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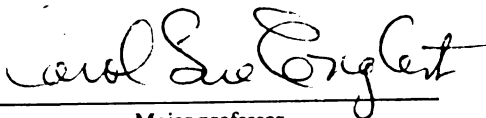
Enactment of Technology Enhanced Literacy Environments (TELE-Web) in a Multi-grade Inclusion Classroom: A Case of Evolving Technology Curriculum and Its Affordances

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Xiuwen Wu

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**ENACTMENT OF TECHNOLOGY ENHANCED LITERACY LEARNING  
ENVIRONMENTS (TELE-WEB) IN A MULTI-GRADE INCLUSION CLASSROOM:  
A CASE OF EVOLVING TECHNOLOGY CURRICULUM AND ITS  
AFFORDANCES**

**Volume I**

**By**

**Xiuwen Wu**

**A DISSERTATION**

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## Abstract

# ENACTMENT OF TECHNOLOGY ENHANCED LITERACY LEARNING ENVIRONMENTS (TELE-WEB) IN A MULTI-GRADE INCLUSION CLASSROOM: A CASE OF EVOLVING TECHNOLOGY CURRICULUM AND ITS AFFORDANCES

By

Xiuwen Wu

Existing research reveals the importance of examining the mediating role of technologies and their impact on the instructional and learning processes in actual classroom settings. Classrooms, especially those with special education students, are extremely complex settings in social, political, cultural, and psychological terms. The introduction of a new technology into such settings entail a in-depth understanding of the contextual structures embedding the use of a new technological tool—values, rules, pedagogies, organization, and other conventions in the classroom.

This study employs two major related theoretical frameworks, Activity Theory and Information Ecology, as lenses to analyze the implementation process of a technological innovation—Technology Enhanced Literacy Environments (TELE-Web)—in an elementary inclusion classroom the bi-directional constitution of the technology and its contexts. The important research questions the study aimed to address included: (a) What TELE-Web activities did the teachers use and how did they implement the activities? (b) What key factors influenced the teachers' implementation of TELE-Web? (c) How did the enacted TELE-Web curriculum mediate the teachers'

practices? Ethnographic observations as well as interviews and surveys were used as methods and sources of data collection.

This study reveals a dynamic co-evolving TELE-Web curriculum enacted by one of the two teachers whose decisions over TELE-Web implementation were built upon the preexisting activity settings, their perceptions about technology, and their objects for implementing TELE-Web. All of these factors conditioned the teacher towards a gradual move in their implementation of the new technology. TELE-Web, on the other hand, incurred change of teachers' goals as they learned to use different tools available on the site. Over time, TELE-Web curriculum evolved and took shape as the teacher thought of new ways of integrating TELE-Web into an increasingly complex series of activities. In the TELE-Web mediated activities, the students, especially LD students gained an expanded repertoire of participating in the literacy practices and showed active construction of their own roles and knowledge during the TELE-Web mediated activities. The study illuminates the affordances and conditions involved in implementing TELE-Web in an actual inclusion classroom. The findings shed light on the process of implementing TELE-Web and the afforded enabling technology-mediated practices for students with learning disabilities.

## **DEDICATION**

**This dissertation is dedicated to my parents, brother, and husband, who encouraged me through all journeys.**

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## CHAPTER 1

### INTRODUCTION

#### Rationale for the Study

Ever since the introduction of computer technologies in schools in the 1960s, educational researchers have shown an interest in studying how technology might innovate and transform instruction and learning. More recently, technology use in schools in the United States has been altered by two major developments. The first development is the dramatic increase in the availability of computers. Computer use in the schools has risen by almost 2.5 million, or approximately 1 computer for every 19 students (Market Data Retrieval, cited in Kinnaman, 1992; Lewis, 1998). Second, the nature and quality of computer technologies has changed with the introduction of new information technologies (Bruce & Levin, 2001). Under these circumstances, teachers face more choices in their use of technologies that provide greater potentials of improving the instructional environments and students' academic performance. In educational research, an increasing number of studies concern the impact of technology on students' academic performance, social skills, values, work, and play.

This study investigates the implementation process of a technological innovation in an elementary inclusion classroom by using a situated evaluation to examine the bi-directional constitution of the technology and its contexts. Recent research indicates that two issues have emerged and dominated the discussion of the efficacy of technologies. On the one hand, some claim that the inevitable power inherent in these technological advancements should shape the activities and identities of human participants (Bell & Gray, 1997; Negroponte, 1995). From this perspective, it is almost certain that the

developments brought about by new technologies would be desirable as well. The underlying message conveyed by these proponents of technology is that computers and information technologies are endowments that help schools to transform their traditional teaching and learning practices. A great body of research that focuses on the impact of various parts of a technological innovation represents such a fundamentally deterministic view. It typically does not focus on the human initiatives and the complexity of multifaceted school contexts. Others, however, are quick to point out the problems and dilemmas concerning technology (Cuban, 2001). They question the worthiness of using computers for instructional and learning purposes, citing equity issue in terms of accessibility to technologies, availability of computer resources, and resistance, for example. These social critics tend to be the extreme opposites of the former group and present bleak pictures of technologies taking over people's lives in every aspect, dehumanizing the individuals in society. Their attitudes towards technology use in schools are that of suspicion and uncertainty.

A common problem plaguing both sides of the above-mentioned debate is that each views a technological innovation as an object that is separate and removed from the social context—the human participants, local environments, existing past and present practices, goals and agenda, which form a dynamic system in which any technology *inevitably* is entangled. Both the rhetoric of inevitability and “dystopia”, as termed by Nardi and O'Day (1999), refer to technologies in ways that are independent of the social contexts of which they are part and parcel. In reality, technology and the social environment, are not two neutral entities but are mutually constitutive. Technologies work dialectically with the social elements of the environment: the affordances of

technology shapes the intentions of designers for carrying out certain activities in a particular setting; it is also subject to human initiatives and purposefulness in its applied use. That is, technology is not a static or fixed material artifact that is independent of the user and the context. A central element in activity theory is that technology, like any cultural artifact, has a mediating role in the sense that such artifacts can either enable or limit the power of the human user in the accomplishment of certain objects and goals in the activity system (Nardi, 1997). On the other hand, humans also control their own behavior in using and creating artifacts. Thus, artifacts such as technological tools are integral and inseparable components of human mental functioning (Engestrom 1991a).

Existing research reveals the importance of examining the mediating role of technologies and their impact on the instructional and learning processes in actual classroom settings. For example, Cuban (2001) studied the Silicon Valley schools in California where heavy financial investments on computers had been installed. He found that the use of computers was very limited; in the case of more regular use of computers, the teachers had “adapted computers to sustain, rather than transform, their philosophy” (p. 66) and conserve traditional academic and social values. Cuban also broke down the types of technology implementation into five levels in the order of increasing integration of technology into classroom: entry level, adoption, adaptation, appropriation, and invention. The teachers in this study had mostly stayed at the adoption level, where they began introducing some lessons to teach students how to use a computer keyboard, mouse, and some applications. Only a couple of teachers actually used computers for teaching purposes at the adaptation level, which meant that most of classroom time was spent in conventional ways of teaching but students spent about one forth of their time

using computers for homework and daily work in class, not to mention for purposes that accelerated their literacy higher thinking skills.

Hauser & Malouf (1996) suggested that systemic research needs to be conducted to reveal what occurs during the implementation of specific technologies, under naturally occurring conditions, as well as what contextual factors influence implementation (such as teachers' pedagogical beliefs and personalities, curriculum), and the relationship among social and contextual factors that interact and influence the outcome or workings of technologies in the classroom (Salomon, Perkins, & Globerson, 1991). This approach allows researchers to explore how specific contextual factors relate to the implementation and effectiveness of technology interventions.

Along the same line, some researchers have begun to shift the focus of their research. Rather than asking questions such as how technologies might transform learning and teaching practices in schools, they now focus on the issue of how technologies can be used in real contexts, that is, how teachers' realizations might be different from developer's idealizations, and under what conditions individuals might benefit from their use of these technologies (Bruce, 1997; Nardi, 1997, etc.). The shift in this inquiry focus comes as a result of the changing stance towards the evaluation of technologies, with increasing attention to the situated context of their use by actual teachers and students. The basic tenet of this evaluation approach is that technology is constituted and assigned meaning by implementers through their social practices and interpretations of the technology (Bruce, 1997). Examination of technologies in any particular context entails a conceptualization of the technologies as not only a physical material artifact, but as a cultural, social and psychological mediator of performance that

interacts with the existing values, beliefs, and cultural practices of members of that particular context. The significance of a particular technology, therefore, is embedded in the social practices of the community through which the meaning of the technology is realized.

This situated perspective of the role of social contexts in technology use is especially helpful in focusing on technology applications for students with mild disabilities. For example, a special series on technology (Higgins & Boone, 1996) called for a new stance towards special education technology research. These authors proposed a broader definition of technologies beyond the traditional assistive technologies that were largely regarded as external to the teaching practices. Instead, they recommended that technology should be defined by how users perceive it and what they do with it; namely, by focusing on the implementers' actual uses of specific technological tools rather than the designers' intended uses. According to Bruce (1993), developers tend to envision that their products will be used in an ideal social setting in which certain desirable goals can be achieved. This idealization of an innovation is different from its realization because technology is not a fixed physical artifact, but a set of social relations that are constructed through the social practices and activities performed by human participants in a particular environment (Bruce, 1997). Classrooms, especially those with special education students, are extremely complex settings in social, political, cultural, and psychological terms. The introduction of a new technology into such settings entail a in-depth understanding of the contextual structures embedding the use of a new technological tool—values, rules, pedagogies, organization, and other conventions in the classroom. Consequently, the study of the technology enactment is one about the mutual

adaptation of the tool and the components marking the culture of practices within the preexisting system of the classroom. The important questions are not only “how is the new technology used and by whom?”, but “what contributed to a certain implementation trajectory?” Then, we could begin to conduct further research on possible ways of effectively implementing a new technology or using it to create affordances for the literacy learning development of students with disabilities as well as those who are in general education, for example, in a natural inclusion setting.

An important overriding question to ask about technologies and their influence in classroom teaching and learning is “how are they used, by whom, and why?” By starting with this question, researchers can conduct more in-depth studies on how to negotiate the conditions for technology implementation for students with disabilities to be maximally effective.

The technology under study in this dissertation is an Internet-based software program called Technology Enhanced Literacy Environments (TELE-Web) (Englert & Zhao, 1998, 2000, 2002). Both teachers and students have their unique log in names and passwords that allow them to access a web site comprised of a variety of activities and functions aimed to develop and support students’ reading and writing abilities. On the site, the teachers could customize multiple levels of support and make them available to the students as cognitive scaffolds during their work on TELE-Web. The TELE-Web curriculum were based on the activities and principles from the past ELP research (Englert, C. S., Raphael, T. E., & Mariage, T. V., 1994), which had been proved to have great potential in improving the literacy performances of both students with mile disabilities and those in general education.



## Theoretical Framework

Several fundamental approaches to the understanding of technology inform the interpretation and research angle of this study. First, technology signifies an informational ecology consisting of participants, social practices, values, and other components in a particular local environment. The metaphor of technology as information ecology proposed by Nardi & O'Day (1999) pushes the embedded nature of technologies as being part of a system of interrelationships and dependencies in an ecological system, such as a classroom. A technology is not an immutable system. Rather, it co-evolves with the social aspects of an environment, both mediating and being mediated in a dynamic process, subject to diverse uses by different kinds of people, and its functions or meanings may be uniquely constructed in relation to its perceived role in the context. Therefore, it is important for researchers to consider the social meaning of technologies, and how the technologies' associated conventions/practices change over time and what forms they take. Such a concept of technology is useful for a situated evaluation of what TELE-Web is and how TELE-Web is used in a classroom with a diverse body of students who, together with the teacher, construct existing practices and social values, forming key components and identities of TELE-Web in this particular setting.

Second, the study drew on Activity Theory for the analysis of technologies and their mediating roles (Leont'ev, 1974; Bodker, 1989; Kuutti, 1991; Wertsch, 1981; Davydov, Zinchenko, and Talyzina, 1982). Originating from the cultural historical tradition of psychology work by Vygotsky (1981), Activity Theory has become one of the most viable theoretical and analytical tools for understanding human-computer

interactions among an emerging multidisciplinary community and increasing number of educators (Kuutti, 1996). Activities as units of analyses in Activity Theory provide ways to understand human actors participating and functioning to achieve certain objects with using technologies as their mediating tools. In activity settings, individuals or tools are not investigated as separate identities but as contextualized within each other and within the complex system of relations involving people, tools, practices, norms and conventions, and so on.

The dialectical relationship between tools and human agents in an activity setting creates a dynamic discourse that can transform the nature of student roles, teacher roles, the set of values and norms in the class, ways of interacting with each other, and the kind of social learning communities that emerge in the classroom. Cole and Engestrom (1993) extended Activity Theory analysis by suggesting that one must understand how artifacts mediate the activity within the cultural context in which the activity is situated, and the aforementioned elements all constitute such a cultural context. Cole's and Engestrom's analysis provided a framework for understanding how new technologies may affect educational change within a classroom context and at the same time shows us that it is not practical to isolate a technology artifact under study from other artifacts or human interactors within this whole complex of classroom activity (Bellamy, 1996).

The key idea in activity theory is the notion of mediation, which holds that artifacts carry with them a particular culture and history (Kuutti, 1991). In order to understand how a new artifact such as a new piece of technology works in the classroom, it is necessary to situate the technological innovation in a complex web of other artifacts used in an existing cultural practice of teaching and learning. The interaction between

technological artifacts and people in the context is not a simple one. It is not unidirectional so that technology transforms the instruction of teachers as technocratic view suggests (Burbules & Callister, 2000). Neither is it true that technologies do not change people's identities and perceptions of technological tools. Rather, Activity Theory embraces a comprehensive analysis of contextual dynamics when technologies enter an existing culture of practice.

The study also draws on the technology as Information Ecology metaphor proposed by Nardi & O'Day (1999). In the local ecological system of a classroom, a multiple set of components or 'species', including people, practices, values, and technologies co-evolve and shape the human activities within the ecology. By looking at the participation in activities in information ecology, this stance towards technology use places emphasis on the interconnecting group of people and their tools and practices. Several key concepts in this metaphor are: interrelationship and dependences among different parts of ecology, diversity in the system, coevolution of social and technical aspects of the environment, and keystone species within the local context.

#### Other Related Theories

In the evaluation of TELE-Web use and its meanings embedded in the existing activities and practices, the study also draws on sociocultural theory of learning (Vygotsky, 1978; Wertsch, 1988; Bruffee, 1986; Bruner, 1996; Gee, 1991). Students are regarded as active learners who move from being novices to experts through teacher and peer scaffolding (Lave & Wenger, 1991; Hiebert, 1998; King, 1998; Rogoff, 1990) within their Zones of Proximal Development (Vygotsky, 1978; Gavelek, 1994). Knowledge is thus socially constructed, negotiated, and internalized through social

interactions with others, rather than transmitted to the students as if they are blank slates (Collins, 1986; Stone, 1998; Burbules, 1993). Further, it is thought that learning occurs on both personal and interpersonal planes (Vygostky, 1978; Daniels, 1993). Students learn in recursive discourses that enable them to step into the public discourse, engage in social dialogue with peers and the teacher, internalize a repertoire of ideas generated from others, and become competent participants of the community of practice. In this process, the teacher is not the sole authority of knowledge. Instead, the teacher serves as a facilitator who provides scaffolded assistance to the students so that the aforementioned discourse-based learning can be established.

Another essential premise of sociocultural theory relating to the study is the use of mediational tools for learning (Wertsch, 1993; Vygotsky, 1978). Vygotsky (1978) emphasized the importance of thought development through tools or signs, among which speech provides the most important semiotic tool of learning. In school, the child learns the meaning of words in the social context of their use. Individuals participate in social activity that is mediated by the speech that others use to influence his behavior and that he uses to influence the behavior of others (Daniels, 1996). In this social context, the individual not only learns to carry out specific actions, but he or she acquires qualitatively new kinds of mental functions (Minick, 1996; Vygostky, 1978). Language incorporates both written and oral discourse, both of which are ways to facilitate learning by supporting students whenever necessary.

In summary, sociocultural theorists emphasized the social interaction and mediation of tools as essential to understanding the processes of the participants' learning and development. Activity theory falls into the broad sociocultural perspective of

learning with the same emphasis on mediation of tools as embodiments of psychological signs with which people interact towards greater development. Activity theorists further explicate the necessity of understanding the tools in terms of complex activity settings in which technologies are only one component with which the participants relate. The role of technologies is best illustrated through examining it in the structure of activity settings along with the people (subjects), goals (objects), relations supporting the achievement of goals (division of labors), and norms of association (rules and procedures). The other lens this study draws on—technology as information ecology metaphor—is complementary to activity theory in that information ecology acknowledges the complexity of relationships embedding the use of a new technology in actual settings, while also highlighting the co-evolutionary nature of technological tools and the contextual elements in a locality such as a classroom. In addition, activity theory provides a useful framework for analyzing the changing roles of the technology in question in the units of activities over time. Information ecology has an added interpretive power for understanding the participants' interactions with the technology over time under naturally occurring conditions. Therefore, both perspectives complement and supplement each other, making the combination of them sensible for the study of TELE-Web in use in a local setting of the multi-grade inclusion classroom.

### Research Questions

This study intends to provide a contextualized examination of TELE-Web in a multi-grade inclusion classroom that contained students diagnosed as having mild disabilities and students in general education from grade 1 to 3. The study seeks to understand the meanings of TELE-Web as shaped by its interactions with other parts of

information ecology: teachers and students, practices, tools and technologies. Among the diverse parts of the classroom context, I will also focus on the students with learning disabilities who, through the teachers' enactment of TELE-Web curriculum over time, came to adopt certain functions and uses of this technology. In other words, the study looks at the issue of what counted as TELE-Web in terms of its roles and affordances in the real classroom as it evolved through the teachers' implementation of TELE-Web. Specifically, the study sets out to answer the following questions:

- What TELE-Web activities did the teachers use and how did they implement these activities?
- What key factors influenced the teachers' implementation of TELE-Web? How did the enacted TELE-Web curriculum mediate the teachers' practices?
- What were the TELE-Web affordances embedded in the students' interactions with TELE-Web?

The first research question aims to capture the contextual backgrounds within which TELE-Web is implemented. The basic structures of the activity settings in the Language Arts curriculum are examined. The second question follows the trajectory of TELE-Web activities and reveals a historical evolution of TELE-Web in connection with the existing literacy activities of the class. Specifically, this question focuses on the mediational role of TELE-Web constrained or shaped by interdependent relationship between the new technological species and the main participants of the TELE-Web—the teachers. The last question looks at the affordances of the enacted TELE-Web curriculum for the literacy participation of the students in this classroom, the students with learning disabilities in particular, as they interact within emerging TELE-Web activity settings.

## Methods

This study was a qualitative research study combining the use of ethnographic and grounded theory methods (Miles & Huberman, 1984; Strauss & Corbin, 1990). Data collected included classroom field notes, transcripts of audio- and videotaped classroom talk, memos, one formal teacher interview and one semi-formal exit interviews (Marshall & Grossman, 1990), student interviews and documents.

The site for the study was a multi-grade inclusion classroom with a total of 22 students ranging from grade 1 to 3. About 45% of the class population was diagnosed with mild disabilities. Half of these students were diagnosed as having a learning disability (LD), based on the significant discrepancies between their ability and achievement. This classroom was new to the larger TELE-Web project at the start of the study. The author acted as researcher to support the two teachers (Amy and Cathy) with their uses of TELE-Web. As novices to the TELE-Web project, Amy and Cathy expressed interest in the potentials of TELE-Web and in using the technology in their classroom. Amy was the general education teacher and Cathy was the special education teacher, but they were co-teaching partners.

The dissertation is divided into the following chapters. Chapter 2 first delineates the major theoretical frameworks that inform the study—Activity Theory within the sociocultural tradition and technology as Information Ecology. These two theories complement each other to bring to light the approaches towards a situated evaluation of technologies in an ecological system in which technologies are part of. Later, this chapter incorporates relevant literature review concerning technology research in classrooms. In the methods section of Chapter 3, the study provides detailed description of the research

setting, instructional environments of the classroom, participants, data collection process, and the research questions. This section also deals with the first research question in some details. Chapter 4 and Chapter 5 are results sections addressing the interrelationships between TELE-Web and two keystone species of teachers and students in a context consisted of activities mediated by existing tools or new technologies such as TELE-Web.

## CHAPTER 2

### Theoretical Framework

This chapter describes the major theoretical and philosophical assumptions underlying this investigation of TELE-Web implementation in an actual primary grade classroom. Specifically, it focuses on two main theoretical frameworks. One is concerned with a stance toward technologies based on the metaphor of “information ecology” delineated by Nardi and O’Day (1999). The other is Activity Theory of learning, especially those aspects that focus on the mediation of thought processes. Common to both of these perspectives is their emphasis on viewing technology as interrelated to the social cultural environment in which it is embedded. While the ‘information ecology’ metaphor of technology provides a theoretical framework for situated investigation of technology use in a particular context, Activity Theory is utilized as a useful reference structure with which to analyze the interrelationships among important factors within that environment.

The chapter starts with an introduction of different ways of viewing technology in educational research and the implication of using the “information ecology” metaphor as a guideline for studying technologies. Then, the chapter proceeds to introduce the core



tenets of Activity theory, specifically focusing on the theoretical and methodological implications for analyzing technology use in real classroom settings. This chapter concludes with a brief literature review of technology studies in both general education and special education to illustrate the importance of the dissertation study.

### Metaphors of Technologies and Implications for Research

Nardi and O'Day (1999) argued for an alternative metaphor for understanding technology. They termed it an "information ecology" metaphor, implying that technology is part of a network of relationships between components of a surrounding environment. This view of technology combines the strengths of other metaphors cited in their book, such as technology as a tool, text, and system, while fostering a balanced conceptualization of technology being as much about influencing and innovating a particular context as being shaped by people's participation and perception.

Each of these metaphors mentioned in the authors' discussion (technology as tool, text, system, and information ecology) has a hidden message about the relationship between technology and the environment in which it is introduced. Learning about these messages has a practical implication for the kind of theoretical and research stance one takes toward technology.

Technology as tool. The metaphor of technology as tool sees each technology as a tool, more or less in a physical and perceptual sense. A common way to understand this metaphor is that tools can be designed well or poorly so that they work with more or less efficiency with a particular object. The goal of the designers is to make tools easy, functional, and maybe fun to use. Admittedly, this metaphor takes into account the social aspect inherent in any piece of technology to the extent that it recognizes the intentional

and cognitive process behind each tool design. However, it does not explicate how tools might be influenced by contextual factors beyond individual capacity and cognitive needs, such as values and norms in a community where a tool is utilized. In fact, there is a larger context than just technologies and individual users of these tools.

When critiquing the tool metaphor, the two authors also employ the concept of “affordances” coined by Gibson (1986), who suggested that any tool has intrinsic properties that lend themselves to people’s perceptions of what the tool’s affordances might be. Nardi and O’Day extended this notion of affordances by arguing that tools evolve and emerge during use so that they are not fixed nor are they determined by the designers. In doing so, these two researchers added a social dimension to the tool metaphor in that they drew attention to the social situations and surrounding context, which provide sources of new meanings and uses of tools such as technologies. This focus on a larger context than what is constituted by designers and individual users of the technologies expanded the tool perspective to include more contextual factors such as network of relationships, values, and motivations involved in technology use in actual context.

Technology as Text. Another way to understand technology is to see it as text, according to Nardi and O’Day. A text approach has been popular among critical theorists such as Bruno Latour (1995) and Michel Callon (1992). These researchers tend to offer critical understanding of technologies and raise problematic social issues such as the messages inscribed in information technology, forms of actions intended by certain technologies, their influence on people’s values, interpretations, and culture, etc. This metaphor takes issue with social cultural contexts of technologies and the dilemma in

using technologies regarding their social impact. The text metaphor does give more weight to the social cultural context of technology use. However, it is limited in its analytical power for the understanding of how technologies relate to the complex network of social factors such as practices, peoples' perception, participation, and use of other tools and artifacts, etc.

Technology as System. A third commonly used metaphor for understanding technology compares it with a system. In this vein of thinking, a greater emphasis is put on the intertwined relationship between technologies, social institutions, politics, and economics, for example. Researchers are concerned with both the cascading effects of technologies on society and possible unintended consequences of using these tools. They further called for critical understandings of technology use based on a systemic analysis of the interrelationship between technologies and larger institutional and other social contexts. This metaphor is different from the previous two metaphors in that it positions technology in a broad framework for evaluation and implies a deep interest in large-scale social and technological systems. Thus, such a view poses difficulties for analyzing small-scale implementation of technologies in local contexts such as classrooms.

Technology as Information Ecology. Under these circumstances, Nardi and O'Day (1999) proposed a new metaphor that is powerful both as a theoretical and an analytical tool. The so-called "information ecology" perspective promotes the idea of possibility of local change that the system metaphor lacks. What's more, it incorporates the social cultural context in a manageable local environment so that it is not conceived as broadly as a system, as presented by the 'technology as system' metaphor. Basically, information ecology is defined as a "system of people, practices, values, and technologies

in a particular local environment” (p. 49, Nardi & O’Day, 1999). This is a human participatory approach to technology use in actual settings. Ecology is complex with the social elements intertwined in their relationship with a newly introduced technology. However, it is more local and immediate to the human participants and users of technologies. Like a biological ecology, an information ecology possess some similar characters:

#### (1) System

The components of an information ecology form interdependent relationships and change in one part would influence the other parts. On the other hand, the change may not leave a trace if it is incompatible with the rest of the system. An example would be a new reform plan for a school, which might not match the existing incentives for the improvement of standardizes scores. Therefore, this reform plan may not produce any effect upon other elements of the local environment at all.

#### (2) Diversity

Within information ecology, there are differences across participants, available tools and artifacts, which constitute diversity in the local setting that is essential for the development of the system. On the one hand, the diversity is a source of continual development of the technologies. On the other hand, the existence of many different participants and other components of ecology encourage critical evaluation of technologies in use in an actual environment of social dynamic context.

#### (3) Coevolution

This aspect of the information ecology metaphor emphasizes the potential for changes in the local practices. The ecologies evolve as new ideas, technologies, tools, and

activities emerge. People learn to adapt and create ways of existing and benefiting in the ongoing changes of ecologies. A great advantage of maintaining a coevolving view of information ecology is that it recognizes possibilities of two-way adjustments and changes among components of a context. Technology is one of the factors with intentions to create new practices, while at the same time it is involved in an adapting process in the dynamics of the information ecology system.

#### **(4) Keystone Species**

A keystone species is a component in an information ecology that might play crucial role in the survival and development of the whole information ecology. Nardi and O'Day (1999) suggested that people participating in a local place where a new technology is introduced are the keynote species whose decision and thoughts influence greatly the use of the technology. They bring with them sets of practices that they have set up in the system, as well as tools, artifacts, and other aspects of the ecology that are in use. Nevertheless, it is not often obvious to the researchers what the keynote species are. In Nardi and O'Day (1999), they provided examples of information ecologies where the keynote species unacknowledged has resulted in unproductive implementation of technologies introduced to that local place.

#### **(5) Locality**

Another special character to information ecology is the importance attached to locality. This suggests that evaluation of technology be grounded in its local environment within a network of interrelation among other species of the ecological system: participants, practices, artifacts, tools, and so on. The meaning and identity of a particular technology would be different across settings or different information ecologies because

the participants are different, hence the activities they are engaged in and practices associated with these activities. In other words, how technology is used will depend largely on people's perceptions, roles, practices, and use of other artifacts and tools in this complex set of social relationships with each other.

In summary, Nardi and O'Day's metaphor of technology as information ecology captures the complexity of a local system in which a new technology comes into contact with: its practices, different people, tools and artifacts, and so on. Evaluation of the use of technologies need to be grounded in the analysis of the network of interrelated parts of the local system because the identity of a new technology is dependent on the participation and perception of people involved in a particular ecology with its practices and other contextual factors. It is important to identify the keynote species, the essence of the survival of an ecology and support of the new technology use. A systematic investigation of the local ecology would shed light on how intertwined the complex parts of an ecology are. Within such an environment, technology bears a bilateral relationship with other local constituencies. This metaphor has three major implications for educational technology research. First, study of a technology use is a study of the participatory activities people in an local setting are engaged with, including technology-supported activities; second, new technologies could create possible systemic changes in the local system. On the other hand, people perceive technologies and construct new meanings about them through actual uses. A third implication is that there are diversities across participants, hence differences in their perceptions of new technologies. This character of information ecology requires that both affordances and constraints of the technology be examined in response to the differences of the participants.

## Activity Theory

While the metaphor of technology as information ecology calls researchers' attention to the local context, Activity Theory has shown dimensions of context with its key elements interacting with each other at different levels. This section focuses on a description of Activity Theory propositions, which has bearing on the roles of educational technologies and their development in a particular context.

### *Basic Tenets of Activity Theory*

Activity Theory originates from Vygotsky's sociocultural psychology and is a further extension of this theory (Engestrom, 1987; 1993; Leont'ev, 1979; 1981; Nardi, 1996; Vygotsky, 1978). The first stage in the development of Activity theory centered on Vygotsky's notion of mediation. The relationship between humans and objects in their environment is mediated by cultural tools and signs (Engestrom, 2000). A study conducted by Luria (1976) showed that implementation of written language and logico-mathematical operations had significant influence on how people categorized objects of the environment. It suggested that signs, language, and other psychological tools exerted influence on human consciousness. Later, Leont'ev added to the theory by emphasizing the emerging division of labor in the cultural and historical process of tool-mediated human mental functioning. Leont'ev, by looking at division of labor, placed great emphasis on the relationship of mediating technological tools with the actions and operations that take place at the collective level as well as the individual level. Leont'ev expanded the early stages of activity theory by deepening the interdependence of the individual, other people, and artifacts in the social matrix of which every person is an organic part (Nardi, 1997). The evolution of Activity Theory through this early research

highlighted the notion tools such as technology mediate behavior and human thinking, but that they do not act by themselves to change human behaviors. It is the constellation of various artifacts and tools with potentially conflicting intended purposes and belief systems that work together to affect and change a situation (Bellamy, 1997). In other words, technology as a mediating tool does not stay fixed but evolves in the dynamic local system. The mediational role of technology is dependent on the contextual factors in a particular activity setting.

The mechanism with which a technology works in such a dynamic activity system is characterized by its bi-directional relationship with other components in the setting. The “external” elements such as new technologies, which are psychological tools themselves, mediate people’s mental processes, as well as the “internal”, which take place in activities involving human subjects and objects they manipulate on to achieve certain goals <sup>1</sup>(Kuutti, 1997). All these social interactions occur within an activity system employing various artifacts including tools (e.g., instruments, signs, procedures, methods), which play mediating roles between the human actors and the object of activities.

According to this theory, activities are inherently “double-natured” (p. 32, Kuutti, 1997). The subjects (actors and participants) and the objects are inextricably related to each other: activity is not merely external behavior; rather, it is linked with consciousness (Hung & Wong, 2000). Infused with values and cultural practices in their interaction with

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<sup>1</sup> Kuutti referred to “internal” as the side of an activity concerning the internal mind. “External” includes the corresponding external activities and means of an activity. He asserted that it was not possible to separate the external from the internal because “...a person’s mental processes acquire a structure necessarily linked to sociohistorically formed means and modes, which are transmitted to him by other people through teamwork and social intercourse” (p. 19, Leont’ev, 1974, cited in Kuutti, 1997).



subjects in an activity structure, culturally and historically developed tools shape the goals of the people who use them as well as being shaped (Latour, 1993). Through investigation of components of activities, researchers could form analyses of the cultural historical trajectory of technological change and its interrelationship with the existing mediating tools and artifacts, the culture formed by the subjects, and the objects or goals of the local environment.

In this sense, new technologies are also cultural tools (subject to the existing context) and mediators of human thoughts and behaviors. Tools and human beings involved in learning through internalization and externalization in an ever-changing context of mutual transformation. This notion is also in line with cultural and historical psychology tradition set by Vygotsky (1978). The cultural perspective embedded in Activity Theory suggests both power and potential limits of tools mediating between the goals implicit in them designed for the technology and the goals of the people using the tools, including the students and teachers. The results of the interactions, in a classroom setting then, depend on the culturally embedded pedagogical beliefs as well as the underlying rationales.

Engestrom's (1987) conceptualization of an activity structure sets a good example of a systemic analysis of mediating roles of tools in a complex setting. Engestrom (1991) showed the mediated relationships of learners and tools in the structure of an activity. He enunciated the mutual relationships between subject, object, and community, which are mediated also by rules and division of labor. This activity structure constitutes the basic meaningful unit for understanding individual actions in this context. Figure 2.1 illustrates his formulation of the complex relationships between elements in an activity.

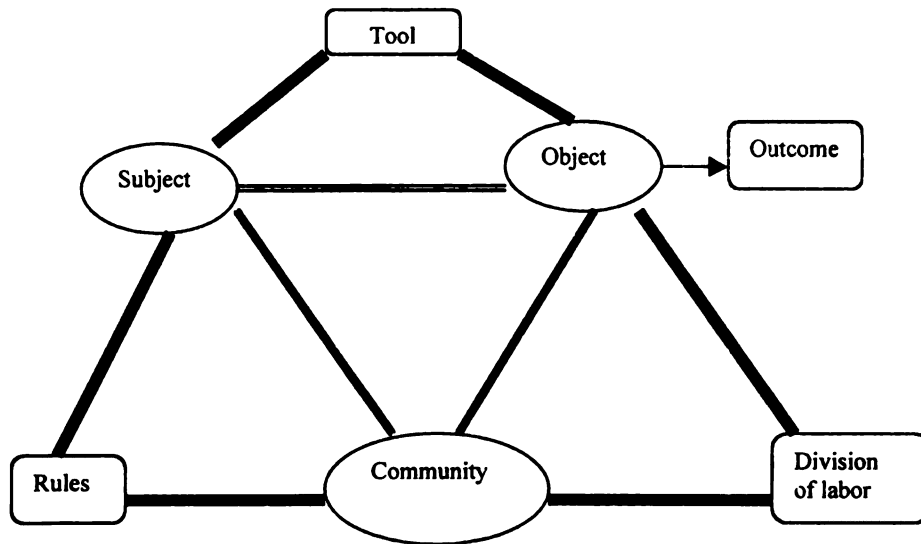


Figure 2.1 Basic structure of an activity. (Engestrom, 1987; cited in Kuutti, 1997, p. 28)

The upper triangle formed by tool, subject, and object indicates the basic mediated relationship at the individual level. A tool can be a combination of various artifacts that work in an activity structure in a specified situation, such as a classroom setting. They have mediating roles to play, which means that they mediate the relationship between the human subjects and the object intended to be achieved. The subject (human actors) can employ tools according to their object in mind, while the tool may also empower or limit the subject in the transformation process.

While this simple triangle composed of mediating tool, subject, and object may well account for changes at the individual level, a more extended structure that includes collective aspects of an activity system needs to be considered. Subjects are human actors with historically accumulated experiences and beliefs. It is not sufficient to just focus on the mediation of the individuals' mental functioning and their goals in a situation. Indeed, an individual is a cultural historical entity that socializes with other components in a community. This demands a study of the historical relationship between subjects, changes in collective thoughts, and the objects. These three elements also are mediated, as can be seen from figure 1, by rules and the division of labor of the community. Rules refer to norms, conventions, and ways of associating with each other within a community (Engestrom, 1991; Kuutti, 1997). Division of labor refers to the way human subjects are organized in the community towards certain outcome mediated by other elements in the activity structure. The model presented in the above figure indicates that an activity is a systemic whole in that all elements participate in a transformation process in a mediating relationship to each other. An activity is, thus, "the minimal meaningful context for understanding subjects' actions" (p. 28, Kuutti, 1997).

### *Activity Theory and Technology in Classroom*

When a technology is introduced into a classroom, it comes into contact with an existing repertoire of tools mediating the activities related to certain objects and a set of goals. Hence, the technology becomes an external tool in a complex network of actors with a cultural and historical past that have been in existence in the particular local environment. For example, the activity in a K-12 classroom may involve a community mainly consisting of teachers, parents, students, and administrators. This community has a set of rules on attendance, schedules for lessons, behavior of students, and so on. On the collective level, subjects in the classroom are, explicitly or implicitly, required to assume certain roles and responsibilities as students or teachers. In fact, the new information technology suggests potentials to enable new activities, which may have an object (physical or non-physical) that would be different from the existing ones. Within the new dynamic process, the technology symbolizes an actor that triggers pre-designed ways of learning and supports corresponding actions in the system. It might also make feasible new rules, routine, use of tools, division of labor, and the kind of community supporting this technology-mediated learning environment.

These possibilities represented by new technologies may give rise to contradictions with existing object, beliefs about learning and teaching, and other tools of the activity system of classroom. Activity Theory responds to this problem positively by recognizing the differences between thoughts behind new tools and those implied by existing classroom activities as opportunities to develop the new technological tools. Activity Theory proposes that activity cannot be understood without “understanding the role of artifacts in everyday existence, especially the way artifacts are integrated into

social practice” (p. 14, Nardi, 1997). This emphasis on “contextuality” is a marked advantage to Activity Theory. Analysis of an actual classroom activity structure where new technologies interact with is critical to shedding light on the dynamic mutual transformation process of technological tools and their environments.

Likewise, the application of Activity Theory to research on technology in a special education setting such as an inclusion classroom requires that investigators look beyond the immediate event focusing on the human individuals mediated by the tools, but to also study the interrelationship between tools, object, and the transformation of the outcomes of a community of learning in a complex system of educational activity (Bellamy, 1997; Cole & Engestrom, 1991).

### *Summary*

In recent years, Activity Theory has been widely used as a viable methodological and theoretical tool. In this approach, social contexts acquire more salient status and guide the historical analysis of development in understanding complex situations in which technological tools act as mediators to human consciousness (Kuutti, 1996). The objects of the people involved in using the technologies are important aspects of studying the implementation of the technological tools. So, tracing the evolving interaction of subjects, the human agents using the tools, and how technological artifacts mediate and hence afford or constraint the subjects in their participation of the activities are among the questions asked in this perspective. The units of analysis are activities around which the users revolve their actions and transform each other’s meaning.

Activity theory provides a comprehensive theoretical and analytical tool with which technology research in education can be framed (Nardi, 1997). It situates a study in

a sociocultural and historical context in which the mediating tool forms a mutually constitutive relationship with other elements in an activity system, such as human subjects, intended goals in the community, existing rules and division of labors, and potential outcomes of the achieved goals. On the one hand, these elements, carrying the historical and cultural values, can be transformed by mediating tools with affordances and constraints. On the other hand, intentional human subjects, along with other contextual influences, could limit the extent to which values attached to the tools are transmitted. In essence, Activity Theory considers activities not as given or static but as dynamic. Development is taking place at all levels.

One of the advantages of Activity Theory is that, unlike many other theoretical and methodological perspectives, it accepts complexities and contradictions in reality of technology use in education, not as problems and setbacks, but as opportunities and sources for development (Nardi, 1997; Kaptelinin, 1997). It recognizes that elements within activities are virtually always in the process of working through contradictions, resulting in maintaining of existing practices and goals through assimilating the tools, or in a transformation of objects and outcomes. It all indicates possible limiting or enabling aspects of a technological mediator. It is best suited for studying complex structures such as activities revolving around uses of information technology in a complex environment such as classrooms.

The contextual aspect of Activity Theory is an important one for studying technology implementation in the area of literacy in a real classroom setting. A classroom is a complex environment composed of students who have diverse learning needs and abilities. The teacher of the class is the key human subject who utilizes his or her use of

existing and new tools based on the intentions and purposes for the tools in carrying out literacy instruction. The classroom forms a context where certain norms are expected of the students as well as the teacher. On the level of the whole class, students have a set of roles and responsibilities to fulfill towards achieving an object/goal of their learning and teaching, whether it be finishing certain chapters in the textbook, mastering pieces of knowledge required by the curriculum or undertaking inquiry upon certain topics. Introduction of technological tools may cause an imbalance in any of the elements in the activity system as illustrated by Engstrom (1991) triangle of the structure of an activity, which suggests a situated evaluation (Bruce et al., 1993) of mediating tools at the level of activity in a classroom in order to capture the dynamic relationships between the technological mediating tool and other elements in the activity system.

In short, Activity Theory with multiple levels of interactions (mediating tools, historical of activities, subjects' goals, and other contextual factors) is a valuable tool in and of itself for understanding how teaching and learning evolve as a new technology innovation is introduced into a complex reality like a classroom.

#### Information Ecology and Activity Theory

Both the information ecology perspective and Activity Theory have in common their highly contextualized understanding of technology in actual settings. The metaphor proposed by Nardi and O'Day (1999) offers a way for discussing technology and its implementation without resorting to extreme dichotomous view of technology and its social environment. Instead, this metaphor situates technology in a manageable local setting in which all parts interact with each other to form an ecology that resembles that

of biological world. However, the authors also emphasize one important distinction about information ecology as summarized below:

“The application of human values in information ecologies brings to bear a different dynamic than that of biological ecologies. We make deliberate, conscious choice about how we want our values to influence practices and technologies in information ecologies. There is a complex dance between two nonneutral forces at work here: technology with its texts and affordances, and people with their values and choices. The choreography of the dance is up to the human side of the equation, but only if we choose to “overcome necessity” by engaging our values and commitments as we shape our information ecologies.” (p. 64, Nardi & O’Day, 1999).

As this excerpt implies, how technology is understood and absorbed into a classroom depends not only on the non-neutral functions and messages carried in the tool, but also on the extent the beliefs and values of human participants in this environments match the pre-designed uses of technologies. In other words, technology would not remain immutable throughout its actual implementation in a real setting. It is important that the study of technologies and their evolving meanings be carried out in order to understand their application and teachers’ practices in classrooms.

Activity theorists notice this bi-directional relationship between a technology and the human actors in a particular context. Furthermore, Activity Theory provides a comprehensive tool for analyzing other components of information ecology by including such factors as object, division of labors, community, and rules. These are basic elements of activity systems, which form the core of information ecology, whether it is library or a classroom. Focusing on activities as basic units of analyses, activity theory enables researchers of educational technologies to articulate the dynamics of human participation in choosing to use technologies and to gain insight into nonneutral tools in an information



ecology. Therefore, using information ecology perspective and activity theory as main framework for analyzing the implementation of TELE-Web is valid and useful.

