at their schools among administrators, fellow teachers, and technical support personnel, the teachers decided to carefully control for any possibilities for chaos during the first session. They wanted to avoid being negatively judged for technical failures that were beyond their control; however, they were willing to make the session open to observers who they believed would be supportive of their efforts to use this new technology. As Teacher B stated:

Teacher B:	You know what? I wouldn't mind if they came in, and it didn't
	work and they saw us flipping around.
Researcher:	Yeah.
Teacher B:	I know them well enough that I, you know, that I wouldn't, that
	wouldn't bother me.
Researcher:	No. But that is great. That's a true compliment, you know, in terms
	of=
Teacher B:	=Well, I just know them well enough that, you know, that I=
Researcher:	=Yeah, they are not judging.
Teacher B:	Exactlyexactly.

During the videoconference each student in both classes stood in front of the camera and spoke with their partner. The students pronounced their names and spoke briefly about their families. The Israeli partner held up the postcard they had made together and each student explained what they were trying to express through their drawings. In spite of the teachers' efforts to avoid technical problems, the audio and 150

video disruptions encountered in this first classroom session (described in chapter four) did prevent the teachers and students from achieving some of their planned activities. The Oscar team's video could not be uploaded on the Israeli computer; however, the American students were able to stream their video that showed Teacher B's students singing an Israeli song. Because there was a seven hour difference in time, the teachers' plan to have students use the Internet to show their partners where they lived on the Google Maps site was not possible to accomplish. (In Israel the videoconference began after school at 15:30; in the United States it was 08:30.)

The teachers had been fearful if technical obstacles occurred, the American and Israeli principals and teachers' enthusiasm for the project would be diminished. In fact, just the opposite happened. The experience gained from this initial foray in using the multimedia technologies and the CTMX platform served to heighten everyone's awareness of the seriousness of the project and the importance of each individual's role in its progress. As Teacher A stated, "...[we] must know (technology) quite good. We have to be professional in the way we work with it... then, ideas will come like rain. If you lose energy... about how am I going to do this, you take energy (away) from ideas."

Traversing the bridge

Throughout the month of May, the teachers worked together almost daily. They used the desktop access form their homes, and occasionally while they were in school, to organize how they would implement the development of additional opportunities for the students to talk about what they had learned from their readings and experiences with the IBSP project. On Saturday, April 28, 200, two days after my return from Israel, the teachers and I used the CTMX platform to evaluate the first classroom videoconference. Teacher A described her students' elation at seeing their American partners while they were speaking and Teacher B reported her students had written essays describing their enthusiasm about seeing their partners and actually being able to talk with one another from such distant locations. The Israeli students had asked to see more of Teacher B's classroom (bulletin boards, desks, and general view of the classroom) in future sessions in order to feel present in the room. This resulted in the teachers' decision to have one student from each classroom walk around the classroom and describe what was being displayed during the next classroom session. Because of the technical delays they had experienced with the streaming video and sound delivery in the first classroom event, the teachers were concerned the pictures might be choppy and unclear. However, they wanted to satisfy the requests of the students and decided any technical inconveniences could be valid components of the learning experience.

Preparing for the May 14, 2007 videoconference

Teacher A shared that her students were scheduled to visit the Ghetto Fighters' Museum for a daylong tour on Monday, the first of May. She explained that because the visit to the Museum had a very powerful emotional effect on the students, she did not want the students in the Oscar Team to be distracted; therefore, the trip would be filmed by the parent who was a professional videographer. The next time all the students would meet in the virtual classroom, she wanted to show the video by streaming it through the CTMX platform and have her students speak about their experience, what they had learned, and how they felt about it after studying for a year about the Shoah and the lives of students who were their age when it occurred.

Teacher A and Teacher B had the following exchange as they prepared for the May 14th videoconference:

Teacher B:	Did the kids ever visit the Holocaust Museum before?
Teacher A:	No, well maybe with the parents. What we do every because it's
	the end of the project.
Teacher B:	Sure.
Teacher A:	So, I prepare them and I ask them for, first of all, to because they
	visit the Holocaust Museum and after they have a conversation
	with the project team in the Holocaust Museum and they're talking
	about the project.

- Teacher B: Right, Okay.
- Teacher A: And, I always ask them they have to sit in groups and they have to suggest things to do better next year.
- Teacher B: I do that too.
- Teacher A: And you can't imagine how much suggestion I use, I really use. And, I tell them... really kids, I use it. So, think, I want you to think about, I want you to think about the next year. You know what they always come up with. Always, my kids, they want to do more videoconference.

Teacher B agreed with Teacher A's suggestions about organizing guiding questions for the students' discussion and indicated she needed several days to prepare her students for this next virtual classroom session. In response to the idea of the students expressing what they had seen and experienced at the museum, Teacher B said, "How great that would be for kids...makes it personal." She also suggested the students' exchanges and dialogue could serve to encourage them to express their feelings about the recent war (Lebanon 2006) as well as the Shoah and commented, "Kids would not become fearful... they could form compassion, empathy, understanding... Now that we have the technology...easier to do it...it opened our eyes."

Both teachers stated they needed time to develop thoughtful questions that would be tailored to their students' particular cultural understandings and sensitivities to the topic. The teachers decided to independently develop the questions and then share them as text documents when they spoke together over the weekend. During the next classroom videoconference, all the students would be able to simultaneously view the museum video and the partnered students would be able to see each other in a sidebar on the screen as they spoke. The teachers decided they would be ready to hold their next classroom videoconference scheduled for May 14, 2007 and would continue to meet online to plan for this session and other summative curricular events over the course of the following days.

Fatigue and frustrations

After working intently together for three weeks the teachers indicated to me around

May 3, 2007 they were beginning to experience fatigue. The end of the school year was approaching for Teacher B and in late June for Teacher A. Both teachers found the audio and video delays they were experiencing to be frustrating and Teacher B commented she often had trouble understanding Teacher A because her accent became more distinct when it was late at night in Israel and she was tired. During these online sessions Teacher A never voiced a complaint about understanding Teacher B, although when she became frustrated Teacher A would often lapse into Hebrew and ask someone else for guidance in conveying her thoughts in English. On one occasion when the teachers were discussing some personal issues online with each other Teacher B stated, "I don't think Teacher A gives me enough time to respond [online] ...part of it is habit...interrupts the flow coming back to me. ...needs to wait for audio delay." Teacher A responded by saying Teacher B was more comfortable than she was in speaking English and speaks more slowly which makes it easier for her to understand what is being said.

In another online session Teacher A shared her frustration in learning how to operate the program with Teacher B when she told her, "...[I] lose a lot of energy to learn the program...rather than how to use it. You take energy from ideas." Teacher A also observed teachers must have a good working knowledge of the technology tools in order to make the program work for their students. In spite of these disruptions and frustrations they were experiencing, the teachers continued planning for two more videoconferences with their students.

May 8, 2007

In response to the teachers' concerns, I made arrangements for them to login to

the CTMX site and work directly with the technical support person assigned by Communications III to provide support for our project. During this hour long session the teachers were able to connect successfully with each other and the technical support person from Communication III in Columbus, Ohio. The purpose of this three-way (I was present at Teacher B's site) session was to encourage the teachers to ask questions about how they could use the various applications available to them through the CTMX platform Communications III supported. This experience provided the teachers with insight about how multiple venues could be accessed and integrated into the virtual, visual environment. It also gave the teachers hands-on experience in integrating several applications within one session. Initially the teachers were frustrated in trying to follow the technician's instructions. When she realized they could not see everything she was trying to show them, the technician at Communications III quickly resolved the issue by showing them how to access a pull down menu to display multiple windows simultaneously on the screen.

After these issues were resolved, the teachers asked how they could use iChat and Instant Messenger and the technical support individual from Communications III walked them through the process and answered their questions. Although the session was primarily oriented towards implementing the CTMX platform, it had tremendous practical value for the teachers because it helped them conceptualize how they could move from a focus on the technology to a broader understanding of how the tools could support their teaching goals. They were able to ask questions about how to implement specific strategies and ideas they were forming and received direct answers. The teachers

156

asked for assistance in learning how to upload video to display during the sessions as well as how to access documents they had made offline. After this session the teachers both commented that since they now understood how to access these resources through the CTMX platform, they would definitely incorporate these strategies into their future pedagogical planning.

May 14 and 29, 2007 videoconferences

Prior to the May 14th session, the teachers met online from their homes to finalize their plans. Teacher A shared the fact that her Oscar team students had been insistent on filming the video at the Museum rather than using the professional videographer. Although some of the video was very dark and difficult to see, the teachers decided they would definitely use the video to initiate the discussion about the Shoah between the students.

The teachers decided to begin the session by having Teacher A's students describe their observations and feelings about what they had experienced; Teacher B's students were preparing their own questions about the Shoah (Holocaust). They said their goal was to integrate the use of the CTMX platform to provide a framework for discussion and reflection that encouraged the students to interact without interference from adults. This was a significant change from their earlier strategy during the April 25th session when both teachers had consciously controlled most of the students' interactions during the session.

As described in chapter four, much of the planning the teachers developed for the session on May 14th was limited in its implementation by the technical difficulties that were encountered. Although the Oscar team's video was not shown during this session, the fact that the students had been organized by the teachers into small groups by their partnering relationships made it possible for the American students to ask their questions about the Shoah and discuss what the Israeli students had seen.

On May 16th the teachers and I met online to evaluate the May 14th videoconference. Their goal was to decide how they wanted to structure the year's final classroom session. The teachers wanted to stream the video of the Museum trip and have the students ask follow-up questions about it. In this session the teachers decided individual students would work with their partners to ask specific questions about the book, *Island on Bird Street*, both classes had read as part of the IBSP curriculum. The teachers also wanted the students to speak with their partners about the decorative face masks they had painted earlier in the year depicting something about themselves and their family history.¹² In the final segment the students would also be encouraged to tell where they were going to spend their summer vacations and identify the locations on Google Maps.

The social organization of the room

As a result of the technical setbacks they encountered during these early classroom sessions, the teachers indicated they were beginning to appreciate the need for carefully planning the social and pedagogical logistics of future sessions. In a discussion with the researcher, Teacher B mentioned both teachers had decided they would work

¹² Earlier in the semester Teacher B's students had made paper mache' masks; they painted one half of the mask with symbols representing their American heritage and Teacher B had mailed the masks to Teacher A. When the Israeli students received the masks, each student had completed their partner's mask with symbols of their own heritage. The Israeli students wanted to show Teacher B's students the face masks they had just completed and share the significance of their symbols with their partner.

together to set objectives and establish a methodology for how, and what, they would teach in future sessions. The teachers recognized they needed to consistently enact the guidelines they had developed for turn-taking, speaking slowly, and using basic words to convey ideas. They suggested that in the future instead of posting several guiding questions to the GHF web board, they wanted to limit the questions and encourage the students to use the CTMX platform as a space where they could interact face-to-face to discuss what they were learning in greater depth. Teacher B made the suggestion, "Let them talk about one question they have with the book."

Although they were still very concerned about the reliability of the CTMX platform, they recognized they had made a significant transition from their initial use of the technologies primarily as a social platform to their current discussions that were focusing on constructing pedagogies that could be used within the classroom environment.

An example of this transformative process can be found in Teacher B's suggestion to develop a collaborative art project that would be taught online with the Israeli art teacher. Using the CTMX platform, she suggested the students could be shown how to make a Star of David using math concepts. Teacher B observed that as a result of her recent experiences in working with Teacher A and their students within the technology she could envision the IBSP project as a "main trunk with branches that could reach out to entire communities". When Teacher B was asked by the researcher if she thought the CTMX platform could be applied in other subject areas such as language arts,

social studies, and intercultural activities, she laughingly remarked, "I don't even have to think about it. It has a life of its own."

One important strategy the teachers adopted was how to use the CTMX platform to work collaboratively to construct a document by sharing the immediate workspace. The teachers quickly realized this was an extremely beneficial tool for their planning sessions. They decided Teacher A would write her words in Hebrew and then she would give Teacher B the podium (access to control the screen). Teacher A would then verbally translate what she had written in Hebrew and Teacher B would write her words in English below the Hebrew. The teachers could simultaneously view the page and discuss any modifications. The process would be repeated until the lists or other materials were completed. In this manner both teachers had the details in their primary language and could check for accuracy.

Teacher B had developed a curriculum about World War II with her students and eventually wanted to incorporate that with the IBSP curriculum. She suggested the teachers could do a genealogy project with their students and ask them to speak to their parents, grandparents, or great-grandparents to collect their stories about this time in history. Teacher A enthusiastically embraced this idea and named it the "Roots Project." The teachers decided the students could be paired by the discovery of common geographic histories, similarities in the life experiences of their relatives (such as immigration and war), and mutual historical interests and would require persistent efforts by the students and teachers to conduct interviews, gather the information, organize the results, and develop collaborative activities. Both teachers suggested they could have the adults the students had interviewed speak to the classes using the CTMX platform as a culminating activity, and were beginning to conceptualize its broader implications for use by the Ghetto Fighters House Museum's IBSP curriculum as well as in other intercultural areas. Teacher A mentioned she was beginning to recognize the specific value a project of this nature could provide for bringing students in Arab, Druze , and Jewish schools together to work on a variety of subjects such as tolerance and intercultural interaction as well as for projects in ecology, science, or learning how to speak fluent Arabic and Hebrew.

Through their continuing use of the CTMX platform the teachers were beginning to develop a contextual space where they frequently met and interacted socially as well as professionally. They joked about being the NASA team and characterized their initial experiences with the technologies as pioneering attempts to conquer virtual space, much as the astronauts had done. The teacher's actions mirrored the theoretical tenets of social interactionism described by Blumer (1969/1998) and Goffman (1959/1967) regarding the individual's efforts and ability to interpret the interactions, gestures, and language of another person in order to construct a response. Through this process of engaged interaction, interpretation of language and gestures, and continuous dialogue, the teachers were beginning to construct local histories for responding to the needs of their partners as they moved toward shared understandings.

Prior to this research project's initiation, the teachers had become close friends and worked well together. Because they could now connect using the CTMX platform at will, it became possible for them to interact much more frequently. Subsequently, their discussions routinely addressed a number of issues they were encountering on a daily basis within the classroom and in their personal lives. These online interactions built upon the relationship the teachers had already established and became a space where they could trust their partners and would be comfortable in admitting they did not understand how to approach a topic or marshal additional resources. The teachers' actions are consistent with the formation of communities-of-practice described by Wenger (1998) and Wenger, et al (2002) that identifies the need for common goals, benefits, and a desire to work collaboratively.

Both teachers expressed a desire to expand the program beyond its current boundaries for next year. One of the ideas they reported they were considering would be to offer a demonstration of their use of the CTMX platform to other Israeli and American teachers who might be interested in working with them on future projects.

Sky's the limit

In late June, when the teachers were more relaxed and the technician who lived on Teacher A's kibbutz suddenly offered to rejoin the project and assist her, both teachers used this opportunity to have several desktop videoconference sessions to plan for a teachers' seminar and discuss how they wanted to incorporate the technology into the IBSP curriculum in their classrooms during the next school year. Although Teacher A had already become adept in facilitating these smaller desktop sessions, she welcomed the technician's offer of support. The teachers used this opportunity to reflect on what had transpired during the previous three months and offered several insights regarding their experiences

- Teacher A: "Before, we just 'did it', now ...I am thinking about it in logical words (rather than) fly by seat of pants...the project has given me possibility to dream...get crazy with ideas. Really just the beginning... gives you the feeling the sky is open."
- Teacher A: "Possibilities are much more than we are doing because of technology problem."
- Teacher B: "Sky's the limit ... [if this technology really worked]. If we could just turn it on, not take any time...then kids could...do it. It's the time and the anxiety... Oh, if it doesn't work...where do we go from there?"
- Teacher A: "If I think about last year...the kids were not disappointed...oh, not working...okay, it will work tomorrow! Kids take it a lot more in stride than we do...we're trying to justify it academically...it's just fun for them."
- Teacher B: "... gives us hope...brings it to reality. Well, you can do everything, gives us possibility. ...gave me validation. Helped me have more confidence as a teacher, not so shy, more aggressive ...willing to fight now. ...tendency to not go against authority... now I would be able to go into it with a lot more fire... more facts to fight."
- Teacher B: "I don't think the teachers (in USA) have a voice...I don't feel we have much voice. We are not asked what do you think is best for

kids. Administration does not value our opinion...not as a professional at all... (we are) not spoken to as a professional...not certain how to respond. You know that (in Israel) teachers are given two weeks to plan. Makes me envious...want to go there and spend time in future to learn how they do it."

In making these comparisons, Teacher B noted that when she visited Teacher A's school, she had observed a greater bond between teachers at Teacher A's school and believes teachers in Israel do have a voice in how the schools are administered. In contrast to this situation, Teacher B stated she has often felt alone. Teacher B concluded her comments by suggesting that changing institutional practices would be more difficult to accomplish in her school because when teachers return to their classrooms they tend to fit the existing mold, not push for change. Teacher B also commented she believed the individual child is more valued in Israel, because American public schools are organized around producing test scores, not addressing the needs of the individual students.

Later in the summer, when Teacher A was asked by the Regional Council's educational director to present a summary of what she has been doing with the use of the technically-mediated space in conjunction with the IBSP curriculum, she regarded this request as recognition of her accomplishments with Teacher B and their students and reported she was very pleased their efforts had been recognized by the administrators and her fellow teachers.

June-July 2007: A proposed professional development seminar

Teacher A had encountered tremendous interest by her colleagues regarding her role in this research project and how it could be expanded for use by other teachers in her school. During the first few videoconferences, her principal, members of the Ghetto Fighters' House Museum (GFH) staff, and several teachers from her school had been observers of the sessions. As the school year was drawing to a close, several teachers in both communities indicated they were interested in learning to use the technologies. The ESL and art teacher in Israel and the language arts teacher in the United States had already begun to make suggestions about how they could work together with Teachers A and B or find additional partners in other Israeli, European, and the American (North and South) schools.

In Israel the school year ends the last week of June; the teachers and principals set aside the first two weeks in July for a review of their current practices and to prepare and design activities for the curriculum they will be teaching in the new school year. Teacher A reported her principal had indicated her enthusiasm for including an online seminar produced by Teachers A and B as a part of the Israeli teachers' two week planning and evaluation program. Teacher B stated she was confident there were teachers from her school who would also be interested in learning to use the CTMX platform.

With this affirmation from their peers and administrator the teachers began working online at the end of June to organize a seminar that would demonstrate and explain how they were able to use the various multimedia tools to work collaboratively. Both teachers identified the need for Israeli teachers involved in the program to have a
good command of the second language they were using in the program (whether it would be French, English, Spanish, or Russian). Although she did not believe it was realistic to expect teachers outside of Israel to be fluent in Hebrew, Teacher A commented she believed the whole key to success of the program was the personal relationship, one-onone, the teachers developed. Teacher A continued by stating that when she and Teacher B had first begun working together she did not know what to expect and had no idea their connection would become so personal.

Teacher A maintained that keeping personal connections helps to understand cultural differences and creates an atmosphere for negotiation and openness. She also suggested the need for a mentor [similar to the IBSP liaison in USA] who would be sensitive to Israeli cultural differences and could work with the partnering teachers. The teachers observed that since their team was already in place it could be used as a mentoring team and commented, "If technology is in place, then you can move to next level. [the question is:] How do we do this?"

This comment captures an aspect identified in the literature about the need to develop training programs, scaffolding, and mentoring opportunities for educators that can serve to assist them in making the transition from "tool to process". Teacher A's question, "How do we do this?" speaks directly to the question and identifies the struggle in moving from direct teaching to a more constructivist orientation to pedagogy. An interesting aspect of how the teachers really felt about being given total control of their use of the technologies was revealed while the teachers were preparing for the July teachers' seminar.

Both teachers insisted that if they were going to be responsible for teaching their colleagues how to use the CTMX platform and the accompanying multimedia applications, their initial focus would be on the technologies and the tools. They agreed it would complicate their agenda to add additional burdens such as the need to integrate the tools with a curriculum. Both teachers stated that although they personally appreciated the freedom they had been given to construct their own pedagogical approaches without interference or direction, their assessment was that most teachers would not want to engage in a program without some guidelines and a defined sense of structure.