Both Activity Theory and 'Technology as Information Ecology' metaphor position the examination of technological tools in close connection with different parts of the ecological system. In these approaches, technology is no longer a stand-alone object to be studied in a classroom setting. Both theories put spotlight not on technologies and what they can do to improve performances, but on activities in which technologies take part in and serve as mediators of human consciousness. For Activity Theorists, the activities provide a reasonable analytical structure for fine-grained investigation of the mediating role of TELE-Web and how its meanings are constructed with participants and various other parts of an activity. Information Ecology metaphor, on the other hand, complements by zooming out onto a ecological view of the classroom locality in which different species including TELE-Web offer unique affordances, but only as result of coevolution with other species during use in the activities.

Having established Information ecology and Activity Theory as useful perspectives for understanding and analyzing technology use in actual classrooms, the following section proceeds to discuss some literature on technology in both general and special education. Next, I will introduce some research that focus on systemic and contextualized evaluation of technology implementations. Last, I will discuss how this latter types of research may contribute to our understanding of technology use in real classroom settings where typically, a teacher, along with his or her students with or without Learning Disabilities (LD) live daily in a complex environment that demands considerations of all elements besides technological tools in the class.

## Related Literature on Technology and Literacy

Studies of Impact of Discreet Technological Features. Traditionally, studies on technology in education for students in both general education and special education have tended to focus on what impact a particular facet of technology has on the academic achievements of students (Reinking, McKenna, Labbo, & Kieffer, 1998). As computer use became popularized in the 1980s, literacy educators began to wonder how computers might affect reading and writing (Reinking, 1998). In these computer studies, literacy was narrowly conceptualized as reading and/or writing which might be mediated by new technologies other than print, similar to what Venezky (1995) expressed in his definition of literacy as “minimal ability to read and write in a designated language, as well as a mindset or way of thinking about the use of reading and writing in everyday life” (p. 142). Therefore, the focus of these studies was on the extent to which technological tools facilitated learners’ reading and writing achievements. Since technology research in special education runs parallel to that in general education and difficulties with literacy skills of reading and writing are especially severe with students with learning disabilities (LD), I will use some examples of special education research to illustrate this view towards technology and literacy.

The largest body of research along this line deals with assistive technology and computer-aided instruction. According to Lewis (1998), assistive technology can be “broadly conceptualized as any technology with the potential to enhance the performance of persons with disabilities.” Intervention studies typically focus on discrete aspects of a technology, such as use of word processing programs and speech synthesizers to support writing skills. Some later developments of assistive technology involve use of CD-ROM

with large storage space, multimedia software which allow students to access audio and other digital information to compensate for some of needs, hypertext and hypermedia which allow the user to decide what happens next, and software which enable the students to interact with meaningful texts in different modalities. More recently, Networking capabilities, such as Internet and the World Wide Web, have been referenced for their potential to increase the access of learners with learning disabilities to tremendously rich worldwide information sources, which is another futile ground for research.

Woodward & Rieth (1997) reviewed the research on the use of technology for students with disabilities ranging from experimental research, which accounts for the bulk of research studies in the field, to observational and naturalistic studies. In their review, they confirmed the tendency for the researchers to focus on the impact of microcomputers on students, namely, the effectiveness and efficiency of computer-assisted instruction (CAI), especially in the 1980s. Software programs for both general and special education students were usually commercially developed and were predominantly limited to drill-and-practice programs, tutorials, and simulations (Budoff, Thormann, & Gras, 1984). Generally, the researchers reported results that supported CAI as a means for promoting academic performance for students with disabilities (E.g., Schmidt et al., 1986; McDermid, 1989; Shiah, Mastropieri, and Scruggs, 1995). In addition, research from the mid-1980s through the early 1990s examined the impact of discrete variables such as feedback, massed and distributed practice, and explicit cognitive strategies.

Limitations of 'Impact' Studies. There is no doubt that these research studies generated some positive results of computers in supporting students' literacy performances in various areas. However, two issues seem to be inherent in this type of research (Woodward & Rieth, 1997). First, there is a confounding of medium and instructional principles (Okolo et al. 1993; Clark, 1983). Some people were skeptical of studies reporting on the large effects of technologies on students' learning, given the problems found in many of the research studies that looked at the intervention features of technologies, such as spelling, prompting, etc. (Clark, 1983). As Clark argues, it is not the medium but the curriculum design principles embedded in the software that are more likely to contribute to the academic gains. Okolo et al. (1993) reported that in assessing the impact of computer word processing functions, many research studies had focused on a combination of treatments rather than one single treatment. Further, in the literature on word processing among students' with LD, there has been scarcity of studies that attempted to isolate the effects of word processing on writing performance. Instead, word processing is often combined with other interventions, most notably writing-as-a-process and instruction in strategies for writing (Kerchner & Kistingner, 1984; MacArthur & Schwartz, 1990; MacArthur, Schwartz, & Graham, 1991; Morocco et al., 1985; Stoddard & MacArthur, 1993). There is evidence to suggest that word processing leads to positive changes in writing quality, particularly when word processing is combine with instructional approaches, such as writing-as-a-process and strategy instruction.

The second fundamental problem is that the underlying hypothesis in most studies of technology in education is that technology or CAI would result in superior academic performance than traditional instructional methods (Clark, 1983). These studies ignored

the fidelity issue of technology implementation at the expense of weakening the validity of their studies. Emerging naturalistic studies on technological implementation also revealed more problems with teacher fidelity and other issues involved in the research process so that it is hard to know whether the effects are due to the instructional technology and or the instructional principles that lie behind the technological features (Woodward & Rieth, 1997). In fact, Woodward & Rieth (1997) stated that "How actual technology use corresponds with researchers' working visions of computer use in classrooms yields important if not sober reminders of the gap between innovation and day-to-day practice." (p. ?) Bahr, Kinzer, and Rieth (1991) found in a reading comprehension study that even after explicit training, teachers still exhibited uneven patterns of use. Woodward's (1993) analysis of the Core Concepts videodisc research indicated that teachers varied widely in how they used the programs once the formal studies ended.

Okolo et al. (2000) also pointed out another weakness in the studies that have focused on discrete features of technology. That is, the intervention studies which pursue the impact of technologies on the academic gains of students with disabilities are compromised by their inattention to the fact that students, especially who are at risk and diagnosed with learning disabilities need longer periods of time to benefit from the interventions. So these experimental studies, which focus on short and intense interventions, would tend to overlook the long-term effect of integrating technological tools on academic performance.

Technology Studies Concerning Constructive Learning Processes. In the past ten years, researchers have begun to shift their attention to the use of information and

communication technology in facilitating social interaction between teacher and students, and among students. There is greater effort to combine better pedagogical practices and computer technology in order to foster interaction and higher-order thinking skills among students. Of these studies, I will introduce the work of Computer-supported Intentional Learning Environment (CSILE) (Scardamalia & Bereiter, 1989; 1990; 1991b; 1993; 1994; 1996; Bereiter & Scardamalia, 1991) and research in social studies conducted by Okolo et al.

The CSILE environment is a networked learning environment for fostering higher-level processes of inquiry among elementary students. On CSILE, the students are responsible for producing all knowledge in the electronic database by accessing text notes, comments, and charts produced by themselves in areas such as mathematics, physics, biology, and history. CSILE is designed on the basis of research on distributed expertise, literacy, and collaborative cognition that complex problem solving (Lehtinen et al., 2001). The students are actively engaged in using their own thinking and knowledge to carry on extensive process of setting up research questions, generating and their own explanations and searching for scientific information. The building of knowledge is carried out collaboratively so that students are supported by each other's expertise in their advancement toward better procedural and higher-level processing skills (Scardamalia & Bereiter, 1989).

Scardamalia & Bereiter (1994) argued that CSILE was designed to be an "enabling technology" to provide a knowledge-building discourse to foster transformational thought on the part of both students and teachers. The use of this technology has the potential of improving the traditional classroom discourse so that it

resembles discourse that occur in more natural contexts where “ideas are conceived, responded to, reframed, and set in historical context” (p. 266, Scardamalia & Bereiter, 1994). These goals are achieved by creating a knowledge-building technology infrastructure directed towards social processes for the improvement of students’ higher-order skills and cognitive abilities. In Scardamalia and Bereiter, they listed three characteristics for knowledge-building discourse supported by the CSILE environment: (1) focus on problems and depth of understanding, (2) decentralized, open knowledge building, with a focus on collective knowledge, (3) productive interaction within broadly conceived knowledge-building communities.

According to Scardamalia and Bereiter (p. 281, 1994):

Evaluations of CSILE indicate that CSILE students greatly surpass students in ordinary classrooms on measures of depth of learning and reflection, awareness of what they have learned or need to learn, and understanding of learning itself....What most impresses teachers and observers alike, however, is what the students are able to do collectively. As the preceding examples suggest, they seem to be functioning beyond their years, tackling problems and constructing knowledge at levels that one simply does not find in ordinary schools, regardless of the caliber of students they enroll. (p. 281)

The CSILE program has worked effectively towards improving the students’ engagement in collaborative knowledge-building activities. The technology itself is intrinsically connected with pedagogical values that are different from those dominating the traditional dyadic and formal language discourse environments (Scardamalia & Bereiter, 1994). This computer-supported learning program marks a new direction towards which educational technology research strives for in recent years.

Another exemplary set of research studies in the recent years have been carried out by Okolo & Ferreti (1996, 1998, 2001). Focusing on the domain of social studies, these authors designed ways of using technology to promote students’ critical thinking

and problem-solving skills (Okolo & Ferretti, 1996). They conducted extensive research on the benefits students with learning disabilities experienced with project-based multimedia programs in the social studies. Their design of computer-supported learning in this domain area started with pedagogical concern that traditional social studies instruction relied heavily on textbooks, which often cause problems for students with learning disabilities because of their depth and breadth of coverage. Further, social studies textbook also contained ill-structured and ill-defined knowledge that impedes comprehension among these students (Okolo & Ferretti, 1996). On the other hand, project-based learning allows students to go through a collaborative process of problem solving in which they read controversial topics from the social studies curriculum, investigate a question or problem, develop an artifact, and present their learning with multi-media technology. Multimedia technology in Okolo & Ferretti (1996, 1998) is a key element for the “construction and presentation of project artifacts” (p. 226, 1996). What distinguished Okolo’s studies from other classroom-based technology studies was that the instructional contexts in which technologies are used was considered and technology becomes a part of the extended literacy practice mediated by multimedia tools.

Okolo & Ferretti’s studies are designed to gain insight into the effects of multimedia projects on the performance of students with learning disabilities (1996). Their investigations on the impact of multimedia design projects on the academic performances are different from the traditional studies on assistive technology and CAI in that they took stock of the situation of a classroom and the learning characteristics of the students before designing the kinds of technologies suitable for a particular literacy



environment. Their studies provided detailed accounts of the instructional context in which technology was embedded, including artifacts (such as textbooks selected for the study), community (discourse, critical topics, and literacy procedures), and divisions of labors (group work or other practices), etc. In fact, the activity system was well accounted for in their writing. In this way, Okolo & Ferreti's put greater emphasis on the interdependence of technologies and their immediate local contexts.

In general, the above-mentioned studies pay more attention to the pedagogical implications of certain technological environments. Computer technology is not simply perceived as separate from literacy practices as if it consists of merely a body of physical configurations without underlying pedagogical systems attached to it. Rather, technology innovations such as the enabling technologies designed by Scardamalia & Bereiter (1996), embody ideas for teaching reading and writing with technology by assigning active roles to students as participants engaged in their own learning in authentic environments.

Towards New Stances Towards Technology. Two main types of important research traditions have been discussed in the foregoing session. One was concerned with the impact of discreet or stand-alone technological features on the students' literacy achievement. The other line of studies incorporated contexts both inherent within the technology or surrounding it. These authors focused more on studying the technologies as supporting tools used to enhance learning as a holistic process. Nonetheless, neither groups of researchers approached technology and literacy as interdependent entities embedded in each other as an integrated activity. Thus, the questions asked in their studies tend to be uni-directional questions such as how technologies impact cognitive

performance of learners rather than the question of how technological tools are used by teacher and students in the given cultural practices of a classroom community. Latour (1991) referred to the first type of question as resulting from a “technology/society divide” view of technology and literacy, which sees them as autonomous from each other; technology exists outside of contexts consisting of human actors and associated ways of thinking about and practicing literacy. This view builds a wall between the material and the social, leading to a less grounded understanding of the sociocultural reality of technology use (Bruce, 1996). Two constraints exist in this approach to technology studies. One constraint is that failure to study the contextual elements of actual technology implementation in classrooms would precondition many researchers to the hypothesis that technological tools brought into class would transform social practices and score big gains in students’ academic performance (Bromley, 1997; Bruce, 1993). That explains the predominant themes of technology studies through the 1980s and early 1990s, which focus on the specific effects of distinct technologies. Or, like in literacy research, it is commonplace to find a question like, “What is the effect on writing of using a word processor?” (Bangert-Drowns, 1993; Bruce & Rubin, 1993).

Another constraint of this view of technology and literacy might be an overemphasis on the existing social relations and cultural context in which technologies are employed. Bruce (1993) framed this way of discussing the role of technology as a “system-based discourse”, which typically finds “little real development, and what change there is incremental and slow.” Larry Cuban’s (2000) analyses of early childhood, high school, and university classrooms in Silicon Valley California also struck similar

tones—that students and teachers use the new technologies far less in the classroom compared to what the society touted technology would do for these classrooms.

The second kind of question addressing the actual implementation of technology breaks down the dichotomy between technology and literacy. Instead of being lured to the research paradigm that divide technology and literacy as two autonomous entities, the new approach asserts that technology research must be conducted to accommodate a social reality comprising technologies, artifacts, texts, signs, and people that are dynamically constitutive of each other (Bruce, 1993). That is, technologies are tools that not only mean the physical artifacts, for instance, the lamp and stand of an overhead machine or the wires and chips inside of a computer. Instead, technologies such as digital computers and multimedia software programs, with various physical shapes and configurations, carry symbolic meanings signifying a set of beliefs about pedagogical values, class relations, social status, etc. in a classroom setting, for example. This is what Bruce (1993) termed a “transactional view” of technology and literacy. The assumption is that technologies do not simply transform literacies, nor could they be irrelevant to the existing literacy practices. They are both part of a dynamic and continual process of construction and reconstruction of each other. This means that technologies such as new informational and digital technologies must be understood in relation to the larger systems of practices mediated by other artifacts and tools which are embedded in the social cultural context. The transactional perspective of technology and literacy studies, therefore, recognizes the “ecological” (Bruce & Hogan, 1996) system in which technologies find themselves in, along with other artifacts, teachers’ pedagogical beliefs, values about literacy, social relationships, etc.

Another important aspect of this transactional view is that it highlights the importance of a variety of factors including observers, participants, texts, technologies, discourses, and so on, which all become integral parts in defining what counts as literacy in that particular environment. Outside of the literacy realm, a large body of research studies has been carried out to the conclusion about technological innovations in society at large (Cuban, 2000; Bijker, Hughes, & Pinch, 1987; Bijker, 1995; Pelto & Muller-Wille, 1972). These authors traced the evolution of certain technological innovations in a larger social system and concluded that introduction of technologies often found themselves in a unpredictable social environment; their mediating roles are constrained by the existing social practices, social relations, ideologies, and values placed upon them by different social groups. On the other hand, technologies also have unexpected effects upon a society in ways that transforms the social relationships and cultural practices in complex and dynamic relations with existing artifacts, beliefs, people's values, and so on. There is no way to separate technologies and their immediate and larger social systems. The essence of technology, then, is reflected in the way it is used in human activity (Bruce & Hogan, 1998; Heidegger, 1977).

Other researchers argue for similar sociocultural accounts of two-way relations between technologies and human environment by clarifying the term technologies as "tools". For example, Burbules & Callister (2000) described two possible ways of talking about technology. One refers to technology as tools used to achieve certain purposes. The authors called it "instrumental" view (p. 5), which tends to externalize technologies as fixed objects with a use and purpose. Burbules and Callister point out problems with this view of technologies. Tools are not merely objects that people use for specific purposes.

Tools themselves may also create new purposes. Therefore, tools also have the potential to change the user and mediate their thoughts and behaviors. Just as human beings use tools, tools also transform human beings in the process of mutual construction and implementation by a number of participants in a goal-oriented context. In this sense, technologies are also cultural and psychological tools associated with the human agents participating and living in activities in a complex sociocultural system. This latter view of technology is a so-called “relational” view of technology. The two-way relationship between tools and human environment implies that technology use is always embedded in a web of changing practices and social processes. In the field of education then, changing technologies themselves may be only part of a process of change associated with other educational processes and social relations. The important message is that, in order to study technologies in the educational process, it is essential to situate the research in the sociocultural contexts and changes in other artifacts and tools, pedagogical beliefs, existing literacy practices, and so on.

Situated Evaluation Studies. The ecological and activity perspectives on technologies suggest that more research needs to be conducted to go beyond investigations concerning the impact of technological innovations on the academic performance of the children, and to ask the broader question of how does technology function in a existing cultural activity setting such as a classroom. More specifically, we must begin to adopt a situated view of technologies in actual use and study the actual implementation process of technologies, teachers’ roles in adopting or rejecting technologies, the combined power of technology integrated with the use of other artifacts in the classroom, individuals interacting with technologies, etc. (Bruce, 1998, 1993).

There is no single form of technology realization that works in the same way across different local contexts. A situated examination will allow us to learn how technologies are used in the classrooms to maintain traditional teaching practices or to foster progressive ways of teaching and learning.

Examples of Situated Evaluation Studies. Technology itself is not isolated practice. It brings the students, computer, and the teachers together. It creates an occasion to understand teachers' roles in the classroom, how they arrange the students working with the technology, and what discourse with which they engage the students. In fact, technology in education conjures up a host of questions that would direct our attention to the issues of implementation and technologies interacting with existing social and cultural factors of teaching and learning. Technologies have to be studied within the existing instructional context (Lewis, 2000). In his study, Lewis proposed several important questions to ask: what are the most effective approaches to integrating technologies into the teaching-learning process? How do we study the applications of technologies within the context of classroom?

Bruce (1993) explored the similar issues in the framework of realization versus idealization of technology. In his view, technological innovations are processes and ongoing manifestations of social relations rather than fixed objects that get applied to produce changes. When examining the implementation of technologies, we need to incorporate the dynamic contextual factors that may generate different results in terms of technology use. In theorizing about technology research in education, Bruce (1993) drew our attention to the differences between realization and idealization:

“...The developers may intend that the innovation modify the social system so that certain desirable characteristics are achieved. They see the innovation set into

an idealized context and used in an idealized way. Their vision of the changed social system is thus an *idealization*. What happens in practice may or may not change at all, and if it does change, it may not do so in accord with the developers' goals. Each resulting social system is a *realization*. The distinction between ideal and real suggests a process, the *realization process*, whereby the innovation leads to practices potentially different from those intended by the developers." (p. 16, 1993)

The ENFI study by Bruce et al. (1993) adopted such an approach to technological innovations situated in actual use. ENFI stood for Electronic Network for Interaction. It is an approach to writing developed in 1985 at Gallaudet University. Several different types of software were used for ENFI work at the various consortium sites involved in the project. Developers of ENFI expressed the following visions for writing intended for ENFI: "(1) New social dimensions in the classroom; (b) writing for authentic purposes; (c) immersion in a writing community; (d) collaboration in writing; (e) writing across the curriculum" (p. 5). Bruce, Peyton, and Batson (1993) studied the realizations of the ENFI concepts in the various classrooms and found it necessary to look in detail at the writing practices within the different classroom discourse communities. They concluded that adopting innovation is a "creative process involving critical analysis of the institutional context, student needs, and pedagogical goals" (p. 6).

Teachers are not passive recipients of new ideas, approaches, or technologies, but rather are active agents in shaping the use of these technologies. Teacher's theories of teaching and learning, their individual personalities and preferences, and their pedagogical beliefs and existing teaching practices all play parts in determining which shape technologies are adopted in the classroom settings (Bussis, Chittenden, & Amarel, 1976; Cohen, 1988; Cuban, 1986, 2000; Fullon, 1982). According to Bruce (1993), those whose ideas and theoretical orientations are consonant with the embedded goals for

ENFI, for example, tended to be the enthusiastic users of ENFI. Those whose ideas are dissonant with what's intended for ENFI, however, became frustrated with ENFI and stopped using the network.

Students' understandings of what teaching and learning involves also shaped their interpretation and use of ENFI. When students perceive writing as self-expression, they had a better match with the ENFI visions. When students were used to the drilling of grammar and writing paragraphs, they were frustrated with using ENFI because it did not fit with their vision of what writing was (Peyton & Bruce, 1993).

#### Broader Focus on Technology Research in Education

Some researchers began to examine the larger conditions for adoption of technologies in the classrooms. For example, Zhao, Pugh, Sheldon, & Byers (2000?) conducted a study of the conditions under which technology integration can happen. Three sets of factors were found to account for the process of teacher implementation of technologies: the teacher, the project, and the context. In order to integrate technology in teaching, teachers need to understand that technologies have their affordances and constraints, and that they must know how ways to utilize technologies to support their teaching practices and curricular goals. Institutional support such as a healthy school environment for technologies project is also an important factor in the process of integrating technologies into teaching and learning.

In short, technologies have been studied from different perspectives. Earlier studies have approached technological innovations as if they were separate entities from literacy and therefore, the common question asked from that perspective is how much impact on academic performances that technologies have. Recently, researchers have



gradually shifted away from the dichotomous view of technology and literacy. More studies are being done from the perspective that technologies as mediating tools for learning cannot be stand-alones in their analyses but should be conceived as part of the ongoing social and cultural practices of teaching in the classroom. The extent to which technologies play a part in the classroom teaching and learning experiences is closely related to other contextual factors such as teachers' pedagogical beliefs, students' orientations towards literacy understanding and their individual needs, use of other artifacts, and etc.

#### Two Contexts: TELE-Web and Special Education LRE

The conceptualization of activity setting fits the ongoing discussion of the Least Restrictive Environment (LRE) in special education in the United States. The Individuals with Disabilities Act (IDEA) stipulates that all students with disabilities be educated in settings with their non-disabled peers to the maximum extent possible. This setting is referred to as LRE. However, how to achieve these goals has remained controversial (Rueda, 2000). The different sides of the debates have mainly focused on the location, namely, general education classroom versus pull out or self-contained classroom, in their argument. The physical placement is cited by all parties in the discussion as casting the most significant influence on how restrictive of an education a child might receive. Rueda (2000) critiques the premise of these views of LRE by stating: "...same placement or setting can be either facilitating or restrictive, depending on the social organization of specific settings that comprise a given context." (p. xxx, Rueda, 2000). In this perspective, it is the context rather than location that is important to consider in the attempts to understand LRE for students with disabilities. Previous debates on LRE have

not focused on the contexts of the students, but discussed individuals as if they were isolated with the social organizations of any particular setting in which they were placed. Drawing on a sociocultural perspective, Rueda proposes an expanded view of LRE that examines the individual student in interaction with a specific setting as a unit of analysis.

In this activity framework, Rueda recommended that researchers ask some of the important questions suggested by Rogoff (1995): “who, what, when, where, why, and how of the routines that constitute everyday life.” (p. xxx, Rueda, 2000; Ashton, 1996; Tharp & Gallimore, 1988). That is, research needs to investigate the cultural system comprised of the essentials components of activities: routines, artifacts, participants, and themes (which characterize different settings) (Rogoff, 1995), which dynamically construct affording or restrictive learning environments. Such view of LRE requires a critical and challenging examination of a social context of any classroom for students with disabilities. Rather than asking where the students should be moved to or removed from, the focus now is on questions such as, what are the tools and technological resources available to the students, how are these tools used and who are using them, what are the routines in teaching and learning in the classroom, why are there certain rules and division of labors, how can this classroom be characterized in terms of pedagogical practice, community, and culture. Therefore, the commanding issue for researchers in special education is the examination of “the type and amount of social mediation available to the individual (both social and academic)” (p. xxx, Rueda, 2000) in a specific context.

A situated examination of the TELE-Web integration in a multi-grade inclusion classroom may shed some light on the affordances and constraints of TELE-Web in use

for both LD and Non-LD students. As a computer-mediated learning environment, TELE-Web is designed to accommodate diverse needs of students with learning disabilities as well as those who are in regular education. It allows responsive assistance and scaffolding through its various online prompts, formats for reading and writing, text-to-speech functions, and electronic publication composed of students' own texts. TELE-Web promotes literacy activities that are authentic and communicative. It also provides different tools for mediating students' participation of their own learning at different levels of literacy tasks in WordShop, Reading Comprehension, and Writing. TELE-Web is designed to be an enabling technology for multiple purposes to improve school achievements of students with learning disabilities. Such software is not merely a physical entity with discrete components, but it embodies significant findings of pedagogical practices in the literacy intervention research of students with learning disabilities (e.g., Englert et al., 1996, 1994, 1993; Raphael et. Al, 1996, 1992; etc.).

The use of TELE-Web as the focal technology for this study has great significance for special education, especially the understanding of effective components of a social context for teaching the students with learning disabilities. First of all, TELE-Web embodies a literacy curriculum that emphasizes both practice of basic word skills and high-order thinking through use of mapping strategies and other tools for learning. A variety of reading and writing activities are available on TELE-Web for teachers to provide instruction that is customized to individuals in the classroom. Besides, TELE-Web also allows students and teachers to form online communities and send feedback to each other through message and sharing functions. Second, the features on TELE-Web were designed on the basis of a set of literacy practices in past research that were proved

to be effective in improving the academic performances of LD students (Englert et.al, 1996, 1994, 1993). For example, TELE-Web provides various mapping, planning strategies, as well as online prompts and scaffolding features to meet the needs of LD students as well as general education students. The implementation of such an Internet-based learning environment geared towards teachers' customizations and students' learning needs should be able to (1) reveal much about the factors influencing the integration of an enabling technology in actual inclusion settings, and (b) provide insight into the affordances of TELE-Web in mediating academic performance of LD as well as non-LD students' and producing LRE for them in such contexts.

TELE-Web itself holds great promises for authentic and purposeful learning with scaffolding within students' ZPDs. However, as has been discussed earlier, a technological innovation can only be evaluated in a situated context and actual setting. Whether TELE-Web is a significant context for students with learning disabilities and those who are in regular education, thus a LRE, must be understood by examining the use of TELE-Web by teachers in their classrooms, by students, and in relation to existing literacy practices. In special education, this type of research is significant in both theoretical and practical terms.

In summary, the purpose of this study was to unveil the process of integrating TELE-Web in the multi-grade inclusion classroom and understand the mutually constitutive entities of TELE-Web and other parts of the class ecological system: how is the meaning of TELE-Web influenced by the human participation of using TELE-Web within the activity structures of the classroom? How do students with LD and those in general education construct TELE-Web in the activities? What are the affordances of

TELE-Web to these students in literacy performances? Activity Theory and Technology as Information Ecology metaphor are two theoretical frameworks used to conduct this contextualized and situated evaluation of TELE-Web. The significance of the study lies in three areas. First, the situated investigation of technology integration in a multi-grade inclusion classroom setting provides grounds for designing enabling technologies for both LD students and general education students. Such a setting is often the most advocated setting for special education students. By examining the implementation process of TELE-Web and its affordances to students in the activity settings mediated by TELE-Web, this study can be used as informing resource for introducing such technologies into inclusion classrooms and for the types of technologies useful in improving students' academic performance. The second significance is that the study employs the Activity Theory as a possible framework to analyze use of technologies, and thus provides a classroom-based case for the situated examination of instructional technologies. Finally, the results of this study may shed light on how the literacy curriculum represented by the designing of TELE-Web evolves in the ongoing use in this inclusion classroom.

## CHAPTER 3

### Methods and Analysis Procedures

This study was a qualitative, observational study of a multi-grade inclusion classroom over the course of a semester. Specifically, ethnography, grounded theory and interview methods were the main qualitative methods employed to analyze the complex set of relationships in which TELE-Web implementation was embedded. I was interested in what instructional activity settings characterized the classroom, what TELE-Web

activities were used by the teachers and students, for what purposes were these activities created, and how both special education and general education students responded to the use of TELE-Web. These questions were well matched with qualitative and interpretive analytical methods (Erickson, 1988). My questions are listed as follows:

- What TELE-Web activities did the teachers use and how did they implement the activities?
- What key factors influenced the teachers' implementation of TELE-Web? How did the enacted TELE-Web curriculum mediate the teachers' practices?
- What were the TELE-Web affordances embedded in the students' interactions with TELE-Web?

Acting as a participant observer (Taylor & Bogdan, 1984), the researcher examined the behaviors, interactions, and processes in classroom activities with or without use of TELE-Web by directly watching participants in action. Thus much data was gathered in natural settings as occurred. This method was especially useful to collect information on activity structures in the classroom, including information on the teacher and student roles, the rules and procedures involved, goals, and the allocation of tasks in the activities. Field notes and memos classroom observations were also part of this ethnographic fieldwork.

The researcher adopted grounded research methods in the analysis of data. That is, data was systematically collected through a recursive process of narrowing questions, selecting transcribing of field notes, labeling, developing and validating the categories and statements arrived at through the data analysis.

Both structured and semi-structured teacher and student interviews were designed to triangulate the data gained through classroom observation and to provide further in-depth information about the participants' perceptions of technologies, literacy practices, pedagogical beliefs, roles, and other aspects of activity settings in this classroom.

In addition, a teacher survey was used to tap the teachers' perceptions about technology and TELE-Web in particular to provide a general background against which TELE-Web implementation examined. A combination of teacher survey, interviews, and ethnographic qualitative methods enabled the researcher to describe and analyze the phenomena arising from the TELE-Web implementation in as objective a fashion as much as possible.

### **The Larger TELE-Web Project**

TELE-Web was based on the former literacy project ELP (Englert, Raphael & Mariage, 1994; Englert & Mariage, 1996), which sought to improve the literacy performance of the students who had mild disabilities or were at risk for academic failure. The key components of the literacy activities on TELE-Web fell into four areas: Writing, Reading Comprehension, WordShop, and Tools. They were designed for the students to practice both basic skills and higher-order thinking skills including the use of cognitive and learning-to-learn strategies. As a web-based environment, TELE-Web offered unique opportunities for sharing, publishing, and searching text materials generated by the students on this web. The students could also use the text-to-speech functions and a set of mapping tools to assist in their learning to read and write on TELE-Web.

TELE-Web is not designed to be a piece of fixed educational software. In fact, teachers in the project have played an active part in making suggestions to the features of TELE-Web and activities represented on this site. The input of the classroom teachers has shaped TELE-Web into an ongoing and dynamic entity that cannot be separated from the contexts in which it is to be implemented. One of the big goals of the project is to study contextual factors associated with implementation and sustained use of TELE-Web and to conduct situated evaluations (Bruce, 2000) in actual classroom situations.

### TELE-Web Principles and Practices

Incorporating a body of research literature on literacy and cognitive development, TELE-Web emphasized the importance of teaching with such a technology support with maximum effect when teachers: (1) Engage students in thinking about literacy as integrated across four domains of listening, speaking, reading, and writing. The activities should be purposeful and contextualized; (2) Apprentice students in understanding the meaning of what counts as readers and writers as well as the tools necessary to accomplish these tasks; (3) Immerse students in discourse with which they participate in the construction and reconstruction of knowledge, and learn scientific ways of thinking around literacy texts and structures. In other words, the students need to learn and practice, with scaffolding of more capable others or the teacher, the discourse and language structures that will allow them to progress from novice to expert levels of literacy proficiencies. (4) Scaffold and support students in their development of independent performance. Scaffolding includes multifaceted procedures that teachers could employ to facilitate students' understanding of literacy concepts and their use of cognitive strategies (e.g., through the teachers' provision of prompts, text-to-speech



features, mapping tools, etc.); (5) Foster students' holistic sense of the relationship between readers and writers through their participation in literacy activities that feature literacy as a as communicative and interactive enterprise mediated by all available tools on TELE-Web.

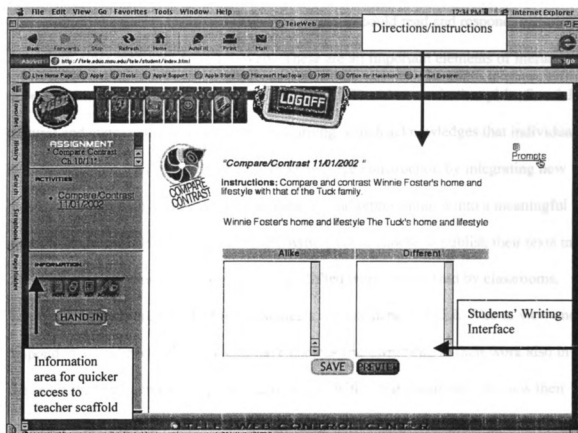
TELE-Web consisted of four literacy environments: Writing, Reading Comprehension, Reading workshop, and Library Tools. Each of these environments provided literacy activities that could be accessed by both teachers and students. On the teacher interface, for example, teachers could create assignments that contained one or more activities drawn from these environments, as well as customize the selected activities by inserting their own instructions, prompts, or provision of background information. On the students' interface, students could access the teachers' assignments, as well as select and self-assign activities of their own choice. In addition, TELE-Web supported the participation of both teachers and students in an online literacy community, allowing teachers and students to publish or share their ideas and work with other TELE-Web participants, in addition to inviting comments, providing feedback to others, or sending messages to one another. In the following sections, these environments of TELE-Web are explored in greater detail.

*Writing Activities.* The writing environment contained activities that enabled the students to produce and view papers with distinctive text structures, such as narrative text structures (e.g., News, Supported News, My Story); descriptive texts (About a Picture), literature response and summary (e.g., Book Report), and expository texts (e.g., Report, Supported Report, Persuasive Writing, and so on). The variety of text structures

represented in this environment was designed to support written expression and communication for a number of curricular or personal purposes.

In addition, TELE-Web allowed at least three types of supports or scaffolds that could be provided by teachers and accessed by students. An example of these various supports that were are shown in Figure 3.1. First, teachers could develop specific instructions, directions, or explanations that preceded the activity, and that appeared at the top of the students' interface in a box entitled "Directions". These directions provided background information about the form, function, purpose, or concepts related to an activity, as deemed necessary by the teacher. Second, teachers could develop and customize specific prompts (e.g., questions, reminders, clues, examples) that appeared in the student interface in a pop-up box when students clicked the word "prompt", and that disappeared when students returned to the student interface to continue writing. Third, teachers could provide access to information on a more uninterrupted basis by entering the information, spelling or writing vocabulary, or topical content in an information box that appeared on the students' screen for the entire session. In this manner, teachers could provide students with three levels of scaffolds that assisted their development based upon their identified needs, while buttressing performance through prompts and clues in areas of perceived weaknesses. This was especially beneficial for students with learning disabilities, who are often lacking in metacognitive strategies or who do not activate strategies useful in cognitive tasks automatically (MacArthur & Haynes, 1995, 1996).

Figure 3.1 Three Levels of Scaffolds on TELE-Web



There were two other supports that were available on the students' interface on a routine basis, without any restrictions or qualifications. These included access to text-to-speech functions, which allowed students to request that the computer read their own or other students' texts using computerized speech. Another function, Spell Check, highlighted words that were not found in the TELE-Web dictionary. Both of these functions helped students identify words that were not properly spelled or text that did not make sense.

Finally, students made decisions about when to hand in their written texts to the teacher, as well as to decide what work to share and with whom. Students could share

their work with specific individuals, or share their work with entire classrooms.

Moreover, in the public space of TELE-Web, students could read and respond to stories written by other members of TELE-Web. These are all important elements of literacy development and facets of TELE-Web environment. The ideas are in the spirit of social cultural and constructivist perspectives on learning, which acknowledges that individuals are active agents, they engage in their own knowledge construction by integrating new information into their schema, and by associating and representing it into a meaningful way (Warschauer, 1997). Furthermore, the writers could choose to publish their texts in TELE-Zine, a place on TELE-Web for all published work categorized by classrooms. These publications are available for all students and teachers on TELE-Web to view and respond to as audiences. The students have choices and ownership to their work also in the sense that they can choose particular members within this community to view their writings.

*The Reading Room.* The ReadingRoom included two main sets of activities: Reading WordShop and Reading Comprehension. The complete listing of reading comprehension activities is shown in Table 3.1. Teachers could use WordShop to create activities that developed students' word-recognition, spelling abilities, and knowledge of word patterns (e.g., (Letter Scrambler, Word Scrambler, Assemble Words, Spelling, and Crosstic). The purpose of these activities was to help children develop an awareness of the spelling in words, letter-to-sound characteristics, and word analysis skills.

Table 3.1 Activities Available on TELE-Web

***Choose an Activity Type . . .***

| <u>Writing</u>                                                                                                                                                                                                                                                                                                                                                                                                                                    | <u>Reading Wordshop</u>                                                                                                                                                                                                                                                                                                                                            | <u>Free Creator</u>                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• <u>About A Picture</u></li> <li>• <u>Book Report</u></li> <li>• <u>Continue a Story</u></li> <li>• <u>Free Writing</u></li> <li>• <u>Journal</u></li> <li>• <u>My Story</u></li> <li>• <u>News</u></li> <li>• <u>Persuasive Writing</u></li> <li>• <u>Report</u><br/>(Lesson plans)</li> <li>• <u>Supported News</u></li> <li>• <u>Supported Paragraph</u></li> <li>• <u>Supported Report</u></li> </ul> | <ul style="list-style-type: none"> <li>• <u>Assemble Words</u></li> <li>• <u>Create Word</u></li> <li>• <u>Crosstic</u></li> <li>• <u>Crosstic 4x4</u></li> <li>• <u>Crosstic 5x5</u></li> <li>• <u>Letter Scrambler</u></li> <li>• <u>Sentence Scrambler</u></li> <li>• <u>Spelling</u></li> <li>• <u>Word Family</u></li> <li>• <u>Word Scrambler</u></li> </ul> | <ul style="list-style-type: none"> <li>• <u>Activity Creator</u></li> </ul> |
| <u>Reading Comprehension</u>                                                                                                                                                                                                                                                                                                                                                                                                                      | <u>Tools</u>                                                                                                                                                                                                                                                                                                                                                       |                                                                             |
| <ul style="list-style-type: none"> <li>• <u>Book Review</u></li> <li>• <u>Cloze</u></li> <li>• <u>Compare/Contrast</u></li> <li>• <u>Comprehension Questions</u></li> <li>• <u>Content\$Story Clues</u></li> </ul> <p>(Table 1 continued)</p> <ul style="list-style-type: none"> <li>• <u>Paragraph Scrambler</u></li> <li>• <u>Sentence Completion</u></li> <li>• <u>Sequence</u></li> <li>• <u>Summary</u></li> </ul>                           | <ul style="list-style-type: none"> <li>• <u>Beginning-Middle-End Map</u></li> <li>• <u>Character Details Map</u></li> <li>• <u>Data Chart</u></li> <li>• <u>Idea Organizer</u></li> <li>• <u>KWL</u></li> <li>• <u>Map</u></li> <li>• <u>Notes</u></li> <li>• <u>Picture</u></li> <li>• <u>Story Map</u></li> <li>• <u>Venn Diagram</u></li> </ul>                 |                                                                             |

The Reading Comprehension activities were used to develop students' comprehension and sense-making strategies. Several of these activities tapped students' understanding and interpretation of stories, among these were story summarization (Summary), comprehension questions, compare and contrast, and book review, to name a few. These activities provided the teachers and students with a variety of ways of participating in making sense of texts in different genres. In addition, both reading and writing activities on TELE-Web incorporated structured and more open forms of engagement with the two literacy areas. For example, Cloze Activity in reading relied heavily on the teachers' choice of word spaces, Book Review was more geared toward students' choices and interpretations of the texts.

Other reading activities that students had access to included reading the published works that other children have submitted for review on TELE-Web, as well as participating in book chats or bulletin boards to where they could post their ideas or talk with others in synchronous or asynchronous conversations. These features offered qualities that inclined the community to become knowledge-building and knowledge-producing communities (Scardamalia & Bereiter, 1996), insofar as the students were able to perceive and contribute to the multiple perspectives and views on different topics (Okolo & Ferretti, 1998).

*Library Tools.* A third environment of TELE-Web offered support to other reading and writing activities. By accessing the tools section of TELE-Web (see Figure 3), teachers and students could append, pictures, notes, charts, and webs to their reading and writing activities. These mapping tools included Venn Diagrams—a compare and

contrast map, semantic webs, and KWL maps. Used as part of an learning-to-learn process in reading or writing, these mapping tools could help children generate and organize ideas as part of planning, organizing, and drafting their thoughts into well-organized texts or relational frameworks. Prior research indicates their value to students with disabilities in the development of text comprehension as well as writing (Raskind & Huggins, 1998, Englert & Mariage, 1996; MacArthur, 1996).

*The Public and Community Features of TELE-Zine.* Within TELE-Web community, the students could publish whatever they have written and chosen to share with other students who had access to TELE-Web. Once their work was published to TELE-Zine, they can be further accessed by outside community through TELE-World. TELE-Zine publications were automatically organized into a newsletter format for each classroom.

*Messages.* Messages room was an important facet of TELE-Web and it permeates all other rooms. Incoming new messages from teachers or other students were highlighted with red ink to signal its status as new messages, while blue ink indicated that a message has been read. Any shared and published work would be able to be responded to in the form of message sent to the authors. Message was a function that is built in different activities on TELE-Web. It formed a key thread to the interactive communication of all TELE-Web activities.

#### The Setting: Stepping into An Inviting Locality

The setting of the study was a multi-age classroom that included 22 students, among whom were ten students with mild disabilities. These students included 5 students with Specific Learning Disabilities (SLD), 2 students with Emotional and Behavior

Disabilities (EBD), 1 student with Physically or Otherwise Health Impairment (POHI), 1 student with Attention Deficit/Hyperactivity Disorders (ADHD), and 2 students with Educable Mental Impairments (EMI). The students spanned the grade levels from grade 1 to grade 3. Table 3.2 below showed the students' profiles in this classroom.