- Teacher A: [M]aybe I'm wrong, but you ask me how you, if you have to teach now the teachers to use it. What are you going to...I think that it's better... or maybe to have a suggestion, okay? You can use it whatever=
- Teacher B: =Right, right, right..=
- Teacher A: =But if you want, I can give you an example _____how you can use it.
- Teacher B: Right, right, right...
- Teacher A: And the first thing, when you get familiar with it, you know it's just.... But, I'm, I think, I just think to myself to... to...just to... somebody else... maybe the, the _____ freedom with you first time it's=
- Teacher B: =Too much=
- Teacher A: =Discipline=

Teacher B:	=They	might need	d our	guidance.
	2			

- Teacher A: Because I'm, I know, I must tell you, I know myself... I don't try to jump to the cold water. _____ it's not for me. Big mistake=
- Teacher B: =Right, right, right.=
- Teacher A: =what happens?
- Teacher B: Right=
- Teacher A: =So, it maybe, if you give them the suggestion to put a new item, a new system, in the curriculum the first time, well lets... I... I gave you an example how you can use it.
- Teacher B: Right. Right...right...right.
- Teacher A: You don't want, okay. Let's take it to another subject. whatever/ wherever ____=
- Teacher B: = Right...right...right.
- Teacher A: I can suggest you=
- Teacher B: =*murmurs agreement*=
- Teacher A: =Here, I give you an example how you can use it.

Teacher B: Right.

The teachers wanted to demonstrate the various programs that were available through the CTMX platform, e.g., developing documents collaboratively and sharing prepared documents, accessing web pages simultaneously, using whiteboards, video or Power Point, conducting videoconferences from multiple sites, and working collaboratively in all these areas in real time. They also decided their students could show some of the artifacts they had made during the school year such as the masks, postcards, and video, and explain their significance. Teacher B had letters from her students and suggested she could ask her students to read their letters.

The following dialogue shows some of their organizational processes as the two teachers work collaboratively online to plan their seminar:

- Teacher B: Teacher A, what do you want to get done...what do you want your teachers to know about the program?
- Teacher A: I think...what I think benefit... is to work with Teacher B...to show this. What it is me and you just talk about. What's it mean. Have to show about... something about ideas we have for next year, let's say.
- Teacher B: Okay.
- Teacher A: I think also, one thing...just show them how things can work... to show them how they can write...I can write to you...you can write to me=
- Teacher B: =In the box... here?
- Teacher A: Yeah, because it's one thing when you talk about things. It's not enough to talk about things... then you just show them... just show them how things work.
- Researcher: Are you also talking about sharing the page and going on the web? All of that?

- Teacher A: That's right, that's right. I'm also going to show them the conversation between me and Teacher B... Okay?
- Teacher B: Okay.
- Teacher A: And then, I'm going to show them how to write. That's an example. All right?
- Teacher B: Yeah, go ahead.
- Teacher A: And then I'm going to show them the possibility to show the movie. Remember when we showed the kids the movie?
- Teacher B: Yeah.
- Teacher A: We can show them the possibility of seeing the movie.
- Teacher B: Okay. Can you do that, Teacher A?
- Teacher A: Yes, we can do it. We can do that at the school, no problem. At the school we have the equipment. Of course.
- Teacher B: Alright. Okay...I'll try to get...remember how you and I got the maps? I'll try to do that again. Remember we had the idea showing Ohio=
- Teacher A: =Right=
- Teacher B: =then you can bring up a map of Israel and show them...I'll practice that=
- Teacher A: =another idea is to have two kids...show teachers how kids can work by themselves... idea is to show possibilities.

During this discussion when Teacher B asks Teacher A, "Can you do that...?" she is expressing her concern about Teacher A's ability to manage the technical aspects of the videoconference if technical support was not readily available. In response, Teacher A offers assurances, and both teachers continue to list candidate demonstrations from activities they had developed and successfully executed during previous videoconference sessions with their students, e.g., accessing Ohio and Israeli maps on the Internet and streaming video programs

Unfortunately, after much careful planning, Teacher A had to tell Teacher B she wanted to delay this project until later in the summer or sometime in the fall. The Israeli teachers' seminar was held each morning from 08:00-13:00 Israeli time, and this translated to 01:00-06:00 EDT. The second problem arose because the school year came to a close in Israel a month after the American school and the Israeli teachers were exhausted. Teacher A felt their efforts would not be fully appreciated or understood.

More importantly, she believed the IBSP curriculum and the videoconference project should be seen as a school–wide endeavor rather than just 'Teacher A's or the researcher's 'special' project. For this reason, she had asked her friend, the art teacher, to work with her and Teacher B next year. Teacher A suggested that in the future any discussion of the extension of this program should be framed as the 'school's project', and she suggested delaying the planned demonstration to avoid any inference of special attention to her during the teachers' July wrap-up.

Building trust and working together

At this juncture in the study, the teachers' ability to overcome their initial frustrations with the technical aspects of the project was beginning to become evident. As their confidence grew, the teachers began to trust the value of their personal classroom expertise and their experiences with the CTMX platform. They planned numerous new tasks and activities for their students that would incorporate the technically-mediated space with the goals of the current IBSP curriculum.

Based on their experiences in using these technologies in the practical world of the computer labs in their local schools and classrooms, the teachers evaluated the physical organization of these spaces and suggested to their principals, the computer lab teacher, and technicians what they perceived the benefits would be if the computers were placed in the classroom rather than a designated computer lab. Teacher A remarked, "...students want to see other classrooms, becomes familiar...too impersonal in computer lab. We invite you to our class." Teacher B indicated her agreement by stating, "... [it] takes too much time; too much energy ... (to move to lab). If you are in a class, they feel like a class."

They also decided it was important for smaller groups of students to work together online with teachers because of the persistent problems with background noise and echo, especially given the levels of English proficiency of Israeli sixth graders who had only begun to learn the language in fourth grade. In light of their experience so far, the teachers decided they would have to devote much more attention to designing tasks when their students are interacting in the virtual space. Teacher B had instructed her students to speak slowly and use simple words when talking to their Israeli counterparts. She also suggested using seventh graders who had previously participated in the IBSP curriculum as mentors to help the sixth graders and remarked, "Kids take to it like water." Teacher A's comment was, "...absolutely, good idea. We can be free to teach, not worry about technical agenda." Teacher A made the suggestion to include other teachers in the use of videoconferencing because when her fellow teachers asked her how she was able to work with non-Jewish teachers and schools (in US) she told them, "We don't need any program to work together... It's (just) hard work to teach the kids." She also remarked she hoped this program would provide future opportunities to work with Arab and Jewish schools as well as American.

November 2007-February 2008

In late October 2007, after the Israeli students had returned from their holiday recess, the teachers began to meet online to discuss the logistics of a videoconference they were scheduling for early November.¹³ Their planning reflected how much they had learned about the limitations of the technologies they were using and the accommodations they were required to incorporate into their teaching and learning activities in order to succeed. At this point in the study the teachers were implementing the strategies they had devised for speaking and listening online: They had determined the number of students that worked best within the virtual space, and had begun to develop a template for what would transpire during each session, while trying to preserve their freedom of interaction. They had also begun to list their students by name and

¹³ There are four holidays that occur in rapid succession anytime from late August through October. Most Israeli schools close during the holidays and makes scheduling difficult for the American schools that are well into their calendars by late September.

gender (it was often difficult for Teacher B. to identify gender in Israeli names) and Teacher A agreed to choose students with good English speaking skills for this first event. Both teachers decided to have the students introduce themselves.

During one work session, the teachers discussed the merits of having their students discuss the play, "Anne Frank". Teacher B's students were scheduled to attend the play prior to their November videoconference.

Teacher A:	"I have to think about it. (Maybe) first lessonnot send such a
	heavy topic."

- Teacher B: Remember when. You know how you said that my kids should write a letter to your kids? About them seeing Anne Frank and what they know about the Holocaust and all of that?
- Teacher A: Yes.
- Teacher B: I have an idea, we can go ahead and type it but we're gonna also... I think we can... now that you've got the program up and running... you know... and I do. I've got to get my computer at school, but that's beside the point. Why don't we have the kids do it, you just keep maybe... your kids after school... like maybe one group of kids after school one day and then I'll keep the same kids on__. Then they could talk like that, they could actually talk to each other like we're doing.
- Teacher A Okay. ... try it.
- Teacher B: Uh huh.

Teacher A: I think after ... Those who know English.

Teacher B: Oh, that's true.

- Teacher A: We would have to suggest what they're going to speak about.
- Teacher B: Right. Well... I just thought... you know... maybe that would be an easier number to manage.

The December visit

After the videoconference in November was held (see chapter four), both teachers were concerned about how they would deal with the interruptions of the Christmas and Hanukkah holidays. Teacher A commented, "Two months can be like years...they will forget everything." As a mechanism to provide continuity for the IBSP curriculum during this period, the teachers decided to develop an art project with the Israeli art teacher that could be done in their local classrooms and then shared using the CTMX platform with their students in January or early February. The teachers decided the organizing theme for the project would be *light* and *hope*. During the December visit of the Israeli teachers to Teacher B's classroom the teachers would work with Teacher B's students to discuss how they interpreted the meaning of these two topics. Each student in Teacher B's class would create their ideas and representations on one-half of a sheet of drawing paper; then the Israeli art teacher would take these representations back to Israel and match them with their corresponding partners. The Israeli students would work with the art teacher and Teacher A to complete their drawings.

Because the CTMX technology could support the display of the students' art pieces in a window while they were discussing their work, the students in both locations would also be able to see their partners during the videoconference. As Teacher A observed:

- Teacher A: When we plan the curriculum now we just build in the Click to Meet with the whole program.
- Teacher B: Right.
- Teacher A: It just came like that.
- Teacher B: Yeah, once you get comfortable with it you can see where it gets.

A second project suggested by Teacher A involved the development of an "artifact box" the students could construct simultaneously in each location using the CTMX platform.¹⁴ This was a remarkable achievement for these teachers. It clearly identified their understanding that their teaching goals and pedagogical approaches could reside in this technically-mediated space and were achievable. Teacher B's excited comment, "I could teach that to your kids…that would be really, really fun to try" during one of their online planning sessions in late November immediately captured her ability to envision the *how* of this situation. Teacher A's unhesitating response was to begin to offer to organize the *what*- the equipment and procedures that would be required to achieve a project they both willingly embraced.

¹⁴ Constructing the artifact box would be done online. Teacher B would teach the lesson as a mathematical exercise in working with rectangular and square shapes on a two dimensional surface. Each student would make their own box. Working in pairs as they had done in the mask and postcard projects, the students would decorate one-half of each box (either inside or outside) with objects depicting some aspect of their genealogy. The teachers would decide with their students during the sessions which group would do the inside or the outside of the box. All the Israeli students would work with Teacher A and the art teacher and Teacher B's students would work with her. The boxes would be exchanged through the mail and then completed by the appropriate partners. When the boxes were completed, they would be made into three-dimension containers in which the students place their actual artifacts. At a later videoconference the teachers would ask each pair of students to discuss what they had drawn and something about the particular artifact they had chosen to place within the box.

Later, during their December meeting in the United States, Teacher B explained how she would use the CTMX platform to teach both classes to make the box.

- Teacher B: What I would really like to do is that the box that I make with the kids here=
- Teacher A: =*murmurs agreement*=
- Teacher B: =I would like to, uhm, be able to do that in front of the camera, Click To Meet, ...because it's like... draw a line=
- Teacher A: =*murmurs agreement*=
- Teacher B: =And I can show it. They wouldn't have to understand me. If I went slow, I could teach that to your kids...and you know, that would be=
- Teacher A: =That would be a class activity that would be _____=
- Teacher B: Yeah, yeah. We could do it (make the box), you know, and that would be really, really fun to try.
- Teacher B: Your kids see me and you know=
- Teacher A: =that's right=
- Teacher B: = make a line. You know, you do it.
- Teacher A:
- Teacher B: And then you take the compass and you go, and you go like that. You do it. You know, I mean, that's the same thing I do in class.
- Teacher A: That's a great idea _____=

- Teacher B: =You know, it's simple. But it would be, it would be a simple idea, you know, not real complicated.
- Teacher A: No.
- Teacher B: But then your kids would have the box pattern, and they could cut it out and do it. My kids could cut it out and do it, we could send it back and forth. We might be able to even still do it this year. You know?

The third project the teachers discussed online involved making a book about the Shoah (Holocaust) that would be a companion piece to the roots project. In the following excerpt, the teachers discuss their rationale for developing this activity:

Teacher A:	Probably, probably my kids, there is a lot of kids, that they have
	the Holocaust story.

- Teacher B: Right.
- Teacher A: Not all of them. And also _____ because in this class
- Teacher B: *murmurs agreement*
- Teacher A: In the sixth class, there is _____ questions, so it will be interesting.
- Teacher B: Yeah, sure.
- Teacher A: Just to see everybody roots.
- Researcher: Yeah. And you might also find that there are kids in your class that have stories that you have no idea.

- Teacher A: Now, what we can do by the way, if we want to add Click To Meet project.
- Teacher B: Yeah.*murmurs agreement*
- Teacher A: In it.
- Teacher B: yeah.
- Teacher A: What we can do is to show them, and to explain, to take just, you know, we are at the point with the Click To Meet that I don't want to do it all class. I want to choose=
- Teacher B: =Yeah. I know, it worked out a lot better=
- Teacher A: =So what we can do, we take four kids _____done four kids, and then we show them and explain here you see, this is the book or whatever and the book, family, my father, _____
- Teacher A: Now, I must tell you, if the videoconference with the books, if we got to the point, if we could do it to the point of _____ all the technic problems=
- Teacher B: =Yeah=
- Teacher A: =so we can use, we can do=
- Teacher B: =*murmurs agreement*=
- Teacher A: =three or four videoconference with the books=
- Teacher B: =Right, right, right, right.
- Teacher A: Which is fantastic. Imagine that the kids, they see in the videoconference, that your kids explain Well, this is ____ the book,

this is my, my story I got, whatever, the shirt that my grandmother was in...

Teacher B:	Right, right, right=
Teacher A:	=and he explained them=
Teacher B:	=Right=
Teacher A:	=And they can see it in, in the videoconference=
Teacher B:	=right, right.
Teacher A:	And after that, he got it. He got it by his hand=
Teacher B:	=Right, yeah, *murmurs agreement*=
Teacher A:	=That the box was there. You can't ask for more=
Teacher B:	=No.

In December when the teachers were able to interact face-to-face they discussed how they wanted the artifact box to be incorporated online with the "Roots" project. Teacher A begins the discussion by referencing the film that was made the previous May (2007) when her students visited the Ghetto Fighters' House Museum.

Teacher A:	You remember in this movie After they get out from the		
	museum to go to a real desk, a real desk that there is thing		
	inside=		

Teacher B:	=Drawer.

Teacher A: A drawer there is some item=

Teacher B: =Yeah, uh huh.

- Teacher A: They collect a lot of items from the survivors. A dress, a book, it was a diary, it was a nice map, you know, a table map.
- Teacher B: *murmurs agreement*
- Teacher A: And each item is in the drawer.
- Teacher B:
- Teacher A: And there is the story of the item. Of course it belonged to one of the survivors, there is a story.
- Teacher B: Yeah, I saw that.
- Teacher B: Yeah. It's beautiful.
- Teacher B: It was very good. I thought it was like a drawer, the drawers that opened up and I love that _____, and I was going to try to do that at home.
- Teacher A: So, what I thought because you can...after we learned about the Holocaust and we readed the, the=
- Teacher B: =Island.
- Teacher A: *Island on Bird Street*... to take an item, to ask or maybe to create. They can create an item, whatever they want. A book, you know, a diary, whatever they think an item=
- Teacher B: =Having to do with the book?
- Teacher A: Nothing... to learn about their roots.
- Teacher B: *murmurs agreement*
- Teacher A: To ask, to ask, for example, their parents.

Teacher B: *murmurs agreement*

- Teacher A: Okay, or their grandma, something=
- Teacher B: =Yeah.
- Teacher A: To bring something and through this to, to learn about their roots. Connect it with the real thing in the beginning.
- Teacher B: Right, right, right.
- Teacher A: To take the idea of learning
- Teacher B: *murmurs agreement*
- Teacher A: With an object.
- Teacher B: So what I really wanted was the kids to bring something to put in here that would have something to do with their roots.
- Teacher A: Okay.
- Teacher B: You know, and I thought my kids could put something in there to do with their roots and then your kids could put something in there to do with their roots. And it would be called the Artifact Box.

Over the course of the final months of the project there were three additional videoconferences and interactions between the teachers and the students. The videoconference in February has been described in detail in chapter four. What is notable about the session is that the teachers were able to accomplish the agenda they had developed in December during Teacher B's visit to the United States. The teachers organized the students into small groups and, using the guidelines they had developed for speaking slowly, using easily understandable words, and turn-taking, the students were

able to be directly involved with their partners. The students talked about the shared drawings they had prepared for the *Light and Hope* project and explained the significance of the items they were placing in their artifact boxes. When this section of the program was completed, the Israeli students spoke about their family members who had some connection to the Holocaust and the American students talked about relatives who had fought in World War II. This segment of the videoconference was directly related to the Holocaust book the teachers had initiated earlier in an online discussion and continued to organize in December. The students had been working on this project with their teachers in each classroom since January but had not had an opportunity to share the information they had collected with their partners until this meeting.

The teachers reported to me the videoconference session in March was successful and provided the students with an opportunity to share more information about their artifact boxes and the Holocaust book; the final session in April had technical difficulties. The teachers reported when the connection failed, they were comfortable enough with their use of the program to determine they were not going to be able to complete the session; after checking several options, they mutually decided to terminate the session. Unfortunately, neither of these sessions was recorded.

As a result of their ability to work comfortably with each other and the technology, the teachers reported the CTMX platform "became like a phone." This virtual, visual space had become a place where the teachers could go to share with each other and dream the unrealized goals they eventually hoped to achieve. As Teacher A so poignantly said, "I have a dream (to fly kites at the GFH Museum) ...we (Teacher B's

and Teacher A's students)... kids... we do the kites in the same time...in the same time. Put them up in the sky... you can see ours, and we can see yours...I have a dream. .Imagine...if we could get technology to work...we could do three or four videoconferences ...If we get to this point."

For the two teachers, finding their feet regarding the *taming of the technology* was now helping them construct a bridge they could routinely traverse to integrate the technologies with pedagogy and the IBSP curriculum. The teachers' goal was to use the tools to build a collaborative bridge where the *traffic*- pedagogical practices, learning strategies, and concrete artifacts could be produced in an environment of technical transparency.

Chapter Six: Conclusion

Initially conceptualized as a study of the use of sophisticated technologies by two teachers to organize an established social studies curriculum, this study became a naturalistic inquiry into how these teachers, given the opportunity to work with connective, multimedia videoconferencing tools, and in the context of their daily professional lives, would devise strategies to bring the technology to a measure of control for their practical professional and classroom purposes. In examining their efforts to master the tools, this study investigated the pedagogical and curriculum designs the teachers negotiated at the intersection of the virtual space they had established, and the real worlds of their local classrooms. How the teachers worked together to integrate these life worlds, and the value their experiences can provide for future projects involving the use of connective, multimedia technologies in the practical world of classroom use, will be taken up in the following discussion.

The conceptual categories used to organize my descriptions of the teachers' work and what they produced were those of *taming* the technology, *building the bridge*, and sending the *traffic*. How the teachers were able to navigate these contingencies are the central interests of the study. Chapters four and five address the first two terms; I now want to turn to the third.

Traffic

A particular area of interest has been to see how teachers engaged in actual classrooms implement the use of technology for their practical work, because as Viadero (1997:16, as cited in

Earle, 2002) has observed, "...like any other tool, teachers have to come up with a strategy or pedagogy to make it work." A question of particular interest in this study has been to discover if these teachers would fit the computer to the curriculum, or make the curriculum accommodate the tool (Cuban, 1986; Papert, 1987)?

As we examine the traffic that was generated by these two teachers and sent across the virtual bridge, it is important to note the difference between the deployment of these technologies as complex tools in the hands of designers, and their use in actual classroom settings in the hands of teachers obliged to deliver a curriculum. In her discussion of the classroom use of technology, Harris (2005) tells us that the literature's technocentric¹⁵ understanding of classroom teaching and learning is generally supported by practicing and pre-service teachers. This conceptualization of technology as a tool is also reiterated in the International Society for Technology in Education's (ISTE) National Educational Technology Standards for Students.¹⁶ Harris makes the argument that placing the emphasis on tool use is in direct contrast to Seymour Papert's (1980; 1987) assertion that teachers must focus on how to assist students' learning, rather than how to use the tools. As Earle (2002) has stated,

Integrating technology is not about technology- it is primarily about content and effective instructional practices. Technology involves the tools with which we deliver content and implement practices in better ways. Its focus must be on curriculum and learning. Integration is defined not by the amount or type of technology used, but by how and why it is used. (p. 7)

¹⁵ Papert (1987, In Harris, 2005) defines *technocentrism* as the fallacy of referring all questions to the technology.