Table 3.2 Students' profiles in the multi-grade inclusion classroom

| Student Names | Ethnicity | Gender | Grade Level Placement | Disability (LD, EI, EMI) | Limited English Proficiency |
|---------------|-----------|--------|-----------------------|--------------------------|-----------------------------|
| Kayelin       | C         | Female | 3                     | LD                       | No                          |
| Josh          | C         | Male   | 1                     | No                       | No                          |
| DeJuan        | AA        | Male   | 2                     | EI                       | No                          |
| Shaquita      | AA        | Female | 3                     | LD                       | No                          |
| Cindy         | C         | Female | 3                     | LD                       | No                          |
| Deron         | AA        | Male   | 1                     | No                       | No                          |
| Leon          | H         | Male   | 1                     | EMI                      | No                          |
| Justin K.     | H         | Male   | 2                     | LD                       | No                          |
| Alexis        | H         | Female | 1                     | Being referred for LD    | No                          |
| Justin L.     | H         | Male   | 2                     | EMI                      | No                          |
| Travis        | AA        | Male   | 2                     | No                       | No                          |
| Brandon       | C         | Male   | 1                     | No                       | No                          |
| Jordyn        | C         | Female | 2                     | No                       | No                          |
| Juan          | H         | Male   | 2                     | No                       | No                          |
| Taylor        | C         | Female | 1                     | No                       | No                          |
| Tyler         | C         | Male   | 3                     | EI                       | No                          |
| Terrance      | C         | Male   | 2                     | POHI/ADHD                | No                          |
| Joe           | As-A      | Male   | 3                     | No                       | No                          |
| Wisney        | H         | Male   | 2                     | No                       | Yes                         |
| Eddie         | AA        | Male   | 3                     | LD                       | No                          |
| Marquis       | AA        | Male   | 2                     | No                       | No                          |
| Criselda      | H         | Female | 1                     | No                       | No                          |
| Russell       | C         | Male   | 3                     | LD                       | No                          |

Code: 1 -AA = African American, AS-A = Asian American C = Caucasian, H = Hispanic O = Other  
LD = Learning Disability, EI = Emotional Impairment, EMI = Educably Mentally Impaired, SL = Speech and Language Impaired, POHI = Physically or otherwise health impaired, ADHD = Attention Deficit and Hyperactivity Disorder



The class possessed two rooms on the opposite sides of the hallway – one classroom for the special education teacher and a second for the general education teacher. However, the students were not separated for instruction according to their (dis)ability status, but the class was divided for small group activities according to the nature of the activity and the students. As told by the teacher, the students were aware of their age and grade levels, but not their general or special education status.

An inspection of the classroom walls showed an abundance of print and text resources. Students' drawings and writings were displayed on bulletin boards on a regular basis. Trade books with literature and informational genres stood in the shelves of a bookstand under the chalkboard by the door, an area known by teachers and students as the classroom library corner. Pasted on the walls were alphabetical graphs, poems, songs, stories, core democratic values, geography chart, and animals' habitats map. The students regularly accessed these resources to support their daily learning experience in the classrooms.

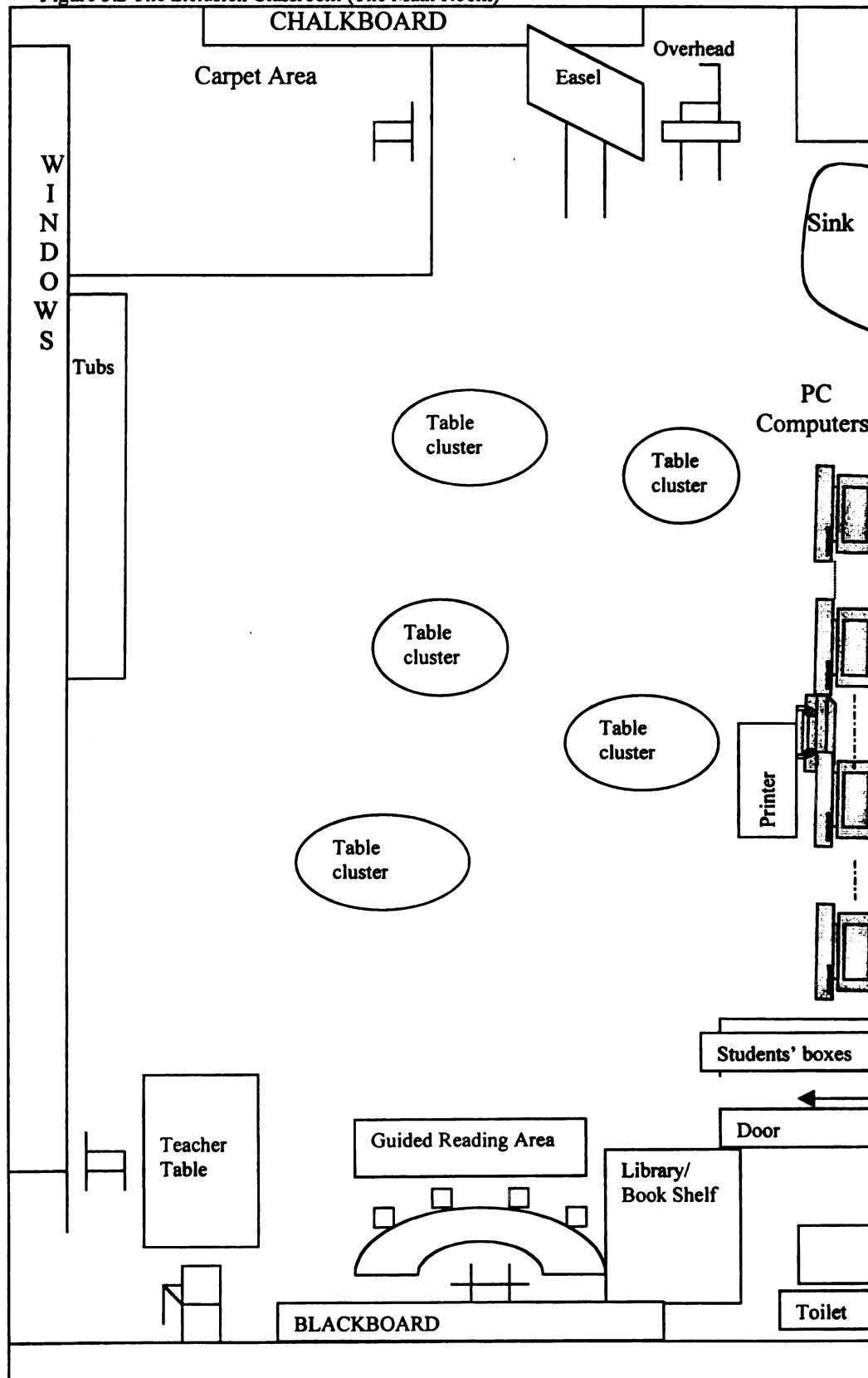
Each area of the classroom served its own purposes: literacy center tubs on the left side, guided reading areas to the left of the door against blackboard, computer center, students' tables for collaborative work and independent learning, students' work boxes. Figure 3.2 portrays the physical layout of room 103, which served as the main classroom for whole class instruction. This figure shows that four PC computers were lined up against the wall by the entrance and a printer was put in the middle of the two Gateway PCs. Given the close physical configuration of the computers and table areas, some degree of student interaction was likely to result during computer use, suggesting that the

teachers seemed comfortable with student collaboration. The students' works were submitted in the box stand beside the door. The classroom also contained a reading corner with two shelves of books at different reading levels and a carpet area for the whole-class instruction and interactions. Since this was a room where many activities occurred, it was part of the classroom rule that the students be responsible for smooth transitioning from one activity to another physically.

Another important characteristic of the physical structure of this class was its additional room across the hallway, room 104. Although the two teachers shared responsibilities for the inclusion classroom, they were assigned two separate classrooms so that they might teach subgroups of students at different times. Room 104 was often employed during the literacy centers when students were grouped and assigned to work at different learning centers. The main physical difference between the two rooms was the existence of four Macintosh computers in room 104, which were hooked up to the Internet. These computers were supplied by TELE-Web Project. The teachers arranged the computers so that they stood side-by-side. Other equipment in this room included a LCD panel, presentation screen, and an audio tape recorder. There was a long sofa beside the door, several round tables at similar distance to each other, blackboard, an easel stand, and a teacher desk.

Judging from the physical setting, the teachers structured and organized the multi-age inclusion class to convey an intentional emphasis on the resources and tools of the activity setting, including the availability of student print, and the possibility of shared intellectual resources through peer collaboration. The physical layout in this classroom implied a unique ecological system that were built upon multiple tools, ways of engaging

Figure 3.2 The Inclusion Classroom (The Main Room)



them within a set of rules governing the transition between classroom activities, and interactions between participants and between teachers and participants. In the following section, the chapter will provide a detailed account and analysis of the complex system of a classroom ecology with its interconnecting group of foundational components: persons, or in this case the keystone species,<sup>2</sup> as well as their tools, values and practice.

### The Teacher Participants

The teachers adopted a team-teaching inclusion model. Amy Jacobson and Cathy Collins were the general education teacher and the special education teacher, respectively. They shared teaching assignments and responsibilities for the students. At the same time, the two teachers complemented each other in their teaching. For example, Amy took the lead role in reading and writing instruction, which meant she gave all students their primary instruction in these two areas. The two teachers shared other teaching responsibilities, such as in science, when they each taught science curriculum to different groups of students. They also collaborated on curriculum construction and the preparation of lesson and behavior management plans. Both teachers used computers, but it was mostly Cathy who created computer and internet-based activities for children. Guided reading instruction took place during the literacy center. Amy and Cathy used the main classroom as well as the room across the hall for small group instruction in reading. Students with similar reading levels were placed in multi-age groups, consisting of students in different grades, students with learning disabilities, and those in general education. Within these reading groups, the teacher set the goal of the reading, allocated

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<sup>2</sup> Keystone species are those that are crucial to the survival and growth of the ecology. In the classroom context, the teachers and students—the participants of teaching of learning—have great influential power in the process of their engagement with tools in activities. They are arguably keystone species in this case.

students' tasks and responsibilities, and implemented lessons that proceeded in a certain sequence. For example, the teacher introduced the book; invited the children to look at the title page; asked students to make predictions based upon illustrations; reviewed the story vocabulary; and read the book with students as they made connections between the story events and the students' lives, and applied strategies for comprehending and interpreting texts within these guided reading groups, the teaching objectives were to assess students' reading progress, evaluate their needs, develop their reading skills, provide guided practice for students who needed support in decoding or reading comprehension, and engage students in the use of number of reading strategies.

The writing lessons, arranged after the literacy center activities, were occasions for the teachers to introduce a new genre of writing, model the use of writing strategies, or support students' subsequent independent writing practices. A writing workshop approach to literacy instruction provided the foundation for the writing instruction in the classroom.

#### Teachers' Practices and Pedagogical Beliefs

Underlying all the major Language Arts teaching practices presented in the previous discussions were teachers' pedagogical beliefs about learning and instruction in the inclusion classroom. In the following section, I attempt to provide a comprehensive analysis of the two teachers' pedagogical beliefs and corresponding practices that determined perception and choices made towards use of various tools in their classroom. This analysis was based on converging evidence from teacher interviews and observations.

## Amy

Good Readers/Writers. Amy, the general education teacher emphasized in an interview that good readers and writers were those who enjoyed picking up books or writing. Enjoyment of reading, she believed, led to an enjoyment of writing because that was how children learned language. In fact, her class always started in the early morning with Amy reading of a book selected by the students. Children surrounded Amy in the carpet area, listening the book as Amy read it aloud in a dramatic voice, a teacher characteristic that was probably attributed to Amy's background as a kindergarten teacher for 6 years in her earlier career.

Amy also felt that good reader should also know how to decode, utilize other reading strategies to decode, and interpret what they read. Amy's approach to guided reading instruction tended to confirm that she used a balanced teaching approach in reading, with a dual emphasis on teaching decoding skills and reading comprehension strategies. In her beliefs and practices, Amy also stressed that 'a good reader must be able to "relate to other situations or circumstances" (interview, 5-3-02, p3). Practically, Amy's belief that readers needed to be able to transfer their strategies to other situations was observed in her emphasis on teaching reading and writing strategies as part of content area instruction within the context of thematic units. For example, during a May guided reading lesson, Amy and Cathy brought in expository and narrative books related to the animal theme of the month. The students were very interested in reading the books, and they applied reading strategies that they learned in other contexts to the comprehension of expository texts. Similarly, Amy felt that exposure to different genres was equally important in writing, too: "Good writers had good exposure to different genres, so they can produce different genres." Amy enacted this belief throughout the year as her

students were introduced to a variety of genre; among these were poems, persuasive writing, letter writing, expository reports, and narrative stories etc. Observations of Amy revealed that she taught these writing genres, however, within a process of writing rather than focusing on the product. That is, her writing instruction emphasized the importance of planning, drafting, editing, revising and publishing. This practice ran through all writing lessons that required students to work on a rough draft and editing before they turned in their writing.

Based on this conceptualization of what good readers and writers do, Amy suggested that the reading and writing curriculum in her inclusion class were driven by the following beliefs about the goals for reading and writing activities:

I think basically you are teaching a child to be able to read either informational or not informational text and being able to read it, comprehend it, or being able to discuss or apply what they read. And so your goal as a teacher is to teach them different strategies and how to accomplish this. Basically, it is reading something and being able to understand it and how that affects readers. Writing is a form of communication, a way to express thoughts and ideas. I think the two are very connected. I think the more you write, the better you have and the more you read, the better writers you have. I think there's connection between reading and writing. (*Amy interview, 5-2-02, p2*)

Emergent Readers/Writers. The previous section of the study has talked about the classroom literacy activities. Another characteristic that emerged in interviews and observations was the teaching teams' emphasis on incorporating a variety of forms of learning to accommodate the diverse needs of their students. Displayed around the room at writing and instructional areas were the different tools and formats used by writers, such as paper, overhead machine, computers, and so on. These were utilized based upon teaching and learning goals to enhance students' motivation and engagement with the literacy tasks. Likewise, the teachers recognized the divergent range of reading abilities

in the classroom, spanning the developmental levels from emergent to mature levels of reading performance. However, Amy believed that all students were readers and writers, regardless of achievement or developmental levels, and regardless of age. For emergent writers or readers, Amy believed that there were a variety of forms of literacy that needed to be modeled and expressed, such as “reading with pictures, context clues, and reading and writing with memorization.” She encouraged her students to apply these strategies for reading and writing in her lessons. “So you tell them they are reading and writing.” There was a positive expectation that all students were able to be competent readers and writers in Amy’s classroom. On the other hand, she recognized that her goal was to advance them to more proficient levels of reading performance: “I’m still finding out with children who do have learning disabilities, exactly what I need to do to help those children to read.”

Specialized Instruction and Special Education Students. Amy’s interview also revealed several assumptions, practices and processes that she employed for the benefit of the special education students in her class. First, students in special education and general education were not taught separately, but they joined a guided reading group at their approximate reading level. Amy believed that teachers needed to give instruction that was appropriate for students at their developmental level. On the other hand, she recognized that assignments to group were tentative rather than permanent. She expressed the view that she needed to maintain a flexible grouping system so that the children in this classroom were not just grouped according to their “developmental” levels; but that she allowed students to switch to different groups or move to a higher level when appropriate.



Second, Amy provided both whole-group instruction to introduce and model concepts or strategies, and offered small group lessons to provide guided reading instruction for more in-depth coverage of particular concepts or to offer suitable instruction for those students who were at various stages of development. Amy modified her instruction for students with learning disabilities mainly by providing instruction at their levels in small multi-age groups. This also allowed students to benefit from other children who could read at more advanced developmental levels, or to serve as models for students at less advanced developmental levels:

It's considered flexible grouping that way, when they are ready to go on, they can go on. When children need to come to a different group, they can switch around. And it's not based on age level, but more where they are at, a reading development level. I think you'll have your role models, helping each other. If I look at Brandon and Leon, Leon who barely could read and Brandon, who was reading, and then who was a bit higher, just what they picked up from each other. You know Leon probably has a stronger phonetic background because his mom works a lot with phonetics with him at home. Brandon, you know Leon is a special Ed child, and reading comes more naturally to Brandon. He doesn't have that many deficits. I think they pick up from each other. And in most reading groups we have regular Ed and special Ed and they pick up from each other.

(Answering to the question about Brandon, it's possible for him to move on... at one point:)

Yeah, right. But Brandon, he's such a good role model for Leon. I mean, you just don't want to leave Leon behind. Because I'm worried that if I take that role model out, if he's going to grow as much as he is growing. So it's hard. But yeah, by keeping Brandon there, I'm holding him back, and doing what? Because he could be doing more in other groups. So you always have to play with those things. (*Interview, 5-2-02, p. 3*)

Leon was a first grade EMI student. In order to provide the benefit of role model for him, Amy partnered him with Brandon, a first grade general education student who was making good progress in the literacy areas. However, the teacher had been struggling with the thought of moving Brandon up with other reading groups too soon because that

would leave Leon alone by himself. What this teacher dilemma revealed about the classroom practice was that modification and motivation for students with disabilities, in large part, took the forms of teacher-assigned student role models, flexibility in grouping. Nevertheless, the general education teacher expressed worry over situations represented by Brandon's case, as revealed in the interview.

Third, Amy offered repeated teaching and review of the same concept in different ways as key elements in teaching students with learning disabilities. As she explained:

I think a teacher who learned to not always teach something the same way, but varies how they teach things...Even regular education children sometimes need auditory, sometimes need visual, sometimes need kinesthetic learning. I think we learn more from special education teacher sometimes because they know how to do, make sure you involved all that different kinds of teaching for the different kinds of learners. (*Amy Interview, May 2, 2002*)

Other accommodations for the students in special education in this inclusion classroom included having the "same expectations of those children" and giving them "a little bit extra support for those expectations". The extra support usually came in the form of the teachers assisting a child in performing a task. As a case in point, at the beginning of the year, Amy had to do lots of dictation and overwriting for a first grader who was diagnosed as EMI. Amy wrote above the child's text with a colored highlighter because of its illegibility, or took dictation that she transcribed above the illegible words on his paper. Amy still expected him to write three sentences in spite of his lack of knowledge of written language, and she encouraged him/her to generate text using a number of emergent writing strategies (e.g., spelling by sounds, scribbling, drawing, copying environmental print, etc.). It seemed that Amy placed great importance on how students in special education could participate, and with teachers' accommodations and support, accomplish a given literacy task.

Other major instructional practices in teaching students in special education focused on behavior management and communication with parents. Both teachers collaborated on ways of communicating with the parents regularly. The most common way was to send home newsletters printed out of the computers or handwritten notes every week. This was something Amy had done for years in her past kindergarten teaching experience. Cathy embraced this practice as she teamed up with Amy to teach in this inclusion classroom. In order to solicit parents' support in these issues, Amy and Cathy sent daily notes about the students to communicate with their parents:

Management is a very important issue. In this week, I write a paragraph on our newsletter (to parents) about behavior. We need to take learning first in our classroom, continuing to talk with children about helpful ways they can, how they can be helpful at school... by following rules, getting to bed early, as busy as May is, school and learning is still our focus right now, and we send weekly newsletters to family and classroom. I find that really helps because at conference time though, you are not having to explain, they know when you share something, they know what they have gone through because they have written about it every week...I've done this all my years. (*Cathy Interview, April 30<sup>th</sup>, 2002*)

A strict set of rules and a reward system were set up in this classroom. Amy was very organized with respect to cultivating students' appropriate behaviors at the outset of each semester, and was consistent in her expectations and consequences for the expected classroom behaviors. Rewards and punishments were carried out fairly across activities, although Amy maintained some flexibility in rewarding students' for specific behaviors if she thought a child needed encouragement at that particular moment. The rewards matched the interests of the child in question, and always were related to opportunities for most motivating literacy activities for the child, such as listening to a chapter book and using the computer.

Teacher Roles and Student Roles. Regarding her teaching role, Amy believed that teachers were facilitators whose main job was to teach the children to become self-thinkers and problem solvers. Amy made sure that the teachers set up boundaries and structure in the classroom, within which the teachers could expect that the students would begin to regulate their own behavior. A key to setting up this type of learning environment was to work on the routines and rules from the very beginning, so that by the middle of the year, the class “was running itself because you have empowered the children in that way.” (*Interview, 5-2-02, p 4*) Students’ main roles were to serve as learners and teachers for themselves and one another. In keeping with this emphasis on peer-assisted learning, Amy used collaborative groups, cooperative learning, reading partners, and so on.

Summary. All in all, Amy’s teaching practices were characterized by the following components and beliefs underlying the Language Arts curriculum in this inclusion setting:

- ❖ Cultivated enjoyment in reading and writing
- ❖ Taught both word decoding skills and strategies involved in reading/writing process
- ❖ Integrated reading and writing as they were considered as part and parcel of literacy learning
- ❖ Emphasized writing as a process
- ❖ Treated special education and general education with same expectations but provided extra support for special education students who were more likely to experience frustration

- ❖ Provided flexible small instructional groups to give suitable instruction to all students
- ❖ Students were expected to act as role models to each other
- ❖ Taught the same ideas in different ways and repeatedly if necessary
- ❖ Utilized a variety of assistance through visual, auditory, or kinesthetic learning such as that represented in the literacy centers
- ❖ Be consistent with behavior rules and be flexible in providing suitable and intrinsically motivating rewards for students in special education
- ❖ Communicated with parents on a daily basis

These elements in Amy's teaching pedagogy and practices suggested a well-balanced classroom anchored towards inclusion of all students, and supported participation of students in all literacy activities. Amy tried to create authenticity in language arts lessons through reading of books in different genres. Basic word skills and phonics rules were taught embedded in guided reading lessons, and then practiced in reading and writing activities across the curriculum. The general education teacher showed confidence in her curriculum and pedagogical practices that were thought to provide adequate teaching for students with different needs and at different levels of abilities. She herself labeled her teaching as balanced instruction. When asked what she believed to be the most effective activities used to teach her students to become better readers and writers, she virtually listed all major components of the classroom curriculum:

I think writing, the balanced literacy program. All areas of it: the poetry, the write-tos, the share (in literacy centers), the reading and writing, the guided reading. I think all the areas of a balanced literacy program. I think reading. I've noticed by reading chapter books has really increased, helped to work on

vocabulary, listening skills. ... Chapter books are theme-based. When you go on field trips stuff, some people don't realize children need visual, I think we've gotten so into ...children need to be entertained and visualized. We are such a stimulated society that, but a lot of times, when you go places, it's I mean, telling you something.

We just read "The Trunks of Swan", "Charlott's Web"... kind of celebrates being through with the chapter book. And I find when we discuss the chapter book, that's for, especially older kids who are at a different level of thinking than the younger kids, and they are sharing these ideas back and forth... That's where we have that cross-age level learning. Sometimes things that I couldn't teach the kids, it's just coming out naturally. (*Amy interview, May 2<sup>nd</sup>, 2002*)

### Cathy

Good Readers/Writers. Cathy, the special education teacher, was more specific about the required skills and strategies for good readers and writers to know, such as decoding, sounding out words, making predictions, and using all of the contextual clues. Her conception of good writing consisted in having good writing structures that made sense, proper use of punctuation, grammar, capitalization, and writing enough details so that the reader could have a good mental picture of the writing. By contrast, Amy seemed to concentrate on the importance of diverse exposure of students to different genres and cultivating enjoyment of reading and writing activities.

The goals varied with the students. Cathy, for example, expected some students to be able to write a complete sentence, while others were expected to be able to put their ideas down on paper in some more complex multi-sentence arrangement. She wanted all children to continue using good strategies and applying what they knew to be better readers. This was in line with Amy's goals for students as writers that included using strategies in a process of planning, drafting, editing, revising and publishing. Both teachers emphasized writing as putting ideas down to communicate with others. Writing was considered as a process for the purpose of self-expression and communication.

Emergent Readers/Writers. Cathy suspected that emergent readers or writers might not have been taught the literacy strategies and techniques that they needed, or if they had been taught, emergent readers and writers weren't able to apply them. For these students, she seemed to feel that the teachers needed to continue modeling and reminding them to use reading or writing strategies. For example, teachers should repeatedly remind students of the writing processes and techniques as involving "coming up ideas first, get a rough draft on, and know it's okay to make mistakes on that rough draft." She also distinguished between "naturally good readers and writers" and "non readers and non writers", with the latter always relying on the teachers to teach them and remind them of using strategies.

Specialized Instruction and Special Education Students. Like her teaching partner, Amy, Cathy felt that all special education students could benefit and participate in all activities if the quantity and difficult level of the assignments were adjusted, or if teachers assisted them in accomplishing a task. Another way to accommodate these students was to involve them in small group work or have them work with one buddy. However, Cathy emphasized the importance of developing independent readers and writers. She wanted her students with disabilities to try to work by themselves, because she might not always be there. "So the more they can do on their own, the better off I think they will be, that they will be able to take that somewhere else and say 'oh yeah, I remember where I was supposed to do.'"

Other instructional modifications mentioned by Cathy included explaining directions or pairing the students so that the students in special education and those who needed similar modifications could cooperate and support each other in their learning.

Peer support, in fact, was one of the essential components of the class curriculum.

Another important instructional element for students in special education was the availability of the support of more than one teacher who could provide “not only help for these students, but a different way of looking at something, or different opportunities to learn a concept”. She gave several examples of hands-on activities in the class that were designed to provide such learning experiences (e.g. puzzle/games literacy center, sand box center, and play center). According to Cathy, it was a combination of instructional approaches that made good readers and writers. The teachers, in terms of instructional adaptation, should provide an environment in which students felt comfortable to participate verbally or in written format.

Teacher Roles and Student Roles. With respect to the teacher’s role in the classroom, Cathy felt that teachers should try to take a facilitator role with the students and encourage them to take more active roles in their learning. In a similar way, Cathy felt that students could learn from each other or on their own, in a variety of experiences and the circumstances offered by the teachers.

Summary. Cathy, the special education teacher, viewed learning and teaching in similar and complementary ways as her general education partner in the inclusion classroom. For Cathy, it was important to provide a variety of experiences to explore a concept. Good reading and writing consisted of applying appropriate techniques, decoding skills, and strategies, although some students needed to be reminded of these strategies constantly from the teachers. Thus, the key to modifying instruction for special education students was to provide assistance repeatedly and allow them to work with other students in the classroom so that lower-achieving students could learn from the



higher functioning peers. Emergent readers and writers were different than those for whom reading and writing seemed to come more naturally. Cathy's instructional focus pointed to supporting individual students who demanded teachers' attention in their literacy performances. She considered teachers as facilitators with a view to cultivate independence in children who were participants of a variety of learning experiences in the classroom.

Table 3.3 illustrated the teaching practices and pedagogical beliefs of both teachers. The middle part represented what both teachers expressed in their interviews regarding important instructional components in this inclusion classroom. They had quite similar belief systems and points of emphasis in implementing reading and writing curriculum. The differences seemed to be that Cathy might be more focused on providing additional support for learning specific skills and strategies required for a good reader or writer, (which was in line with her special education teacher status) while Amy paid more attention to providing students with exposure to a variety of genres and connecting reading and writing in her curriculum. In addition, Amy attached great importance to managing behaviors and setting up boundaries in order for students to participate and navigate their learning in a more independent way. Another difference seemed to be that Amy's support to students in special education was more in the way of providing assistance for their completion of tasks and fading the assistance later when the students caught on. She believed that students should be encouraged to become independent learners in this way. For example, the whole-class instruction was characterized by modeling and demonstration followed by supported students' work. Afterwards, the students had less support and worked on their reading and writing more independently. In

Table 3.3: Teacher Practices Summary

| Amy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Common                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Cathy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Enjoyment in reading and writing</li> <li>• Students as teachers sometimes</li> <li>• Making use of different senses</li> <li>• Emergent readers and writers were not non readers nor non writers</li> <li>• Same expectations of all students but some students need extra support</li> <li>• Creativity was used to enhance students' enjoyment and participation in an activity</li> <li>• Flexible small grouping</li> <li>• Took away support when the students become more independent</li> <li>• Consistent behavior management</li> <li>• Constant communication with parents</li> </ul> | <ul style="list-style-type: none"> <li>• Reading and writing strategies</li> <li>• Decoding skills</li> <li>• Peer/buddy work and student role models</li> <li>• Teachers as facilitators</li> <li>• Variety of ways of teaching and presenting concepts</li> <li>• Teachers provided assistance for some students in their accomplishment of tasks</li> <li>• Students were encouraged to become independent readers and writers</li> <li>• Writing is a process rather than product</li> </ul> | <ul style="list-style-type: none"> <li>• "Naturally good readers" versus "non - readers/writers"</li> <li>• Good writing had good structure, proper use of writing conventions, and complete ideas with details</li> <li>• Teachers needed to remind students constantly of applying reading and writing strategies</li> <li>• Different expectations for different students</li> <li>• Some modifications included the explanation of directions or working with a peer</li> <li>• Gave support by more than one adults to provide different teaching</li> <li>• Adjusted levels of difficulty for students</li> <li>• Provided environment in which students felt comfortable participating</li> </ul> |

both small group and whole-class instructions, Amy also tried to support the students and later on faded the support when possible. For Cathy, the assistance and support to students would always be there, especially for students with learning disabilities and other disabilities in special education. Although both teachers expressed the importance for having same expectations of all students, Cathy seemed to believe in constant reminders and modification.

The discussion of the two teachers' instructional beliefs revealed that the teachers had similar sets of belief systems and yet different division of labors in their co-teaching relationship. The special education teacher Cathy aligned herself with roles of providing support to students who needed to be reminded constantly of the strategies for reading and writing. In Cathy's view, students especially LD students, were different than regular education students in that they would always demand help from her. For her, the most important modifications for special education students was to provide environments where they were comfortable to participate verbally or in written forms and learn from each other, through a variety of learning experiences. Meanwhile, she was there to help students with strategies in reading and writing. Amy, the general education teacher, had her mind set in broader instructional terms in this classroom. For Amy, her roles and responsibilities were more related to classroom-wide curriculum, behavior plans, instructional consideration such as introducing students to different genres of text, and provided scaffolded support to students in both whole-class and small group learning. Therefore, both teachers have different emphasis in their complementary roles in this classroom.

## Pedagogical Practices—Activities

Teaching is pedagogically challenging. Given the nature of the multi-age inclusion classroom, it demanded great efforts on the part of the teachers to create a safe environment where children's social and academic horizons could be enhanced (Manen, 2002). The description of the classroom instructional environments drew sociocultural theory, and especially, Activity Theory as extended by Engeström (1987, 2000). The description of the teachers' pedagogical practice was anchored on such questions as, "what are the activities in which people participate? What tools or artifacts are used to mediate the participants' learning process? With whom do they participate? What are the routines, rules and procedures involved in these activities? How do people interact with tools and each other to transform their goals?" These questions are similar to those raised in Rogoff (1995) and Rueda (2000), who applied the activity setting as unit of analysis in their research. The questions provide important clues to the existing teacher practices of the inclusion class. In the following section, I will describe the activity settings in this classroom from the Activity Theory perspectives. That is, the major components of the activity structures will be presented, such as routines, division of labors, and the goals of the activities implemented in the existing literacy curriculum.

A look at the daily routines indicates the teachers' arrangement of each subject area. A typical school day began at 8:45 A.M. and ended at 3:45 P.M. for Amy and Cathy's classroom. Language Arts lessons were arranged for the mornings; the rest of the subjects started in the afternoons. The schedule is listed in the table 3.4.

Table 3.4: Amy and Cathy's Classroom Schedules

|                                                     |
|-----------------------------------------------------|
| Morning schedule:                                   |
| 8:45 —Greet students                                |
| Reading                                             |
| Check weather and calendar                          |
| Spelling                                            |
| 9:15 —10:00 Language Arts: Literacy Centers         |
| 10:00—11:00 Writing lesson                          |
| 11:00—11:30 Wrap up writing, snack time, and recess |
| 11:35—12:30 Math lesson                             |
| (About 40 minutes interim at noon)                  |
| Afternoon schedule:                                 |
| 1:40—2:00 Chapter book reading with teacher         |
| 2:00—3:45 Science and social studies                |
| Art                                                 |
| Assembly                                            |
| Library time                                        |
| Sharing circle                                      |

Usually, Amy would prepare the students for the whole day lessons by first reading a book to them in the carpet area first thing in the morning. Students often brought their favorite books for the teachers to read and share the books with the class.

The field note below illustrated how the day started:

(At 8:50 A.M., Monday): Amy gave points to several children who sat nicely on the carpet in front of her. Then she took out a Winnie the Pooh book to read to the students. She held up every page of the book to the students as she read. She paused a little bit after each reading and looked at the children. She read the book with vivid intonations and dramatic tones as if she enjoyed the story very much! (*Field Note, February 12<sup>th</sup>, 2002*)

Next, the children switched to calendar and temperature check for that day. On the chalkboard by the carpet area were two graphs, one indicating the days of each

month, and the other representing a bar graph showing temperature changes in red and white colors, symbolizing hot and cold weather. Every morning, two children were designated as the weather person and calendar person respectively. They went up to the front and pointed out the number of days remaining of that semester and mark the temperature at the appropriate place on the temperature bar. It is worth noting that the teachers had set the Internet to a temperature website before students came in that day. Internet was used daily as a *convenient* tool in searching online information about temperature, though students themselves were not directly involved in Internet browsing for temperatures. This daily morning routine were described by Cathy as follows:

Children look up [www.weather.com](http://www.weather.com) for morning calendar. Students have the job doing the calendar independently...One of them goes to computer to look up the temperature and take it back to the calendar and graph it, the temperature. ... They look up weather through the Internet (daily). (*Cathy interview, April 30<sup>th</sup>, 2002*)

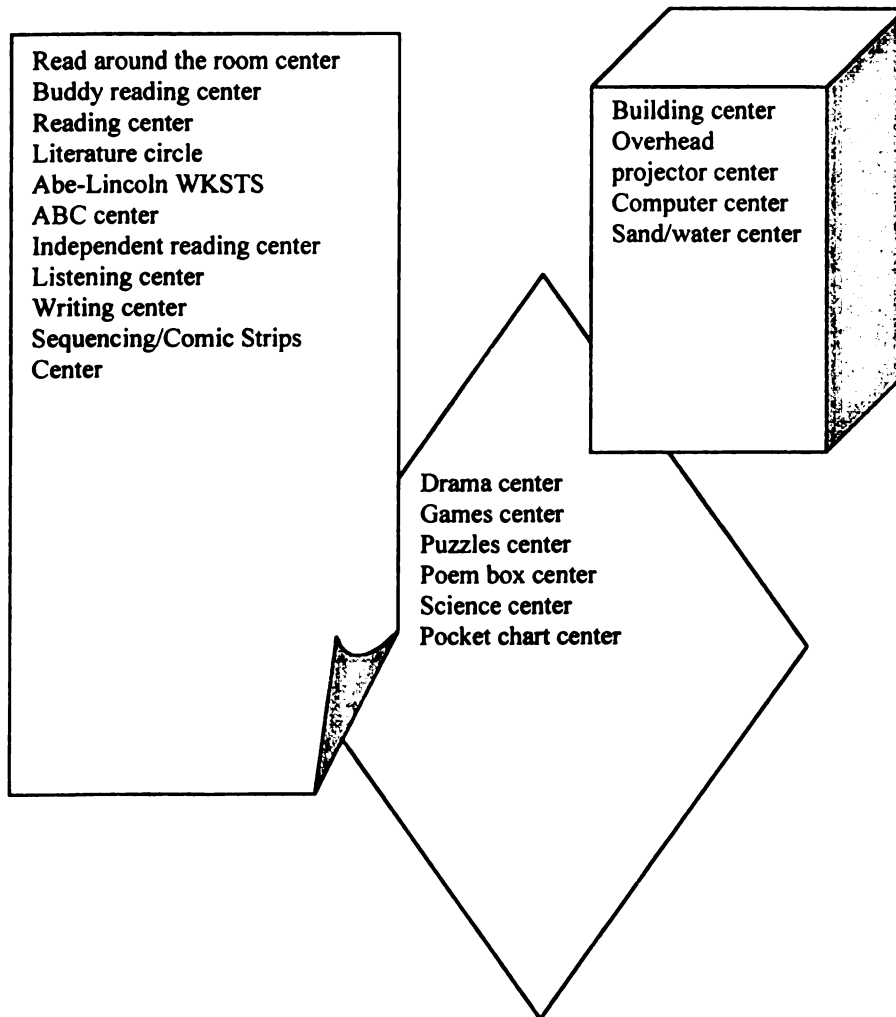
Spelling test was administered two times a week. It was a time for students to work on a list of words matching their levels. The children could take the test for two times before they were allowed to type and print their final list of words on the computer. Again, the computer technology was made use of to serve the function of word processing.

The morning Language Arts lessons consisted of two parts: literacy centers/tubs and writing. They were arranged in sequence during the mornings so that the class could spend extended time on these reading and writing. The teachers designed the literacy centers as integrated activities in which the students were engaged in recursive learning experiences using a variety of tools including computer. Each week, the students rotated among the literacy centers set up specifically for that week. Students of the same table

cluster were assigned the same two centers every morning. Every two weeks or so, the teachers would select a new set of center activities for the week from the repertoire of center activities presented in figure 3.3 in below.

Literacy center activities played an essential part in the Language Arts curriculum in this classroom. Through rotation of these centers, the teachers aimed to accommodate students' needs for diverse learning experiences through integrated and some hands-on literacy practices in the centers. Reading, writing, hands-on exploration and construction, mathematics, and science were all elements represented in these literacy centers. An assortment of tools and artifacts were employed to support the students' learning. For example, reading activities in the literacy centers ranged from peer reading, independent reading, and read around the room center. Not only were students required to read in all most of the center activities, but also they were most likely to engage in writing at the same time. The other activities encouraged students to use their hands in exploring the literacy skills. In the sand/water center, students wrote words in the sand box or construct

Figure 3.3: Literacy Center Activity List





stories verbally using plastic animals with their group peers. In some centers, students built blocks or made changes to sentences written on the overhead transparency. Other centers allowed the students to practice rhyming words, phonetic spelling, and word rules through puzzle and games. The students also participated in reading poems and practicing math stories for problem solving.

The computer center was, as found through teachers' surveys and interviews, often a place where students practiced their typing and keyboarding skills, using word processors to type in their writing, going to an Internet website to read about something, and playing games designed to reinforce their basic skills. These uses of computer corresponded to the teachers' perceived computer functions.

A most common feature to all the literacy centers was that the students usually cooperated with peers in these center activities. For one thing, students were regarded as important resources in their own learning in this classroom. Sometimes, the teachers designated students as experts or helpers to other students in the centers. The following transcript segment represented a typical way of teachers' introduction of the literacy centers to children and provides a glimpse of the goals for the kinds of tubs introduced here:

Amy: Read by yourself tub, there is a Time Magazine for the kids. You can choose what to read. On the back there is activity... you can read by yourself. Again, the sequencing tub, this is when you are gonna to take comic strips and put them in order. There are some challenging ones. Okay, that's for table number one. Table number 2, you have the overhead projector and one, two, three tub. Use the different materials to find out which makes a shadow and which doesn't. You are gonna record your results on the work sheet. One two three tub, you got to play the trinomial. Table number three, the game tub, you get to ask the trivia questions. The ABC tub is the rhyming tub...In the rhyming tub, there is a bat for the cards, for the green words... Table number four, you have the

computers and puzzles. On the computers, you are gonna have to type spelling words. Table five, you have the block tub...Lincoln block to build log cabins... do you remember we have read the story yesterday, 27 people lived in ONE log cabin. Think about how you can fit 27 in one log cabin. Mrs. Collins, do you want to add something about cleaning up? I know you and me were both upset yesterday.  
(Feb. 20<sup>th</sup> classroom observation)

The Language Arts curriculum also included guided reading and writing lessons.

Amy and Cathy divided the students into guided reading groups according to similar levels rather than by age or special education status. Books were selected that were at the students' reading level for each guided group. Depending on the group, the book could be picture books composed of one-sentence pages, or in the case of higher-functioning students, of chapter books. However, the instructional components remained the same across the guided reading groups. That is, the students were exposed to the key strategies or skills taught in the class, with various degrees of accommodations and support provided for each group. An example on the guided reading activity is shown below.

Amy gave the instruction in this guided group. The lesson focused on the use of Venn diagram with a group of 5 students who were at an average reading level in the class. Josh was a first grade student who had average reading skills. Marquis was also a general education student in grade 2. DeJuan was a second-grade EI student. Kaylein was a third grader who was diagnosed with SLD. Deron was a first grader in general education. They were comparing and contrasting two books in this guided reading conversation.

|         |                                                       |
|---------|-------------------------------------------------------|
| Amy:    | Okay, let's think about one more thing about Moligan? |
| Josh:   | He's in a bookstore.                                  |
| DeJuan: | I hate my hands.                                      |
| Amy:    | Is Moligan a boy?                                     |
| DeJuan: | No                                                    |
| Amy:    | Well he's a kid, we can write that...                 |
| DeJuan: | He's a person.                                        |
| Amy:    | What else do we know about Jim?                       |

Kayline: Plays the trumpet?  
 Amy: Let's write that! Plays the Tr-um... (Sounded out the word)  
 Marquis: Can you get the book?  
 Amy: Oh, what a good idea. Marquis is remembering the book has the word...  
 Amy: Hei, let's think of one more thing about Jim?  
 Josh: He lives in a building?  
 Amy: What kind of building would you call?  
 Josh: He's in a city.  
 Amy: ... apartment! Now I'll put the word "apartment" on the board.  
 DeJuan: (Signs) I can't write that, I can't write!  
 DeJuan: I can't see. I can't see.  
 Amy: Good job Josh. Hei, now let's see, look if there's any similarities...  
 What's the same? Is there anything same about ...  
 Josh: They are both mammals.  
 Amy: What do you mean they are all mammals?  
 Josh: They both have hair.  
 Amy: Okay, what is a mammal? ...that covered with hair,...that the babies usually drink milk from their mom... Do cats do that?  
 Kayline: Yes...  
 Amy: Do people ...are they born alive? ... Do they come out with hair? ..  
 Ss: Yeah.  
 Amy: You are right! So we are both mammals... (Sound out mammals)  
 Daron: They both live in Lansing?  
 Amy: What's this look like?  
 Ss: A city.  
 Amy: Might be in Lansing, might be not. So we could put 'city', (sound out), good thinking! Apartment would be in a city and bookstore would be in a city. Good job, DeJuan. City is c-I-t-y.  
 DeJuan: My ears are itchy.  
 Amy: Okay, something else, that is the same.  
 Kayline: ... people play outside...  
 Amy: And James even play what? You know...I remember one word talked about in this book... They both are?  
 Kayline: Entertaining!  
 Amy: James played trumpet and Kayline says that ... Both are entertaining. Entertaining.  
 (Mrs. Amy Jacobson also showed some word cards in front of the students.)  
 Amy: Well today, during reading, we didn't reread the story. It would have taken too long. But we reviewed the story... We used a Venn diagram to compare Mulligan to Jim. I was kind of surprised. We found three things.

*(Field Note, February 17<sup>th</sup>, 2002)*

In the above-mentioned guided reading episode, the teacher underwent extensive conversations with the students about using Venn diagram in reading. Amy's goal in this activity setting was to assist the students in a guided practice of Venn diagram. The lesson given in such small groups was an essential part of the learning environment of the class, apart from the whole-class instruction, literacy center activities, and writing time. In this excerpt, Amy facilitated the students' use of Venn diagram by engaging them by asking questions, prompting students' actions, checking for students' understanding of concepts, eliciting students' ideas, and explaining the functions of the Venn diagram tool. Students with LD, such as Kayline and others, benefit from the presence of each other in the small group in their dialogue contributing to the distribution of knowledge about strategy use and comprehension of the stories. In another group, Amy chose two different pages of the same book for the students to compare and contrast. The task was changed to suit the reading level but the strategies to be learned didn't change.