¹⁶ "Curriculum integration with the use of technology involves the infusion of technology as a tool to enhance the learning in a content area or multidisciplinary setting...Effective integration of technology is achieved when students are able to select technology tools to help them obtain information in a timely manner, analyze and synthesize the information, and present it professionally. The technology should become an integral part of how the classroom functions—as accessible as all other classroom tools." International Society for Technology in Education (NETS-S; ISTE, 2002, In Harris, 2005:116)

In this study the 'how and why' implicates the traffic that was sent across these technical bridges. The "traffic" refers to the tangible and intangible evidence of what the two teachers accomplished in the virtual space of their lessons and videoconferences. This traffic includes the traditional expectations of produced student work and also the tasks, activities, and engagements the teachers crafted to accomplish their work within this technically-mediated, visual environment.

The traffic that resulted from their collaboration across this fifteen month case study produced several categories of interest. These categories include explicit artifacts as well as less tangible examples of the guidelines and strategies the teachers developed to address the technical, social, and pedagogical organization of their work. They began with the International Book Sharing Project (IBSP) curriculum. The explicit artifacts the students developed included face masks, postcards, a book about the students' personal or family connections to World War II and the Shoah (Holocaust), artifact boxes for the Roots project, questions the students developed with their teacher's guidance about the Shoah and the play "Anne Frank", drawings from the Light and Hope art project, and several videos made by the Israeli and American teams. These projects and collaborations were described and discussed in chapters four and five. They represent the teachers' efforts to enact the IBSP curriculum and its project of promoting dialogue and greater understanding among their students.

Constructing the strategies

The teachers' task was to learn to use the sophisticated videoconferencing and multimedia tools that were a part of the Click to Meet (CTMX) platform, and then to find them useful for their pedagogical work with their students. As a result of their hands-on experiences with the technology in both the desktop and classroom environments, the teachers produced a series of

strategies that addressed specific technical and organizational problems they had identified. This included their list of essential conditions for working together (described in chapter four) and a technical checklist that included performing audio and video tests prior to the actual videoconference, checking the settings on the CTMX equipment to verify they were consistent with the hardware being used, making certain they had telephone numbers readily available to contact support personnel, alerting local technical personnel of impending videoconferences, and encouraging the technicians and computer lab teachers to be present either in person or online as observers to monitor the performance of the technology.

Through their expanded use of the CTMX platform and their efforts to bring the technologies to a measure of control, the teachers reported they had become increasingly aware of the limitations of the technologies as well as those of the activities it could support. The teachers addressed these discovered limitations by establishing social and organizational protocols for turn-taking, using words and short sentences that could be easily understood by second language learners, strategies for circumventing technical transmission delays, decisions about the length of the actual sessions to avoid fatigue, the optimal time of day for conducting professional planning sessions between the teachers and for the larger classroom sessions, and setting limitations regarding the number of students who would be present (on the Israeli side) and actively participate in the videoconferencing sessions (four or five students). The teachers also discovered that when they could organize in advance the materials and information that would be exchanged during these sessions, they were far more comfortable with the overall process. This became particularly evident in the professional development seminar the teachers collaboratively planned online in June/July 2007.

As discussed in chapter five, their focus as the developers of the professional development

seminar would be to demonstrate the actual use of the tools rather than how the tools could be integrated into the curriculum. Instead of introducing the CTMX platform's possibilities for supporting alternative teaching and learning practices, the teachers decided to demonstrate those affordances of the CTMX platform that they had tamed.

Because they wanted the other teachers to understand how readily students could use the technologies, the teachers also asked some of their students to demonstrate specific functions of the CTMX platform, such as the ability to access the Internet and locate a particular website, search for a specific site on a Google map, create a document and work collaboratively to develop it, or present a Power Point display. They also made the decision to provide participants in both locations with hands-on opportunities to work with the CTMX platform's applications. But here again, the activities were themselves closely planned.

In some respects, it could be argued the decisions made by teachers A and B affirm Papert's (1987) discussion of how teachers, in their technocentrism, frequently focus on technology as a tool, rather than considering how they could employ the tools to support the students' efforts in developing critical inquiry and problem-solving skills. I think the teachers are showing us something far more practical. As the literature elsewhere suggests (Ely, 1990, Wenglinsky (Dec. 2005-Jan. 2006), Earle (2002), Richardson (2008), Starr (2000), Borko (2004), teachers and other adopters of new technologies are risking the practical disruption of their workplace settings, from whose tasks, expectations and accountabilities there is no time out. They need sustained opportunities to learn how to use the tools, sufficient time to plan and reflect about how they can integrate the tools with their teaching practices, adequate technical assistance, and encouragement from their administrators and fellow teachers without fear of criticism. In their absence we find practical constraints on what the teachers can do with the technology—what *can* be done with it—rather than ideologies of technocentrism.

On several occasions throughout the study when the teachers had opportunities to reflect on their interactions and efforts to master the technologies in my presence, they reported their recognition of the possibilities this medium could provide for teaching differently and giving their students opportunities to interact substantively with other students in geographically distant locations; however, the teachers continued to struggle to find a balance between these design possibilities and what they had determined was required to effectively manage the virtual space in their actual classrooms.

Peck and Dorricott (1994) ask: 'Do the technologies simply provide another mechanism for extending the same teaching and learning practices, or can we do something now that was not possible before?' Their question re-plays the dichotomy between focusing on the tool to perpetuate the same pedagogical practices versus using the CTMX platform or other technology affordances to construct a more open-ended, learner-centered approach. The difference seems clear cut when cast this way, complete with its obvious answer. When we examine actual cases, however, contingencies intrude.

In this study, some the conditions for adoption that have been identified in the literature (Ely, 1990) were noted and incorporated into its design at the outset. As the researcher, I assumed responsibility for orchestrating and installing the required hardware and software components that constituted the foundational 'floor'. Before the study began, the two teachers were provided with sustained opportunities to learn to use the technology tools. They were given permission by their administrators to participate in the project and extensive opportunities were made to provide adequate technical support to them, particularly during the initial stages of the study when they were learning how to work with the CTMX platform. A critical component of this study, identified in the literature by Callister and Dunne (1992) and Earle (2002)--often ignored by educational technologists and policy makers--is the need to empower classroom teachers as the frontline developers of programs implementing technological affordances in real-world classroom contexts. In response to this identified need for further inquiry and what would be discovered, throughout this project the two teachers were given "complete freedom" to devise the pedagogical and curriculum strategies and programs they determined would support their efforts to teach and extend the IBSP curriculum. But it could only, of course, be imperfect freedom. The study design could not relieve them of their daily professional tasks and responsibilities.

As Salomon and Almog (1998) have observed, using tools simply for their novelty is not a productive learning exercise; technology should serve a purpose beyond simply connecting students in internationally distant communities or to design a new database. They maintain that the ability to connect visually through these technically-mediated spaces can provide an opportunity for teachers and students to develop "webs of significance" (Geertz, 1973) that can become "causal, correlational, part-whole, rule-example, associational, or sequential links connecting a bit of information to others that give that bit its meaning" (Salomon and Almog, 1998:3). They suggest what is actually required for new learning practices and environments to develop are "a number of major shifts –a conceptual and cultural shift from teacher-led instruction to an interactive community of active learners" and movement "from a highly structured curriculum to an emerging, often improvised one …" (1998:

<u>http://vnweb.hwwilsonweb.com</u>). But again, these are urgings relieved of the contingencies of actual classroom life. They are calls for change rather than examinations of its ground.

This naturalistic study has described the actual practices of two teachers as they routinely worked within a technically-mediated, visual platform to bring the technology into the practical world of their classrooms. What the teachers learned about the tools and their ability to bring them to a measure of control has direct implications for beginning to realistically determine how the virtual spaces these technologies establish might provide a contextual platform where 'major shifts' could be carefully considered and constructed by the participants actually involved in their use.

Considering the data

Over the course of the study I assembled an archival record of the teachers' routine interactions as they planned the teaching and learning activities they would implement with their students in both their local classrooms and online in the virtual classroom. As I reviewed and explored this traffic with the teachers, it revealed the extensive pedagogical planning they had engaged in as they attempted to move beyond the traditional expectations of produced student work to establish innovative teaching and learning strategies for working collaboratively in a technically-mediated, visual environment. The data also captured some of the inherent tensions that were evidenced on multiple occasions as the teachers struggled to accommodate the technical limitations they had discovered in both the CTMX, and classroom, space. Several examples of the teachers' exchanges and negotiations as they attempted to resolve these issues have been presented in previous chapters. In the following discussion some of these same occasions will be referenced to further interrogate how these persistent tensions between tool use and pedagogical design ultimately shaped the teachers' decisions about the teaching and learning strategies they would craft and attempt to implement.

At the beginning of the study when the teachers were first learning to use the CTMX

platform, I encouraged them to become familiar with all the multimedia affordances of the CTMX platform in order to acquire a sense of what was possible and how they might begin to plan activities within the IBSP curriculum. In their efforts to become familiar with the various multimedia applications, the teachers' directed their attention towards mastering the tools-primarily the CTMX platform and the videoconferencing software. Because achieving a degree of mastery over the tools was their goal during the beginning days of the project, when they were able to work together online from their desktop computers and did not encounter any serious technical disruptions the teachers increasingly gained confidence in their ability to manage the technical platform.

This was a significant accomplishment for the teachers. After a series of moderately successful practice sessions where they discussed how they would conclude the current IBSP program, the teachers began to seriously consider the possibility of conducting at least one videoconference with their students. Their decision to use the technology beyond the original, limited focus of the study provided an opportunity to explore practical occasions of using the technologies in the classroom.

As an observer to most of the teachers' online conversations I observed the relaxed, casual nature of their interactions and their willingness to discuss ideas for future curriculum activities, craft pedagogical plans, and work to resolve various technical issues in the organization of their local and virtual classroom spaces. I had observed the teachers' adoption of learnercentered activities and problem-solving strategies within their local classrooms, as well as when they were working privately with each other using the desktop CTMX equipment. However, when they began to strategize about how they would conduct the initial videoconferencing session on April 25, 2007, their teaching and learning approaches were very similar to a more direct transmission model where one person speaks, the other responds and the process is repeated until the conversation is concluded.

When I asked the teachers about their decision to implement this strategy during this first videoconference, they explained that their choosing to carefully control the session had been influenced by their need to demonstrate to their administrators and fellow teachers they could manage both the technical medium *and* the students. A discussion of the teachers' decisions can be discovered in Zhao, Pugh, Sheldon, & Byers (2002) who have observed how successful teachers are able to read the socially organizing conditions within their classrooms and schools and are able to successfully negotiate responses and ameliorate controversy when introducing the use of technology.

Another example of the teachers' ability to read their local cultures and successfully respond to its requirements became evident prior to the July 2007 professional development seminar Teacher A was planning with Teacher B for her Israeli colleagues. Several days before the seminar was scheduled to occur Teacher A was confronted by her Israeli peers regarding her intentions for organizing the session. Teacher A assumed she had the support and encouragement of her cohort. When she announced her plans to present the professional development workshop demonstrating what she and Teacher B had been doing, she was surprised to discover the Israeli teachers were not terribly interested in participating. They even indicated a degree of jealousy regarding her 'special' status in working with the Americans. The teachers shared their concerns that her motivation was to draw attention to herself and the use of the technologies that were unfamiliar to the other teachers. Reading the situation, Teacher A immediately cancelled the seminar and provided a graceful exit strategy by suggesting it should be delayed because the Israeli teachers were tired and the time differences were unworkable.

During the second classroom videoconference in May 2007 the teachers decided to allow the students much more freedom to interact with their partners when discussing the Israeli students' trip to the Ghetto Fighters' House Museum. The teachers had originally planned to stream the video of the museum trip as a device for introducing the physical surroundings and organizing the discussion; when it was not possible to show the video, the Israeli students used the additional time to talk about what they had experienced at the museum and the American students asked numerous questions about what they had seen and how they understood and interpreted what had happened during the Shoah.

Although the use of the technology on this occasion was modest, it served the pedagogical and curriculum purposes of the teachers very well. The students were able to interact and hold a serious discussion about a topic that was of definite interest to them. The teachers had used the CTMX platform on their desktops to work collaboratively in planning their approach to the topic and preparing the questions they would address with their students. These small steps in the teachers' mastery of the technology were critical in achieving their adoption of the technology for future work.

Throughout the next month the teachers struggled with their individual issues of trusting the technology to perform reliably and confidence in their ability to master the tools, as well as their willingness to believe they could trust my promise of sustained, reliable technical support. In June/July 2007, when the teachers were becoming confident they could effectively manage the operation of the CTMX platform and recognized they would have access to reliable support personnel, they began to discuss two projects: The professional seminar Teacher A wanted to develop for the Israeli teachers' summer workshop, and how they would use the CTMX platform to teach the IBSP curriculum during the following school year.

At this point in the study, although most of their reservations about the technology had been addressed and resolved¹⁷, the teachers continued to formulate plans for using the CTMX platform that would allow them to maintain the level of control they had determined was essential if they were to successfully use it with their students and colleagues. Again it is important to note the teachers were in control of their own decisions regarding the use of the technologies and their decisions were sensibly and practically determined by their understandings of their local school communities.

When the teachers resumed their online dialogue in October 2007, their primary interest was to use this toolkit as a connective, collaborative device for their pedagogical and curriculum planning relating to the IBSP curriculum and the projects they wanted to develop in the forthcoming year. When the teachers were interacting from their desktops they were much more inclined to engage in discussions that encouraged inquiry and accessed many of the multimedia tools at their disposal. For instance, they frequently used the text box or created a document to write specific information they could save and print. As they accessed the Internet to visit web sites they wanted to use with the students they identified particular topics, searched for additional information, and collaborated in real time to develop webliographies (online bibliographies) or other materials they could use for the future videoconferencing sessions with their students.

By November the teachers were becoming accomplished technicians who could comfortably perform audio and video checks well in advance of the actual session. Since their students in previous years had used the IBSP web board to interact and share ideas, the teachers indicated they would begin to use the CTMX platform in a similar fashion, for the immediate, visual connection it afforded their students to interact and exchange information about what they

¹⁷ As the project developed Teacher B became increasingly comfortable in managing the CTMX platform without technical assistance. Teacher A also became more confident about her ability to address technical disruptions, but stated she preferred to have technical support present in order to concentrate on the students and their work rather than worrying about the technology.

were learning.

Many of the social organizational strategies the teachers had developed in the previous school year were in place. The Israeli students had been divided into smaller, manageable groups; the students waited for their partners to complete their conversations, enunciated their words carefully, and used visual cues if they could not fully understand their partners. When the students met online the American students were able to tell their Israeli partners about the play they had seen; then, the students discussed what they had learned about Anne Frank's life and some of the historical events that were relevant to what they were learning in the IBSP curriculum.

Although the teachers frequently worked together online to formalize their planning and make suggestions about new programs they could develop for their students, it wasn't until December 2007, when the teachers were physically located in the same room, that they began to verbalize how it might be possible for them to work differently with the technology. On that occasion Teacher B introduced her ideas for using the CTMX platform as a virtual classroom where both teachers could interchangeably teach the students. Her suggestion was immediately embraced by Teacher A and they began to plan a series of teaching and learning activities they would develop over the remaining months of the school year.

The activities the teachers planned for the ensuing months included art projects, the development of an artifact box that Teacher B would instruct the students to make online incorporating a number of mathematical constructs, and a book the students would develop about the Shoah. For the book project the teachers decided to ask their students to interview their parents and grandparents about their experiences during World War II and to attempt to discover if they had emigrated from similar locations or could identify other connections in common. The

teachers planned to have the adults speak to the students in both classes through the CTMX platform, but neither teacher ever suggested using the technologies to provide opportunities for their students to interact independently with these individuals or work collaboratively to construct their own inquiry and knowledge development.

In spite of the technical limitations the CTMX platform posed, over the course of the study it became an increasingly useful tool the teachers could access in the performance of their routine interactions for the IBSP curriculum. The social and technical organizational strategies the teachers had developed were increasingly integrated into their pedagogical plans. It is through their negotiations within the real and virtual spaces they inhabited that we can locate the strongest evidence of how the two teachers were able to craft a pragmatic strategy, an operational hybrid, for negotiating the space between tool use and the practical contingencies of the classroom. The hybrid the teachers ultimately created was derived from the tension described by Salomon and Almog (1998), Cuban (1986), Papert (1987), and Earle (2002) between the teachers' initial focus on the tools and their eventual efforts to craft alternative pedagogical strategies that would provide additional teaching and learning opportunities for their students.

The operational hybrid the two teachers came to terms with and devised for practical use in their classrooms did not mirror the descriptions found in the literature by Pea et al (1995), Earle (2002), or Papert (1980). Instead, the teachers had painstakingly crafted a pedagogical approach that accommodated to their needs, allowed them to retain control of the technology in order to satisfy the demands of their students, administrators, and peers, and provided them with an opportunity to connect their students to discuss the questions posed in the IBSP curriculum, while offering additional opportunities for the students to engage with one another on limited occasions. As the case study progressed, it became obvious the teachers were increasingly devising pedagogical programs that would accommodate the now familiar limitations and existing realities of the tools they were using. Both teachers explained to me they had discussed whether they wanted to plan opportunities for their students to work together without the teachers' direct supervision and had agreed to continue using a more directed approach during the videoconferences because it would enable them to maintain better control of the students and the CTMX platform.¹⁸ In this regard the teachers' actions were consistent with the findings described by Duffield (1997, In Earle, 2002), Greenagel (2002), and Harris (2005) that identified most teachers' reluctance, when they engage with technological tools, to move from a transmission model for conveying information to a situated, problem-solving learner-engaged method of inquiry and knowledge construction. But the reluctance here was practical and organizational, rather than ideological or an expression of a pedagogical theory. Our teachers were making an assessment of what they *could* do.

What was learned?

The study provided me with the opportunity to continually revisit and question the participants about their interactions, the local conditions that influenced their work, and their rationale for making specific choices. As Mehan (1982) has noted, the ability to review the digitally-captured sessions with the teachers throughout the study and show them specific examples of their interactions and dialogues provided a contextual framework for gaining greater understanding about what they were doing and how they had chosen to negotiate their interactions. The teachers were very willing to reflect and explain the practices and decisions they had made. Their discussion was extremely beneficial to me in attempting to understand how they

¹⁸ At this point in the study the teachers were more concerned about the possibility of criticism from their administrators for not maintaining order than they were about establishing a context for engaged, open-ended dialogue and interaction.

chose to work collaboratively to develop decisions about the social organization of the classrooms (real and virtual), the technical operation of the CTMX platform, their pedagogical approaches to what they would teach within the virtual space and their local classrooms, and the artifacts-the traffic-they intended to have their students develop.

It became increasingly evident to me as the study progressed that the teachers were pleased with what they were accomplishing pedagogically. They indicated on several occasions that when the technology worked, they were very comfortable in using it and felt the sky was the limit in terms of what they could teach. The teachers did not express particular interest in using the CTMX platform as an additional tool for small student groups to work on solving problems that the students might want to explore. At the conclusion of the study Teacher B was still concerned about what the students might do if they could freely interact with each other without her supervision. This was not a topic of concern for Teacher A, although she did indicate she had much more freedom to work with her students without interruptions by parents or administrators.

Because participation in this case study required an enormous commitment in time and energy from the teachers, the teachers occasionally expressed their desire for some expression of interest or an acknowledgement by their administrators of support for their efforts. It was also apparent that for teachers to agree to dedicate the amount of time that was required to learn how to use and gain mastery of the technologies, there had to be reliable technical support the teachers could trust and readily access.¹⁹

¹⁹ The teachers' concerns mirrored my personal experiences with technology personnel with whom I had worked over the preceding eight years in both communities. On these occasions I had observed several patterns of service. There were technicians who actively became engaged in trying to resolve any problem that presented itself. When connections failed, or there were hardware and software problems, these individuals made themselves available to the participants either in person or through alternative means such as cell phones and email. They were persistent in their efforts to resolve the technical disruptions that occurred and were forthcoming to all participants about what they were doing, or considering, as remedies to fix the problems. In doing this the technicians were able to establish an atmosphere of trust and confidence that lessened the anxieties of the teachers.

These teachers willingly chose to participate in the research project. They were given freedom to make decisions about which technologies would be used during the videoconferences, construct pedagogical practices they wanted to implement for introducing various topics, and determine how they would engage the students in the planned activities. The opportunity to learn to use innovative technologies, routinely connect to work face-to-face to plan the teaching and learning activities they would enact for the IBSP curriculum, and offer their students the opportunity to interact within the virtual space for authentic learning opportunities was an extraordinary experience in their professional lives.