Guided reading was indicative of the teachers' conceptualization of their facilitator roles in leading and supporting the students who were expected to benefit from their fellow students and eventually become independent readers and writers. These teaching practices shaped, to a great extent, how technology-related activities might be implemented in terms of teacher and student roles, division of labors among students, the kind of discourse participation norms and procedures, and the general goals to be achieved through these activities.

Writing lessons in the morning lasted for one and a half hour. The teachers normally started by explaining and modeling writing conventions, processes or strategies. Then the students might be engaged in brainstorming ideas in ways that invited them to

explore their writing topics as much as possible. Next, the children were sent off to their tables to begin writing on their own within their groups. Teachers circled around to provide necessary support to students and checked their work at the same time before the students moved from rough draft to final product, either handwritten or typed out on the computer.

In summary, the classroom's Language Arts routines were comprised of literacy centers, guided reading groups, and writing, all of which took place in the morning periods. The literacy centers were designed with a view to accommodate and encourage different ways of learning embedded in a variety of activities. Students participated in construction, reading, and writing in situations that enabled them to practice valued ways of thinking and interacting with oral and written language in collaborative groups. Tools and artifacts utilized in these centers were diverse: sand boxes, markers, pencils, paper, and overhead transparency, to name a few. The technologies available to them included overhead machine and computers. The computer center was normally a place for students to be engaged in the exploration of literacy-related web sites and playing of games, for skill building, remediation, and incentive purposes.

### Data Collection Procedures

Because of the nature of the questions and the complexity involved in dealing with computer and its implementation in a social cultural context as suggested by the theoretical framework used to address the research questions, the study requires qualitative data collection procedures. Ethnography was carried out as an investigation of the classroom's complex web of relations through participant observation. This approach allowed the researcher to gain insight of the behaviors of the people in the observational

setting and to develop an insider point of view through regular observation. Meanwhile, the researcher also conducts systematic analyses of the data collected through her or his immersion in the actual setting (Cross, 1994; Doheny-Farina & Odell, 1985). Grounded theory from the qualitative methods research also guides the data collection of the study. According to this methodology, the theories are “grounded” in the observable experiences, but researchers add their own insight into why those experiences exist (Banning, 1995; Minnis, 1985; Strauss & Corbin, 1990). It is an inductive process of reaching to valid conclusions about qualitative data.

To match the research questions and methods of this study, I gathered the following types of data to be used for understanding the teachers’ and students’ TELE-Web implementation: (a) field notes and transcripts of classroom observations as a participant observer, (b) classroom observation and research memos that are written immediately after each observational period, (c) teacher interviews and surveys, (d) student interviews associated with their perception of TELE-Web tools for learning and literacy goals, and (e) video tapes and audio-tapes of formal and informal conversations with teachers. These sources of data are intended to complement and triangulate each other (Miles & Huberman, 1994) to further validate findings. Table 3.5 summarizes the data collection procedures in response to the research questions.

Table 3.5 Data Collection/Analysis

| Research Question                                                                                                                                                                      | Sources of Data                                                                                                                                                                                                                                                                                        | Data Analysis                                                                                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Enactment:</b> What TELE-Web activities did the teachers implement and how did they implement the activities?                                                                       | <ul style="list-style-type: none"> <li>• Teacher interviews</li> <li>• Field notes</li> <li>• Transcribed of selected videotapes of classroom lessons</li> <li>• Memos</li> <li>• Conversations with the teachers</li> </ul>                                                                           | <ul style="list-style-type: none"> <li>• Qualitative methods</li> <li>• Triangulation with Activity theory analysis of the settings</li> </ul> |
| <b>TELE-Web mediation and teachers:</b> What key factors influenced the teachers' implementation of TELE-Web? How did the enacted TELE-Web curriculum mediate the teachers' practices? | <ul style="list-style-type: none"> <li>• Teacher interviews</li> <li>• Teacher survey</li> <li>• Field notes</li> <li>• Memos</li> <li>• Transcribed conversations with the teachers (both formal and informal meetings)</li> <li>• Transcripts of selected videotapes of classroom lessons</li> </ul> | <ul style="list-style-type: none"> <li>• Qualitative analysis</li> <li>• Activity structures analysis</li> </ul>                               |
| <b>TELE-Web affordances:</b> What were the TELE-Web affordances embedded in the students' interactions with TELE-Web?                                                                  | <ul style="list-style-type: none"> <li>• Student interviews</li> <li>• Transcripts of selected videotapes of students' interactions with TELE-Web</li> <li>• Student documents both on and off TELE-Web</li> </ul>                                                                                     | <ul style="list-style-type: none"> <li>• Qualitative analysis</li> <li>• Activity structure analysis</li> </ul>                                |

### Field Notes and Selected Transcriptions

I visited the inclusion class two or three times a week and wrote field notes that targeted both general circumstances of the lessons and particular literacy events relevant to the dissertation questions. For example, I took notes when the teachers started to prepare the students for the literacy centers and as they introduced the goals of the centers to them. This was important to my study because it gave clues to the teachers' perception of TELE-Web activities during the core literacy activities as opposed to other curricular activities. Meanwhile, the information that was pertinent to how the various parts of an activity setting might be created by the teachers for centers utilizing different tools and technologies was carefully recorded. As students engaged themselves on computers, I

also wrote down their interactions with computers, peers, teachers and the TELE-Web software while focusing on maintaining detailed field notes about their verbal and nonverbal actions as much as possible. Sometimes, my responsibilities also extended to helping students with technological questions and assisting them in completing a task on the computer. However, I tried to write down field notes my actions immediately afterwards while the memory was fresh.

Field notes were also recorded during TELE-Web computer center and writing activities throughout the semester. These notes focused on both the students' nonverbal and verbal behaviors on the TELE-Web screen and their interactions with other students. When I was unclear about my observations, I checked with the students to ask questions about what they just did or thought as they worked on the computer to avoid inaccurate recordings or interpretations.

#### Observation and Research Memos

Memos constituted an important part in the data. First of all, they were reminders of the events covered in the field notes. Second, memos recorded possible themes that contributed to the research questions whenever possible. A variety of forms of recordings were used for memos: tables, summaries, vignettes, questions to be clarified by teachers and students, and so on. In the memos, I also wrote down any teachers' requests or questions concerning TELE-Web use. Another way of writing memos was to relate the content to research and data analysis. In the dissertation research memo, I recorded statements and findings for my study and went back to revise my ideas through different stages of my data analysis.



### Teacher Interviews, Survey, and Student Interviews

In early February, I conducted a teacher survey with both teachers. The questions were designed to produce an initial picture of teachers' perceptions towards technology, TELE-Web, and teaching in general. Teacher interviews were subsequently conducted to collect in-depth understanding of the following areas of their practices: past experiences with technology use, their expected use of TELE-Web, and pedagogical beliefs.

### Design Experiment

During the study, I planned with the teachers on how to integrate TELE-Web and examine its affordances to students both in special education and general education. The design experiment was a tool for the researcher and classroom teachers to test an idea or technology in the process of using it. The design experiment was not an experimental study itself but rather an activity to be created for the purpose of informing instructional practices and in this study, specifically, to examine the role of TELE-Web in the classroom. The design turned out to be two activities that were related to an animal thematic unit that were accessed by students on TELE-Web. The first activity involved the students' construction of an Animal Web using the Idea Organizer of TELE-Web (see Figure xx).. The second activity, Animal Report (Supported Paragraph), involved students in writing their animal report on TELE-Web. The main goal of the design was to allow students to practice organizing their ideas through webs, and subsequently, writing well-formed paragraphs containing the mapped ideas recorded on the webs. Both activities were created with teachers' collaboration according to their instructional needs. This piece of data provided important sources of investigation upon special education students' construction of TELE-Web and its affordances.

### Formal/Informal Conversations

The previous data then became a basis for conducting further conversations with the teachers. Formal conversations were those arranged ahead of time in order for the researcher to have sufficient time to confirm with the teachers on questions or findings involved in the study.

### Student Documents

I read students' work, especially writing, carefully as this was the area that students were exposed to most often on TELE-Web. Their stories and informational texts written on TELE-Web were read in comparison with writings on paper, which provided one way of looking at the results of using TELE-Web.

It was important that I also utilize the students' documents to conduct 'member check' with teachers on the potential findings of TELE-Web's mediating role. LD students' participation on TELE-Web was revealed partly through their stories, which were then presented to both classroom teachers. They were asked to rate the students' work according to the existing classroom rubrics and discuss the affordances of TELE-Web as well as their future uses of this technology in class. In this way, the teachers reflected on their implementation of TELE-Web, which in turn, provided a continuity between teachers as keystone species and their construction of TELE-Web on the one hand, and special education as well as general education students' construction of TELE-Web on the other.

### Summary

Using multiple sources provide opportunities for triangulation of data to strengthen the interpretations of the data. As suggested by Nardi and O'Day (1999),

studying the application of technological innovations is, in many ways, to understand how people engaged and are engaged with the technology. There is not a single story to be told about technology. Part of researchers' job is to understand the formal and informal practices that affect technology use in actual settings. The above-mentioned data collection methods match the nature of this qualitative and ethnographic study of a situated interpretation of TELE-Web in relation to other parts of a classroom information ecological system.

Accordingly, I will give continually updated accounts of observations that occur among a complex set of group interactions at all levels of an activity system. Specifically, notes on the discourse patterns will be analyzed according to the data analysis frameworks set by Miles and Huberman (1994) and Strauss et al. (1991) so that TELE-Web can be examined situated in the existing teaching practices. Audiotaped and videotaped observations of classroom interactions in literacy lessons provide information on the existing cultural practices of teaching and learning. This can help the researcher understand the various aspects of the classroom information ecology: its diversity, practices and beliefs, values, keynote species. Then, I can ground my analyses based on the information and seek an answer to the ways TELE-Web may be used in this system and conscious choices made over its use.

According to Activity theory and information ecology metaphor of technologies, it is important to exam the contextual factors, which contain values and beliefs that affect the use of TELE-Web. In order to follow the historical construction of TELE-Web in a specific classroom, the analysis includes an attempt to understand how TELE-Web fit into the teacher's current pedagogical beliefs. This would be central to the study of

teachers' implementation practices and evolving role of TELE-Web for both teachers and students. Therefore, I will describe teachers' literacy practices and beliefs, which would shed light on the connection between their beliefs, teaching practices, and their engagement with TELE-Web. This narrative tradition of qualitative studies will take place in a non-manipulative way as it describes the instructional behaviors as they occur in the classroom.

The observation and field notes will be segmented and coded through a process of data reduction. I will review the emerging data to find recurring patterns, behaviors, or themes (Miles and Huberman, 1994). Each step and rule related to the interpretation of the data will be recorded and documented in an organized fashion. Throughout the process, I will also look for ways to verify the themes to confirm and disconfirm the previous conclusions in my effort to ensure the rigorous process of qualitative data analysis.

I collected longitudinal data running from January to May of 2002 over a four-month period. My role as the participant observer allowed me ample opportunities to talk with teachers either before or after school, gain insight into students' various abilities and their learning processes, and offer assistance where they needed. I also kept track of TELE-Web activities and students' documents on the Web regularly and collect them as artifacts of the study.

Working with teachers, I kept in mind the importance of exchanging ideas with teachers on ways of using TELE-Web whenever I saw possibilities of implementation of certain aspects of TELE-Web in the teaching and learning processes, while making sure

that my role was not to impose the use of tools on the individuals using them unless the objects of the tools match with the users' objectives.

Classroom observation in this technology-supported classroom went beyond examining TELE-Web activities only. In order to untangle the complexities of the implementation process of TELE-Web, it was necessary to also document the context where this technology plays a part in. A context refers to the “*specific set of properties that pertain to a phenomenon.*” (p. 101, Strauss & Corbin) Studying a particular phenomenon such as TELE-Web use in a classroom entails understanding: (1) how it related to other activities, tools, and artifacts used in the same context; (2) the role of TELE-Web as an *intervening condition* in the broader structural context pertaining to literacy learning and instruction. The process of collecting useful qualitative data involved identifying what has bearing on the TELE-Web uses and wove them into an analysis of how these factors afforded the implementation of TELE-Web as a technological mediating tool.

Methodologically, Vygotsky (1978) and Scribner (1985) have argued that the ideal data for an application of activity theory consist of “longitudinal ethnographic observation, interviews, and discussion in real-life settings, supplemented by experiments”(P. 177, Christiansen, 1997). This study has just combined these qualitative methods in the study of TELE-Web implementation over a period of 4 months.

#### CHAPTER 4 TEACHER'S IMPLEMENTATION OF TELE-WEB

According to Nardi & O'Day (1999), there are different kinds of tools employed by people in a system of practices, values, and technologies in particular information ecologies. Examining TELE-Web in such a system means to focus not only on the types

of the existing tools and technologies used in the classroom, but also on the current activities served by them. TELE-Web is not neutral and isolated from the immediate environment. It must be understood in activity use as it comes in contact with other species of the classroom ecology. Conversely, the ecological metaphor in interpreting technologies suggests that TELE-Web also contributes to the evolution of the ecology, mostly in the form of adjusted activities and human practices. This chapter embarks on analyzing the construction of TELE-Web embedded in its reciprocal relationship with other important parts of the classroom ecology by first exploring the teachers—a keystone species. Activities created by them with and without TELE-Web tools are foundation for discussing the mutually constitutive nature of teacher practices, beliefs, values, and use of tools such as TELE-Web.

This chapter and, as Part I of the results of the study, examines the actualization of TELE-Web innovation in light of different activities created with this technology. Focusing on the teachers as keystone species of the inclusion classroom ecology, this section studies the interrelationships between their teaching practices embedded in the existing literacy center activities, their perceptions of computer technologies, and forms and functions of TELE-Web implemented in this room. Accordingly, the layout of Chapter 4 is organized as follows:

First, it looks at the activity setting underlying the literacy center activities set out by the teachers in this inclusion context. Using activity theory, I present an interpretative description of the activities without the use of TELE-Web and provide an understanding of the matrix of relations between key components in the preexisting activity structures before TELE-Web was introduced and implemented. For example, the analysis will

target on the norms of participation in the literacy activities, the teachers' roles and students' roles defined in the existing center curriculum, and how they employed what kind of tools to participate in learning on a routine basis. I will also provide segments of classroom discourse reflecting corresponding elements of the preexisting activity structures: objects, rules and procedures, division of labor, and community. The above-mentioned components of the literacy activity settings reflected the two teachers' pedagogical beliefs and practices in this multi-grade inclusion classroom. They also revealed contextual relationships that underlie the teachers' implementation of tools and technologies, such as TELE-Web. Along with the ethnographic data, surveys and interviews are also used to provide triangulation methods for the analysis.

The second section of the chapter devotes itself to the use of non-TELE-Web computer technology as a mediational tool in this classroom ecology. I use parts of the surveys and interviews that elicited teachers' perceptions of using computers for both personal and instructional purposes. Activity theory is utilized to analyze the functions and roles that computers played in the center activities mediated by computers within the large scope of literacy center curriculum. Combining the teachers' report of their views of computer technologies in general and an analysis of the activities mediated by computers in this classroom, this section reveals the status quo of technology use as a function of the larger activity structure defined by the teachers' existing attitudes and knowledge towards computer technology and their pedagogical practices.

In the last section of the chapter, I present the historical trajectory of the evolving use of TELE-Web through investigation of the activities created during the period of a semester. A timeline of the activities created on TELE-Web is used as a starting point for

the discussion of a changing topography carved out in terms of different phases of teachers' implementation of TELE-Web in this classroom. In this final section, I will further unfold the mutual adaptation process by focusing on the factors that influence the teachers' decision-making over the implementation of TELE-Web tools in their classrooms. TELE-Web takes meaning as it interacts with the teachers who bring with them particular practices and instructional goals in the existing activity settings of the multi-grade inclusion classroom. This section will also show the effect of using TELE-Web on the teachers' practices in the new activity settings.

Overall, this chapter offers a situated examination of the construction of TELE-Web, the conditions underlying the nature of its use in this classroom, and an emerging literacy curriculum mediated by TELE-Web tools by revealing the interrelationships and co-evolution of the multiple parts of a local information ecology: technologies, tools, people, and existing practice.

In the following discussion, I will foreground the teachers' literacy practices and curriculum by a detailed descriptive account of the existing classroom activities, especially the components of activity structures fundamental to gaining insight to the curricular contexts for the use of technological tools. Both teacher surveys and interviews are drawn on to provide member check for the observational findings about the contextual aspects of the classroom ecology, in which TELE-Web were introduced and implemented.

### Existing Center Activities and Structures

One essential strategy in the activity theory analysis is the identification and description of the various situations or activities in the classroom environment for



focused investigations of the intentions and goals. In my examination of the literacy centers, which was the major existing literacy setting established by the teachers prior to the introduction of TELE-Web, I aim to answer the question of “what was the nature of literacy practices embedded in the activity settings characterized by particular goals, subjects, tools, social relationships, and participation rules? Or, what were the teachers’ intentions for these activities?” Through transcripts, videotaped classroom observations along with teachers’ interviews and surveys, I discuss the knowledge production processes and participation structures in the center activities, which are further clues as to the teachers’ pedagogical and instructional intentions.

The triangular activity structures developed by Engestrom (1987; 1991) as illustrated in Chapter 2 included the major components of an activity setting in which people interact with the mediating tools and with each other to achieve certain goals. Most importantly, the triangles ensure a contextualized evaluation of tool use by incorporating collective aspects of an activity system besides studying of mediating tool, subject, and the object, which, according to Activity Theory, grounds the examination of the mediational role of technology or other tools and artifacts.

Literacy Center Activities. This was a set of activities that were collaboratively planned by both teachers prior to the start of the school year. Each week, the teachers selected certain activities including independent reading, hands-on exploration of literature, games and puzzles, math centers, and so forth. For five mornings every week, the students were assigned to work in two different literacy centers of the day. They moved with their ‘table mates’ from one center to the next before the class reconvened for the writing lesson. Students rotated among centers so that they could experience

different kinds of learning throughout the weekdays. As mentioned in previous sections, the activity structure triangle (Figure 3) represents the matrix of relationships between the structural components of the literacy center activities (Engestrom, 1989). Figure 5 also extracted some sub-components from Hung et. al (2000) who elaborated a bit on each component in the Engestrom's triangle structure by providing some potential examples under each component. For instance, Hung and his colleagues further defined the rules and procedures as incorporating management issues and processes, or division of labors as consideration of the allocation of tasks and leadership among the participants. Their work supplemented Engestrom's original triangle through their more detailed list of the major elements of activity structures.

Subjects & Objects. A key emphasis of activity theory is the importance of motive and consciousness, which are mediated by tools or artifact that are used to facilitate the achievement of goals. In the literacy center activities, the teachers' objects were multifold: reinforcement of literacy skills and strategies learned in other settings, the development of literacy skills, individual or collaborative engagement in the development of these knowledge, cultivation of cooperative work, and providing incentives and a variety of learning experiences for students (see Figure 4.1).

In one instance, Amy stated that literacy center was sometimes set up as a follow-up to guided reading lessons, which were simultaneously conducted with the center activities. Overall, the general object of literacy centers can be summarized as including reinforcing and promoting basic skills, utilizing different tools to experience diverse ways of learning, and motivating students to become more interested learners.

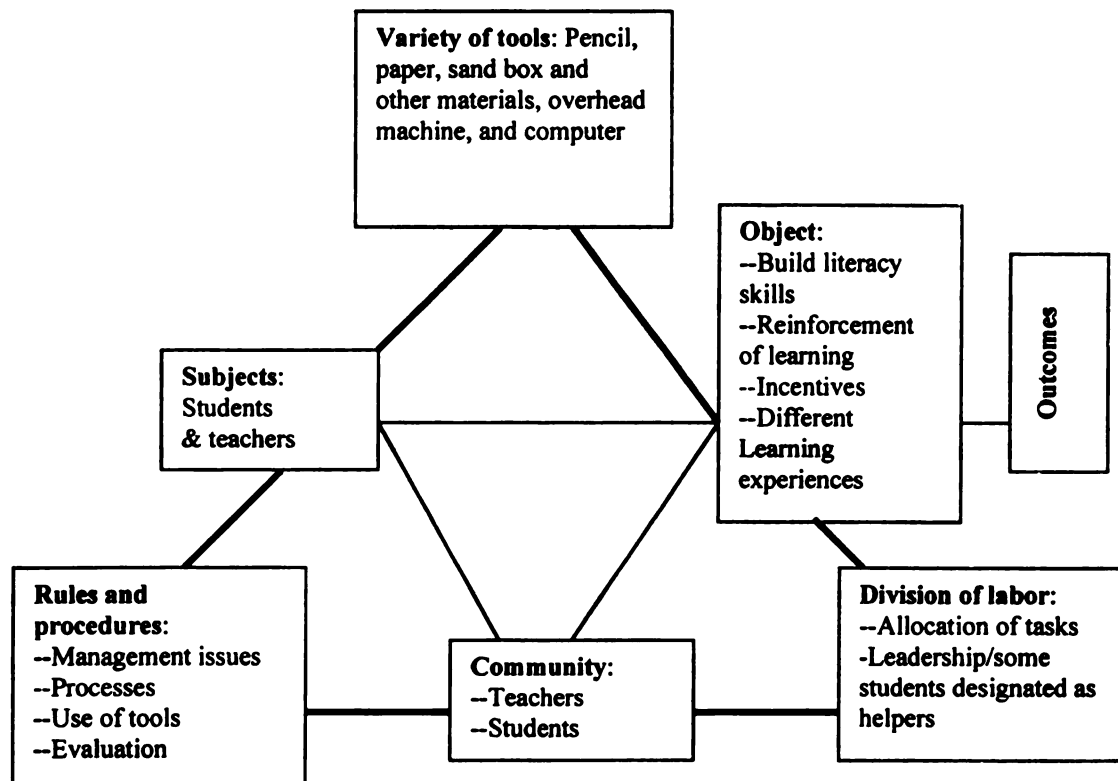


Figure 4.1 Activity structure for literacy centers

As for computer technology, the teachers had clear intentions to use the computer centers as an added incentive for learning. In addition, the teachers also tended to believe that computers provided “opportunities for students to use computers that adults in the working world use” (*Cathy interview, April 30<sup>th</sup>*). But I will focus only on the literacy activities apart from the use of computers first.

Tools. In the center activities, except for the computer centers, the participants employed various instruments or tools such as books, paper, pencil, and markers to help them engage in their learning. These tools offered participants familiar structures in which the students explored the book together, played with animal characters in the sand box, constructed puzzles, or wrote a piece of story in the journal books. Amy referred to

these center tools as ‘traditional tools’ because they were not computer-related. The use of traditional tools provided the teachers with methods to carry out their instructional goal of exposing students to diverse ways of learning.

The use of these tools also allowed the teachers to inculcate the rules and norms of participation valued in this community, implied, for instance, by the daily routine of assigning the students to centers as well as evaluating the students’ academic and social behaviors afterwards. In this sense, the use of the traditional tools has itself become an essential *tool* mediating the teachers’ action in maintaining a functional classroom ecology that facilitated their fulfillment of their instructional goals. The connection between the use of tools in the literacy center settings and rules applied to these centers is further explicated in the following section.

Rules & Procedures. The rules for literacy centers were two kinds: academic rules or, rather, ‘rubrics’, and the behavioral rules related to appropriate participation in the activities. The procedures referred to the teachers’ expectations of the students in their engagement of learning in literacy centers. The start and the conclusion of the literacy centers marked the time when teachers reviewed center rules and procedures, provided rewards in the form of points, and reminded children of proper behaviors between and during the center activities, as shown in the two segments below:

*(Feb 20<sup>th</sup> Classroom field note and transcript)*

Amy: Read by yourself tub, there is a Time Magazine for the kids. You can choose what to read. On the back there is activity. You can read by yourself. Again, the sequencing tub, this is when you are gonna to take comic strips and put them in order. There are some challenging ones. Okay, that’s for table number one. Table number 2, you have the overhead projector and one, two, three tub. Use the different materials to find out which makes a shadow and which doesn’t. You are gonna record your results on the work sheet. One

two three tub, you got to play the triominoals. Table number three, the game tub, you get to ask the trivia questions. The ABC tub is the rhyming tub. Our tubs were not cleaned well yesterday. Things were just thrown in the tubs. Today we are going to have a tub check. In the rhyming tub, there is a bat for the cards, and for the green words... Table number four, you have the computers and puzzles. On the computers, you are gonna have to type spelling words. For the puzzle, you need to read the puzzle before you get the puzzle out. Table five, you have the block tub...Lincoln block to build log cabins... do you remember we have read the story yesterday, 27 people lived in ONE log cabin. Think about how you can fit 27 in one log cabin. Mrs. Crone, do you want to add something about cleaning up, I know you and me were both upset yesterday...

Cathy: I would...everyone to make sure that they are doing their part and helping as a group to clean up the tub please? Okay?

*(Feb. 26<sup>th</sup> classroom field note and transcript)*

Amy: There are 24 possible points to be earned for your tables today.

Some S: yes! (Excitedly)

Amy: Your eyes on Mrs. Jacobson.

(Amy held up a literacy center rubric.)

Amy: Number one, follow the directions. That also goes with using the material appropriately. If you take the flashlight just like Mrs. N told us, then you get your table 3... Complete the task. It's a story you have to write. You have to write the story. If it is a worksheet you have to work out, you have to finish your worksheet. Cooperate with the others within your group. Building on our map and you will work together. Stay at your centers. You have to stay at your center. That one says "move to your next center at the right time." If I use the star tub and write a story, I don't go to a math tub until I am all finished. One does this (within one table), you only got one point *(Feb. 26<sup>th</sup> class observation)*.

In the above examples, Amy explained the literacy centers to the students. She mentioned each tool to be used in a particular literacy center such as flashlight, worksheet, puzzles, blocks, and overhead projector. The goal for each use of tools in the activities was made explicit, and sometimes accompanied with teacher modeling. Throughout the directions given to the students, Amy emphasized the proper use of tools,

smooth transition between activities, obedience of rules, as well as the procedures for the participation of the center activities. Some rules and procedures—cooperating with others, cleaning tubs, writing and reading in the corresponding centers—were interwoven in the daily lessons and constantly made explicit to the students so that these rules became norms for the community of practice in this classroom. They were also in compliance with the goals set by the teachers as they designed these centers. The rules and procedures were consistently vocalized and carried out by both teachers. But usually it was Amy who provided directions to the assignments before the activities started and who wrapped up the activities when it was time for writing lessons. Cathy acted as more of a collaborator and supporter during the process. When it was time for children to convene in the carpet area at the end of the literacy centers, Amy or Cathy reviewed and evaluated the students' performance during the activities. Rules and procedures were highlighted as the teachers rewarded or reminded the students of their social or academic behaviors during the center time. Tally marks were drawn on the blackboards as the whole class counted and cheered for each group. Finally, the teachers announced the number of points earned by each group and individual. Additionally, the teachers used writing rubrics to evaluate the work done in some centers, especially journal center. The following transcript showed how Amy and Cathy routinely reinforced center rules and evaluated students' work according to the writing rubrics:

- Cathy: You left the center *in good condition*. You earned a *total 22 points*. You did *a good job*. So tomorrow it seems that we need to work on *our soft voices*.
- Amy: I'm giving the whole class a reminder right now. I know that I have to stop before...
- Amy: And you know what Mrs. Collins I am noticing *many children already have four or five tallies*.

Cathy: And it is only Tuesday... Yeah, maybe we can use that to *make better choices*...

(Amy is sharing Justin Lake's journal.)

Amy: Now let's look at *Taylor's*.

(Amy showed the kids how Justin L.'s work met the rubric.)

Amy: Oh, Taylor even had an *illustration to the story*.

Terry: I wrote one in marker, in yellow... (King Cobra)

Amy: "A king cobra"//

Terry: "Is a venomous snake."

Amy: ... even a picture of the king cobra. You know what *he didn't include the audience* ...

Amy: This one [journal] a lot of you write, *look how many pages she has written*.

(Now she is sharing Alexis' journal.)

Amy: "I went on an air plane. I saw a fish and I saw a star fish. That was cool and I saw lots of people."

(Students applauded.)

Amy: *Capital sentence and first letter*. I like how you *added details too*. Okay. That was it.

(Amy gives some points now and counts the tallies.)

(June 3<sup>rd</sup> Transcript)

In the above conversation after the center activities, Amy solicited both Cathy and the students' help in examining some children's behavior and journal writing performance according to the rubric (Table 4.1) Amy held in her hand. At the same time, Amy noticed problems and reminded the students of the rules on a moment-to-moment basis. Therefore, the teachers also utilized the literacy center settings as main venues for building norms and rules for participation, as well as values in terms of students' performance in these activities.

Through practices around literacy centers, the students themselves learned to attach great value upon observing the center rules to earn rewards in these settings. During one of the after-center conversations, Cindy, a third-grade LD student, inquired

about the possibility of earning points during the center time, which shows her focus on the reinforces provided by the teachers for appropriate behavior.

*(March 7<sup>th</sup> Field Note)*

Amy: And group five//  
Cindy: Computer one two three...  
Amy: One gets to be the teacher and another becomes student. Cindy thank you for raising your hands, I can see if you have a comment or a question. Thank you Terry for getting those legs folded. Cindy, what's your question?  
Cindy: When we are doing the tubs, are we going to get points?  
Amy: Yes, I know Mrs Collins and Mrs. N will be happy to.  
One S: How many points do you get?  
Amy: Sometimes we catch you maybe five or six times... Leon, I appreciate how you raise your hands. Sometimes you may get two points... Okay, can I have table number one stand now? ...

To sum up, there were two dimensions of participation in the literacy center activities, sanctioned by the rules and routines reinforced through routinized teacher directions and evaluations of students' work after center time. One dimension concerned the appropriateness of social behaviors, for example, smooth transitions from one center activity to another, the need for cooperation, use of quiet voices, and cooperation with each other. The accumulation of points could trade for special lunch with the teachers or free time on computers on Friday. A second dimension of rules was more academic in nature. This was the evaluation of students' products in writing-related centers such as 'writing original sentences' and 'theme journal writing'. To this end, two rubrics were provided as the standards against which the students' written texts were compared and assessed. One rubric was for sentence writing and the other for writing stories in the literacy centers, which were both listed in table 4.1 in below.



Table 4.1 Rubrics for Participating in Literacy Centers and for Evaluation/Sharing

| <u>WRITING RUBRIC</u>                                                                                                                                                                                                                                                 | <u>RUBRIC</u><br>(for 'original sentence' writing)                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>4 Includes:<br/>*Planning<br/>*More than 1 sentence<br/>*Punctuation<br/>*Illustration</p> <p>3 Includes:<br/>*Planning<br/>*More than 1 sentence<br/>*Punctuation</p> <p>2 Includes:<br/>*Planning<br/>*More than 1 sentence</p> <p>1 Includes:<br/>*Planning</p> | <p>4 Illustration<br/>Original Sentence<br/>Punctuation<br/>Capitalization</p> <p>3 Original Sentence<br/>Punctuation<br/>Capitalization</p> <p>2 Punctuation<br/>Capitalization</p> <p>1 Capitalization</p> |

They were laminated by the teachers and assigned to the students during the center activities where writing was involved. The students had rubrics available in the centers and they were often prompted by the teachers to use these rubrics both at the start and conclusion of literacy center activities as indicated by above examples. The standards provided visual reminders regarding the use of capitalization, punctuation, planning, and originality. These writing rubrics served as both guidelines for gauging students' written performance and for assigning points to the students. Overall, the two-dimensional rules in the literacy center settings encompassed expectations for social and academic behaviors, which were realized through regular management of center rules and the use of teacher-produced rubrics for writing.

Division of Labors. This component of the activity structure focuses on the way human subjects are organized towards the certain outcomes mediated by other elements

such as use of tools and existing rules for participation. According to Activity Theory, division of labor incorporates the allocation of responsibilities and norms of participation, that is, the allocation of tasks and leadership among the participants, as shown by figure 3. This facet of an activity structure reflects the teachers' underlying beliefs and practices in children's literacy development. In the centers, there were basically two types of activities: individual or cooperative. The hands-on activities that involved the use of sand box, puzzles, or blocks, were mostly cooperative work. In these activities, the students worked with their tablemates and shared resources or tools in their pursuit of common goals. Another set of activities was characterized by individual-oriented tasks involving worksheets, journal writing centers, or listening as in the case of listening center. Buddy reading center activity, although requiring collaborative efforts, did not take a unified form, as some students shared one book and others might read their own books in the buddy reading corner near the bookshelf. Therefore, this activity might be counted as either an individual-oriented or cooperative activity.

Peers were important resources in the literacy activities that emphasized hands-on construction and literacy play, in particular. For example, cooperation and collaboration were much more needed in the puzzle solving or character playing sand box activities than in other centers. However, for most of the literacy center activities involving reading and writing, the students were individually responsible for the completion of their own tasks. They were provided a set of tools such as paper, pencils, markers, overhead transparency, and so on, for them to accomplish their goals at the different centers, whether the work entailed worksheet exercises or writing tasks. The teachers put great emphasis on the use of cooperative behaviors by the literacy members of the community

during center time. This could be interpreted as a natural outcome of the teachers' choice of center activities. In the first kind of activities mentioned above, the students engaged in hands-on activities in which cooperation among them was most important, while in the second type of centers, when the students either wrote independently or engaged in individual completion of tasks such as worksheets, the teachers either paid attention to the students' written texts as compared with the rubrics or their proper behaviors. Therefore, the center activities placed great responsibilities on each individual to be both independent and cooperative workers, which were also the main roles of the students.

In all center activities, typically the students were monitors of their own behaviors and learning processes while the teachers occupied themselves in guided reading instruction groups during the center time. An example from a March observation is shown below to illustrate the division of labor in a center activity in which the students were required to cooperate and take turns to make changes to the sentences printed in their own transparency sheets. In this activity, four students were seated at table number four. Jordyn was a third-grade high-functioning student; Marquis was a second grader; and Alexis was in first grade and was in a process of being referred to special education. Terry was diagnosed as having ADHD and POHI (Physically or Otherwise Impaired). In this activity, they used the overhead machine for their completion of the sentence-editing task.

*(March 7<sup>th</sup> field note)*

(Overhead Tub—Jordyn is working with Terry. On her transparency sheet, there are 8 sentences. The students were required to fix the sentences by putting capital letters and punctuations in appropriate places.)

Terry: *You are supposed to put capital mark there.*

Terry: (Gives another student a transparency): Here is yours. Give me a red pen. You use an orange pen.

(Terry would go to look at some walls in the room and point out letters... )  
(Jordyn is helping Terry do his overhead sentences.

Marquis: Done. *Your turn now.*

Jordyn: *Okay Terry it is my turn. That's not mine.* You are going after me.

Terry: That's one of my classmates' names.

Marquis: Joe?

Marquis: What are you doing?

Alexis: *We are done...everything in the class.*

Jordyn: That's hard to believe but you take out a paper... *it's Marquis's turn and then it's your turn...*

In this segment, Terry, the student in special education, started his participation by appointing himself the role of a helper as he made a suggestion to another student: "you are supposed to put capital mark there." Then, he assigned a transparency sheet to a student in his group, which positioned himself at the center stage of participation in the activity. He went further as to assume authority in handing out pens of different colors and assigning himself a color of his choice. So far, his roles included both managerial and cognitive. Another main player in this setting was Jordyn, a general education student. From the middle of the conversation onward, the distribution of labor in this activity seemed to shift toward maintaining rules and turn-taking procedures for participation. Jordyn took strong leadership by monitoring other students' roles and responsibilities in the activity, making sure everyone had his or her turn. Terry and Alexis were participating on the border of the activity as they walked in and out of their own centers occasionally. Throughout this activity, the four students did not share cognitive responsibilities for the product, although they wrote on the same transparency. Rather, they were given their own tools, sheets and markers, to finish their own editing work.

Therefore, in spite of the suggestion made by Terry at the start of the activity, the students' roles had mostly been that of maintaining order and rules so that they could take turns finishing their work for this center and move on to the next one. The distributed cognition was limited in such a structure, which placed heavier demands in terms of obeying the center rules and being cooperative among the students. In other words, the literacy centers were structured in a way that inclined the students to assume roles with the main responsibilities of obeying rules, monitoring behaviors, and taking turns through their individual tasks. These roles were in compliance with the teachers' roles in these center activities, which were to reinforce the rules and procedures, as well as evaluating the students on the confirmation of center rules. In other words, the division of labors of the centers was mediated by the existing rules and procedures in this community of teachers and students. In turn, the use of tools, the rules and procedures, and the division of labors mediated and shaped the goals and outcome of learning in these center activities.

Summary. The foregoing section addressed the activity structure of literacy centers without the use of computer technology. Traditional tools, as called by Amy, were employed in those centers with an aim to create different ways of learning and exploring literacy for the students in the multi-grade inclusion classroom. The activity theory analysis of the settings revealed a noticeable accentuation on the management of behaviors and cooperation skills, which in turn, influenced the division of labors among student participants in the centers. Apart from this emphasis, the teachers used rubrics as tools for evaluating the students' written texts produced independently in the center time. The teachers' roles, especially for Amy, thus boiled down to maintaining a functional and

organized community governed by the rules or rubrics reinforced through the literacy centers in which the students assumed responsibilities of monitoring their own behaviors and proceeding through centers according to the social or academic standard. The amalgamation of these literacy activities highlighted not only a rule-emphasized and cooperative-enabled community of learning, but also suggested a usage of tools as more of physical instruments to allow students to finish their tasks.

This finding naturally led to the examination of the relationship between the major existing curricular framework—literacy center activities, the use of computer technology, and the implementation of TELE-Web in this classroom—as they were elements embedding or mediating each other. The following part will address these issues in order to gain insight on the use of computers embedded both in the existing center setting of this particular classroom environment and the teachers’ general beliefs about computer technology and learning.

#### Teachers’ General Perceptions of Technologies

In order to gather information about the teachers’ general orientations towards technologies and their perceptions of TELE-Web, I conducted a teacher survey that contained questions concerning the teachers’ conceptualization of computer-related technologies and the perceived functions of computers for personal as well as classroom uses. Table 4.2 illustrated the teachers’ use and perceptions of technologies in general according to section of this survey in the study. The first part of the ‘Technology and TELE-Web Survey’ focused on two aspects: the teachers’ personal uses of computer technology and what uses of computer were made accessible to students. The results

Table 4.2 Teachers and Use of Computer Technologies

|                                        | Amy                                                                                                                                                                                             | Cathy                                                                                                                                                                   |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Teacher's Use of Computer Tools</i> | Preparation for instruction (monthly)<br>Student expression & publication(weekly)<br>Use technologies for personal use (weekly)<br>Use WWW for personal use (Weekly)<br>Record keeping (Yearly) | Preparation for instruction (weekly)<br>Use technologies for personal use (Daily)<br>Use WWW for personal use (Weekly)<br>Record keeping for class (yearly-never)       |
| <i>Computer for Students' Use</i>      | Classroom management and/or incentives for students (monthly)<br>Core curriculum skills development (weekly)<br>Remediation (monthly)<br>Keyboarding, mouse skills, etc. (monthly)              | Classroom management/incentives (monthly)<br>Core curriculum skills (Monthly)<br>Remediation (Monthly)<br>Keyboarding, mouse skills, etc. (weekly)<br>(Word processing) |

revealed similarities between Amy and Cathy. Both teachers made limited use of computer-related technologies for instructional purposes, although the two teachers assigned the greatest frequency of use to the computer as a tool to help them prepare for instruction. Amy, the general education teacher, was found to have a lower frequency of use of computer for this purpose than that of Cathy (monthly versus weekly), the special education teacher. Both teachers reported on a low frequency regarding the use of the computer for recordkeeping, such as creating and maintaining Individual Education Plans (IEPs), recording grades, and keeping track of student attendance ('On a yearly basis' for Amy, or 'between yearly and never' as in Cathy's case). When it came to personal use of computers and related technologies, Cathy seemed to score higher in frequency of use than Amy. Surprisingly, one category that Cathy did not select was the use of the computer for student-to-student communication and publication (e.g. publish student work on a Web page, pen pals, e-group projects, etc.), whereas Amy did select this item. Amy's use of the computer for communication and publication might have been explained by her inclusion of the in-progress project of 8's Great at that time. However,

Amy didn't participate in that project. It was Cathy who led the students in the computer project, which involved a group of students selected from this inclusion classroom and the upper-grade inclusion classroom in the same school building. The children each year took turns in building a web page about their school and the classrooms with the support from the teachers. On the whole, the use of computer-related technologies in this class was narrow in scope and limited in purposes.

For students, computers were instrumental in serving the purposes of remedial education, classroom management or incentives, development of core curriculum skills, and training of keyboarding, and practice of mouse skills. The survey revealed that Amy believed that she used computers on a weekly basis to develop core curriculum skills, as opposed to monthly basis for Cathy. The difference in their reported use could be attributed to Amy's employment of word processors as tools for students to develop their keyboarding skills and to retype their final drafts of stories, which took place on a weekly basis. In contrast, Cathy reported on using the computer to access Internet websites where students could play games and engage in literacy practices, such as poem sites, animal sites, and the like, which she tried to come up with on a monthly basis, according to the thematic units of the general education curriculum. Neither Amy nor Cathy mentioned using computers for student inquiry, communication with parents, and teacher-student communications. While Amy mentioned using computers for remediation purpose on a monthly basis as she counted in the CD-Rom games, Cathy reported 'never' to using computer for this goal.



In summary, the teachers' perceived use of computer technologies in this classroom were characterized by: (a) relying on computers for looking up information and educational sources, (b) using computers for preparation of instruction, (c) less frequent use of computers for maintaining student records, or providing remediation and core skills development, and (d) using word processors to foster computer keyboard training. In addition, the two teachers also reported using computers frequently for personal functions such as emailing and finding information through the Internet. Computer in the classroom was not conceived in an integrated fashion along with the existing curriculum to serve as a viable tool for mediating students' literacy development. The teachers' reported uses of computers for students did not seem to go beyond providing occasional incentives to students, supporting the developing their keyboarding skills, and publishing a final draft of students' stories.

Interviews were subsequently conducted to gain a more comprehensive understanding and supporting evidence regarding the situations of technology use in this classroom. When asked what technology she personally used, Amy indicated the word processor and looking up online literacy programs for her children. However, Amy also expressed dilemma about using computer technologies:

... Word processor; looking for software that my children might be able to use. Some online things...maybe email, maybe looking up information. As I get busier, it's a lot harder to use technology just because it's a lot of sit and wait time for me. I mean I'd rather physically do things, than just kind of play. I feel like it's a waste of time sometimes, just to, yeah, to browse. I'd rather go to the teacher's store and get information. (*Amy Interview, April 2<sup>nd</sup>*)

Amy's answers suggested that she perceived the value of computers related to the convenience and communicative functions they offered: "Word processing is just fabulous! Think of the old days you have to type things on typewriter. Now I can just

write my intern's report. And now you can just bring up last year's and make changes, instead of reinventing the whole thing." Amy enjoyed the fact that computers and the Internet allowed her to access educational materials without having to go to the library and process intern's evaluation at home. For Amy, computer technology played two important roles in her personal life: One role was comparable to that of a warehouse or web-based library to which she could save and retrieve information or materials useful for her preparation of instruction. The other role for computers in this classroom was to allow both teachers and students to print off final writing products.

Cathy showed similar belief patterns to Amy. Cathy, too, emphasized the benefits of computers for word processing and looking up Internet resources. The example she offered of the kinds of internet-based information she collected was materials from a science website that the school district had placed on the district website.

To conclude, the two teachers revealed that, prior to their introduction to TELE-Web, the computer technologies served two purposes: word processing and internet research. The latter use was highly controlled in terms of access to the students. One of the Internet project was the yearly project 8's Great, the purpose of which was to involve the students in collaborative projects utilizing 8 intelligence areas proposed by the school. During the time of the study, the 8's Great project was to build a website for the upper and lower elementary inclusion classrooms in the building, which allowed the students to go to designated web site to search for information they needed. Also, the teachers entered a weather forecast website for the students to read temperatures as the first thing to start every school day. The teachers' beliefs about the value of computer technologies

conditioned their applications of computer technologies in the classroom, and the particular functions and tools that they made available to their students.

### Teachers' Use of Computers

The contexts of the existing social practices within literacy center setting and teachers' perception to computer technologies have been carefully delineated in the previous discussions. Constituting the major literacy curriculum in the classroom, the center activities were designed to provide a structure for the students to experience a variety of learning processes. In the centers, rules for participation were highly emphasized and persistently reinforced by the teachers to ensure the ultimate goal of diversified learning could be achieved. Accordingly, computers were made available to students as one kind of literacy center activities. In line with the teachers' perceptions towards computers in general and their goals for literacy centers, the use of computer technology as a literacy center mainly took on several forms as a center prior to the implementation of TELE-Web: keyboarding, word processing, CD-Rom games, and exploring literacy websites containing poems, puzzles, or games.

Computer center activities typically involved individual practices, whether it be keyboard drilling through a typing tutor, a writing task contained in a CD-Rom software, or browsing of a school district's literacy website for children. The students were not evaluated against the rubrics on their work with the computers, which was attributable to the teachers' perception of computer technologies as mainly serving the functions of motivating students and providing a real-world work experience like adults, as well as developing computer keyboarding and navigational skills. That is, the main goal was not to provide the students with opportunities to practice writing as in journal writing literacy

center. When it came to the computer center, the teachers thought of it as a way to provide the students with incentives and enhance motivation through the use of computer tools. On the objects of the computer center, Cathy stated:

Children's motivation was higher on computer. In general, we use computers so LA, math, social studies, some like Oregon Trails they can use during computer time. They might pick them up on Friday, such as Reader Rabbit software or a phonic-based software because they are game-oriented and kids do see that as interesting and motivating. They will pick that up on their own... Gives them a motivation. They like the computer. It's a good way for them to learn, whether they are using educational software or word processing, they like doing that. They feel like it's a game and it's a fun learning experience. It's convenient and it's different method of doing things besides paper and pencil. (*Cathy interview, April 30<sup>th</sup>*)

As implied in this transcript, the teachers had clear intentions to use the computer centers as incentive-rich for students. The teachers also tended to consider computers as generating "opportunities for students to use computers that adults in the working world use." Overall, the general objects of literacy centers included reinforcement and promoting basic skills, utilizing different tools as means to experience diverse ways of learning, and motivating students to become more interested learners.

General rules of behavior, however, were applied in the setting in which the students were required to be on task and cooperate with other members of the same center.

In relation to the objects of the computer center, the division of labors in this setting thus did not adopt specific patterns. Depending on particular tasks involved in the computer activity and individual students' interests the students either worked independently or collaborated with each other. For example, a 'Leap Frog' game on a teacher-designated website attracted more than one student's attention at a time and lent itself easily to collaborative problem solving throughout the game. The students also

tended to rely on helping one another when they entered a website that demanded higher reading levels and navigation skills and consequently assuming experts or novice roles in respect to their reading or computer skills.

Below is a segment of the field note on the students' behaviors around the computer center activity on March 7<sup>th</sup>. Cathy opened [www.kidworks.com](http://www.kidworks.com) web site on all the three computers in the main classroom. This website had a compilation of poems for the children to explore. They could read children's poems on the web, created a line of their fun poems, left a guest message, and so forth. Tyler was a 2<sup>nd</sup> grade general education student. Brandon was a first grade general education student.

(Some kids are doing Kid Works on computers. The kids are mostly interested in the drawing function of [www.kidworks.com](http://www.kidworks.com).)

(Tyler has written down the following by a picture on the website:  
OUTS A POTIM TIME A NITE COME TO THE VICHE TO SEE THE  
DAGINE AND FALLETE IT AND WON BUT IT WUSITE OVER IT MOM  
FALLTE AND I WON.)

[He read to me as: 'Once upon a time, a knight come to the village to see the dragon and fought it and won but it wasn't over. It mom fought and I won.']

(I asked Tyler about the story. He smiled when I read the story and discussed the characters with him.)

(Brandon is also working with the picture and story on this website. He kept experimenting with the painting function of the software. He only wrote down one sentence for the writing during the entire computer center period: "I have a cat and a dog.")

Brandon: It has to be printing. I got a cool story.

In the rest of this computer center activity, Brandon spent much time with selecting different colors provided in the writing software. Then he printed twice the sentence he wrote with the illustration and showcased the story around the classroom. During this activity, the students' interest in the task was high as they engaged the computer tools for illustration or writing. The computer was a motivating tool for these

students to work independently. Once the students allocated themselves to one particular task in the designated computer center area, they often became free ‘explorers’ of the site or software, while the teachers were responsible for reminding the children of the rules and leading the students’ guided reading groups at the same time.

When the students encountered great difficulty or had trouble proceeding through the task, they might need the teachers to step in and provide assistance. In a May 16<sup>th</sup> computer center, Amy was observed to start the children off with a web site of children’s poems:

Amy went to the computer area and helped Taylor and Terri with opening the “Poem Fun” link and playing with the poems in the [www.gigglepoetry.com](http://www.gigglepoetry.com) website. Then Amy helped them to think of a rhyming word that matches the line they saw in a poem on the “Poem Fun” page.

Taylor:       What about these?  
Amy:         Just click on the red.  
Taylor:       No (“School Fun”), guest book.

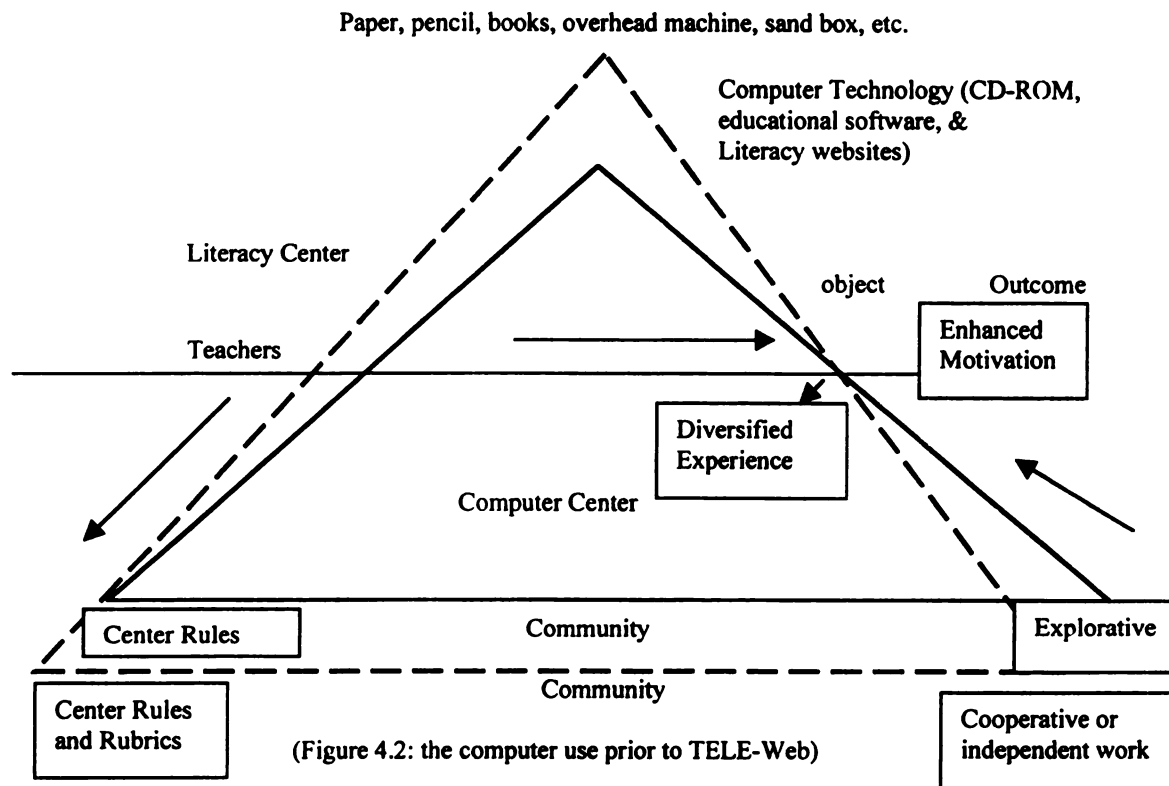
(She didn’t want to go into “School Fun” link but accidentally clicked it open. But she was in time to change the link and go into Guest Book area.) Now she gets in the book and began signing her name in the guest book.

*(May 16<sup>th</sup> field note)*

This segment showed that the teacher helped start the students with the computer-based activity by entering a site and necessary links contained in the site and assisting the children with finding a rhyming word for their further involvement with poem exploration. The teachers were often made available at the start of the activity when needed because they put upon themselves the most attention-demanding work of teaching guided reading lessons with small groups of children during the center time. In this note, the first grade student Taylor also asked the teacher how to go into a link called ‘Guest Book’. Having told her that, Amy left the computer center to set up her guided reading instruction. There was not much teacher guidance during the children’s work on the

computers. Other times, the computer was used as a place for the students to type the written texts and print the final copy with the word processor.

In summary, the literacy center setting was the only context where computer was utilized in this classroom before TELE-Web was implemented. Being a center activity, the computer was used, like other tools, to create diversified experience and additional motivation for students in their exploration of literacy. These general objects, along with other elements of the activity structure were captured in the figure 4.2. Within the literacy center setting was embedded the computer center activity. Its structure was characterized by close affinity with the rules applied to all center activities, except that there was no rubric standard for the work involved in the computer center. The reason has been explained in terms of the object of the computer-mediated setting, which was not only to support the students with diverse learning experiences such as using computers that they might encounter in an adult world, but also to provide incentives in a literacy context. In the computer center activities, the students also were required to cooperate whenever possible. However, they were often positioned as free explorers of the website or the computer games while the teachers remained occupied for the most time in their guided reading instruction groups. The division of labor for the computer centers was slightly different than that for other literacy centers in general as a result of the lack of rubrics as a checking point for the students' performance and of the goal underlying the computer-mediated centers, namely enrichment of learning experience and enhanced incentives for the children. Students were for the most time left to monitor their performance in the



computer center activities as well as behaviors. The functions of the computer technology in the center environment was consistent with the teachers' general perceptions of the computer as being useful especially as a motivation tool and a different way to experience literacy learning. All the structural components in the computer center activity were embedded in the larger setting represented in the curricular activities of the literacy center as illustrated in the above figure. The role of computer technology in this classroom was mainly that of an incentive booster where the children were exposed to a different context containing literacy elements.

Therefore, before TELE-Web was implemented, the computer tools served to enrich current literacy experiences through their added-on motivational appeal to the students. Computers were not directly connected to the core content and standards of the curriculum. The teachers remained as participants to the extent that they selected



websites and games for this center, reminded the students of the center rules, and helped the students to start on the computer activities.

### Teachers' Approaches to TELE-Web

Until this point, the discussion has been concerned with teachers' as intentional users of computer technology to serve certain instructional purposes in the literacy center framework. The foregoing discussions of the literacy activity structures in the centers showed that computer use was embedded in the larger activity system of the literacy centers and that the teachers' choices and decisions regarding technological innovations were manifestations of both their perceptions towards technologies such as computers and routine activities created to support a functional ecological system. The computer was regarded as an additional element conducive to the students' motivation and exploration of diverse learning experiences in the multi-grade inclusion classroom context. In the next part, I will examine the teachers' implementation of TELE-Web from cultural historical and activity theory perspectives.

Teachers' Perceptions of TELE-Web. At the beginning of the semester, a teacher survey about their attitudes towards technology and TELE-Web was administered to both Amy and Cathy. The questions concerning TELE-Web were designed to reveal the teachers' perceptions of TELE-Web design and its potential for enhancing students' learning. The first nine questions addressed the TELE-Web teacher involvement and design in general. The teachers rated these nine statements on a Likert Scale, 1 indicating 'Strongly disagree' and 6 'Strongly disagree'. Both Amy and Cathy assigned a score of five to all of the following questions regarding TELE-Web potentials and what it could do:

- TELE-Web is a useful tool for teachers.
- TELE-Web is highly flexible in matching teacher needs.
- The TELE-Web teacher's manual is a useful resource to teachers.
- The TELE-Web in-service and meetings are useful to help me begin implementations.
- TELE-Web allows customization of assignments for diverse learning needs.

From the answers to the above questions, it seemed that Amy and Cathy were fairly satisfied with the level of support and flexibility allowed teachers in using TELE-Web in their classroom, thus suggesting a high potential of TELE-Web. Amy and Cathy also assigned "5" to the following two statements related to TELE-Web's design and the students out of 9 questions concerning the design of TELE-Web:

- TELE-Web is an attractive and motivational technology for students.
- TELE-Web will extend the publication and dissemination opportunities for students in my classroom.

That both teachers considered TELE-Web a motivating tool for the students was compliant with the study's previous finding about their general perception of computer technology. The teachers also agreed strongly that the TELE-Web had potentials in terms of dissemination and publication among the students in their classroom.

In response to the statement that "TELE-Web can help students become better readers and writers", Amy indicated her strong agreement with a rating of "5"; whereas she rated her response "4" to the statement "TELE-Web is easy to use." By contrast, Cathy rated 4 for both of these two statements. On the one hand, the teachers affirmed the

important role TELE-Web might play in motivating students and expanding their communicative writing and publication on the Web. On the other hand, they held some doubts about the difficulties that students might face in using TELE-Web. In other words, the teachers were not quite sure how their students would react to the new technology, and if TELE-Web would pose technical difficulties to their students. Also, TELE-Web is more difficult than stand-alone technologies or CD-ROMs. It is a technological innovation that demands learning on both parts: teachers and students. As far as the question of whether TELE-Web might help their students become better readers and writers, Amy was more confident in the potential of TELE-Web to meet her students' needs than the special education teacher Cathy, who rated this item '4' on the scale of 1-6 from 'disagree' to 'agree'. This difference was not surprising because Amy in her interview said that she had the same expectations for all readers and writers; but that some students would need support (scaffolds) in the beginning. She believed that teachers would need to remove that support in the end as the students attained certain goals. Amy did not view the emergent readers and writers as non-readers or non-writers. That was why Amy thought that teachers should provide as many ways of teaching as possible, especially making use of different senses. In contrast, Cathy distinguished between 'natural readers/writers' and those who had a hard time applying skills and strategies in reading and writing processes. That might explain her rating of 4 for "TELE-Web can help students become better readers and writers", since she perceived that some students had skill deficiencies that prevented them from being successful readers and writers. In addition, Cathy did not fully agree that TELE-Web would be easy to use.

Teachers were also asked to indicate to what extent they would use TELE-Web in the classroom. They rated their expected frequency of using TELE-Web on a scale from 1 indicating 'infrequent' to 10 representing 'frequent'. Amy chose 8 and Cathy chose 6 for this question. Obviously, time was a big concern for Amy, who mentioned time as the main type of support that she needed in implementing TELE-Web in the classroom. As Amy explained, the type of support that would be most helpful would come in the form of someone checking on needs and questions she might have, which was somewhat similar to the sort of support she was receiving. Likewise, in response to the question of what type of involvement she would like with the TELE-Web project, Cathy said that she would like to use TELE-Web but she was having "a difficult time finding *time* to explore with it." To the same question, Amy expressed that she liked working with TELE-Web, however, she was not quite sure of what was required of her to do for the project in her classroom. It was interesting that both of them mentioned time as the major factor in supporting or detracting from their uses of TELE-Web. Time is always a necessary part of anyone's learning, and time figured in the teachers' perceptions of their ability to learn to use TELE-Web in the classroom. Nevertheless, they both rated their intentional frequency of using TELE-Web on the 'high' end of the scale.

In response to the question of "What type of involvement would you like with the TELE-Web project," Amy said that she was not sure of what the researchers expected of them in terms of how they might use TELE-Web. Her answer actually echoed Cathy's concerns and confusion with the researcher's role in the classroom. In the very beginning of the semester, the researcher made contact with Cathy about making observations and working with TELE-Web project in her classroom. Cathy thought that, if the researcher

was there in the class to help the students when they had TELE-Web questions, then the researcher might also help with other ongoing technology-related student projects, that is, by building a website for the 8's Great activity. The two teachers, thus, tended to perceive technology expertise in a global way, and they tended to position others (researchers) as possessing a general technology expertise that might be applied in a more general way. On the other hand, the teachers in the initial stages of using TELE-Web tended to feel that they needed to "do something" for the research people on TELE-Web, as indicated by the response they wrote to the question of the type of involvement they wanted in the project: confused about what was expected of us in this project. This could be attributable to the fact that it took time to build a researcher-teacher rapport in which the researcher acted as a participant observer in her efforts to encourage the teachers to use TELE-Web.

Another set of questions on teacher survey addressed teachers' understanding of the potential values of many TELE-Web features and functions, such as rubrics, prompts, and so on. The two teachers were quite similar in their rating results. Table 4.3 below showed the ratings of potentials of the important features and functions of TELE-Web innovation. On a Likert type scale ranging from 'no opinion' (0) to 'highly valuable' (6), both teachers placed high value on the TELE-Web functions that allowed students to practice basic reading and writing skills as well as to use reading and writing strategies. Another category of importance to them was communication between teachers and students or among students themselves through the feedback features of TELE-Web.

The interest in high ratings assigned the TELE-Web feedback function was probably attributable to the fact that the teachers valued a process approach to writing and sharing of written texts with an audience, which was already in place in some literacy

center writing activities. Other functions, such as chat rooms, TELE-Zine newsletters, and publishing stories on the World Wide Web did not score high in terms of their perceptions of their potential values, which suggested that the teachers had no strong intention of sharing students' work beyond the classroom or TELE-Web community. Some follow-up questions were asked of the teachers later about TELE-Web activities that would most likely be used in their classroom. Amy said: "So far I find the webbing on TELE-Web the most useful, including the map and organizers. I would like to see a variety of organizers." In fact, Amy chose the story map as the first activity to be used in her classroom. For Cathy, she thought she would most likely use the story map in addition to Wordshop activities, comprehension activities, and idea organizers (another

**Table 4.3: Teacher rating of TELE-Web Features' Potentials**

| TELE-Web Features                                | Amy | Cathy |
|--------------------------------------------------|-----|-------|
| Rubrics                                          | 6   | 5     |
| Prompts                                          | 5   | 5     |
| Feedback to Students from Teacher                | 5   | 5     |
| Feedback to Students from Peers                  | 5   | 5     |
| Supported Writing                                | 5   | 5     |
| Chat Rooms                                       | 4   | 4     |
| Bulletin Board                                   | 5   | 4     |
| Student Book Reviews (TELE-Zine Library)         | 5   | 5     |
| Community—People of TELE-Web                     | 5   | 4     |
| TELE-Zine Newsletter                             | 4   | 4     |
| TELE-World: Publish stories on the WWW           | 4   | 4     |
| Wordshop Activities                              | 5   | 5     |
| Comprehension Activities                         | 5   | 5     |
| Story Map                                        | 5   | 5     |
| Idea Organizer                                   | 5   | 5     |
| Picture (add pictures to activities and stories) | 5   | 4     |
| Activity Creator (create your own activity)      | 5   | 5     |
| Self-Start (children select own assignments)     | 5   | 5     |
| Public                                           | 5   | 0     |
| Message Center                                   | 5   | 4     |

(Ratings ranged from 0 to 6.)

mapping tool). Eventually, she selected an activity from TELE-Web's WordShop area as her first TELE-Web activity, "just to have me and my students become familiar with what TELE-Web has to offer". It seemed that Amy had her mind set on the cognitive

strategies and skills offered by TELE-Web as a potential way to improve her students' learning. She tended to start immediately with the kinds of activities that could be connected to what she wanted to teach through the rest of the literacy curriculum. Cathy was more cautious in her approach to TELE-Web, perceiving a first step to include trying out a single activity to get herself and her students familiar with the new technology.

The teachers' ratings of the TELE-Web potentials and the first TELE-Web activities they wanted to use indicated that they were thinking about TELE-Web differently than the other computer technologies they had used in the classroom. While computers in the past had the major function of motivating students and engaging them in fun game-like activities, the teachers set goals on using the literacy activities on TELE-Web which provided not only the practice of basic skills, but also strategies and scaffolding tools to facilitate the writing processes. They also took notice of the interactive nature afforded by the TELE-Web publication features.

In this section, I summarized the two teachers' responses to the survey questions about their awareness of the design and potentials of TELE-Web in the classroom. It was found that both teachers recognized TELE-Web as a useful tool for teachers as well as students. They strongly agreed that this new technology was highly flexible in matching teachers' needs and the assignments on TELE-Web allowed customization for diverse learning needs in a classroom. As far as teacher involvement was concerned, the teachers expressed satisfaction with the support provided by the project for them to become familiar with the new technological tool for learning. For example, they were supplied with a TELE-Web teacher manual that introduced them to TELE-Web functions in a

easy-to-follow format. They also agreed that in-service meetings were useful in helping them to begin implementation of TELE-Web.

However, the teachers' responses to the question of "TELE-Web is easy to use" indicated that they had more concerns for the students in terms of their use of TELE-Web. For teachers, the technology itself was not difficult. The major factor in supporting their use of TELE-Web that both teachers mentioned was time. They showed concern for not having enough time for exploring TELE-Web as teachers in implementing this innovation in their room. Another item that received high rating from the teachers was "TELE-Web is an attractive and motivational technology for students." This was in keeping with their emphasis on using the computer as a motivating tool for their students in the classroom. The survey results thus offered a general insight into the role TELE-Web might play in relation to the teachers' understanding of the affordances and constraints of this new technology. The following section will present a more in-depth analysis of the implementation of TELE-Web by focusing on the three phases of TELE-Web use over the course of the school semester. Towards the end of the entire implementation process, the activity structures of the TELE-Web-mediated activities would be more saliently discussed to shed light on the mediating nature of the TELE-Web tools.

#### A Timeline—Evolution of TELE-Web Activities

The use of TELE-Web in the classroom was incremental as the teachers implemented the new technology first as novices of TELE-Web. Gradually, TELE-Web moved towards center spaces of the literacy curriculum of the classroom. As the survey results have shown, the teachers were not sure of the difficulty level that the students



would face in using TELE-Web. In the researcher-teacher meetings and the interview, Cathy constantly expressed the necessity of starting with small things on TELE-Web:

Cathy: I think we just started with things that are small, not only for myself in learning how to use TELE-Web sites but then a way to introduce the kids to it slowly. I think some kids could handle bigger chunks and you probably could introduce bigger things. But for some of the special Ed kids, I think important to introduce smaller things to help them get used to it and build up to something bigger. (*Interview, April 30<sup>th</sup>*)

In fact, a historical evolution of the teachers' implementation of TELE-Web could be illustrated in the timeline shown in table 4.4, which displays all the activities made available to the students throughout the semester.

Table 4.4 TELE-Web Timeline in Amy and Cathy's classroom

| Assignments                                                                                                                  | Activities Name (format)               | On-line Functions                                                            | Description                                                                                                             | Creator            |
|------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|--------------------|
| The Cat Story (Feb. 10 <sup>th</sup> , 2002)<br>*This was borrowed from Mrs. Romig's assignment "About a picture 10/04/2001) | What a Day! (About a Picture Activity) | Prompt: make sure you include:<br>--Two characters<br>--Setting<br>--Problem | Write a story about this picture. Explain how the cat got in the tree. How does the cat feel? How will the cat go down? | Teacher            |
| Spelling (Feb. 18 <sup>th</sup> , 2002) (to one group of students)                                                           | Spelling                               | No public<br>No self-start                                                   | Spell the following words.                                                                                              | Teacher            |
| Spelling 1 (Feb. 19 <sup>th</sup> , 2002)                                                                                    | Spelling                               |                                                                              | Spell the following words.                                                                                              | Teacher/Researcher |
| Spelling 3 (Feb. 19 <sup>th</sup> , 2002)                                                                                    | Spelling                               | Public                                                                       | Spell the following words.                                                                                              | Teacher/researcher |
| Spelling 2 (Feb. 19 <sup>th</sup> , 2002)                                                                                    | Spelling                               |                                                                              | Spell the following words                                                                                               | Teacher            |
| Making Words (Mar. 10 <sup>th</sup> , 2002, Mar. 12 <sup>th</sup> , 2002)                                                    | Create Word 03/10/2002 (Create word)   | Prompts                                                                      | Using the letters given, put together as many words as you can.                                                         | Teacher            |
| Safety Rules (Mar. 10 <sup>th</sup> ,                                                                                        | Compare/Contrast                       |                                                                              | Compare and contrast safety                                                                                             | Teacher            |

|                                                     |                                                                   |                                                                                                                                                       |                                                                            |          |
|-----------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|----------|
| 2002)                                               | 03/10/2002<br>(Compare/Contrast)                                  |                                                                                                                                                       | rules at home and at school.                                               |          |
| Animal Web<br>(April 11 <sup>th</sup> , 2002)       | Idea Organizer<br>--Brainstorm facts and put them into categories | Prompts                                                                                                                                               | Put 3-5 facts in each category.                                            | Teacher/ |
| Desert Animal Story<br>(May 5 <sup>th</sup> , 2002) | Free Writing                                                      | Prompts: Remember to use capital letters and to put in periods.<br><br>Rubrics: Must use capital letters and periods. Must have at least 3 sentences. | Write a story about a desert animal.                                       | Teacher  |
| Animal Report<br>(May 13 <sup>th</sup> , 2002)      | Supported Paragraph                                               | Prompts                                                                                                                                               | Remember to write complete sentences. Use capital letters and punctuation. | Teacher/ |

Three Phases of Implementation. The above timeline table shows that the teachers' use of TELE-Web was characterized by a shift of emphasized areas of literacy skills. In the first couple of months, the assignments on TELE-Web focused on basic word skills as represented by such activities as "Spelling" and "Making Words". For the first activity, Cathy used a cat picture that was posted by another teacher and made available on TELE-Web. Then, Cathy turned this picture into an About a Picture assignment requiring the students to write a story about the event conveyed by the picture. The teacher initiated these assignments without my request.

However, the spelling assignments ran into technical glitches on TELE-Web when the students logged onto TELE-Web to find these assignments during the center time. I provided immediate support by checking the SoundMachine that was set as the

default audio plug-in for the text-to-speech function essential to these spelling activities. However, it could not be fixed due to some computing problems. The following memo was recorded on the day when the students were supposedly engaged with the spelling assignments:

This assignment didn't work. Mrs. Crone has created 3 sets of spelling assignments: spelling 1, 2, and 3. They are designed for different kids (according to their level). She used the most up-to-date Internet explorer to create the assignments as home yesterday. She previewed it and could not get it to dictate the spelling words to her. Later, she logged on as students and she had the same problem with the assignment. This morning I also could not get the text-to-speech function in the TELE-Web spelling assignments to work for these kids.  
*(Memo, Feb. 19, 2002)*

Cathy's efforts in using TELE-Web were met by a setback caused by the occurrence of this technical problem on TELE-Web. From early February to the middle of March, the teachers' participation on TELE-Web was mainly limited to creating basic word-level activities that were easy to perform for the students. The teachers also underwent trial and errors through this early period. Thus, I categorized this phase as phase 1 of TELE-Web implementation. Almost one month after the failure to use Spelling activities, the teachers implemented the Compare/Contrast activity on TELE-Web. This assignment was different in focus from the previous ones in that Compare/Contrast activity was tightly linked to the concurrent literacy skills practiced in this classroom: Venn diagram. The emphasis was on the use of this important strategy involved in writing processes, rather than word skills. This is the second phase of the teachers' implementation of TELE-Web. In the last couple of months, three activities were created by the teachers, mostly in collaboration with the researcher, which tied directly to the animal thematic unit. More formats on TELE-Web were used to engage the students in the inquiry and writing processes in this unit. The Idea Organizer and

Supported Paragraph became the tools for the Animal Web and Report writing on TELE-web. A Free Writing tool was used so that the students could write a story about a desert animal. During this phase—Phase 3 of TELE-Web implementation—the TELE-Web activities were integrated not only in computer centers but also writing time.

#### Phase One: Explorative Use of TELE-Web

Between February 10<sup>th</sup> and March 10<sup>th</sup>, six TELE-Web activities were created by the teachers and assigned to the students. Two factors seemed to be affecting the teachers' hesitation to make more uses of TELE-Web as a place for literacy learning at this stage of implementation. One was a web site project demanding Cathy's attention. It is important to note that this was also a month when another major computer-related project—8's Great—was carried out. As the survey has revealed, the teachers were concerned about the limited time they had to explore and implement TELE-Web. For the 8's Great computer project, the main teacher in charge was Cathy, who said to me that she felt uncomfortable using Netscape composer to build web site with the students, which she did not know much about. The web site project seemed to relegate TELE-Web to a less important position in their classroom teaching during that period of time. The classroom observation memo recorded the researcher's meeting with Cathy about the plan of using of TELE-Web:

Today, I had a better sense of Cathy's expectation of using TELE-Web. She said that she didn't know that she would be so committed as it appeared now to TELE-Web. She thought at first that I was just going to be an observer and student helper in her classroom. She was thinking of using TELE-Web once or twice a week, or maybe every other week... She told me that they had 8's great as the major project that would last till March. So for a certain period of time, she may not be able to use TELE-Web that much. (*January 25<sup>th</sup> Memo*)

Two factors seemed to be obstructing the teachers' hesitation in using TELE-Web as a main tool in teaching and learning at this stage. One was the other computer website

project that demanded the majority of Cathy's time. The other factor was the teacher's conceptualization of implementing a new technology such as TELE-Web. They started the project incrementally beginning with small steps so that both the teachers and the students were gradually introduced to the functions and operations of TELE-Web.

The first writing assignment on TELE-Web (Figure 4.3) chosen by Cathy was entitled "The Cat Story", which required the students to look at a cat picture on TELE-Web and write a story about it, explaining how the pictured cat got in the tree, how it felt, and how it could get down. Cathy created this picture story assignment without the researcher's help. In the teacher interview, she recounted that she viewed this first assignment as a way to "have the students get familiar with using the new classroom technology TELE-Web and practice writing". (*Interview, Feb. 16<sup>th</sup>*) Cathy actually borrowed the assignment from another TELE-Web teacher, accessing it through the TELE-Web database. She did add a prompt to the assignment, reminding the students to include "two characters, a setting, and a problem". When students logged on using their ID and passwords to the TELE-Web site, they opened Cathy's assignment with the direction written as shown in the timeline of table 4.4.

Figure 4.3 contained the text of a story written by Cindy, a third-grade student with learning disabilities. Notice that Cindy drew upon the details of the picture in her text and made use of the genre-related language in her composition, which was in accordance with the instruction outlined in the prompt area by the teacher on TELE-Web.

Figure 4.3 Cat Story—About a Picture



During phase 1, the second set of assignments on TELE-Web involved a series of spelling activities, as illustrated in Figure 4.4. For these assignments, created by Cathy one week later, the students were asked to spell out words dictated on TELE-Web. However, there were some technical glitches at that time with TELE-Web text-to-speech functions, and these glitches interrupted the expected routines of the class. Both teachers were affected by the technological problem, which distracted the teachers from their guided reading instruction while they replaced the spelling activity with other tasks to keep the students occupied. Meanwhile, the teachers felt more pressure in managing the children's behavior and covering enough curricular material for that day because of the technical malfunction. Since Cathy was the major technology teacher in this classroom, she spent time away from her guided instruction group in the other classroom across the hallway in order to solve the problem. Eventually, she asked the students to forsake the

TELE-web spelling activity and practice the same set of spelling words by typing them onto Microsoft Word instead.

Figure 4.4 Spelling Assignment on TELE-Web



Figure 4.5 Create Word Assignment on TELE-Web



The third type of assignment on TELE-Web during the first phase was assigned to the students on March 10<sup>th</sup>, almost one month after the breakdown of the last spelling assignment. The new activity called “Create a Word”, like “Spelling”, was also a WordShop activity focusing on the development of word skills. Figure 4.5 was a

screenshot of the assignment completed by a student. The purpose of the “Create a Word” assignment was to allow the students to combine given letters provided by the teachers into as many words as possible. The letters themselves as illustrated in figure 4.5 were part of a scrambled word that could be unscrambled and spelled out by the students. This activity was also created as a literacy center or more specifically, a computer center activity. Students logged on with their individual names and passwords and performed this task independently.

In general, teachers’ participation in TELE-Web from the beginning of the semester to the 10<sup>th</sup> of March was characterized their use of above-mentioned activities which served the main purpose of allowing the teachers and the students to explore and experiment with TELE-Web. All of the three TELE-Web assignments implemented at this stage were integrated into the literacy center settings. The major function of the first “About a Picture” TELE-Web activity, according to Cathy, was to familiarize the students with the new technology. Computer center was chosen as the setting for launching these assignments as only one or two students worked on the computers during this time, thus making it easier for the teachers to provide assistance to the students in terms of logging in and opening assignments on the TELE-Web site, which was a little different than other web sites. The second and third TELE-Web activities were “Spelling” and “Create Word” respectively, which were separated by more than twenty days. The selection of the WordShop activities on TELE-Web and the integration of these activities into center settings also suggested that the teachers viewed TELE-Web activity as any other computer center activities. That is, during phase 1, TELE-Web was used as a site where the students could try out the new technology from the smaller activities with



which they could quickly learn to engage without much adult support. Besides, it also was used so that the students could have fun, enhancing their motivation to explore literacy in ways that were different from those offered by other settings in the classroom. That the glitches occurred for the Spelling assignment also indicated that Cathy did not preview the assignments as students before assigning it to the students. This might signify that the teachers tended to view TELE-Web as a stand-alone that relieved them of instructional responsibilities once they helped the students to log on and find the assignments, just as what they would do for other computer center activities. The teacher did not expect problems or think in terms of the students' experience with TELE-Web activities.

Consequently, the teachers regarded the glitches that occurred during the "Spelling" assignments as disruptive to their classroom dynamics because the technical problems distracted the teachers away from other commitments such as guided reading instructions. They found themselves faced with an emergency for on-spot troubleshooting and an alternative plan was necessary. As a result, the teachers moved slowly and cautiously towards more active use of TELE-Web in the first phase, stating that they would need more time to become skillful and familiar with TELE-Web activity settings. The uncertainty revolving the use of the new technology and the demand of instructional planning around this project contribute to the teachers' view that time was a key factor and they needed to slowly move towards implementing TELE-Web on a wider scale. Another factor that influenced the use of TELE-Web during this initial phase was that the teachers, especially Cathy, were preoccupied with the major month-long computer project—8's Great. Unsure of the website building technologies and nervous about the

instructional schedules, Cathy mentioned again time as a key factor in her slow move in her implementation of TELE-Web. All in all, this initial stage of TELE-Web use represented a launch of the innovation mostly for the purposes of testing and exploring the technology and its potentials. Furthermore, the new technology was viewed as a site where the students could engage in learning in a fun way and without much adult support, just as they did in the past with the computer centers.

### Phase two: Adapting TELE-Web

The next TELE-Web assignment marked the teachers' entry into assigning TELE-Web a more central role in their curriculum. The period of time between March 10<sup>th</sup> and April 15<sup>th</sup> included a spring break that lasted for a week. However, the teachers managed to put up on TELE-Web a major classroom activity titled "Safety Rules" that combined the theme topic of the time—"health and safety"—and the "Compare/Contrast" activity format offered on TELE-Web. Unlike the previous trial runs on TELE-Web, this assignment was integrated into the main literacy curriculum as this activity was aimed at providing the students with opportunities to practice using Venn diagram as a tool for writing. The following excerpt from the memo written immediately after the researcher's meeting with the two teachers showed that Venn diagram was an emphasized curricular area in the classroom and that it was considered by the teachers as on the top list of activities they intended to implement on TELE-Web.

She mentioned what she had been doing for language arts mainly: Persuasive writing (recently), Venn Diagram, Character mapping, Literacy centers, Guided reading, Writing, Shared reading, and Poems

Amy then asked Cathy which activity on TELE-Web they would start next week. Amy suggested doing partner Venn diagram. It is a productive meeting. We together are moving the project forward. The first activity that the teachers will set up on TELE-Web is partner Venn diagram. It seems to be a natural extension

of what has been going on in their classroom. The teachers are already familiar and skillful with having kids do stuff in pairs. So a partner Venn diagram activity is what they naturally thought of doing on TELE-Web.

(January 29<sup>th</sup> Memo, 2002)

Although the teachers had indicated Venn diagram as the first TELE-Web activity they might use, they did not implement it until March when they had explored TELE-Web by taking small steps (first with an “About a Picture” assignment, and later with WordShop activities such as Spelling and Create Word). In this second stage, the teachers proceeded to use TELE-Web as an important venue to supplement their teaching of Venn diagram, an important organizational strategy for writing. For this purpose, Cathy made an adaptation to an existing Compare/Contrast writing activity on the TELE-Web site. Figure 4.6 demonstrates the Compare/Contrast assignment on the students’ interface.

Figure 4.6 Compare/Contrast Safety Rules Assignment on TELE-Web

The screenshot shows a web browser window titled "Untitled Document - Microsoft Internet Explorer". The address bar shows "http://www.teleweb.org/". The page content is titled "ASSIGNMENT 'Safety Rules'" and includes a sidebar with "ACTIVITIES" and "INFORMATION". The main content area is titled "Compare/Contrast 03/10/2002" by Travis Allen (Trav)". It features a Venn diagram icon and a question: "How are safety rules at home different than the ones at school? How are they the same?". Below the question is a table with two columns: "Alike" and "Different". The "Alike" column contains the text "I can push my brothers on the swing at home." and the "Different" column contains the text "we can not push kids on the swing at school." There are also buttons for "My Question" and "Post it".

| Alike                                        | Different                                    |
|----------------------------------------------|----------------------------------------------|
| I can push my brothers on the swing at home. | we can not push kids on the swing at school. |

In this activity, the students were asked to “compare and contrast safety rules at home and at school”. The foundation for the teachers’ implementation of this activity was thus two fold: instructional considerations—the ongoing thematic unit and the similarity between the activities of TELE-Web and the emphasis in the literacy curriculum. There were still differences between TELE-Web and their curriculum which needed to be bridged. Venn diagram has been the focus throughout the literacy instructions observed in this classroom. The Compare/Contrast chart in above figure did not include the overlapping circles with the point of commonality between two concepts in the middle, as displayed in the classroom. Instead, it provided two columns titled “Alike” and “Different”. Nevertheless, this activity aligned fairly well with the Venn diagram lessons that were taking place in the classroom. Therefore, the Compare/Contrast activity on TELE-Web met the criteria and needs of the teachers at this stage of implementation of the innovation. The integration of Compare/Contrast activities for the writing curriculum of the classroom also confirmed the teachers’ objects of using TELE-Web to reinforce the students’ literacy learning as documented in the first week’s researcher-teacher meeting. They had intended to launch the Compare/Contrast activity during the second week of their involvement in the project. However, it took them till middle of March to realize this goal for reasons mentioned in the discussion of their first phase of TELE-Web implementation. The realization of the Compare/Contrast activity indicated the teachers’ adaptation of TELE-Web beyond experimental and explorative purposes.

### Phase three: The Expansion Stage—Deeper Integration of TELE-Web

The third phase of TELE-Web implementation started from the first week after the elementary school’s spring break. For their thematic unit about animals, the teachers

created two major connected activities on TELE-Web beginning on April 15<sup>th</sup> and ending in early June: Animal Web, and Animal Report.

As a result of researcher-teachers collaborations, the teachers decided to make an animal inquiry project using both TELE-Web tools and the traditional paper and pencil writing tools. The idea that the class should be divided in half –with half writing their webs and reports on TELE-Web, and the other half writing their reports with paper and pencil—sprung from the researcher’s proposal to conduct a design experiment that could provide information for both researchers and teachers about the role of TELE-Web in their use of webbing tools and writing a report on the animals. Table 4.5 below outlined the activities involving the use of TELE-Web or paper and pencils in the thematic unit projects. The figures 4.7 and 4.8 were representative of the Animal Webs and Animal Reports done on TELE-Web.