This collection of occasions of the teachers' encounters with highly sophisticated videoconferencing and multimedia technologies, their ability to master the technical aspects of the project, their determined efforts to establish a hybrid structure that would serve their pedagogical, curricular and cultural requirements, and the resultant strategies and knowledge they produced can be instructive on several levels. For policy makers and educational technologists who are often seduced by the 'sizzle' of the gadgetry, it offers a realistic glimpse into what ordinary classroom teachers encounter when they are given technologies and not provided with essential professional development support. In this study, I attempted to ameliorate this condition. However, in spite of these efforts, the culture of the schools became a determining factor in the level of technical support that was available to the teachers. Although I was able to reach beyond the confines of the local support venues to the university and two commercial vendors who had a personal stake in the software, under ordinary circumstances, this would rarely be achievable. The need for knowledgeable, well trained, technical support who are available to the teachers and willing to work with them as members of a community effort to support the integration of these

In contrast to these individuals, there were other technicians who, when they were confronted with challenges they were not prepared to resolve, would retreat into their own cloistered world of gadgetry and *techspeak*; become unavailable and fail to communicate with the teachers, or simply state they did not know how, or have sufficient time, to resolve the issues that had occurred.
technologies into the schools has also been shown to be a critical factor in these projects ultimate success or failure.

Conclusion

In its modesty, this ethnographic case study has been an attempt to describe the practical, often messy work of two teachers in bringing sophisticated videoconferencing and multimedia technologies to purposeful use in their respective classrooms. Over its course, we can see how experienced teachers are able to work collaboratively across not only geographic, but cultural boundaries. In response to the grand promises of some futuristic thinkers and educational technologists, this study provides the reader with practical insight into how the teachers initially confronted the technology and their own reservations about its value to their pedagogical requirements and were able to bring the tools to a measure of useful purpose in their classrooms. In this study it is the teachers who instruct us in how the tools can best be put to use.

Salomon and Almog's (1998) admonishment to educators to find substantive use for videoconferencing other than as a device to connect overseas students in superficial projects is particularly relevant to the findings in this study. Perhaps when the initial idea for the research project was offered to the teachers they understood it as a means to do little more than serve as an introductory and summative device for their IBSP curriculum. However, as they repeatedly indicated throughout the study, once they began to use the CTMX platform themselves and particularly after using it with their students, they began to realize the potential this medium offered for crafting entirely different, and innovative pedagogical strategies. The problem was not the teachers' motivation or desire to change; it was their task to master the tools for their own purposes in order to develop and implement the teaching and learning practices they envisioned in their actual, practical classrooms. The tasks owned the problems.

This study identifies the need for educational technologists and members of academic faculties to develop sustained opportunities for practicing and pre-service teachers to become actively engaged in learning to use the tools as a first step; then, consciously moving beyond mastery to participate in sustained learner-centered programs that assist them in crafting teaching and learning programs for implementation in their classrooms. In-service programs and academic courses designed to offer sustained opportunities to practitioners and pre-service teachers for experiential, hands-on interaction with the technologies in a learner-centered environment could be designed to provide teachers with learning opportunities that are similar to those described by Lave and Wenger (1991). Perhaps in such a context, it will become possible for the teachers to craft alternative pedagogical approaches, such as those suggested by Papert (1987) and Salomon and Almog (1998) that embody the integration of the technology into the everyday processes of classroom life. In the absence of these opportunities, the two teachers demonstrate their ability to make the technologies useful and purposeful to their own agenda.

The teachers involved in this study repeatedly demonstrated their ability to resolve the technical difficulties that were encountered either as a result of the limitations of the equipment or their practical, professional constraints. In the context of their everyday, practical routines and interactions with their students, the technical personnel and the technologies, the two teachers reported they had discovered talents and energy that revitalized their professional practices and made them hungry for learning new ways of teaching and learning. Rather than decrying the inability of teachers to fully integrate the tool with the process, the findings in this study suggest the consideration of alternative strategies that include teachers in the planning and design of technological integration programs and their implementation into pedagogy and curriculum should be considered. Perhaps this modest study can be used to suggest, if we want teachers to

use the tools, we need to invest the time and effort not to "show them", but instead work with each other to experience and use the tools to unleash the power of the teacher to teach.

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Appendix A: Description of Technology

The identification of a collaborative software program capable of supporting the integration of videoconferencing with the appropriate multimedia applications was essential to the research project. The software application, Click-to-Meet (CTMX), was made available, at no cost to the researcher or the schools, through a technology provider, Communications III, located in Columbus, Ohio. Throughout this case study personnel at Communications III provided online support to the researcher and the teachers at no charge. The CTMX program is password protected and supports multiple users who can synchronously enter the virtual space to view streaming video, access web pages, display documents or Power Point presentations, and collaboratively construct documents incorporating graphics, video, Excel, and Power Point presentations.

Technology Used

The components used to construct the technological 'floor' combined the videoconference client application [Click-to-Meet] with desktop and laptop computers; high speed, broadband and ADSL Internet connections; inexpensive, eyeball desktop cameras installed on the schools' and teachers' home computers; and digital projectors that displayed an image on the wall or a movie screen [later in the Israeli school, a flat

panel HDTV with a high definition sound card was used as the display monitor]. The

integration of these technical components established the virtual space.

Hardware

- 1. High Speed Internet access /Broadband Delivery:
 - T1 Cable [USA]
 - ADSL [Israel] with twisted pair metal lines
- 2. Computers:
 - Israel: Dell Pentium IV ; later upgraded to Dell dual core Pentium IV
 - USA: Sony Vaio laptop with Pentium IV chip [Classroom only had Apple/ Macintosh computers; at that time Click to Meet software was only compatible with PC.
- 3. External Speakers
- 4. Logitech Desktop Camera
- 5. Toshiba Digital Projector was used in USA classroom.
- 6. Ben Q digital projector manufactured by ACER was used in Israeli classroom
- 7. Israel: Upgrade to HDTV with high definition sound card in February, 2008

Software

- 1. Click-to-Meet [Proprietary software made available to researcher at no cost by Communications III, Columbus, Ohio. Software is password protected and resides on Communications III server]. Click-to-Meet is not supported on Apple/ Macintosh computers.
- 2. Microsoft Suite
 - a. Word
 - b. Power Point
 - c. Web Page development program

Additional Equipment

- 1. Sony XHD 1080 Digital recorder
- 2. Radio Shack Voice Activated Tape Recorder
- 3. Nikon Digital Camera

At the time the research project was being conducted in 2007-2008, the client

server software, Click to Meet, could only operate on a PC based network. Since then, the

technical capabilities of the CTMX software have been significantly upgraded by the developers at Radvision. This had direct implications for the case study because Teacher B's classroom was equipped with Macintosh computers and it became necessary to provide her with the researcher's PC. In the past year, Mac OS X/Safari and Firefox can support conference watching only and Intel based CPU is required for data viewing.

The following information is offered to provide additional insight regarding the technical capabilities of the client software that was used in this particular study. No endorsement of any product is being offered. [Retrieved from the Rutgers University web site through NJEdge.Net - New Jersey's statewide education network: http://oirt.rutgers.edu/cmn/video_desktop/clicktomeet.html]

Click-To-Meet

Introduction

<u>Click-To-Meet</u> is a full-featured desktop videoconferencing solution for Microsoft Windows PCs running Internet Explorer. The strength of this package is that is webbased and has numerous tools available for multi-faceted videoconferencing. The system does support H.323 and Session Initiated Protocol (SIP) clients. Many of the tools described below are only available only to other participants using the Click-To-Meet interface.

Support Clients and Hardware

Client OS	Client Machine Specs	Video/Audio Equipment
Preferred: Windows XP	Preferred: PIV 1.5+GHz	Logitech 4000 USB Camera
Minimum: Windows	512MB RAM	NJEDge.Net Recommendations
2000/98SE	Minimum: PIII 500 MHz	
	256MB RAM	

Figure 4: Click-to-Meet data

Basic Client Layout



Figure 5: Click-to-Meet display

Click-To-Meet has many tools found in other full-featured videoconference systems (Chat, Whiteboard, Application & Document Sharing, and Web Viewer.) The strengths of Click-To-Meet lie in its:

- Podium control feature (necessary in larger meetings to control discussion)
- MCU (multi-point control unit) backend (allows necessary data/video channels to hold larger meetings and share more data effectively.)
- Individual layout control of the video display.
- Ability to annotate and highlight web sites and documents for others to see.

To Join an Existing Click-To-Meet Videoconference

1) Log onto the Click-To-Meet system

- 2) Enter the Meeting ID under the Meetings in Session section.
- 3) Click Join Now!

To Connect in other H.323 or SIP Participants

1) Enter a videoconferencing session as described above.

2) Select the menu item **Participate -> Invite** or the **Invite...** link in the second row.

Note: In this location, you can create your own directory of places you regularly videoconference to.

3) Select location out of the directory or click Others.

4) Select how you wish to contact the participant. For example, if you have the IP address of the participant's H.323-compliant system, click **Invite a video device by IP address...**. Enter the IP address at the **Invite At:** text box. and Click **OK**.

6) If the system is available, it should connect directly.

Share a Document

1) Enter a videoconferencing session as described above.

2) Click on Request Podium. 3) Click on Action->Present Document (2nd menu line).

4) Click on **Select a Document... - > Other** (3rd menu line).

5) Click on Add from My Computer.

6) Browse to document and select **Open**.

7) Click **Yes** in dialog box to permit sharing.

8) Click on **Present**.

Note: You can draw/highlight a document by clicking on **Annotate** and using the drawing tools. (3rd menu line)

Use a Whiteboard

1) Enter a videoconferencing session as described above.

- 2) Click on Request Podium. 3) Click on Action->Whiteboard (2nd menu line).
- 4) Click on **Click here to start whiteboard** (Center of Window).

Control Video Layout of Participants

2) Click on **Layout** (2nd menu line). 3) Click on the desired grid from the available layouts.

CLICK TO MEET [dba Scopia Desktop]

[Retrieved from the Radvision.com web site

http://www.radvision.com/NR/rdonlyres/EE643C4B-A77C-4E8A-B3FD-00A27473C99C/0/SCOPIA_Desktop_Datasheet_V57_Web.pdf]

SCOPIA® Desktop

Easily connect remote employees and external partners to your existing video network for voice, video and data communications

Extend the Reach of Your Existing Video Network

With SCOPIA Desktop, your video network is accessible to any member of your organization. Team members can collaborate regardless of their chosen device: a high end room conferencing system, a laptop in a small branch office or a teleworker's personal computer. For larger audiences, use SCOPIA Desktop's built-in streaming capabilities.