**Table 4.5: The Animal Thematic Unit Project**

|                               | <b>Group 1</b>                                                                                                                                                                                                                                                         | <b>Group 2</b>                                                                                                                                                                                                                                                     |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Literacy Activity Name</b> | TELE-Web Animal Web;<br>TELE-Web Animal Report                                                                                                                                                                                                                         | Animal Web;<br>Animal Report                                                                                                                                                                                                                                       |
| <b>Goals</b>                  | Research on animal facts and habitats;<br><br>Learn to Categorize knowledge about a chosen animal using idea organizer on TELE-Web;<br><br>Label each category; Research facts and write them down under each category;<br><br>Write up a report based on these facts. | Research on animal facts and habitats;<br><br>Work on categorizing facts about a chosen animal using idea organizer on paper;<br><br>Label each category; Research more facts and write them down under each category;<br><br>Write up a report about this animal. |
| <b>Tools</b>                  | TELE-Web idea organizer;<br>TELE-Web supported paragraph;<br>Other TELE-Web features such as:<br>Prompts;<br>On-line spell check;<br>Share and Preview buttons                                                                                                         | Paper and pencil;<br>Graphic organizer (exactly looking like the idea organizer on TELE-Web) sheet on paper;                                                                                                                                                       |
| <b>Resources</b>              | Teachers, a teacher aid, and the researcher;<br>Books, classroom print resources, etc.                                                                                                                                                                                 | Same.                                                                                                                                                                                                                                                              |

|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                    |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data         | <p>Students' discourse on TELE-Web;</p> <p>Students' navigation behavior, time spent on each task, interaction with each other within or across pairs, roles of each student, and use of certain TELE-Web tools, etc.; (process)</p> <p>Students' products, content of their writing (both quantity and quality);</p> <p>Students' perception of their participation on TELE-Web idea organizer task; their likes and dislikes, etc.</p> <p>Student-teacher interactions</p> | <p>Discourse, behaviors, conversations, (I might need several audio tapes?)</p> <p>Teacher-student interactions; student-student interactions with pairs and even across pairs</p> |
| Participants | Pairs                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Pairs                                                                                                                                                                              |

Figure 4.7 Animal Web Assignment (Idea Organizer) on TELE-Web

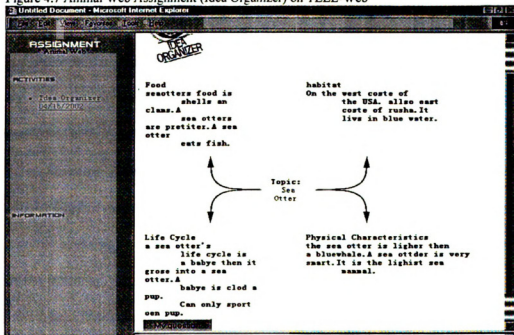
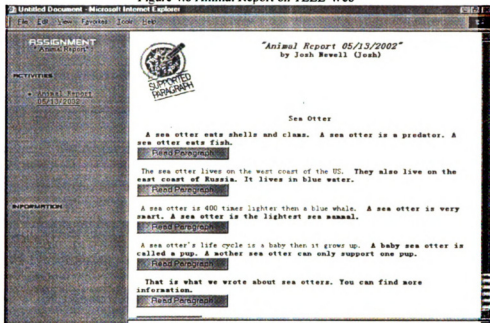


Figure 4.8 Animal Report on TELE-Web



For the first time, the teachers integrated TELE-Web as part and parcel of an inquiry-based project for the animal thematic unit. Spanning a period of two months with an entire cycle of activity, the project engaged the students in choosing an animal for their research, learning about animals, organizing them into animal habitats, conducting research about facts of their chosen animals, using idea organizers to categorize the facts, writing a report, and finally making a presentation of what they found about their animals in front of the students' parents. As mentioned earlier, the class was divided in half.

Each teacher took charge of a group of students who were assigned either paper and pencils or TELE-Web, as tools for their construction of animal webs and reports. Since Cathy was the teacher who worked with the computers in the classroom, she led the TELE-Web group through the research and writing process throughout the animal thematic unit activities. For the same undertaking, Amy kept her group of students in the main classroom when it was time for the students to write their webs and reports. The

researcher made the assignment of the students into the two different groups based on several considerations. First, the students in each group were balanced on grade level, special education status, and gender as much as possible. They were listed in the ranking order from high to low according to their literacy performance in the class as reported by their teachers. Such ordering allowed the researcher to assign students of similar levels to each group. Then, the assignment was inspected and adjustments were made so that there was balance on both gender and disability for each group. Second, the teachers participated in choosing the students for either the paper-mediated animal theme activities or the TELE-Web ones. Cathy, for example, voiced her concern about which students would be in the TELE-Web group: "If we do this, I would be very selective about whom I choose to do that. Like I would be concerned about doing some of that [working on TELE-Web for the Animal Web and Report] with some of the first graders." (*Interview, Mar. 20<sup>th</sup>*). It was then agreed that the students would better participate in these TELE-Web activities if they worked with partners as Cathy suggested as follows in the researcher-teacher planning meeting:

Maybe if we pair them, pair them with some of the partners, and depending on the pairings, I could integrate some of those younger graders, with someone I would feel comfortable doing this completely.

I think we have planned for them to do it in pairs, this assignment in general. I do feel that for some, it is to pair them up, for those children that either have difficulty writing, or those children who may not be as computer-literate as we would like if we made an assignment such as this, because we found that that was the most helpful, and giving them opportunity to work cooperatively.

(*Planning meeting, March 20<sup>th</sup>, 2002*)

Cathy placed great emphasis on the instructional accommodation to the diversity in terms of both computer literacy and ability/disability of the students in this multi-age inclusion classroom. At this point, her role as an object-driven participant of the TELE-



Web projects emerged as more salient as she treated the third-phase TELE-Web implementation with more ownership. Instead of using TELE-Web as a stand-alone technology, Cathy assumed major responsibility in shaping the identity of TELE-Web through her planning of TELE-Web Animal Web and Animal Report activities for the thematic unit. Cathy's participation in the implementation of TELE-Web during this phase indicated her stronger influence in shaping the role and function of TELE-Web as well as her deepened integration of TELE-Web into the central literacy curriculum.

The following conversation with Cathy was evidential of her salient goal (object) of using TELE-Web to meet the students' diverse needs in this inclusion classroom—in this case—to practice paragraph writing in this multi-grade inclusion context:

You know the paragraph idea will be great for a third grade student who may not be getting as much of the structured paragraphed writing of a third grader. They are getting those writing skills, but maybe not into several paragraphs.

*(Researcher-Teacher Planning, March 20<sup>th</sup>)*

Even before the implementation of the Web and Report activities on TELE-Web, the teacher established a goal for the project that was distinct from that for the typical uses of computers in the past and from the goals set for the previous TELE-Web activities. In these animal series assignments, the students were expected to hone their paragraph writing skills with the use of formats available on the TELE-Web site including the webbing tool "Idea Organizer", whereas the students had been exploring websites for diverse experiences or experimenting with TELE-Web on smaller activities before. Even the Compare/Contrast assignment was much smaller in scale compared to the Animal Web and Report activities. In addition, the students' differences were fully considered as a part of the instructional package accompanying the use of TELE-Web. Other instructional accommodations included the size of the text boxes on TELE-Web,

necessity of modeling of TELE-Web Idea Organizer and Supported Paragraphs for the Web and Report assignments, organization, and structuring of these activities:

If we are having children research this ahead of time, but they are doing research on those books. So those children on the computer get a fact and then come onto the computer or are they looking at a book... or are they writing on a paper and then coming to the computer? Over there it's very crowded especially when you have four children on that one side. Cause if you are thinking two on each computer, with children trying to get a book. I don't know if the book could be on their lap or if we can give them special clipboard. We don't have them but maybe we can say to them "you are the star reporter" ...

*(Researcher-Teacher Planning, March 20<sup>th</sup>)*

Not only did the teacher adapt TELE-Web tools for instructional purposes by integrating it into the animal thematic unit, but also her views toward the technology seemed to be mediated by the activity settings created as a result of allowing the students to work on the project directly on the TELE-Web site. In the following conversation, Cathy showed awareness of the additional teacher role of modeling as essential to the smooth progress of the TELE-Web activities:

Well...goes along with the same concern I had with that compare/contrast. This may be a little easier to do versus that compare/contrast, but without having that modeling or something before hand, I don't feel comfortable having them go directly to the computer. ...

*(Researcher-Teacher planning, March 20<sup>th</sup>)*

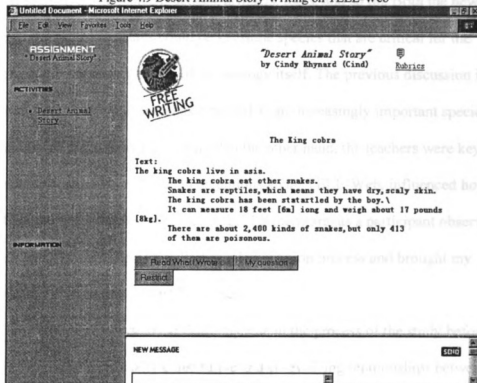
The need for modeling was highlighted as an important teacher responsibility, which suggested that the teacher's implementation of TELE-Web also acted as a mediator of her instructional planning and accommodations for learners with different abilities in this classroom. Through the enactment of TELE-Web, Cathy's conceptualization of this technology shifted, from experimentation and getting familiar with the technology in the first phase of its implementation, to the use of the Compare/Contrast activity on TELE-Web as an important venue for practicing a core

strategy—Venn diagram in the second phase, and to a deepened analysis of TELE-Web activities in terms of instructional accommodations and structuring in the third phase of use. The teacher and the technology evolve through the goal-oriented actions of implementing TELE-Web.

The only independent work assigned on TELE-Web in this phase was the Desert Animal Story assignment created in between the Animal Web and the Animal Report activities. Figure 4.9 showed this assignment as produced by a third-grade LD student named Cindy. The students engaged in writing a story about an animal using this Free Write format on TELE-Web as a computer center activity during the thematic unit. The purpose of the Desert Animal Story was to give the students some more opportunities to practice writing about the animals they had been learning in this unit. Unlike the Supported Paragraph used for the Animal Report assignment, the Free Write did not provide “topic sentences”, “add sentence”, “add paragraph”, and “concluding sentence” text boxes on the TELE-Web site. Instead, the students had access to a title box, text input area, in addition to the teacher- created prompts or rubrics, which were “remember to use capital letters and to put in periods”, and “Must use capital letters and periods. Must have at least 3 sentences” respectively.

Further conversation with the teachers revealed that their intention behind this assignment was to engender an opportunity for the students to think about the habitats in connection with the animals they had learned in this project. This activity was also tied to the animal thematic unit and used to engage the students in pursuing knowledge and writing on a desert animal of their choice.

Figure 4.9 Desert Animal Story Writing on TELE-Web



In summary, the third phase of the teachers' implementation of TELE-Web was more advanced than in the first two phases. The teachers had a more deepened knowledge about TELE-Web activities and the assignments they created suggested increasing complexity in the activity settings and literacy knowledge the students were asked to practice on TELE-Web. Overall, there was an increased integration of TELE-Web into the central literacy curriculum of the thematic unit.

#### Co-Evolution of Species: Unpacking TELE-Web Implementation

In this section, I intend to apply both information ecology perspective and Activity Theory to the unpack the interrelationships between TELE-Web and the contexts in which the implementation of this new technological species was embedded. According to technology as Information Ecology metaphor (Nardi & O'Day, 1999), an innovation acts as a new species to interact with a network of interrelated species of the preexisting

ecological system: participants, practices, artifacts, tools, and so on. Both the new technology and the participants could be keystone species that are critical for the continual growth and development of the ecology itself. The previous discussion in this chapter indicates that TELE-Web has emerged as an increasingly important species with its own niches in the literacy curriculum. On the other hand, the teachers were keystone species whose practices, values, and perceptions about TELE-Web, influenced how TELE-Web was implemented in this ecology. Furthermore, as a participant observer, I also was a participant in the TELE-Web implementation process and brought my influences on the trajectory of TELE-Web use.

Hence, it is necessary to explicate my role in the process of the study before I move on to unpack the mutually constitutive and co-evolving relationships between the teachers as keystone species and TELE-Web as a new species to the ecology.

#### Researcher's Mediation Roles

As the researchers in this classroom, I also played a part in shaping the implementation of TELE-Web in this classroom. My mediational role worked in a dynamic relationship with the teacher participants characterized by their beliefs, instructional practices, perceptions, and goals for using the TELE-Web activities. Through the interactive process, the goals and identities of both the researcher and the teachers changed to produce certain outcomes in terms of the use of TELE-Web in this local context. Table 4.7 was a representation of: (a) what my roles as the participant observer involved in terms of my interaction with the teachers and the activities I engaged in, and (b) how the teachers (esp. Cathy) utilized my existence as the researcher to achieve their goals.

During the phase 1—the explorative stage of TELE-Web implementation, my interaction with the teachers, first of all, revolved around gaining entry to the classroom locality as a researcher on the larger TELE-Web Project. In order to be a legitimate participant observer, it was essential that I conversed and negotiated with the teachers my purpose and plans for conducting research in their classroom. To this end, I clarified my participant-observer roles as a researcher, while making compromises by agreeing to assisting on their ongoing website project. Entry negotiation requires time, patience, and sensitivity to the rhythms and norms of a group, according to Marshall & Grossman (1989). Secondly, my major activities in this period of time included classroom observations and conversations with the teachers with a view to confirm and disconfirm values and norms in this naturally occurring context.

In addition, my researcher role necessitated other interaction and activities with the teachers in this classroom including: acquainting the teachers with the TELE-Web features and activities, creating different activities as a way to demonstrate their utilities for instructions and reinforcement of literacy skills, and conducting classroom observations in order to understand the context of TELE-Web implementation.

In response to my researcher functions, the teachers involved me into their website project that took place after the morning language arts lessons. As the teachers started the implementation of TELE-Web began, they indicated that they would need to use TELE-Web activities bit by bit in an incremental manner. Both teachers expressed interest in Venn diagram (Compare/Contrast Activity on TELE-Web) as their first choice among all activities they intended to implement. It seemed that my researcher role did gain myself a good entry into the classroom because the teachers were ready to set up

time for our meetings to talk about the literacy curriculum and norms, their pedagogy, or perceptions and plans of implementing TELE-Web. However, the outcome—the TELE-Web activities created by the teachers—suggested that their actions were directed more by their own concerns at this stage: time and the need of starting with smaller and more manageable TELE-Web activities.

Table 4.6 Researcher Mediation Role

|                                                   | Researcher's interaction with teachers                                                                                                                                                                                                                                                                                                                            | Researcher's major activities                                                                                                                                                                                                                                | Teachers' activities and interaction with the Researcher                                                                                                                                                                                                                   | TELE-Web activities (Teacher-Produced, Teacher/Researcher-Produced, or Researcher-Produced)                                                                                                   |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Phase 1<br>(From late January to middle of March) | <ul style="list-style-type: none"> <li>Clarified researcher role for teacher</li> <li>Gained entry to the classroom by providing assistance to non-TELE-Web computer projects</li> <li>Explained TELE-Web features and activities to Cathy</li> <li>Created various activities as demonstrations of what could be used in relation to their curriculum</li> </ul> | <ul style="list-style-type: none"> <li>Observed established instructional practices</li> <li>Identified areas of literacy curriculum in which TELE-Web could be integrated</li> <li>Understood the teachers' perceptions of computer and TELE-Web</li> </ul> | <ul style="list-style-type: none"> <li>Asked the researcher for assistance with a website project</li> <li>Suggested using Venn diagram (Compare/Contrast) activity as the first TELE-Web activity</li> <li>Expressed the need to introduce TELE-Web bit by bit</li> </ul> | <u>Teacher-Produced Activities</u> <ul style="list-style-type: none"> <li>The Cat Story (About a Picture)</li> <li>Spelling 1, 2, 3 (Spelling)</li> <li>Making words (Create Word)</li> </ul> |

|                                                      |                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Phase 2<br>(From middle of March to middle of April) | <ul style="list-style-type: none"> <li>• Provide on-site support for the teachers</li> <li>• Inquired about their curricular goals in connection with possible TELE-Web activities</li> <li>• Planned the implementation of design experiments</li> <li>• Conducted on-going conversations with Cathy about curriculum and TELE-Web use</li> </ul> | <ul style="list-style-type: none"> <li>• Observed lessons and students' use of TELE-Web</li> <li>• Monitored and supported students' use of TELE-Web features such as 'save', 'share', 'spell check', and 'preview', etc.</li> <li>• Introduced some children to message function of TELE-Web</li> <li>• Assisted the students on computers when it was necessary</li> <li>• Continued my assistant role on the class's website project</li> </ul> | <ul style="list-style-type: none"> <li>• Integrated TELE-Web into writing and the concurrent unit of Health and Safety</li> <li>• Gave suggestions about the details of implementing the design experiments</li> </ul>                                                                                                              | <p><b><u>Teacher-produced Activity:</u></b></p> <ul style="list-style-type: none"> <li>• Safety Rules (Compare/Contrast)</li> </ul>                                                                                                                                                                                             |
| Phase 3 (From early April to June)                   | <ul style="list-style-type: none"> <li>• Supported the teacher in the creation of the design experiment activities</li> <li>• Conducted formal interviews besides informal conversation with and the teachers</li> </ul>                                                                                                                           | <ul style="list-style-type: none"> <li>• Observed students' engagement with TELE-Web activities</li> <li>• Provided scaffolding and other support to the students while they worked on TELE-Web</li> <li>• Interviewed the students about their work on the designed activities</li> </ul>                                                                                                                                                         | <ul style="list-style-type: none"> <li>• Asked the researcher if she needed to put in prompts for the design experiment activities</li> <li>• Modeled the use of TELE-Web Idea Organizer and Supported Paragraph</li> <li>• Assisted in the students' work during their engagement with the design experiment activities</li> </ul> | <p><b><u>Teacher/Researcher-Produced Activity</u></b></p> <ul style="list-style-type: none"> <li>• Animal Web (Idea Organizer)</li> <li>• Animal Report (Supported Paragraph)</li> </ul> <p><b><u>Teacher-Produced Activity:</u></b></p> <ul style="list-style-type: none"> <li>• Desert Animal Story (Free Writing)</li> </ul> |

In the second phase of TELE-Web implementation, my role was less of a researcher entering the setting than a participant-observer who were more involved in such responsibilities as monitoring and supporting students' work on TELE-Web,



introducing features as needed by the students during their engagement with the TELE-Web activities, and planning with the teachers for the designed experiments in connection with the upcoming animal inquiry unit. My previous commitment to their 8's Great website project continued but approached to the end. During this stage, there was also increased attention on what activities could be enacted in this classroom. I scheduled meetings with Cathy and introduced various possibilities of using TELE-Web to reinforce the literacy skills and strategies emphasized in their curriculum. It was a time when my researcher role became stronger and yet it worked in close proximity with the teachers' goals and their curricular highlights.

The teacher responded to my researcher activities by showing appreciation of the value in multiple ways in which TELE-Web might enhance the students' literacy performances in the reading and writing areas. Meanwhile, she maintained her view that she should implement TELE-Web bit by bit. For this period, Cathy created one assignment called "Safety Rules", which was a Compare/Contrast activity requiring the students to write about rules that applied to their home under the 'alike' category and rules that applied to the school in the 'difference' area. This activity was integrated into the concurrent 'Health and Safety' thematic unit of the month and aimed to reinforce the students' learning of Venn diagram—an important skill taught in this classroom.

Cathy's implementation of TELE-Web in this phase was seemingly influenced by the researcher's participant-observer status in that her interaction with me shifted from uncertainty of my roles and the use of TELE-Web in the first phase to making detailed suggestions on how design experiments might be conducted in her classroom. She was

more heavily involved in thinking and planning about TELE-Web activities so that it was more integrated in the central literacy curriculum connected to the thematic units.

The third phase of the TELE-Web implementation was a period of closer collaboration between Cathy and me, which resulted in the three assignments related to the animal inquiry unit. As the researcher, I participated in the enactment of these TELE-Web activities by monitoring and supporting the students' work, observed and took field notes of their interactions with and around these activities, and interviewing and conversing with both the students and the teachers about their perceptions of their TELE-Web work. My interactions with Cathy focused on supporting her in the finalizing of the details in the implementation of the design experiments of Animal Web (Idea Organizer) and Animal Report (Supported Paragraph).

It was important to mention that the researcher had to make significant compromises in the design experiments. Originally designed to compare the students' reports using TELE-Web versus paper and pencil tools, the Animal Web and Report activities were conceived by the researcher as a way to engage all students in the classroom by rotating them to the two conditions over several weeks' of time. The reality was that half of the students in the classroom used TELE-Web to finish the animal inquiry project while the other half of the class employed paper and pencil tools to complete the project with the other teacher Amy. The change in the design was based in the teacher's consideration of manageability of time and instruction.

The enactment of TELE-Web technology in the last thematic unit suggested that the teacher's concerns about time and management also had great influence over how TELE-Web was used. My interactions with Cathy were useful in directing the teacher's

attention to the Idea Organizer and Supported Paragraph activities. The teacher also consulted me about the need to put any prompt for these assignments, indicating their awareness of my research agenda. However, the teacher was the main crafter of how these activities were actualized in the classroom so that they served real functions catering to their curricular emphases of that time. In addition, Cathy created the Desert Animal story assignment by herself without my involvement, further suggesting the teacher's participation in TELE-Web enactment as driven by their needs and perceived role of TELE-Web in the animal thematic unit.

To sum up, I have served the role of a mediating species in the process of the teacher's implementation of TELE-Web. That is, I first focused on gaining entry and rapport with the teachers while moving to more active roles in helping the teachers set up activities that might be conducive to the development of the children's literacy performances. The second and third phase of the teachers' use of TELE-Web reflected my interactions with them in that a set of TELE-Web activities were agreed upon and subsequently assigned to the students. My participating role resulted in the teachers' awareness of the research agenda and also allowed me to understand the teachers' goals for these activities as shown by their organization and structuring of these chosen TELE-Web activities. In the process of implementing TELE-Web throughout the three phases, the researcher and the teachers co-evolve as participants of integrating TELE-Web activities into the classroom literacy curriculum.

#### Mutual Evolution of Teachers and TELE-Web in the Activity Settings

The implementation process discussed in the preceding sections has shed light on the interconnectedness of the new technological tools offered on TELE-Web and the

preexisting practices. For one thing, the teachers' perceptions towards computers in general inclined them to use computers as fun experiences for students during literacy centers. Word processing, CD-ROM, and games were among the most common computer center activities present in the classroom before TELE-Web was introduced. Otherwise, the students might be given a web site with which they could work independent of the teachers' help for most of the time while the teachers gave guided reading lessons. It was also found that the teachers viewed TELE-Web as having great potentials for the students to practice important literacy skills and strategies. But they approached TELE-Web incrementally by going through three phases of TELE-Web implementation: (1) explorative and testing (Phase 1); (2) adapting (Phase 2); and (3) expansion and deepened integration (Phase 3). The historical timeline of the activities, the teacher-created TELE-Web activities, combined with analyses of the processes of TELE-Web implementation pointed to the hypothesis that TELE-Web and teachers as keystone species had coevolved as two species of the inclusion classroom ecology. Drawing upon Nardi and O'Day (1999)'s information ecology approach— a “human participatory ecology approach to technology use in actual settings”, the innovation took on meaning and identities as a result of its interconnection with the teachers' beliefs and practices in their implementation of TELE-Web embedded in the existing contextual relationships. Equally, TELE-Web left traces on the teachers' participation of its use for instructional purposes. This final section of chapter 4 presents a highlighted mutual adaptation process of TELE-Web and the teachers as keystone species and decision makers of TELE-Web use.

## Teachers' Construction of TELE-Web.

The study found that the teachers' decisions over TELE-Web implementation, or their construction of TELE-Web, were mainly related to the following aspects: familiarity with TELE-Web, teachers' general perception of computer technology, their beliefs about the potentials of TELE-Web, concern for time, connection with curriculum, and ease of management. All of these factors defined the teachers as subjects or participants of the TELE-Web activities and shaped their decisions upon using the new technology in their literacy curriculum. These underlying 'traits' of the teachers, which were discussed in the analyses of previous sections, will be unpacked through the Activity Theory lens again in order to shed light on the teachers' influence over the construction of TELE-Web in this classroom. Figure 4.10 below illustrates the teachers as active agents defining what TELE-Web and the outcome of TELE-Web uses in this room.

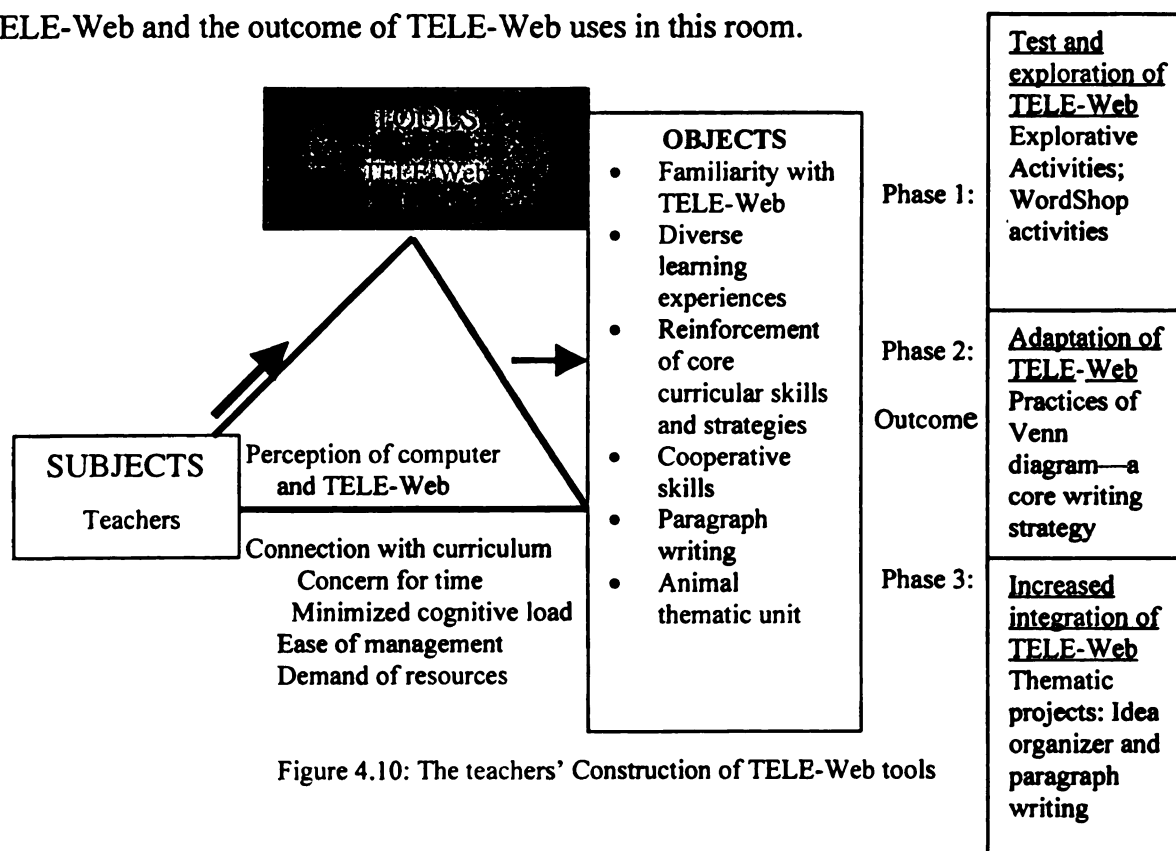


Figure 4.10: The teachers' Construction of TELE-Web tools

The teachers were intentional users of the TELE-Web technology in that their actions were goal-oriented. In the triangle of figure 4.10, the objects were the curricular goals that reflected the teachers' pedagogical beliefs, literacy practices, and beliefs about technologies as learning tools. The teachers' belief system, or the traits of the teachers, could be summarized by the five major factors listed in the middle of the triangle. These perceptions regarding instruction and technology were the foundations of the decision making process upon which the teachers implemented TELE-Web. Combined with the objects of the instructional processes, these factors created an outcome of three-phase implementation of TELE-Web tools.

For example, the teachers' objects intended for the TELE-Web activities during phase one of its implementation focused on getting the students as well as themselves familiar with the new technological tools and activities offered on the TELE-Web site. The first activity, in particular, was to "give myself [Cathy] practice in creating a simple assignment to get the kids accustomed with a simple assignment and using TELE-Web (*Teacher interview*). Thus, TELE-Web was arranged as a computer center activity during which time the students could test out a simple activity such as the first TELE-Web assignment—Cat Picture Story writing. This basic objective also drove the teachers to create some WordShop activities to practice basic word skills such as spelling and creating words using given letters on TELE-Web, the outcomes of the teachers' implementation of TELE-Web at this phase.

Aside from getting familiar with the TELE-Web tools on an incremental basis, the teachers' other objectives included using TELE-Web to motivate and provide an alternative learning experience for the students. Like the existing computer center

activities, TELE-Web was utilized as a computer center activity where the students might be more motivated to practice literacy skills than with more traditional tools. As a result, another outcome of using TELE-Web in the first phase was to provide incentives to the students' learning in the form of practicing spelling words on TELE-Web in the computer center time.

During the second phase of the teachers' implementation of TELE-Web, the major goals of the activities created on the TELE-Web site was to reinforce the students' writing strategies such as Venn diagram—a core curricular skill emphasized in the classroom. Called “Safety Rule”, this assignment used the Comparison/Contrast format provided on TELE-Web, which resembled the Venn diagram taught in other lessons in this classroom. The teachers were asked to implement TELE-Web on a higher level at this stage because they had acclimated themselves to the new technology through the previous assignments created for testing purposes during the first phase of their use of TELE-Web. The condition was ripe for tying the innovation more closely with the teachers' objects of reinforcing skills and strategies that were emphasized in the literacy curriculum, which Venn diagram was a major part of.

In the third phase of the teachers' implementation of TELE-Web, three theme-related activities were created, including two TELE-Web assignments, Animal Web and Animal Report, and a Desert Animal Story assignment. In this phase, the teachers' main goals were to immerse the students into an animal research process for an extended period of time. The implementation of TELE-Web in this phase was strongly influenced by the teachers' object of cultivating and reinforcing the children's skills in using mapping skills for writing up a final report on their chosen animals. When the researcher

suggested that the teachers employ TELE-Web Idea Organizer and Supported Paragraph tools for the animal report project, the teachers, especially Cathy, agreed to encompass these activities in the thematic unit. Through researcher-teacher collaboration, the class was divided into half, which had been discussed in the previous sections. In the TELE-Web group, students worked in pairs to pursue the study of their chosen animal for a lasting period of time. For over a month, they were immersed in the TELE-Web animal web and animal report activities for several days a week, during which time they interacted with their partners, researched, used TELE-Web Idea Organizer and Supported Paragraph to help them organize facts and write the report.

This final stage of implementation of TELE-Web differed from the first two phases in terms of the goals and outcomes of the activities. As Figure 14 implied, the outcome was an increased integration of TELE-Web: more complex activities and extended use across two months of time.

The Animal Web and Animal Report assignments were also connected to the main part of the curriculum at the time closely, namely, the animal thematic unit that integrated science and language arts. In the construction of these TELE-Web activities, Cathy emphasized that the supported paragraph idea (writing the Animal Report with TELE-Web supported paragraph) would be “great for a third grade student who might not be getting as much of the structured paragraphed writing of a third grader... They are getting those writing skills, but maybe not into several paragraphs...” (*Cathy interview April 4<sup>th</sup>*)

All in all, the implementation of TELE-Web was in a great part dependent on how teachers could connect the new technology and find it a place in the current curricular



emphasis. The teachers' decision-making over what and how TELE-Web activities might be used during the three phases of their implementation of this innovation have shaped the meaning and functions of TELE-Web in the existing literacy curriculum. Figure 4.11 illustrates the coming to be of a TELE-Web curriculum as enacted by Cathy and the ongoing construction of the activity settings in the classroom during the semester of the study. The axis represents three progressing phases of TELE-Web implementation from February to the first part of June. Each circle indicates an assignment that Cathy created on TELE-Web for the corresponding the phase of implementation. For example, circle 1 is the About a Picture assignment ("Cat Story")—the first TELE-Web activity made available to the students, the purpose of which was to familiarize both the students and teachers with TELE-Web technology. The left column describes the TELE-Web activities' alignment with the literacy curriculum. In other words, Cathy crated the assignments on TELE-Web to fulfill specific goals in her curriculum in reading, writing, or other domains. The right arrow line shows the features such as prompts and instructions that the teacher incorporated and made available to the students when she created these assignments on TELE-Web. In addition, the graph distinguishes the TELE-Web activity settings by indicating which activities were performed by individuals alone and which by a pair of students working in collaboration with each other.

Hence, figure 4.11 captures the mediation relationship between the teacher participants and the technology tool. It presents the teachers' use of the TELE-Web tools



in terms of what and how: What curricular objects (goals) did the TELE-Web activities align with in this classroom? How was TELE-Web used to achieve the goals?

The alignment of TELE-Web activities in the first phase was characterized with the teachers' use of this new technology as a venue of reinforcing the students' vocabulary words. During the entire month, the teachers focused mainly on the word-level reading and the students were assigned to work individually at the spelling words on the TELE-Web site during the computer center time. For these assignments, Cathy only used instruction text box to put in the directions for the word activities. In the same phase, the teacher also used a writing assignment using the About a Picture tool on TELE-Web. This activity was created to serve the main purpose of testing the new technology and learning about its operations on the part of both the teacher (Cathy) and the students. Therefore, it was not in alignment with a specific curricular goal per se. It was an activity for trial and experimentation, a mark set before the teachers moved forward to their destination. In a sense, the About a Picture activity, which was borrowed from the TELE-Web activity database, was an entry point the teachers have picked to become further involved with the use of TELE-Web. Online prompts were employed for this assignment. The teacher tried to figure out the features on the site gradually by starting slowly in the implementation process.

In the second phase, Cathy created the 'Venn diagram' writing activity (Compare/Contrast on TELE-Web) in order to engage the students in practicing the Venn diagram skills on a topic related to the health and safety thematic unit. The TELE-Web activity was aligned with the teacher's emphasis on a higher-order thinking skill required in the central curriculum. Instructions were included in the assignment. It was also the

first time for the teachers to pair up the students for this writing activity. Not only was this assignment more aligned with an emphasis on the higher-order process in the literacy curriculum, but also it gave rise to a change in the allocation of the students' responsibilities during their writing performance.

During the first and second phases of implementation, instruction boxes were made accessible to the students when performing the reading or writing tasks. Prompt was only used for the About a Picture assignment when Cathy tested the functions and features of the TELE-Web site. As the teacher became more familiar with the activities on TELE-Web, she used both instruction and prompt features for all the assignments (5, 6, & 7) she made during the third phase. In this last stage, the focus of the activities were increasingly aligned with the complex literacy skills of using web to organize ideas and write a paragraph of report on the chosen animal the students had conducted some research about. These assignments were also more related to the writing domain of the literacy curriculum. With the growing complexity of the activities, the scaffolding tools such as prompts as well as instructions were incorporated into the activities on the TELE-Web to provide more assistance to the students. For Animal Web and Animal Report assignments, the students were assigned partners to work for an extended period of time on the two projects, in which they engaged in research, brainstorming, discussion and writing while working on TELE-Web in both literacy center and writing settings.

What Figure 4.11 attempts to capture is a dynamic and coevolving relationship of TELE-Web technology and the teachers' practices as highlighted by their instructional goals for the literacy curriculum in this multi-age inclusion classroom. TELE-Web was influenced by the goals or objectives Cathy set for each phase of the technological

implementation. Meanwhile, the teacher's set-up of the literacy curriculum driven by her objects was inseparable from her consideration of TELE-Web as a technological species in her classroom. As TELE-Web was implemented in the inclusion classroom, it became adopted as one of the tools, at first for literacy center, and then for writing activities, because it embodied some of the goals the teachers wanted to achieve. Thus, the result was an enacted TELE-Web curriculum as a function of the teacher's ongoing construction of the literacy curriculum incorporating what was made available on the TELE-Web site. The enacted technological curriculum also enabled us to understand how well the technology was aligned with the central curriculum goals as well as the teachers' practices and emphases in learning of the literacy domains.

### Three Factors in Teachers' Implementation of TELE-Web

The rest of the chapter aims to summarize and crystallize the factors that influenced the teachers' decision-making process underlying the entire 3-phase implementation of TELE-Web.

Minimized Cognitive Load. Having a technology that was easy to handle and placed little demands was a very important criteria for Amy and Cathy who considered time a precious asset in teaching this inclusion classroom. During the beginning-of-the-year surveys administered to the teachers (February), both teachers expressed the personal uses of computer and its benefits, which were convenience and efficiency brought to the teachers in their work and personal lives. For TELE-Web, they also had the similar feelings as reflected by Amy in her April interview when asked about factors that helped her try TELE-Web:

Just time. Time seems to be an issue this year with me. I think if I had more time, it's not that I don't want to do it, but finding the time just to sit and relax and play

with it...it's hard for me to just make time when I know that I have other things to do. I guess I need to make it a priority. (*April 4<sup>th</sup>, 2002*)

Cathy's reaction to technology use and TELE-Web corresponded to her general approach to technologies in the class, which were used for the purposes of remediation and building up basic literacy skills during literacy center time, accompanying the learning in other lessons. Her answer to the question of what factors might make her reluctant to use TELE-Web or any other technology innovations also echoed the previous response:

Just the ease, the flexibility of it, the convenience of it. When things don't work. I know TELE-Web has worked. I know that other parts of the technology hasn't, like the server. Things like that. That's not TELE-Web's fault. But I think that makes you reluctant because you always have to come up with that extra idea of what you are gonna do... I know when we were trying to do the animal reports, the computers haven't worked and you are trying to think of something quick to do. (*April 4<sup>th</sup>, 2002*)

After the study, I also scheduled member checks with both teachers on the time factor as an influence on their implementation of TELE-Web, to which Cathy responded:

Time in implementing it is number one. To play and explore ourselves and how to use it...It's easy to do once you get into it. But, Knowing what's on there, completely knowing what you can do with it, what you'd like to see done. I know that curriculum has to be at certain pace because of the quarterly tests. Time in that way is important also. They are requiring more and more of you. Some of the older grades are taken up by the tests themselves [for] several weeks over the course of the year. (*Nov. 26<sup>th</sup>, 2002*)

The process of using TELE-Web has also tested the teachers' tolerance of the cognitive demands placed on them in contingency, such as when computer server failed to function at a moment when half of the class needed to work on their animal projects. This mishap was cognitively more demanding of teachers who might then need to come up with an alternative plan B in such situations. Since Cathy was the teacher who actually logged on TELE-Web and created assignments, she might be more intimidated by any

extra load placed on her in class to resolve the problem, though the other teacher Amy did emphasize the same factor in her interview:

I know Cathy has worked some weekends on designing something and we had it as a tub (center). And then we go and put it on, it's not coming up. So you have, there's a whole table of children, which can be four or five that we have to quickly think of a different activity. (*June 3<sup>rd</sup>, interview*)

At the same time, the fact that Cathy took the main responsibility for navigating the TELE-Web interfaces and creating assignments on the computer, also helped Amy use TELE-Web in her classroom. Amy was very appreciative of the support provided by Cathy in this respect:

I think, this year, what's helped me to try is having just a person, like Cathy's husband who comes in, and not necessarily, you know, say read this to see what had to do it because he's such an expert at it, and he can quickly explain it. Because sometimes to do things you need someone you could feel comfortable saying "I don't know how to do this" and who's willing to kind of show you the shortcuts because, to read a manual or things is a lot harder. (*Amy interview, May 2<sup>nd</sup>*)

Amy did not directly involve herself in the creation of assignments on TELE-Web because she found it hard to read manuals and to learn how to navigate TELE-Web, which was not considered as convenient or easy for her, compared to a more familiar technology such as a word processor. Generally, all new technology demands were shifted to her team teacher, Cathy and even her husband, who donated time to hook up the virtual blackboard. Increasingly, Cathy was positioned as the technology expert, and she assumed that role in the classroom, negotiating her own, her coteacher's, and her students' entries into new technology innovations. On the other hand, Cathy did not always feel comfortable with the technology, nor did she feel comfortable in debugging problems related to technology. In this way, the teachers' beliefs about and avoidance of

the cognitive loads resulting from the use of technologies influenced their willingness to learn new technologies, as well as their relationship and position with other teachers.

Ease of Management. Related to teachers' implementation practices, the ease of classroom management influenced their uses of new technologies: "Sometimes managing the computers can be very difficult with the big group of children, especially in a classroom where it's full inclusion. You have some behavior issues that you have to deal with." (*Amy interview May 2<sup>nd</sup>*). The teacher's concern with technology and behavior was present at the very beginning of the introduction of TELE-Web into the classroom, especially for Amy, the general education teacher:

...If you have that happen once or twice (server down), it's very frustrating because if you have something that's not working, you lose the management of that classroom. So while you are quickly finding something, you have kids who are getting restless, and because we usually do that in the morning that tends to kind of set the day... it's very frustrating. Yeah. (*Amy interview, May 2<sup>nd</sup>, 2002*)

Amy was very management-minded in terms of classroom teaching. The first section of the chapter gave a portrait of the classroom rules, routines, and procedures that Amy and Cathy had established to maintain order. Because of the diversity of students in the inclusion classroom, Amy was more sensitive to any possible troubles that TELE-Web might bring to the class's behavior management. Cathy was also watchful of possible breaches to the classroom rules due to technology factors:

I guess the things makes me reluctant to try, things so widespread, with like half the class with the animal reports, then the computers don't work. And that's not necessarily TELE-Web's fault. That factor makes me reluctant to try that again. (*Amy Interview, May 2<sup>nd</sup>*)

In the creation of the Animal Web and Animal Report activities on TELE-Web, behavior management also surfaced as an important issue to consider when she and the



researcher discussed whether to tell the students who would be using TELE-Web tools for the final animal unit project.

I figured if we took some children to the other room, that might be yeah, be a little more helpful. I do worry about that and I could be overtly concerned about that. ...I think that could be cause for concern. I don't know what Mrs. Jacobson thinks of that.. but.. (*Cathy talk, May 20<sup>th</sup>*)

As the teachers thought of computer technologies as motivating tools for students and thus having potential of causing misbehavior for students who would not be in the TELE-Web group, they decided to be cautious in telling students which tools they would be using for the accomplishment of the Animal web and report project. Another time that behavior issue came up in the conversation about setting up the final project was when the talk focused on children researching while working on TELE-Web. Cathy raised many questions and concerns about how to organize this activity better in order to be least disruptive:

If we are having children research this ahead of time, but they are doing research on those books. So those children on the computer get a fact and then come onto the computer or are they looking at a book... or are they writing on a paper and then coming to the computer? Maybe that will be something, organizationally, that we have to really think about before the day we do that, as far as space. Over there (where computers were placed) it's very crowded especially when you have four children on that one side. Cause if you are thinking two on each computer... children ...trying to get a book. I don't know if the book could be on their lap or if we can give them special clipboard... I would hope they will get more than one book to search for facts... I guess I want them, if at all possible, to have sometime, to just look at it. I envision children saying "This one has too many words. I'm going to close it off and get another one from the table... Well I'm hoping that they are getting that from the health report that Mrs. N is doing. Mrs. Jacobson has done that with her classes last year. ..Some same children are in here. I am hoping that processes are okay... Maybe we need to give them some reminders, some more assignments on TELE-Web before then to do that. I'm not all so sure they all know where to look for that.

The above excerpt of Cathy's conversation suggested that the teacher's uses of TELE-Web was very much contingent upon how disruptive the activities might be and

what kinds of behavior management needed to be installed to ensure smooth learning on the part of the students.

Demands of Resources. The type of TELE-Web use, as characterized in this classroom, was also dependent on how much monitoring was demanded of the teachers and other adults available in the classroom. Amy and Cathy were lucky in that they had Mrs. B, an adult teacher aide in the class, and Mrs. N., an intern who stayed for the most part of the semester. In addition, the researcher of the study was also a valuable asset in helping the teachers set up assignments, assist students with their computer/TELE-Web work, and plan with teachers on what to implement in this classroom. All the human resources made it reassuring to the teachers in using TELE-Web and the related projects in the inclusion class. That is, the potential demand in terms of the division of labor in the TELE-Web activity settings was a factor in the teachers' implementation of TELE-Web.

In the very beginning of the study, the technology demands on the teachers seemed to be ever great because they had another technology project to be accomplished: the "8's Great project". When the meetings with Cathy about plans to use TELE-Web began, the "8's Great project" was given priority over TELE-Web because of the lack of energy, time, and human resources for the teachers to learn and do two computer projects simultaneously.

Another aspect pertaining to adults available for teachers was my presence as the researcher, who worked with the teachers from the very beginning of the study as a participant observer. The roles and responsibilities of the researcher sometimes actually went beyond being an observer. I also offered help in other technology-related projects for the class. For example, I helped a group of students from this class and from an upper

grade to finish their “8’s Great” project in the early phase of the TELE-Web project. That was one way to also gain trust and entry into the classroom community. During the study, I joined “class planning meetings” with the two teachers; asked them the curricular needs that they wanted to cover; inquired about possible skills and strategies the teachers wanted the students to grasp; made propositions as to how the teachers could make use of TELE-Web to reinforce these skills, etc. My involvement in the final project of Animal Web and Animal Report was also important. I showed Cathy the idea organizer and supported paragraph activities on TELE-Web, demonstrated how TELE-Web worked, and discussed how the teacher could carry out the project on TELE-Web. I served as a resource person in the teachers’ integration of TELE-Web in their curriculum.

#### TELE-Web and Its Mediatlional Effect on Teaching

The last section of the chapter focuses on the mediational role TELE-Web played in the ongoing construction of the activity settings in the literacy curriculum. Earlier discussions have touched upon the interaction between the teachers’ goals (object) for the literacy curriculum and the TELE-Web functions. The rest of the discussion looked at other aspects of the curriculum in particular: division of labors, rules and procedures, and teaching practices.

Mediation of Rules and Procedures. Rules were norms or conventions that governed the individuals’ behavior in a classroom community.

The newly arisen rule governing the TELE-Web use was the teachers’ monitoring of students’ work on TELE-Web. Cathy printed out some of the students’ work done on TELE-Web so that she could monitor the students’ progress on the TELE-Web activities. This was not the case for other types of computer-mediated activities that did not involve

the use of TELE-Web in this classroom. For the Animal Web activity in the third phase of TELE-Web implementation, Cathy first printed out the animal webs (Idea Organizers) completed by the students at different stages of their work on this assignment. Then, she had the students use their webs as an organizer sheet to assist them in writing up the final report on TELE-Web. In other words, TELE-Web presented new 'problems' for the teachers' evaluation of the students' work in this technology-mediated environment. As a solution, the teachers came up with new ways of monitoring the students' writing by logging onto the web and printing out the students' assignments. The teachers could do this regularly even before the assignments were completed so that they could plan for the work progress for the TELE-Web-mediated learning.

The teachers could also evaluate the students' work by writing to the students and responding to their writing on TELE-Web. However, this feature was not implemented at the time of the study. But the impact of TELE-Web on the rules and procedures of the classroom teaching and learning was emerging. Through the change of rules and procedures, the computer technology was increasingly related to quality work instead of mere fun exploration of websites without the teachers' involvement in monitoring the flow of the students' work on the computer.

Mediation of Division of Labors. In any activity setting, the participants have responsibilities to take in the learning process. In this class, the students were given plenty of opportunities to explore and acquire knowledge on their own and with peers' during the literacy center time. Teachers modeled the lessons and processes of learning before assigning the students their work that was completed either alone or with a buddy. In the regular activity settings of the class, the division of labor was such that teachers

assigned students to certain roles as “helpers” or “novices”. In the literacy centers, for examples, Amy and Cathy would send some students as helpers of other students who might need help on the center activities. Students might also volunteer to help the other students, but they needed to ask for teachers’ permission first.

However, in the TELE-Web activities, it seemed that the students could designate themselves as helpers or novices without teachers’ assignment. The following field note transcripts drawn from the writing of Desert Animal Story on TELE-Web showed that the two students Marquis and Juan had become self-appointed themselves in the competent students’ roles (*March 5<sup>th</sup>*):

(Marquis and Juan are working now at two computers next to each other.)  
Juan:            what are you writing?

(Both of them are writing about bobcats now.)

Marquis:       Don’t copy on me.

Juan:            I’m writing “bob cats like to eat meat”.

Marquis:       Oh, that’s what I will write!

Marquis is now writing in the text box “Bobcat like to eat meat”

(Juan now joins the Guided Reading Group now with Mrs. Jones.)

Marquis just went to the poster of desert animal to find a spelling for ‘jack rabbit’.

He came back and asked me ‘do you know how to spell ‘jack rabbit’?

(Xiuwen asked him to sound out the words.)

(Marquis put in: *Bobcat like to eat meat like jackrait. I like bobcat.*)

Leon to Marquis:    Are you my friend?

(Leon to Tyler who just came in: Give me high five.)

Leon:            where’s u?

(Marquis showed him the letter on the keyboard.)

Marquis put:        “they are cool.”

Xiuwen:            What does it look like? Is it a cat? Why is it called ‘bobcat’? Does somebody named ‘bob’ give the cat the name?

Marquis:            I don’t know.

(Then Marquis went to the poster and come back to put down on TELE-Web: *it looks like a cat.*)

As this example showed, the use of TELE-Web engendered opportunities for the students to freely position themselves in different roles. They appointed themselves responsibilities that were not determined by the teachers' instruction. It was different from other center activities such as the overhead example introduced in the first part of the chapter, in which the students had limited roles in interacting with each other and scaffolding each other's learning process. There were many spontaneous interactions between students during the TELE-Web activities when they construct knowledge together through assuming different responsibilities, which would be discussed in more detail in the next chapter.

In addition, the creation of activities such as Safety Rules, or Compare/Contrast activity, TELE-Web Animal Web and Animal Report assignments encouraged Cathy to be reflective of the instructional accommodations she needed to implement to ensure the success of TELE-Web activities. When Cathy was asked to provide reflections on the use of Compare/Contrast TELE-Web assignment, she indicated that modeling and giving examples were important instructional precursors to the activity. Cathy's thinking of her teacher's role was expanded to include more modeling and demonstration prior to sending the students to be engaged in the TELE-Web activities. The following is the excerpt from Cathy's reflection during a planning meeting with her:

Yeah, I started off with modeling and then I got worried that that wasn't what you wanted. I guess it was just a matter of communication. But I probably would have done some more comparing/contrast so they had an example. Then I guess I wanna make sure that we do that in a week before that we start this and that we clarify things so that we are on the same page. (*May 20<sup>th</sup>*)

Increased Amount of Instruction. The introduction of TELE-Web demanded Cathy to provide more instructions around both the content and the operations of the TELE-Web activities. Towards the third phase, the teacher's increased amount of teaching prior to TELE-Web activities was characterized by her use of the TELE-Web activity webs and formats as visual scaffolds of the students' learning.

The following transcript showed an episode of Cathy modeling a lesson on animal habitats before students worked on their TELE-Web assignments in pairs.

- Cathy: The job now is to choose an animal for our report, okay. I need you and your partner right now, to think about a region or habitat that you would like to do. Remember that there were 7. Who can name one of the regions for me?
- Eddie: (pause for 3 seconds) What was one of the habitats that we are going to study?
- Eddie: Tropical forest
- Cathy: Yeah, tropical forest  
(She listed it as # 1 on the blackboard.)
- Cathy: what's the second one, Joe?
- Joe: Polar region.
- Cathy: Wow, I noticed there are lots of good hands raised.  
What's a third one, Russell?
- Russell: The grassland
- Cathy: Okay, what's a fourth one DeJuan?
- DeJuan: Desert.
- Joe: Temperature? Uhm, temporal forest?
- Cathy: Okay, let's say a fifth one, Taylor?
- Taylor: The, we could do wet lands.
- Cathy: We've only two more. Okay, what's the sixth one? Alexis?
- Alexis: A polar region?
- Cathy: We've already ... had that one. But I can see you're thinking...
- Alexis: A forest?
- Cathy: What kind of forest? We already have a tropical forest?
- Alexis: Temperate forest.
- Cathy: Temperate forest (and put that on the blackboard), good job...Okay, the last one, Josh?
- Josh: the ocean.
- Cathy: the ocean (put that on bb) Wow, you were really thinking. You were really thinking today. Thank you very much. Now, stop for

just a moment. I want you to be, this is your job right now. Your job is to talk with your partner about a region, a habitat you would like to work on with your partner. Then choose an animal from that habitat okay? Now if someone from the other class has already chosen an animal...we will have to choose another one because we want to have all kinds of animals that we are going to report about... we want everyone to have a different one. So that when we make these reports, it's special, when we make these reports them to each other. We can have lots of knowledge about animals of different places. If you have thought of an animal you and your partner would like to do, Mrs. Collins will come around the room with the piece of paper, you can quietly whisper, thumbs up if you and your partner have an animal you would like to report to.

In this transcript, Cathy conducted an instructional lesson about the TELE-Web group's activities. The segment was quite typical of the mini lessons given each time these students went on TELE-Web for the Animal thematic assignments. In the mini lessons or instructions, the teacher Cathy elicited students' knowledge about animal habitats learned from former big group lessons. She involved the students in thinking about ideas and their prior knowledge, which prepared the students for further interactions around the computers during their research and writing processes. In this conversation, Cathy also reminded the students of both the general goals for the entire project and the objectives to be achieved through each working session on TELE-Web. In this activity setting then, the students engaged in pursuit of a collective goal of presenting knowledge to the community through their collaborated efforts.

Another example given in below illustrated the way the teachers tried to model writing a supported paragraph for the Animal Report assignment on TELE-Web as a result of using TELE-Web in the animal project. The teacher is brainstorming with children on what to write about for life cycle category in the Animal Web and Animal Report. Cathy positioned herself as one of the members of the community by using words



such as 'we', asking questions to think aloud during the mini instructional lesson, and paraphrasing the students' ideas.

- Cathy: Okay, let's do one more because I know this one's tougher. What do we know about life cycle?
- Russell: Smaller, babies?
- Cathy put that down.
- Cathy: What else can we say about life cycle?
- Josh: How they grow.
- Cathy: Do all the animals grow the same?
- Josh: Not really, some like their parents and some are kind of mix with their parents.
- Cathy wrote down *How does it grow? Does it like its parents?*
- Cathy: Does it look the same as their mom or different from mom or dad?
- Taylor: you get to...
- Taylor: Ooh, I got one, Miss
- Cathy: How do babies get their food? Russell? Can you help me with how do baby Robins...?
- Cathy: "How do they get their food?
- Russell: Some don't cover their eggs.
- Cathy: Some don't lay their eggs? So maybe we can say '*do they lay eggs?*'
- Cindy: How big the animal?
- Cathy: Okay, we have that.
- Joe: (inaudible)
- Cathy: Are you saying 'how do they protect the eggs?'
- Cathy: Some moms lay eggs inside and some lay eggs outside.
- Cathy: We could talk about how do they protect their eggs.
- DeJuan: By keeping them in the stomach.
- Juan: Turtles protect their eggs, burying them in the sand.
- Cathy: Okay, I went through three of the categories. In about five minutes or so, we are going back across the hall and ready for gym. Before we do that, I want you to be thinking ways you can answer the questions in the animal web.

At the end of the this instruction, Cathy pointed out to the students the objective of that day's writing, which was to decide ways with which they wanted to answer questions concerning their chosen animals in order to construct an animal web on TELE-Web animal web task. The use of TELE-Web thus demanded the teachers to provide more enriched instructions incorporating demonstration and modeling of lessons around

the use of the new technology, as shown in this example. Although this was also true for the group without the use of TELE-Web, the modeling given by the teacher arose from Cathy's concerns that the students needed to have enough knowledge to bring with them during their work on the TELE-Web site.

The following observation of lessons showed Cathy's emphasis on modeling and scaffolding in her lessons before she assigned the students to work with the TELE-Web Animal Web and Report activities.

*(May 21 Field Note)*

(On the blackboard are two big pieces of paper—Food and Physical Characteristics. Cathy is talking about physical characteristics now.)

Cathy: Oh, you give me another idea. What do we step on in the doctor's office?

Ss: Steel.

Cathy: oh, how much does it weigh?

She put this question under physical characteristics.

Cathy: if you are in science yesterday, we talked about how much the baby weighed.

Juan: 600 pounds?

Cathy: Russell, you just gave me an idea. Are all the tigers the same?

Joe: Most of them are.

Cathy: Do all tigers look the same? What tiger are you doing?

DeJuan: Siberia tiger.

Cathy: Do they look the same as ...tiger?

Ss: no...

Russell: Something on the desert...they live in different places.

Cathy: Let's count here. We have all kinds of facts we can find. Boy, we can easily get 7 facts and put them in the idea web. So I want you to be thinking, before you say you are done, you have two adults to help you, with each one of those different boxes, all right?

Cathy: Okay, let's do one more because I know this one's tougher. What do we know about life cycle?

Russell: Smaller, babies?

Cathy put that down.

Cathy: What else can we say about life cycle?

Josh: How they grow.

Cathy: Do all the animals grow the same?

Josh: Not really, some... their parents and some are kind of mix with their parents.

Cathy wrote down: "How does it grow? (Does it like its parents?)  
 Cathy: Does it look the same as their mom, or different from mom or dad?  
 Taylor: you get to (pause)  
 Taylor: ooh, I got one, Miss Collins.  
 Cathy: How do babies get their food? Russell? Can you help me with how do baby Robins...  
 Cathy: (put down on board): "How do they get their food?"  
 Russell: Some don't cover their eggs.  
 Cathy: Some don't lay their eggs? So maybe we can say 'do they lay eggs?'  
 Taylor: (not audible)  
 Cindy: How big the animal?  
 Cathy: Okay, we have that...  
 Joe: ...(not audible)  
 Cathy: are you saying how do they protect the eggs?  
 Cathy: Some moms...eggs inside and some lay eggs outside.  
 Cathy: We could talk about how do they protect their eggs.  
 DeJuan: By keeping them in the stomach.  
 Juan: Turtles protect their eggs by burying them in the sand.  
 Cathy: Okay, I went through three of the categories. In about five minutes or so, we are going back across the hall and ready for gym. Before we do that, I want you to be thinking ways you can answer the questions in the animal web.  
 Cathy: When we write a sentence, what is it that Mrs. Jones talks about in a sentence...she will also like to add details... Maybe your parents, maybe miss Wu, and maybe Ms. Hagerman and Ms Bobo want to know the details... I'm very interested to read those kinds of things. I want you to be thinking, did I answer this question? Go down the list and answer some questions...  
 Travis: How does it grow? You missed 'what does it look like?' 'Does it look like it's parents'.  
 (Cathy fixed that sentence on the paper by adding 'look' before like.)

[On the blackboard: (categories on paper)

Life Cycle

- How big babies are?
- How does it grow? (Does it look like its parents?)
- What do the babies eat?
- How do they get their food?
- Do they lay eggs?
- How do they protect their eggs?

Physical Char.

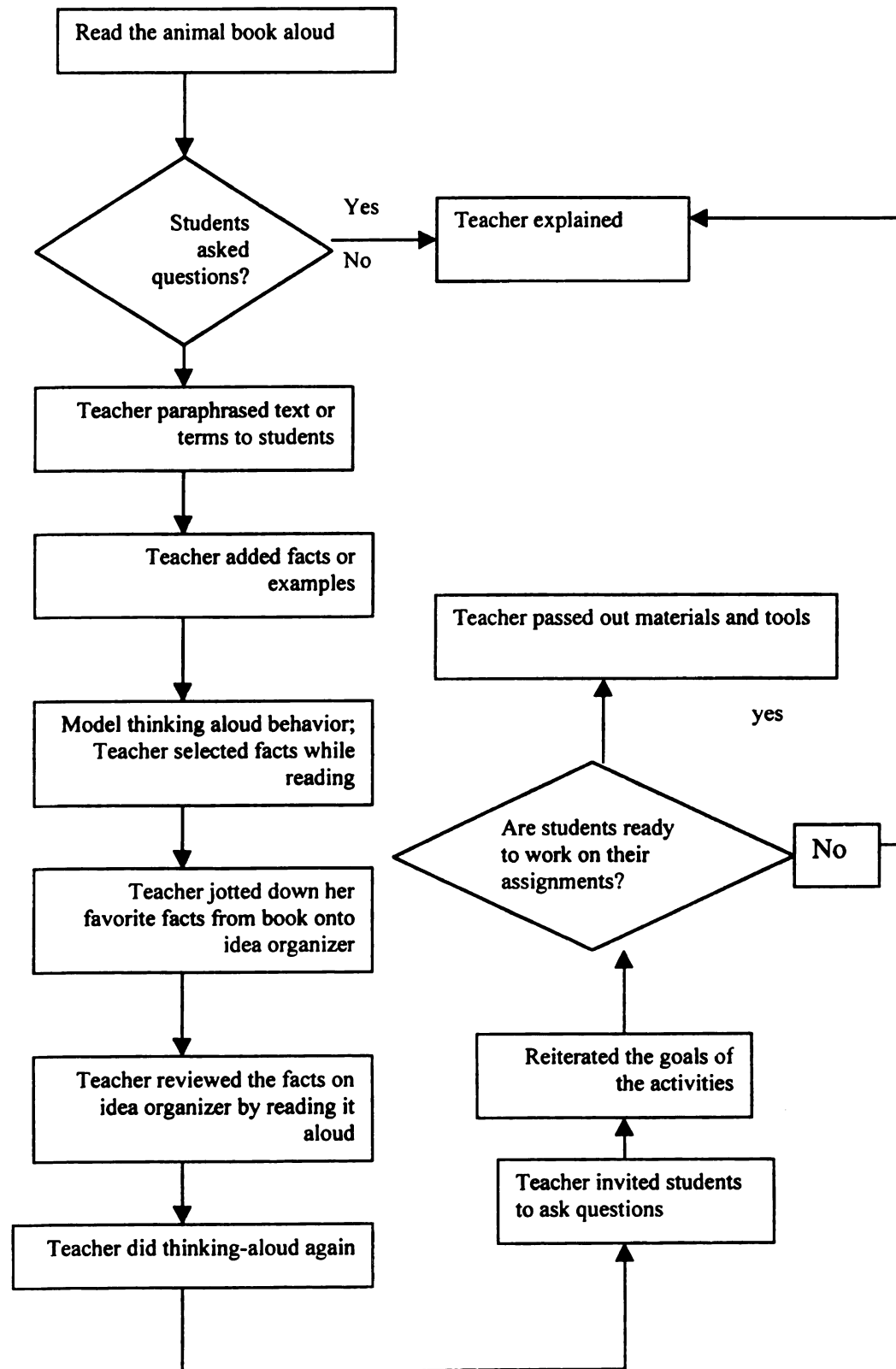
- Color/Does it have stripes or spots?
- Camouflage easily?
- Teeth (sharp)
- Fur or Feathers? (Body Parts)—Keep warm or protect?

- How tall is it?
- How much does your animal weigh?
- Different kinds?
- Food
- What they eat?
- How do they get their food? (Body parts)
- Predator or Prey?
- Interesting Facts
- Do they hide to catch their food?]

Figure 4.12 illustrates the modeling and scaffolding characteristics as shown in the conversation. In Cathy's instruction that accompanied the TELE-Web Animal Web and Animal Report activities, the focus was on eliciting students' prior knowledge about animals and engaging them in brainstorming of the kinds of facts belonging to each category to be put in the idea organizer. In the lesson, Cathy used a variety of modeling strategies to support the students' participation in the TELE-Web activities when they went on TELE-Web with their peers. She raised many questions that challenged the students in thinking about the animals in terms of categorized facts such as habitats and their life cycles. Another way to engage the students was through making connection with what the students had learned in other subjects such as science. Cathy also used children's chosen animals as examples to invite their participation. For example, she asked about tigers and their physical characteristics that Joe and his partner were researching about.

Another modeling strategy in this lesson was to remind the students of how to keep researching goal in mind while writing: "I want you to be thinking, did I answer this question? Go down the list and answer some questions..." The teacher conducted extended conversations with students to construct the way to think about facts when necessary. For instance, Cathy scaffolded the students' knowledge construction of life

Figure 4.12 Teachers' Modeling of Instruction Prior to TELE-Web Animal Unit Assignments

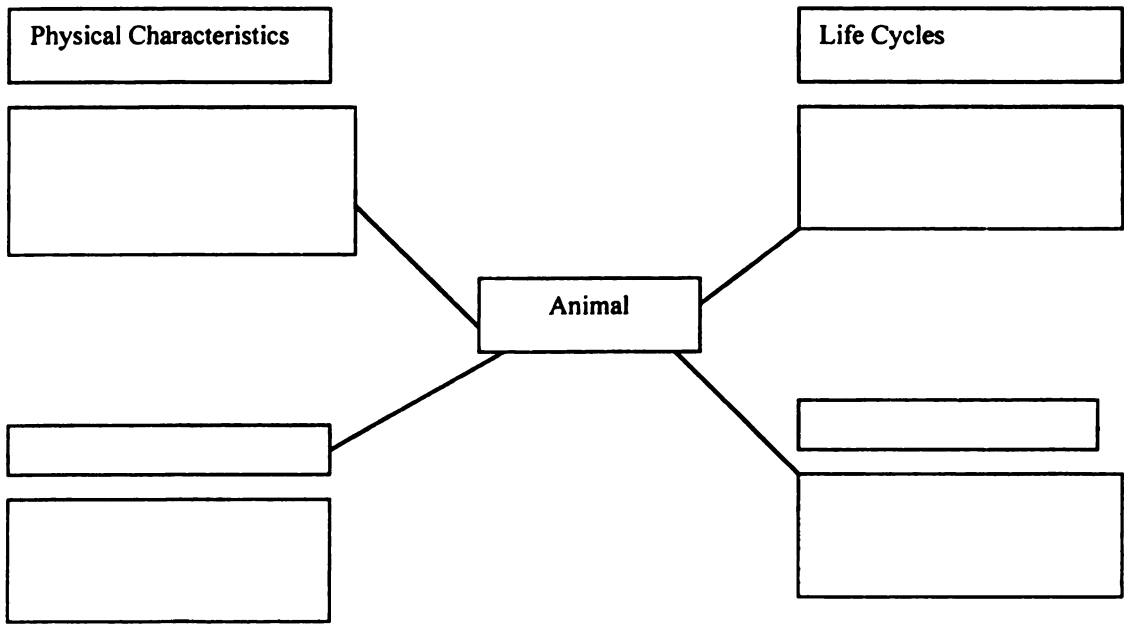


cycles and how to organize details in this category. During the process, Cathy tried to elicit the student's ideas, rephrase their answers, and remind the students of the larger goal of research in the children's minds.

This example showed that the teacher had come to associate TELE-Web technology with literacy practices that demanded instructional accommodations to ensure the maximum learning on the part of the students. Technology was treated as inseparable with teacher's roles in the process of learning with TELE-Web. Such behaviors resulted from the teacher's implementation of TELE-Web in greater alignment with complex writing activities in the literacy curriculum of the classroom.

In addition, TELE-Web idea organizer was used as a cognitive scaffold for the teacher in presenting the Animal Web activities. In the blackboard, the teacher drew the exact form of TELE-Web idea organizer to be used by the students in the Animal Web activity and it became a public cognitive tool for the students to understand the process of categorizing their animal ideas. The graph above illustrated the TELE-Web idea organizer the teacher had drawn on the blackboard (Figure 4.13).

Figure 4.13 TELE-Web Idea Organizer Used as Cognitive Scaffold



Enhanced Computer Literacy Teaching. An interesting result of using TELE-Web in this classroom has been students' exposure to more sophisticated and advanced knowledge about computers. TELE-Web created occasions for the teachers to introduce the format of an online learning environment, a different way to interact with assignments on the Internet, and just the basic navigation skills involved in using a different computer technology. For instance, the following transcripts before the students worked on their TELE-Web assignments captured some of the mediational role in creating computer literacy instructions.

Cathy: Let's see I have to give Dejuan some points for his table. I have to give Russell and Cindy each a point. They are waiting so quietly. Josh and Eddie, thank you so much. Miss Wu has helped us out. She's kind of logged in to TELE-Web already. That means she's put her name and pass word into TELE-Web already. Terry I need you to find a seat please. I need you to be a good listener. Thank you so much for being helpful and raising your hand.

Terry: What does the lightening mean?

Cathy: Oh the lightening.

Researcher: It's where you can find your assignments.

Cathy: So if Mrs. Collins gave you an assignment to do during tub time or during writing time, you can go there and look up what Mrs. Collins or Mrs. Jacobson has asked you to do. (*April 15<sup>th</sup>*)

In the above conversation led by Cathy, the teacher introduced the students to different ways of experiencing learning about computer, which matched the teachers' expectations about using computers to provide students with a variety of ways of experiencing the adult world and be empowered in their learning. The students were instructed on how to log in with their own account's Ids and passwords; pull up assignments from TELE-Web, and get familiar with what all the icons could do for them. Another example of computer literacy practices in using TELE-Web was given in the following excerpt:

Right here, it's something I know it's difficult to see, it's called "Animal Web". So if you go in, under your name, after you put in your name and your password, it's going to come up, Animal Web, you are gonna click on that, then you are going to come over here, then you are gonna see "idea organizer"...just a fancy name for the webs that we have done. The big pieces of paper with Mrs. Jacobson, Mrs. Nordmark, Okay? So we are gonna kind of have our own web but it's gonna be on the computer this time. So we are gonna click under idea organizer. Once we do that, it's gonna give us some directions, says instructions. You can help me read these and you can read along with me. It says "after researching... put facts about the animal under the correct category". What that means...could you scroll up Miss Wu? See the bottom? (*May 10<sup>th</sup>*)

Here, the teacher again showed the students many possibilities with the use of computer technologies such as TELE-Web. In fact, during the instruction, the students were absorbed by TELE-Web interface and they waited patiently for each page to appear. Some children murmured "TELE-Web" to themselves. One student shouted out "That's digital!" when he saw the web page of TELE-Web flashing on. Modeling on how to navigate through TELE-Web pages on the Internet was a valuable experience for the students to learn more about what computer technologies could do. Teachers would not have been able to provide this sort of experience with the word processors and other software in this class.

In summary, the creation of TELE-Web activities have allowed the teachers to add instruction in the form of extra modeling and demonstration concerning both literacy lessons and the strategies and tools to assist the students' performance in the Animal Web and Animal Support activities. This chapter applied the metaphor of Information Ecology and sociocultural Activity Theory in the descriptive analyses of TELE-Web-mediated curriculum construction in the multi-grade inclusion classroom. The meaning of TELE-Web in this unique ecology was unfolded through several steps. First, the physical configuration of the class was illustrated to give a general impression of the instructional structure. Second, I provided an in-depth analysis of existing curricular activities and



teaching practices as reflected by data including the teachers' interviews and surveys, field notes, transcripts, and classroom observations. In this section, I also focused on the teachers' general orientations towards technologies and TELE-Web in their classroom, which was analyzed in connection with their actual uses of TELE-Web. A subsequent analysis of the forms and functions of TELE-Web were conducted based on the nature of the activities created on TELE-Web and historical development of how TELE-Web evolved in the classroom. The final section of this chapter discussed the results of employing TELE-Web activities in the existing curriculum: (1) How TELE-Web use was seemingly limited to and determined by four kinds of teacher decisions based upon: connection with curriculum, minimized cognitive load, ease of management, and demand in resource. Reciprocally, TELE-Web actualizations in the information ecology produced results in several areas of instruction. They were summarized in Table 4.7.

**Table 4.7 TELE-Web's Mediational Roles**

|                                   |                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TELE-Web and Mediation of Objects | <ul style="list-style-type: none"> <li>◆ Shaped objects through TELE-Web activities</li> <li>◆ Created more authentic reading and writing practice opportunities</li> <li>◆ Reinforced and enriched objects</li> </ul>                                                                                                                                       |
| TELE-Web and Rules & Procedures   | <ul style="list-style-type: none"> <li>◆ Introduced rules in TELE-Web activity setting</li> <li>◆ Reified TELE-Web activities through introduction of rules</li> <li>◆ Use of on-line prompts and rubrics provided more cognitive tools for students</li> </ul>                                                                                              |
| TELE-Web and Division of Labors   | <ul style="list-style-type: none"> <li>◆ Allowed the students opportunities to designate roles to themselves</li> <li>◆ Created contingency roles for teachers</li> </ul>                                                                                                                                                                                    |
| TELE-Web and Teachers             | <ul style="list-style-type: none"> <li>◆ Improved instructional environment through accompanying modeling lessons and online cognitive scaffold such as prompts and rubrics for students</li> <li>◆ Enhanced computer literacy teaching as a bonus</li> <li>◆ Reinforced teachers' modeling of skills and strategies prior to TELE-Web activities</li> </ul> |

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**ENACTMENT OF TECHNOLOGY ENHANCED LITERACY LEARNING  
ENVIRONMENTS (TELE-WEB) IN A MULTI-GRADE INCLUSION CLASSROOM:  
A CASE OF EVOLVING TECHNOLOGY CURRICULUM AND ITS  
AFFORDANCES**

**Volume II**

**By**

**Xiuwen Wu**

**A DISSERTATION**

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**DOCTOR OF PHILOSOPHY**

**Department of Counseling, Educational Psychology, and Special Education**

**2003**

## CHAPTER 5 LEARNERS' CONSTRUCTION OF TELE-WEB

Tools are only tools when in use. This chapter examines the reciprocal relationship between TELE-Web and the students as participants, special education students in particular. In addressing the research question of how TELE-Web as a species grew and evolved with the students, I again employed activity setting as a unit of analysis to examine how TELE-Web mediated students' participation in literacy activities and, in turn, what it became as a result of its use by the students. Therefore, like the previous chapter focusing on the teachers, the structural components of the literacy activities formed the basis for investigating TELE-Web's roles and meanings in relation to students' use of the technology.

The layout of the chapter is as follows: First, the characteristics of the existing literacy practices available to the LD students and general education students were examined. This discussion examined how the participation of special education students was enhanced or constrained by the various literacy activities established by Amy and Cathy in the multi-grade inclusion ecology. The discourses underlying the different scenarios of LD students' engagement in these activities are presented to shed light on their learning processes afforded through these activity settings. Next, I analyzed the changes in the LD students' as well as general education students' participation and the literacy practices that they employed via TELE-Web as a mediating technology. In this section, I also argue for the reciprocal relationship between TELE-Web and other activity setting components by looking at the structure of the activity settings, the multiple

components of activity settings and their interactions with TELE-Web in the context of the existing curriculum.

#### Students' Existing Literacy Practices

Students with LDs constituted 23% of the entire class population. The teachers sought to create an environment conducive to the social and academic development of students with learning disabilities in inclusion environment. This section will foreground the students' participation in these settings—with a particular focus on the roles, interaction, and artifacts the students used and what they afforded the students in terms of their repertoire of literacy practices in these activities. In the discussion, I examine the ways in which individual students' performance and participation are mediated by the tools that exist in the activity settings. The students are regarded not as single entities in this examination, but as agents mediated by the instruments available in the social setting in which they find themselves.

#### *Eddie*

A third-grade LD student, Eddie was a quiet and average-size African American boy with big bright eyes. He proceeded at a deliberate pace at everything he did, even if it was walking. Going about business in the classroom without making much noise or any disturbance, Eddie's behavior could easily make him 'transparent' in the room. His behaviors in the activities without the use of TELE-Web indicated similar patterns of participation as shown in the table 5.1 below. During his engagements in the activities, Eddie rarely initiated conversations with others in these activities. Therefore, my notes reflected a necessary focus on how he behaved in a non-verbal way and what he did not do compared to other students in the classroom.



Table 5.1 Eddie's Participation in Non-TELE-Web Settings

|                                                                                             |                                                                                                                                                                                                                                                                                        |
|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6/3/02 Journal (Animal theme) Writing Center                                                | <ul style="list-style-type: none"> <li>• Did not have ideas to write about on the journal book</li> <li>• Accepted the researcher's suggestion on the topic</li> </ul>                                                                                                                 |
| 5/16/02<br>Computer center<br>(www.gigglepoetry.com)                                        | <ul style="list-style-type: none"> <li>• Asked the researcher for a word's spelling</li> <li>• Helped a first grader read a line on the web site</li> <li>• Indicated that they should have saved his line of poem on computer</li> </ul>                                              |
| 5/13/02<br>Guided Reading                                                                   | <ul style="list-style-type: none"> <li>• Answered the teacher's questions</li> </ul>                                                                                                                                                                                                   |
| 5/9/02<br>Writing ("what's silly about the special person")                                 | <ul style="list-style-type: none"> <li>• Had no interaction with peers</li> </ul>                                                                                                                                                                                                      |
| 5/8/02<br>Write about a special memory about a special person                               | <ul style="list-style-type: none"> <li>• Asked spelling questions</li> <li>• Stopped writing after two sentences and announced he was done</li> </ul>                                                                                                                                  |
| 4/17/02<br>Guided Reading                                                                   | <ul style="list-style-type: none"> <li>• Sat on the edge of the group</li> <li>• Did not volunteer answers</li> <li>• Used minimum verbal response</li> </ul>                                                                                                                          |
| 4/15/02<br>Research on Habitat: drawing and jotting down information                        | <ul style="list-style-type: none"> <li>• Did not grab necessary tools (index card and a pencil) to engage in the task</li> <li>• Needed the researcher to put the tools in his hand</li> <li>• No verbal interaction with peer</li> </ul>                                              |
| 4/11/02<br>Computer Center:<br><a href="http://www.kidsworld.com">www.kidsworld.com</a>     | <ul style="list-style-type: none"> <li>• Was at lost on the computer</li> <li>• Needed adult support in the computer center task: reading the clues about mammals</li> <li>• Took no action before the researcher asked him to seek help from the teacher</li> </ul>                   |
| 4/10/02<br>Research on habitat and color (copy on card 3 chosen animals and their habitats) | <ul style="list-style-type: none"> <li>• Had a hard time copying words from the blackboard and did not go near the board before the researcher suggested him to do so.</li> <li>• No interaction with other students</li> <li>• Murmured the letters of each word he copied</li> </ul> |
| 3/19/02<br>Popcorn How-to writing                                                           | <ul style="list-style-type: none"> <li>• Asked classmate how to spell a word</li> </ul>                                                                                                                                                                                                |
| 2/5/02<br>Reading Center                                                                    | <ul style="list-style-type: none"> <li>• Flip through a book in silence by himself</li> </ul>                                                                                                                                                                                          |

A preliminary examination of Eddie's participation in the traditional classroom activities implemented in this classroom suggested that this LD student engaged himself on the periphery of the settings as he went about the tasks mostly by himself, passive in his application of strategies and tools. His deficiency in participating effectively in the literacy tasks was salient in these settings. Next, I will discuss in-depth Eddie's participation in the non-TELE-Web activity settings.

Eddie's Writing Practices. The classroom observations showed that he was often writing laboriously and quietly with a pencil on a piece of paper, reading with a buddy or by himself, or raising hands once in a while to volunteer an answer. Sometimes he got distracted and stared out of the window or at other objects. During students' writing time, Eddie had little verbal interaction with other students at the same table. He typically exhibited engagement by murmuring several letters as he wrote, erasing what he wrote, or asking a question about a word's spelling. Most of the time, Eddie seemed to be unsure of his answer and he would always use a rising tone at the end of what he had said, as if he was not sure of himself. Eddie's writing level was indicated by two pieces of writings that he produced at the beginning of the semester:

I like to play wit my fun and we mad a clube hosue and we play. (1-29-02)

I no a aBt Bole and I one twis and my sister and my mom my bolo flule I like to aBt. the and (2-4-02)

The first piece of writing required that the students write about a special event in their lives, while the second required they write about a topic about which they were expert. In both writing samples, Eddie produced invented spellings (e.g., wit, clube, hosue), and he was inconsistent in his use of capitalization, as evidenced by the fact that

he capitalized “B”s in the middle of two sentences (e.g., aBt, Bole, aBt). At times, his ideas and sentences were incomplete (e.g., I like to play wit my fun).

In a classroom observation during the middle of the first semester, the students were sent to their tables to write an explanation or “ How-to” essay after a writing lesson.

Eddie’s behavior was recorded in the field note:

(Eddie, Taylor, Travis, and Justin L. sat by the same table.)  
Taylor:       What else do you need for this food? Tomato?  
Travis:       (Raising hands) I’m done!  
...

(Eddie had just produced one line of text and now was writing from the beginning on the back of the page. He asked Travis how to spell a word. Travis ignored the question and then Eddie asked another peer how to spell the word.)

Eddie:       How do you spell ‘first’?  
Justin:       Ask her. (The researcher)  
(The researcher offered to help him.)

...  
(Eddie is still writing the directions for making the food.  
Taylor is done, as she informed the others at the table:)

Taylor:       Who wants to read my book?  
(Eddie to Travis):

Eddie:       How do you spell ‘corn’? Wait.  
(Travis does not help him. He is reading a book and talking to others.  
...6 minutes later)

Eddie: How do you spell ‘of’?  
(No response)

(Eddie has written the following text for his explanation paper: “1. you need a bowl. 2. and you need a lot of corn put it in”)

*--March 19<sup>th</sup>*

Prior to this, the teachers had modeled how to write an explanation. Thus, the teachers had sought to model the text structure and language that might assist and scaffold students’ performance on the construction of their explanation texts.

In the above writing activity, four children sat at one table. They each wrote independently on their chosen topics about how to make a food. The object for each of them was to finish the piece of writing and submit it by putting their papers in their

mailboxes near the door before recess and snack time. Eddie worked alone on his paper. His only verbal interaction with other students or adults was limited to asking how to spell words. Except for Justin, who was a first-grade EMI student, Eddie worked much more slowly and laboriously than the other two students who were both only at their first years at school: Travis and Taylor. Even though Eddie asked his peers for help at the same table cluster, he did not receive the help needed, as Travis and Taylor were more interested in other things. For example, Travis announced that he was done with his written text and was eager to move on to other tasks. Taylor was also finished writing her text and she had become more interested in finding reading partners as she asked other tables “who wants to read my book?” By that time, Eddie had gone back to his writing paper and was thinking about the spelling of ‘first’. However, the only support that was available at that time was the researcher, who stepped in as a participant-observer to help Eddie spell the word he needed for the explanation paper. In a way, the researcher was positioned as one of the peripheral subjects participating in this activity. But the role of the researcher was limited to answering spelling questions in this occasion. For Eddie, the materialized object of this activity was the two sentences he had put on his paper to be turned in after writing time as included in the above-quoted field note. Writing in this setting was a lonesome engagement that did not require mutual engagement among students. For Eddie, an LD student, it also meant that he did not receive or access the scaffolding tools and resources for more active or advanced participation in the writing process. Although he tried to position peers as his expert informants, they refused to serve in this role and there were no established consequences or norms for ensuring the co-participation of students in the activity. Besides, Eddie was observed to write

painstakingly with pencils on the paper, erasing his writing completely, and started from the very beginning again on the back of the paper when he made a spelling mistake.

This suggested that Eddie's participation in writing was characterized by fairly limited access to effective tools and social resources that might help him to produce written texts. Overall, this activity setting allowed students to practice independent writing on the one hand, and constrained LD students such as Eddie in their full participation in the literacy process, on the other hand.

As observed from the above example, a prominent characteristic regarding Eddie's literacy practices was that he was very much focused on words and spellings. That is, his verbal interactions with peers and adults were mostly focused on the spelling of words. This was the most common way for him to participate in classroom activities that did not involve TELE-Web. One other example was when the students were asked to write what was special about a person in their family at another writing period. As part of the routine established in such activity settings, the students went off to work on their own texts. Eddie began to display a similar participation pattern, by asking spelling questions as his only form of social interaction during the entire writing activity:

Eddie: How do you spell 'with'?

Researcher: W-I-th.

Eddie: W I T H?

...

Eddie finishes one sentence.

Eddie: How do you spell Tommy?

Researcher: Sound it out.

Eddie: T? R? MM? I?

Eddie finishes his second sentence. I asked him if he had any other ideas he could add to the writing consisting of two sentences thus far. He shook head and was ready to announce he was done. (*May 8<sup>th</sup>*)

Another characteristic of Eddie's participation in the classroom's literacy activities was the lack of scaffolding in terms of generating ideas that could enhance his literacy performance. This seemed to deprive him of more effective ways of practicing his writing skills in terms of accessing cognitive resources and mediating tools to help him construct meaning in the writing. An illustrative example showed that Eddie lacked mediational support to help him start on the writing activity during journal literacy center. The following conversation took place on June 3<sup>rd</sup>, almost in the last week of the school semester.

(Eddie takes out a piece of paper and starts writing something. I walked over to his table.)

Researcher: Are you writing a journal?

Eddie: Uh-hum.

Researcher: What are you writing about?

Eddie: Don't know.

Researcher: Since this is a book about animals, why don't you write about animals?

Eddie: Okay. What do I write about?

Researcher: How about, since this is about jungles, what kinds of animals you can find and why they like living in the jungles?

Eddie: Okay

(Now he starts writing.) —(June 3<sup>rd</sup>)

In this activity structure, Eddie sat by his table, not knowing how to start and what to write about for a journal article. In this activity setting, students were required to write a journal given a choice of different themes: food, friendship, animals, and so on. The journal writing took place during literacy center time when the students rotated between two centers each morning. As journal writing was structured as independent work, Eddie himself was responsible for initiating topics to write about and mobilizing the necessary knowledge needed to perform the writing task.

Guided Reading Activity Setting. Eddie's existing repertoire of literacy practices was also shown in guided reading instruction setting, in which he remained mostly in a

peripheral role in the exploration of books. Instead of asking questions about word spellings as in other settings, Eddie responded to the teacher's questions with minimal answers that often ended with a rising and uncertain tone.

- Cathy: I don't think we read this book together last week. This one is called "Monkey Bridge". ...What other animals live in the grassland?
- Eddie: lion?
- Cathy: Remember this page...what is it called?
- Eddie: Title?
- Cathy: Shall we read it together and you can try it on your own. Because it is the first time... look at the pictures and that might help us too... What do you think is happening? You think lion is very happy? ...Turn the page and see what else happens. ...Now what is it doing?
- Eddie: Down the water? (A bridge)
- Cathy: Yeah, they are crossing the water, how are they doing it?
- Eddie: use the vines?
- Cathy: Just turn the page and see what else we got?
- Eddie: One helping him down?
- Cathy: Yeah, looks like they are helping each other right?
- Eddie: these...on the top.
- Cathy: How are they different in this picture?
- Eddie: They are all holding hands?
- Cathy: Yeah...what do you think they are doing in this picture?
- Eddie: Cross the bridge?
- Cathy: A good thought... let's turn the page and see what happens...
- Cathy: You think the monkey's gonna get all the way across?
- Eddie: Yes.
- Cathy: Okay, we have to see. I think your predictions are right...