Collaborate Effectively with Business Partners

Simply send a Web link to business partners inviting them to participate in a high end video conference. SCOPIA Desktop's built-in firewall traversal ensures call connectivity regardless of your partner's firewall.

Recording and Playback

Lets users record, archive, and view all aspects of the meeting including audio, video, data and annotations. Recorded content is easily organized and managed providing simple web-based access and retrieval.

By utilizing RADVISION's state-of-the-art audio and video hardware processing, each participant is assured a high quality audio/visual experience, now with HD to the desktop.

Common Experience for All Participants

Whether connected from a high end conference room or a remote laptop, all users get the same conference features like Continuous

Presence video, H.239 data collaboration including annotation, PIN protected meetings and conference moderation.

Say Goodbye to Expensive Deployment Costs

SCOPIA Desktop uses a freely distributable, state of the art Web client.

There are no client software fees, complex installations, license provisioning or software upgrades.

Enjoy High Quality Video, Audio and Data on any Computer

SCOPIA Desktop Product Specifications

Client Connectivity Modes

- Live connection (Audio, Video, Data, Chat) for interactive participants
- Data only connection with moderation capabilities, optional call back
- Streaming mode for non-interactive participants

Data Collaboration

• H.239 based data collaboration

- Annotation over H.239 data collaboration
- Room system-compatible data collaboration format

(H.263+, H.264 HD)

• Data shared from a room system or desktop visible on all other room systems or desktops

- Share the entire screen or specific applications
- Text chat with emoticons for desktop users

Recording and Playback (Optional)

- Records audio, video, data, and annotations
- Auto posted for easy web access
- PIN protected for access security
- Permit anyone to record or restrict users1 by administrator

Layout Selection

- Video or data focused
- Side-by-side video and data
- Full screen video or data
- Automatic based on meeting context

User Controls

- Mute/un-mute
- Stop/start video
- Turn on/off local self-view

- Choose your video layout (active speaker or continuous presence)
- Have the system call my voice or video number (callback)
- View consolidated conference roster (desktops and rooms)
- DTMF keypad

Client Computer Requirements

- Operating System: Windows® 2003, Windows® XP, Windows®
- VistaTM, Mac® OS X
- Browsers: Internet Explorer® 6, 7 or 8, Firefox® 2 or 3, SafariTM 3.12

Moderator Controls

- Acquire moderation rights (may require moderator PIN)
- Lock meeting
- Terminate meeting
- Invite any room system or phone (dial-out)
- Central, integrated directory
- Start/stop streaming
- Mute, un-mute and disconnect any participant
- Request to speak/raise hand

Meeting Types

- Un-moderated meetings Anyone can control the meeting
- Moderated meetings Moderator PIN required to control the meeting
- Personal virtual rooms

Built-In NAT and Firewall Traversal

- Traverses local and remote firewall to ensure connectivity
- Automatically handles local and remote NAT private networks
- Automatic detection of optimal media path: UDP, TCP or tunneled TCP

Built-In Streaming

- Built-in streaming server supports 'watch only' participants
- Simultaneous streaming of audio, video and data
- Multicast or Unicast connection modes

Security

• SRTP encryption to ensure the privacy of media and signaling between SCOPIA Desktop client and server

• Waiting room capability – Meeting will not start until moderator joins.

• Pre-defined virtual rooms – Optional mode where only pre-defined virtual rooms can be used for meetings.

• The Call back feature can be optionally disabled to avoid misuse.

Scheduling and Reservation

- Outlook and Notes plug-in for easy meeting scheduling
- Web based meeting scheduling from any browser
- Ports can be reserved assuring availability for critical meetings

Note

Mac OS X/Safari and Firefox support conference watching only. Intel based CPU required for data viewing.

Appendix B: Overview of Research Project

The purpose of this research project was to observe and then describe how teachers would consider the use of a technically-mediated, visual platform where they could work together to plan pedagogical strategies they could subsequently implement in their classrooms. From a research perspective, my interests were to discover, analyze and describe the various hurdles these teachers would encounter in their interactions with the technology tools, their students, the technicians, the researcher, and more importantly each other. I was particularly interested in trying to capture a sense of how the individual teachers came to an understanding of both the possibilities and the limitations of the technology tools they were encountering; how they would interact with each other as they worked to construct teaching and learning programs within the virtual space; and if, and more importantly, how they would incorporate this knowledge into future opportunities when they would actually use the virtual classroom space with their students.

Initially, the teachers were asked to become acquainted with the CTMX technology and its accompanying multimedia tools in order to use it only for professional interaction and curriculum planning, not with students. However, once they accomplished the initial benchmark, the *taming*, the teachers insisted they wanted to use the CTMX platform in their classrooms. Drawing upon their hands on, immersive experiences of

working together within the virtual space, the teachers acquired first hand knowledge they could apply in building collaborative inquiry-based pedagogical approaches to the IBSP curriculum for their students. Over the course of fifteen months the two teachers worked repeatedly using the CTMX platform, their cell phones, and one face-to-face, two day meeting during December, 2007 to craft a series of teaching and learning activities they could implement with their students using the CTMX platform. They also used these opportunities to discuss how they would present materials and ideas to their students within the context of their local classrooms that would be sensitive to the unique cultural demands of their students. This process is described as *building the bridge*.

The outcome of these pedagogical and curriculum efforts resulted in a series of artifacts. This *traffic* is represented by explicit objects the students created and more subtle, tacit exemplars that were evidenced in the work of the teachers as they continuously worked to plan for each step of the process throughout the year. The tangible evidences of the *traffic* are demonstrated in the artwork and other artifacts that were collaboratively produced by the students and exchanged electronically and by snail mail, the videos produced by the Oscar teams, and the numerous presentations the students developed in preparation for their online interactions with their partners.

Teachers' Responsibilities

- Teachers agreed to work with researcher in project.
- Researcher would assist teachers in learning to use CTMX software.

Teachers agreed to use CTMX software to work together to plan and develop teaching and learning strategies for their students related to IBSP curriculum Prior to the initiation of the research project, during the previous four years, the teachers had used occasional emails to organize their work. However, their primary vehicle for connecting and interacting had always been the cell phone. This project was presented to the teachers by the researcher as an opportunity to begin working together face-to-face. Once they had learned to operate the equipment, they were assured they would be free to organize their discussions and plan for their classes without interference.

- The researcher promised the teachers they would be trained by her to use the hardware and software applications that were available in the CTMX program. More importantly, the researcher assumed the responsibility for securing reliable technical support in their local settings who would agree to be available to support them throughout the project. It would also be the researcher's responsibility to work with the technical
- Teachers agreed to maintain journals for the project to annotate their experiences
- Teachers were given complete freedom to construct all activities and determine how they would operate in the virtual environment.
- Teachers agreed to allow researcher to capture all proceedings on video, to be available for scheduled interviews to review and reflect on the events of the study, and discuss their understandings about what they were experiencing.

Administration

- Secure or grant permission to teachers and researcher to proceed with research program
- Provide tacit support to teacher for her efforts
- Administrators were invited into classrooms and encouraged to observe all interactions throughout the course of the study.

Technical Support

- Work with researcher to install equipment and software to assure all security and network conditions were being fulfilled in each location.
- Agree to be present when teachers in both locations are attempting to connect using the CTMX platform. [This agreement takes into consideration the demands of daily life; it was primarily concerned with supporting the initial efforts of the teachers as they were beginning to work together and was still uncomfortable with the technologies. Later, the most prescient issue would be the need for technical assistance when the teachers were conducting videoconferences for their entire classes.].
- Provide support to Israeli teacher when researcher was not able to be present either in person or online.
- Provide support to American teacher when researcher was not able to be present either in person or online.
- Work with teacher offline in local setting to make required adjustments and upgrades to equipment in order to assure teachers there would be no technical conflicts that would prevent them from connecting.

Researcher's Responsibilities

- Identify and secure client-server application that can support integration of videoconferencing with multimedia applications to produce an Internet based technically-mediated, visual platform
- Evaluate available hardware and broadband connectivity in both locations
- Supply equipment required to accomplish program at no cost to teachers or schools
- Meet with administrative personnel in both school locations to present research program, secure approval, and ask them to help to identify local technicians who would be willing to support the teachers during the research project.
- Identify and secure agreement from technical personnel to work with teachers and be present (within reasonable limits) when they requested support.
- Install CTMX program and required hardware on the teachers home and school computers.
- Work with each teacher to assist them in becoming familiar with the multimedia tools and the CTMX platform
- Be available to teachers throughout the project, both in their classrooms and virtually, to record their interactions without interference.

The Interdependency

At the inception of the research project, the degree of interdependency between all the participants could not have been anticipated. As the two teachers began to work 230 with the technology they became increasingly aware of the value for reliable technical support to be present when the classroom activities were taking place. They clearly understood the potential the medium provided for extending the curriculum and their pedagogical practices and as they began to incorporate these affordances into the practical classroom work of teaching the IBSP curriculum with their students. Their need to focus on the students, rather than resolving technical glitches became more apparent as they added layers of complexity to the activities and their use of the technology.

In very short order the teachers began to envision the use of this virtual, connective space as something that could provide enormous opportunities to open up new vistas for their students. Through their own understandings and experiences with the technologies, the teachers used the CTMX platform as a space for discussion and dialogue between their students in the same manner they had initially experienced it. As the study progressed, the teachers' use of the tools became increasingly transparent. They devised specific teaching and learning opportunities, such as the artifact box, that were specifically designed to allow the students to incorporate their personal stories with the subject material of the IBSP curriculum. As their confidence increased, the teachers crafted lessons that allowed one teacher to be the primary leader while the other teacher supported her partner's efforts. Over the course of the study administrators, teachers, students, and technicians began to form a collaborative whole, a union of the virtual and real life worlds where they could meet, discover, and learn

Appendix C: Transcript Conventions

	Something was said, not able to discern what.
=	[equal sign] Notes speaker transition without overlap
	Pause between words
* *	[asterisk] notes soft speaking
(word)	Spoken with emphasis

Speaker designations

The Israeli teacher is shown as Teacher A. The American teacher is shown as Teacher B. The Researcher is shown as Researcher. Students are identified as Student and alphabetical letters.