In this guided reading setting, the object was to read and comprehend the book, *Monkey Bridge*, chosen by the teacher. Furthermore, Cathy's goals for this lesson also seemed to include connecting the content with the animal thematic unit of the class. From the start of the guided reading activity, the teacher set the stage by drawing Eddie's attention to the cover page. The first question the teacher asked of Eddie was to check whether the student remembered where the title should be. In the entire conversation, Eddie's participation was characterized by short answers to prediction questions based on

the illustrations for the book they were reading for the first time. The reliance on pictures offered a useful affordance. However, the transcript also disclosed a potential problem in terms of Eddie's broader access to possible roles and identities he could take up in order to experience learning more actively.

For instance, in this activity setting, Eddie was expected to respond to the teacher's questions that were mostly 'known' questions (Cazden, 1983) aimed to evaluate the students' knowledge rather than engage them in truly authentic exploration of the content of the story. The discourse pattern followed the traditional teacher initiation, student response, and teacher evaluation (IRE) that have been underlying the learning processes of classrooms setting. Here, the student was positioned as a novice in reading, a role that prescribed a way of practice in this learning process. As the division of labor in this setting tended to be fixed, students like Eddie learned to remain as a novice and proceed through the activity by observing regular procedures and rules of participation.

As the previous scenarios demonstrated, Eddie displayed a limited repertoire of literacy practices in the major classroom activities including writing and Guided Reading activities, which suggested to students similar sets of social and interactional structures for participation. According to Wenger (1998), "Practice is a shared history of learning ...an ongoing, social, interactional process." (Page 20) In these existing classroom activity settings, the individuals were engaged in independent literacy activities in ways that kept them largely independent from each other. Their participations in the existing small-group literacy settings were, on the other hand, were dependent on the designated roles made available to them. As an LD student, Eddie possessed few ways and strategies to enhance his participation in the learning and exploration of literacy knowledge as he



was observed to laboriously work on current tasks quietly by himself asking for word spellings, respond to the adults in an uncertain and questioning tone, and stay in a relatively fixed novice role.

Eddie was not only conditioned to perform a limited repertoire of participating in the above-mentioned literacy practices. The nature of on-going interaction afforded him by the existing practices also revealed potential factors that drove him towards the periphery of participation (cite Lave & Wenger, 19xx). The transcript of another guided reading lesson below illustrated this point. This was a group consisting of Eddie, Criselda, Russell, and Justin. Criselda was a first grade general education student. Justin was a first grader with EMI. Russell was a 2<sup>nd</sup> grade LD student who was relatively new to the class.

Cathy: Which one is the animal's habitat?

Russell: Grassland.

(Eddie is really quiet. He also sits the farthest from the teacher.)

Cathy: Who can tell me/read the cover... go to where the title is. Criselda?  
Thank you Russell for following directions, thank you Justin Lake for following directions.

(All students but Eddie are crowding upon the teacher. Eddie just dropped his book.)

Cathy: I appreciate all your help but I have a hard time listening to everybody. Fast, or faster? Why would they add 'er' on the end?

Criselda: It means animals runs fast.

Cathy: If I say, "who can jump longer", what does that mean?

Russell: Longest.

Cathy: If I say Russell and Justin Lake, who is being able to jump longer?  
Does it mean higher, or does it mean more time?

...

Cathy: But if I say 'running the fastest', just as you said before, out of the whole group that person runs the fastest. Let's take a look at page two. Eddie, how do I find page numbers?

(Eddie turned the page.)

Cathy: By turning the page, how do I find the page number?

(Eddie pointed out the number.)

...

Criselda: Exclamation point.

Cathy: Do you remember what that means? Do we read soft? Do we read it like really excited?

(She is looking at Eddie)

(Eddie murmured something in a very low voice with head down.)

Cathy: Yes...I have a question first. Who remembers

which animal in the story runs faster? The Cheetah or the Giraffe?

Russell: How do you know that?

Russell: A cheetah runs 70 miles an hour.

...

Cathy: Eddie, who is faster? The Giraffe or the Zebra? I know we only read at one time. Do you remember?

Eddie: The Zebra.

Cathy: Yeah. The Zebra runs faster than Giraffe.

In this conversation, Eddie physically and mentally positioned himself on the border of the activity as suggested by his verbal and nonverbal actions. In comparison with the previous guided reading lesson, this was the regular set-up for guided instructions, involving more than one student each time. However, the students within the group mostly spoke in answer to the questions raised by the teachers rather than to each other. The teacher controlled the content of conversation, checked students' comprehension, assessed where they were in reading the book, and kept students on task. The students were called upon mostly according to a certain IRE turn-taking patterns. Eddie appeared to be the least active of all students. Verbally, he said no more than five words in response to the teacher's questions, which consisted of factual recall or pointing out the page numbers of the book. Nonverbally, Eddie seemed quite disinterested in the activity as, during the discussion, he put down the book, sat far across the table, and looked down at the table. The structure of the guided instruction activity might have allowed students to access valuable ways of thinking about texts as demonstrated and prompted by the teacher. However, the roles and norms of participation featured in this

activity setting were not specially designed to lend LD students' access to resources and tools that created opportunities for them to be mutually engaged with each other in pursuit of a common goal. In other words, the literacy practices as represented in the above activities represented an educational process in which Eddie was positioned in the periphery as he continued to employ the limited number of ways of participating in classroom learning that he knew: asking for word spelling, responding to questions with uncertainty, and positioning himself on the boarder of the stage for participation. In a sense, he remained fixed as novice throughout these settings.

Computer Tub Practices. Another activity worth of noting in the class was one of the literacy center activities—computer tub—because the tools that mediated the students' behavior in learning were computers. Before TELE-Web was introduced into the classroom, the computer literacy center was the only literacy setting where the students utilized computer as a major tool for learning. Chapter four already introduced the types of activities that students experienced with computer, which included Internet websites related to the concurrent thematic unit of the class, or some software, which might provide a multimedia interface for reading and writing. The goals for these computer-mediated activities were different than those involved in other literacy settings in the class. The students were still required to observe similar set of rules that applied to other literacy centers. In the computer centers, students tended to engage in social interactions with each other more often than in other activities. Students in special education as well as younger students were seen sometimes as the experts providing assistance to other students working in the computer center. In one of these occasions, DeJuan, which was a second grade EI student, helped two first graders go on the

designated Internet website and navigate through the icons in the Kid Works site ([www.kidworks.com](http://www.kidworks.com)).

There were also constraints in the regular computer center settings. As the goal was for the students to find motivating experience the literacy website' activities by themselves, the students were left to explore the multimedia texts on the web by themselves. In many such settings, the students often spent more time playing with the pictures or fonts, for instance, than with reading or writing with the computers. The observational data collected on February 26<sup>th</sup> revealed such constraints.

Brandon is writing something about a turtle now. He asked me how to spell that word. I encouraged him to try sounding out the word by himself first. There is no space between words. He put in the following words now: "IHAVEATURDOL" Brandon asked Criselda how to spell "brother". First, he read to Criselda what he wrote already in the website

Brandon:       AND MYBROTHERDONTHAVEATURDOL  
                  [Note: "*And my brother don't have a turtle.*"]  
Criselda:       And that's it. That is it.  
Criselda:       You didn't do much. And you can do Cursive.

In the scenario, Brandon and Criselda sat near each other in the computer center focusing on the [www.kidworks.com](http://www.kidworks.com). Brandon wrote about a turtle and asked Criselda how to spell the word 'brother'. After Criselda pointed out the word that already existed in his writing, she commented on the quantity of his story. This showed the affordances of computer centers in terms of enhanced student interactions in the learning process. Later on, more students came up to the computer:

Justin Lake was attracted over to their center and saw that they were doing... giving some suggestions about the kind of picture Brandon could do to go with his turtle story on the website.

Criselda wrote so far: "I like to be wet my grandma I have a wet my"...  
Brandon has just drawn a very cute picture. He is experimenting with colors.  
Brandon showed some students in his class how his name was upside down.

Justin L said: “You are doing all over again. Doing it all over.”  
Brandon asked Mrs. Nordmark, the intern, if he could do another picture on the website. (*April 11<sup>th</sup> field note*)

Brandon seemed intrigued in the illustration and coloring functions on the computer websites, which were affordances of this multimedia literacy site for elementary students. He explored the colors and graphical features of the software embedded in the website. He chosen different colors using the mouse and printed out his final writing with the illustration he was finally satisfied with. Proudly, Brandon showed the product to all adults in the classroom as well as some students. On the other hand, Brandon, like Eddie, created only one-sentence story and then moved on to play with colors and pictures that they could print out along with the stories.

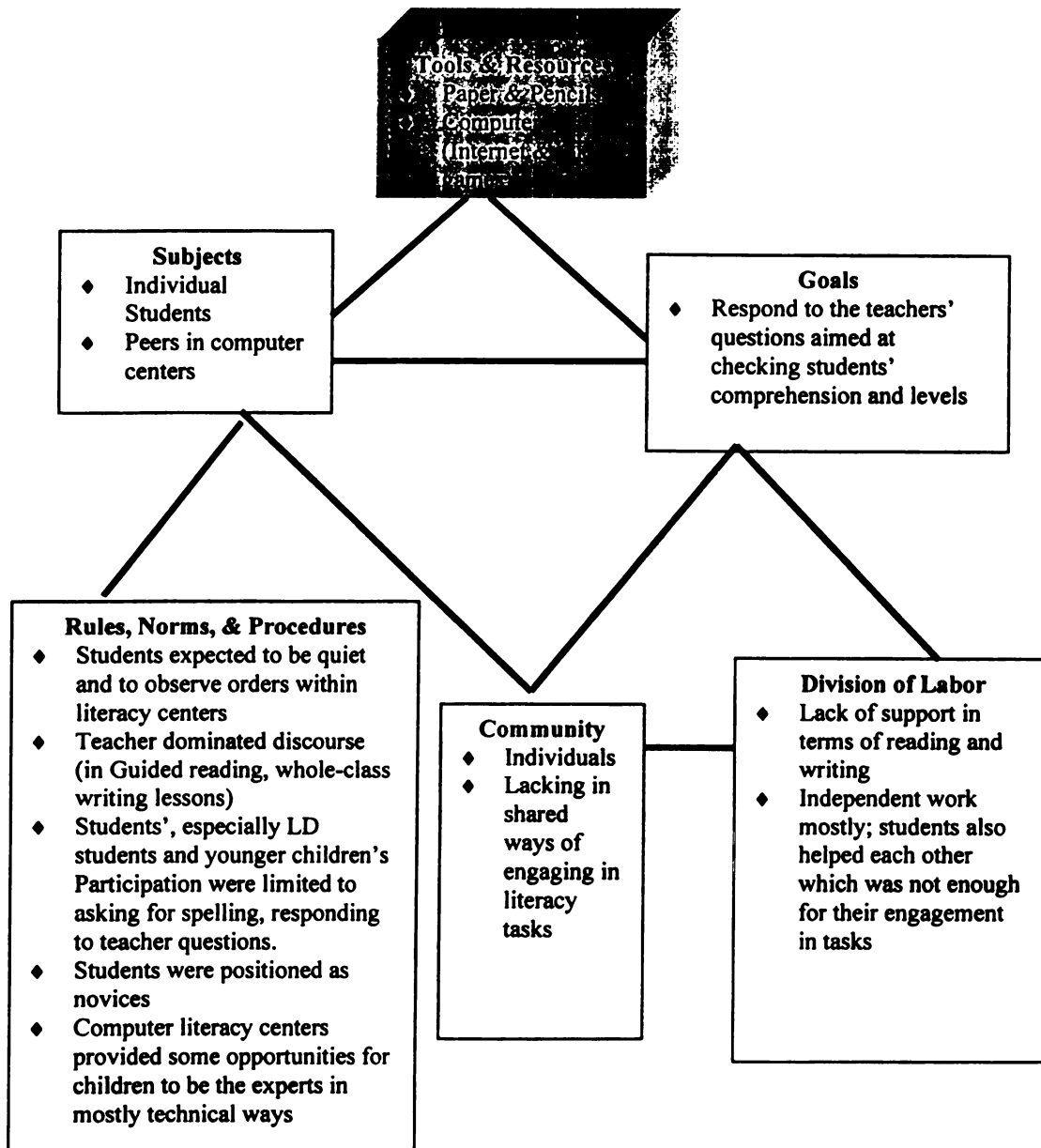
On another occasion, Justin K, a second-grade LD student, and Eddie sat by the computers to explore the website of the week: [www.gigglepoetry.com](http://www.gigglepoetry.com). This was a poetry site where students could explore in a variety of ways poems for kids on the Internet. Neither Justin nor Eddie could read many of the poems by themselves because the reading level of the texts was too difficult. The researcher stayed beside these two students to provide reading or writing assistance. Eddie asked a familiar question of “How do you spell ‘did’?” to Justin when he tried to fill out a line for an uncompleted poem. Later on, another pair of students, DeJuan and Kayelin, went to the same site. DeJuan was 2<sup>nd</sup> grader with EI, and Kayeline was a third-grade student with LD in special education. Both needed a great deal of support from the researcher, in order to participate in the activity, and in the absence of that support, it would have been impossible for them to finish the assigned task (e.g., supplying a rhyming word to complete a poem).

To sum up, within this kind of computer-mediated settings, the LD students and some younger children displayed similar characteristics of participating in the literacy learning processes. They had limited social interactions in terms of engaging each other in a common pursuit of goals utilizing the tools available to them. The existing reading and writing activities were mostly independent activities. Computer centers might have motivated the LD and younger students to develop their technology expertise, but lacked in support for them to engage with the texts successfully.

Figure 5.1 illustrated the basic literacy practices involved in the structures of the existing activities of the classroom. The Activity Theory framework was employed as a lens to analyze the existing literacy practices in which the students were engaged. As the analyses suggested, the literacy and technology goals were oriented towards independent completion of tasks on paper mainly, or using computer as a way to explore learning with enjoyment without much guidance from the teachers. The division of labor, or how the responsibilities were allocated among the students, involved student engagement in the activities, with the teacher controlling the flow of the discourse or individually.

The figure summarizes the set of relationships between the interrelating components of the activity settings represented in the existing literacy curriculum of the multi-grade inclusion ecology. The students were the intentional keystone species who, within the existing activity boundaries, actively constructed the meaning of tools and resources available to them. Their roles in the literacy activities were influenced heavily by the kind of tools they used. Tools, broadly speaking, involved both material and human resources that could be utilized to assist students in performing a literacy task. In the computer center, the computer technology afforded possible ways of positioning

Figure 5.1 Afforded Literacy Practices By Existing Activities' Structure



themselves as experts or more central participants in the task, for example. Whereas, in guided reading or writing activities, the students, especially the special education students focused in this classroom, worked laboriously and independently on their stories, they

tended to exhibit fewer interactions with peers and more constrained participation in the activities.

The foregoing examination also suggested that technologies did not mean the same thing to all students. While some students did well in these existing activities, special education and younger students in this classroom might find it still difficult to become more active participants in the activities. It could mean that these students needed a different type of structure than what was afforded by the existing literacy activity settings mediated by paper and pencil tools or computer technology represented by Internet websites. As the new technology TELE-Web was introduced into the classroom, the students experienced the impact of TELE-Web on their participation in activities that were mediated by the new technological tool for learning.

#### TELE-Web Mediated Affordances to Students

TELE-Web tools took on meanings when they were used in actual settings like this inclusion classroom. As a new technological species of the information ecology, TELE-Web interacted with both special education and general education students to create a new literacy participation framework within TELE-Web mediated learning environments. The most notable characteristics marking the students' participation in TELE-Web activities included: From peripheral to central participation, expanded literacy practices, persistence in learning, exploration of new identities and roles, and students' awareness of writing as permanent. These are interrelated aspects of the affordances as a result of the students' using of TELE-Web. Tale 5.2 summarized the behavior changes in Eddie's participation in the TELE-Web mediated activities.



Table 5.2 Eddie's Participation in TELE-Web Activities

**Phase 3**

|                                                           |                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5/28/02 Animal Report                                     | <ul style="list-style-type: none"> <li>• Agreed to redo a sentence they had put in</li> <li>• Continued to read the book to learn more facts about sea otter for the report</li> </ul>                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                         |
| 5/23/02 Animal Web & Animal Report (Supported Paragraph)  | <ul style="list-style-type: none"> <li>• Read the Web content with his partner</li> <li>• Read the book on sea otter</li> </ul>                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                         |
| 5/20/02 Animal Web                                        | <ul style="list-style-type: none"> <li>• Read the Web with his partner</li> <li>• Gave ideas for 'where they live' category</li> </ul>                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                         |
| 5/16/92 Animal Web                                        | <ul style="list-style-type: none"> <li>• Suggested to fix the use of a punctuation</li> <li>• Read the Web—what they had written so far</li> <li>• Gave his partner ideas for the Animal Web</li> <li>• Continued to show interest in reading the book and searching for facts to put in the Web</li> </ul> | <ul style="list-style-type: none"> <li>• Suggested Josh to put in fish under this category ("Put fish!")</li> <li>• Made an assertion of his typing role (He tried to type too. Then Eddie wants to type the letters and not wanting Josh to interfere.)</li> <li>• Suggested to his partner to write more on "What Sea Otters Eat" category</li> </ul> |
| 5/13/02 Animal Web                                        | <ul style="list-style-type: none"> <li>• Became more engaged in reading the book about sea otters—their chosen animal for the inquiry project</li> <li>• Asked the researcher for pronunciation of a word contained in the book ("What's this word?")</li> </ul>                                            | <ul style="list-style-type: none"> <li>• Was attentive to what his partner was doing ("What are you trying to spell? Sea otter?")</li> <li>• Read the Web</li> </ul>                                                                                                                                                                                    |
| 4/29/02 Animal Web                                        | <ul style="list-style-type: none"> <li>• Clicked on "Save" button on TELE-Web upon request by the partner and the researcher</li> <li>• Agreed to "Share" their Animal Web</li> </ul>                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                         |
| 4/23/02 Animal Web                                        | <ul style="list-style-type: none"> <li>• Paid attention to the facts contained in the research book</li> <li>• Cooperated with his partner by holding the book for him</li> </ul>                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                         |
| 4/18/02 Animal Web (Idea Organizer)—first working session | <ul style="list-style-type: none"> <li>• Typed in words</li> <li>• Suggested putting space in between words his partner typed in</li> <li>• Initiated social-oriented conversation with his peer Josh</li> </ul>                                                                                            |                                                                                                                                                                                                                                                                                                                                                         |

**Phase 2**

|                                         |                                                                                                                                                                                                                                                   |                                                                                                                                                                                                             |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3/14/02 Safety Rules (Compare/Contrast) | <ul style="list-style-type: none"> <li>• Pointed out the need for capitalization of TELE-Web log-in name</li> <li>• Played with the roles<br/>(Travis: Okay you type I tell, is that fair enough?<br/>Eddie: no.<br/>Eddie: Okay, go.)</li> </ul> | <ul style="list-style-type: none"> <li>• Displayed off-task typing behavior (Eddie wrote "eddie likes"; Eddie pretended to be a fast typer. He typed a string of letters on the Idea Organizer.)</li> </ul> |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

- Travis: I'm telling the teacher...oh you made it
- Socialized with his partner

**Phase 1**

3/14/02 Make Word • Relied on the middle school helper to form words

2/14/02 Cat Story (About a Picture) • Eddie was quiet  
• Murmured letters while typing  
• Tried to figure out how to use mouse to start another line

From Peripheral to Central Participation. Students' participation in TELE-Web activities reflected an increasingly active role as a member in the activity settings mediated by TELE-Web tools. An examination of students' engagement with TELE-Web activities over the period of the study indicated that their participation became stronger with the support of TELE-Web tools towards the end of the study. One of the changes in the students involved in TELE-Web activities was a gradual move from peripheral to the central stage of participation.

Eddie, one of the LD students, represented a telling case to show the change in participation, especially through the Animal Theme assignments on TELE-Web: Animal Web and Animal Report (with Supported Paragraph format). An examination of his changing involvement in the TELE-Web activities over the time of the study revealed several changes. The first TELE-Web activity he was engaged in was "Cat Story", which was an About a Picture activity Cathy had created for the students to do in literacy center time. The following table 5.3 illustrates the nature and extent of Eddie's participation in this activity.

Table 5.3. February 14<sup>th</sup>, Eddie's engagement with TELE-Web

|                                                                                                  |                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Student actions on TELE-Web (The individual)</li> </ul> | <ul style="list-style-type: none"> <li>--Log on TELE-Web</li> <li>--Put in title 'a bot cat'</li> <li>--Wrote 'the cat ran in the tree and I LIKE T</li> <li>--Highlight the whole sentence</li> <li>--Went to read in the reading corner</li> </ul> |
| <ul style="list-style-type: none"> <li>• Student interactions (The social)</li> </ul>            | <ul style="list-style-type: none"> <li>--With himself</li> <li>--Murmuring letters</li> <li>--Researcher helped him put 'cursor' back in the front of his sentence.</li> </ul>                                                                       |

In this first TELE-Web writing activity, the students were assigned to work by themselves on the computers. At first sight, the structure of this activity was very much like that for other computer literacy center activities. The division of labor was marked with individual-based work on a single task provided on the computer. Students needed to abide by the rules that applied to the literacy centers: keeping voice down, making smooth transition between the centers, and work without disturbing others in the same room. However, the activity setting had a different structure as it was mediated by TELE-Web tools. At the computer table, the students needed to be involved in a different set of procedures or routines than those in regular settings with the use of TELE-Web: they logged into TELE-Web with their user names and passwords, clicked on the right links leading to the current assignments, and wrote in the appropriate boxes in the TELE-Web text boxes, to name a few. The support provided in this Cat Story assignment consisted of prompts, which was also put in the information area right on the students' working page, the introduction text box, a body input box, 'read my paragraph' button, and a 'spell check' button. However, the teachers created this first assignment as a trial use of TELE-Web to get both themselves and the students to become familiar with the new technology

in the classroom. Therefore, the teachers only introduced the students to the basic procedures and tools involved in this TELE-Web work as shown in the above table. No lesson was given on using the text-to-speech function and spell check functions.

Before this activity, the teachers announced the new TELE-Web center activity to the students by mentioning that the students would write a story on the computer. Then Cathy helped a couple of the students log on TELE-Web and pull up the About a Picture activity before she left for guided reading lesson. During the TELE-Web activity, Eddie murmured letters to himself during this composing activity without asking the adults any spelling-related question, unlike in other writing situations when he was not using TELE-Web. He tried to write the story without putting disproportionate emphasis on word spelling and concentrated on expressing himself based on the picture in this composing assignment. The final writing became:

a bot cat [title]  
the cat ran in the tree and I like cat and my sister and my  
big sister mom the and eddie

As shown by his writing, TELE-Web helped Eddie write a title that was pertinent to the picture. This activity, with its new set of procedures and online features, such as the various text boxes, prompted the structural elements of a piece of writing, allowing Eddie to access writing in a different fashion as in other settings. By logging on TELE-Web with his own username and password, going back to the beginning of the sentence and highlighting the whole sentence, putting a title to his story, Eddie was involved in a series of steps during his performance on this TELE-Web activity. The new structure of TELE-Web writing activity conditioned Eddie to engaging himself in a new set of literacy practices with the support of the new technology. Thus, TELE-Web mediated

Eddie's writing by encouraging actions that directed the student to the newer focus or goal: writing for expression rather than for spelling. The student's initial encounter with the new technology also focused his attention more on the text structures (title and meaning about the picture story, for example) than on the spelling of each word.

The only social interaction that occurred during this assignment was between the researcher and the student. It occurred when Eddie was puzzled about typing letters into the writing boxes of TELE-Web. He only needed to know how to point the mouse to the appropriate area in the text box.

The students' participation in learning also changed over time, as TELE-Web use was embedded in the specific goals the teachers wanted to achieve with them. In the second major activity on TELE-Web, Eddie engaged in a compare/contrast assignment titled "Safety Rules". What made this activity setting different from the last one was that Eddie was paired with a high-functioning second-grade student named Travis. The teacher created this activity so that the students could practice comparing and contrasting related to the health/safety theme of the time. This was also a time that TELE-Web was gradually incorporated into the core curriculum of Language Arts in the class, unlike the first Cat Story assignment. The table 5.4 below summarized Eddie's behaviors involved in this writing task. Eddie's participation throughout this activity was more active than before as indicated by his increased self-initiated actions in this setting. For example, he himself chose the partner Travis for this pair activity because he considered Travis as his friend.

Table 5.4 March 14<sup>th</sup> Engagement with Safety Rules: compare/contrast on TELE-Web

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|                        |                                                                                                                                                                                                                                                 |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| • Student Actions      | --Chose Travis as partner<br>--Listen to teacher model the activity<br>--Volunteer an answer<br>--Remind Travis of punctuation<br>--Receive the role as 'typer'<br>--Ask questions of spelling<br>--Play with typing<br>--Socialize with Travis |
| • Student Interactions | --With Travis, his partner<br>--Socialize and cooperate with the partner<br>--Teacher stepped in to ask questions about ideas                                                                                                                   |

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In this compare/contrast activity, Cathy modeled in a lesson how to write a comparison and contrast paper prior to sending the students to work with their peers on this TELE-Web activity. During the modeling lesson, Eddie volunteered an answer that displayed his own knowledge about the rules in his own house. He also listened attentively during the modeling lesson given by Cathy. When the students began to work on their TELE-Web Safety Rule assignment, Eddie was seen to be more than a peripheral figure in the activity as he constantly gave suggestions to Travis on punctuation and capitalization mechanics, in spite of the fact that Travis was a top student in the class.

The following transcript of the TELE-Web Compare/Contrast activity in which Eddie participated provided further insight into how this TELE-Web activity structure mediated Eddie's participation.

|         |                                                     |
|---------|-----------------------------------------------------|
| Eddie:  | "Just put your initials there. There you go!"       |
| Eddie:  | Capitalized. Capitalized.                           |
| Travis: | I am going to do your initials                      |
| Travis: | Okay you type I tell, is that fair enough?          |
| Eddie:  | No.                                                 |
| Eddie:  | Okay, go.                                           |
| Travis: | I don't know what that means when they say "alike". |

(Eddie is writing "eddie likes")

Travis: I'm telling the teacher...oh you made it

Travis: Okay, walk at home.

(Eddie is doing the typing.)

Eddie: How do you spell it?

Eddie: k?

Xiuwen: sound it out.

(Travis just wrote down "Walk at home" and Eddie took over the keyboard and typed "do".)

Travis: Don't run on the school.

(Eddie is pretending to type very fast...all nonsense characters.

Eddie finished typing "school" for Travis. )

Eddie typed in "don't"

Travis just said something about 'don't play'

Eddie typed in "don't lay"

Travis deleted that part and retyped "don't play")

(Now they have three ideas under "alike".)

Crone: How are you doing? I have an idea for "different" to give you an example okay? How about do you have swing set at home? And slides?

Travis: Yes.

...

Crone: You have to think about how things are the same or different at home or school. Something you do...that you can't have at school.

Travis: Okay.

(Eddie sat back in the chair.)

(Eddie sat on where Leon used to sit and typed the following in the "alike" area: "eddie likes Leno" then he retyped into "Leon". )

Travis saw that and said "oh..." (Smile)

Travis: Eddie likes Leon? For a friend?

(Then Eddie puts that in the text box.) (Field Note March 13<sup>th</sup>)

In this transcript, Eddie's participation took on a more active form compared to that in his previous engagements in the literacy activities, including the first time he was on TELE-Web. Being partnered with Travis, Eddie gained legitimacy in locating and asserting himself as a capable member in the compare/contrast assignment. In fact, his first conscious action was to launch the TELE-Web assignment by helping Travis log in. He had already gained the insider knowledge about how to log on TELE-Web in this

classroom. Through his past association with TELE-Web, a new technological tool for literacy, Eddie could instruct his partner to log in with capitalized initials of the student's name. After they logged in, Travis took control of the situation by assigning Eddie the typing role and himself as the 'teller' as he asked in a negotiating way: "Okay you type -- I tell. Is that fair enough?" In answer to Travis's allocation of responsibilities, Eddie's first response was 'no'. This did not mean that Eddie refused to cooperate. On the contrary, Eddie immediately agreed to type what Travis said after his previous objection to the division of labor. The apparent contradiction in Eddie's responses implied that Eddie was aware of the goals and activity structures of this TELE-Web assignment. Realizing that this activity was different from guided instruction and any other center activities, Eddie was testing if now that he could legitimately engage himself in this activity that afforded him possibilities of more agency in terms of division of labors and rules and norms of participation toward achieving the goals with a fellow student. Thus, he played around these possibilities first by making a contradictory comment on the responsibility assigned to him by Travis. What's more, Eddie tried to make his role seem bigger and more influential than simply typing what Travis told him to type in TELE-Web. For instance, during the activity, Eddie took the liberty of typing in words that were not relevant to the compare/contrast assignment. Once, he typed in 'eddie likes'. Later on, Eddie pretended to type very fast in the TELE-Web text boxes as if he were a real skillful typist. Towards the end of the work, Eddie switched to another computer and typed the following words in the 'alike' area of the compare/contrast TELE-Web assignment: "eddie likes Leno". He then corrected 'Leno' into "Leon", the name of a



student in this classroom. The three incidences pointed to the Eddie's more active exploration of his roles and identities in this TELE-Web-mediated activity.

Nonetheless, Eddie was compliant to his responsibility for the majority of the time. When Travis thought of an idea for a rule that applied to school, Eddie began typing in the rule in the appropriate box under 'school'. He started with asking a question on the spelling of 'walk'. He also supplied a letter 'k' that he knew to be included in this word. At this moment, Travis took over and typed in 'walk at home'. Interestingly, Eddie took over the keyboard again after that and typed 'do'. Next, Travis made another suggestion to put in the school rule box: "Don't run on the school." Eddie typed that sentence in TELE-Web and another sentence from Travis afterwards: "Don't play". Travis made a correction when seeing that Eddie had mistyped the sentence into "don't lay", instead of "don't play". Travis deleted the sentence and retyped it in. This series of moves carried out by Eddie and Travis indicated dynamic relations between students' roles, use of TELE-Web as tools, and the goals of the activity.

The goal of the assignment was not just individual completion of a piece of writing. Instead, it was working with a student partner collaboratively on computer, comparing and contrasting the safety rules both at home and at school. Since it was the third time Eddie worked on TELE-Web, he already knew more about the rules and procedures involved in TELE-Web activities, which enabled him to extend his participation a little further beyond what he could do last time. Another way he became active was that he saw his role as being a competent member in contributing, as seen by his comment on punctuation and capitalization of the letters typed in the text boxes. In this activity, the students' roles and identities were not fixed. Rather, they kept changing

through constant negotiations and explorations of what they could do within the practices mediated by the use of TELE-Web tools. Although Eddie was an LD student, he was aware of and made use of the unique participation spaces afforded him in the activity setting mediated by TELE-Web. He said “no” to the division of labor designated to him as a member of this specific learning community. Then he changed decisions by saying “Okay, go ahead” which allowed him to position himself as the one who negotiated the division of labor. Another indication of Eddie’s experimentation with roles was the fact that he tried to see to what extent he had control over the object of the activity by typing words that didn’t pertain to the writing. In the process, the two students engaged in the negotiation of the roles and responsibilities involved in working in a TELE-Web mediated learning environment. The LD student moved between legitimate peripheral participation to more active participation in the fluid and dynamic construction of students’ roles and identities. The general education student in this setting also served as a resource for Eddie to try out his roles and extend literacy practices rather than a sole authority figure that controlled the discourse and participation. The rules and norms in this TELE-Web activity served to improve Eddie’s power of participation through his accumulated knowledge about how to use TELE-Web technology to log on, for example, and through other procedures involved in the work.

In the same conversation, Cathy stepped in as a facilitator to provide modeling and scaffolding assistance as she saw the students run into difficulty, e.g., in understanding the ‘alike’ part for home and school rules. She began with the intention of providing an idea for the students. That is, she located herself as the information provider. Then, she changed her approach by shifting her talk to questions that focused

on the students' home environments so that the students were further involved in the conversation and thinking about the activity. In this sense, the students were positioned as having control of the activity content. As the conversation moved on, Cathy pointed out the real meaning of the compare/contrast assignment as "thinking about how things are the same or different at home or school", thus anchoring the students to the goal of the assignment. Throughout the conversation, the teacher acted as a facilitator and used TELE-Web as a tool for engaging the students in their zones of proximal development in thinking about the activity. In conclusion, the analysis of the Safety Rules ( the Compare/Contrast TELE-Web) activity revealed a unique activity setting, in which Eddie and his general education student partner negotiated roles, identities, and moved fluidly between periphery and central stages of participation through engaging in TELE-Web-mediated rules, norms, procedures, and division of labors. The outcome was an increased level of participation for an LD student, who began to transform his role as a contributing and purposeful member of the TELE-Web learning community.

The next two assignments created for the students were Animal Web (TELE-Web Idea Organizer) and Animal Report (TELE-Web Supported Paragraph). The students worked in pairs for these two TELE-Web activities that comprised the Animal unit project. Eddie was partnered with Josh, a first-grade student in general education. Josh had an average reading and writing ability according to the teacher but had a good background in computer technology.

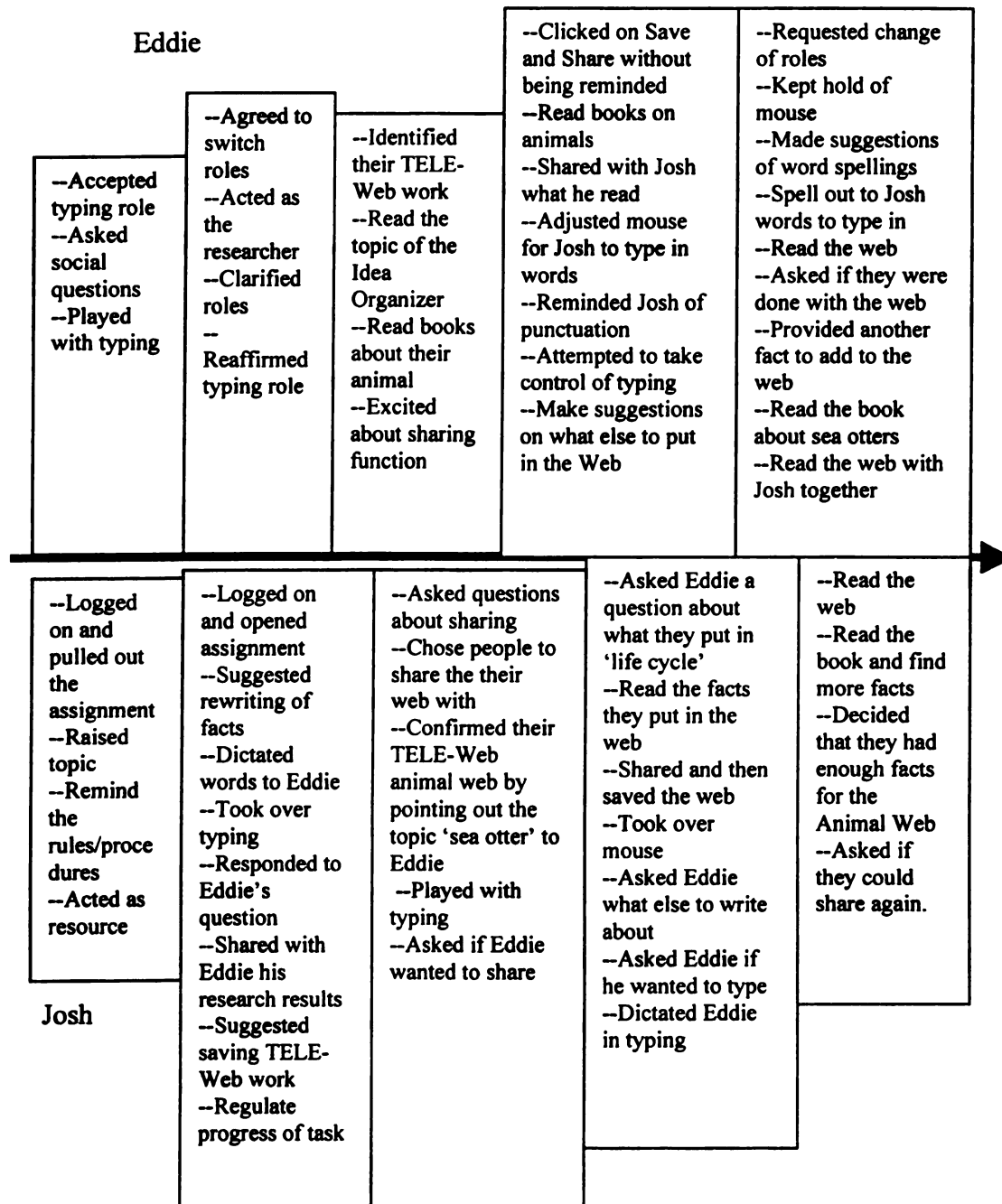
In Animal Web assignment, the students were required to "After researching, put facts about your animal in the correct category." The categories were set as habitats, food, life cycle, and physical appearances. In the prompt on TELE-Web, Cathy wrote

“put 3-5 facts in each category.” In the subsequent Animal Report assignment, the instruction was “write a paragraph for each category in your animal web, using the information you and your partner researched.” The online prompt for the students was “Remember to write complete sentences. Use capital letters and punctuation.” The following table compared these two students’ behaviors in these two connected TELE-Web activities over a period of time. As the instructions and prompts in the Animal Web assignment (TELE-Web Idea Organizer) suggested, the activity became a part of the collaborative process of researching and organizing animal facts with the support of the Idea Organizer webbing tool on TELE-Web. From April 18<sup>th</sup> to May 23<sup>rd</sup>, the students who worked on TELE-Web Animal Web assignment spent an extended period of time using the Idea Organizer as a tool for research and organization purposes. In order to examine Eddie’s participation patterns during his engagement with TELE-Web Animal Web activity, it was necessary to understand how the students adapted and mediated their relations with other subjects, division of labor, roles, conventions, and goals in this TELE-Web activity setting. The following figure illustrated both participants as keystone species and the evolution of their participation in the TELE-Web Animal Web activity structure.

The arrow in the middle divided the two students’ participation behaviors and trajectories over the one month of Animal Web activity. Each box represented the students’ participation behaviors for a particular chunk of time during the Animal Web work on TELE-Web. For example, the first box above the arrow on the left indicated some of the characteristics of participation for Eddie at the beginning stage of this assignment. The corresponding box below him depicted the way Eddie’s regular

education partner, Josh, engaged himself in the same task. The same was true for the rest of the boxes. What's important about the figure was that it displayed the dynamics of mutual construction of TELE-Web tools and the participants on both individual and interpersonal level within the TELE-Web Animal Web activity setting.

Figure 5.2 Eddie and Josh—Participation in Animal Web



In the beginning stage of working on the Animal Web assignment, Eddie was assigned the typing job, which involved putting facts they researched into the TELE-Web Idea Organizer. He did not engage himself in the activity until the researcher put the mouse into his hands so that he could start working together with Josh for the research and webbing assignment. In this sense, Eddie accepted his typing role that was given to him in this setting. During this first stage, Josh directed the flow of the task, positioned himself as the resource person of the pair, and even reminded Eddie of the particular rules and procedures of engaging the task at hand. For example, Josh drew Eddie's attention back to the task by calling Eddie's name. The following excerpt from Animal Web transcripts illustrated how these two students were engaged in the Animal Web activity mediated by TELE-Web technology:

Josh: All right, we are supposed to write our topic. Now we are gonna write sea otter right?  
Eddie: S? A?  
Josh: No. s-e  
Eddie: What else?  
Josh: A.  
(...)  
Josh: Eddie, Eddie, E---ddie, all right, habitat.  
(Eddie began to type in the word.) (*April 18<sup>th</sup>*)

In this first phase of interaction with TELE-Web and with student peer, Eddie asked a question that was aimed at socializing with his partner Josh. Although not relevant to the Web assignment, the question implied an effort made by Eddie to enter the community of practice engendered by the TELE-Web Idea Organizer. Interestingly, he

initiated this part of the conversation after the teacher announced that it was almost time for transitioning to another activity.

Eddie: Is Marquis in Francis also?  
Josh: Yeah, that's where I live.  
Eddie: I saw your dog. Was your dog kind of white?  
Josh: That was not my dog.  
Eddie: Your dog black?  
Josh: Yeah. It's kind of brown. Hold it up in the air.  
(Josh held up the book in the air too.) (*April 18<sup>th</sup>*)

By raising a personal question, Eddie found a way to reinforce his identity in this TELE-Web activity in which he was paired up with a high-achieving first grade student in general education. This Animal Web activity was different than the last Safety Compare/Contrast assignment in that Josh, unlike Travis, was not among the few friends with whom Eddie usually associated with in the classroom. The goal of the Animal Web activity was also different. For this activity, the students worked together in pairs for an extended period of time. The main goal was to use TELE-Web Idea Organizer as a tool for both research and organization purposes. Therefore, even the non-relevant questions about Josh's dog and Marquis' living area were potentially effective for Eddie to become identified with the practice involved in the Animal Web activity. It was one step forward to positioning himself as a legitimate participant of the community.

As the students became familiar with the activity, both broadened their participation in their own ways. No longer a novice in this setting, both students began to explore more active roles in relation to other components of the activity setting such as the use of technological tools, procedures, and division of labors. The second set of boxes in the figure showed that Eddie was more aware of the possibility of negotiating his responsibilities in the activity and more assertive in his exploration of roles in the process

of categorizing facts about sea otters into the TELE-Web Idea Organizers. For this phase of interaction with the Animal Web activity, Eddie reaffirmed his typing role, agreed to switch roles, acted as a researcher, and clarified roles. The following transcript gave an example of how Eddie switched into the researcher role in the construction of a TELE-Web Animal Web.

(Josh took over the mouse and pointed to the text box under the category of ‘food’ in the TELE-Web Idea Organizer.)

Josh: Eddie, Eddie, could you be the researcher?

Eddie: Yeah.

Eddie: What does sea otter eat?

Josh: It doesn’t say in this book.

(Josh gave Eddie the book and began typing in TELE-Web.)

Eddie: Otter? O, r.

Josh: Where’s facts?

(Eddie looked at the book and read: “40, 99.” Josh also leaned over and read aloud: “40, 49, and 99 pounds.” They then read together: “42 and 45 Kg.”)

Eddie: Kg?

Josh: What is Kg?

Eddie: 3 thousand?

Josh: What? Three thousand? Where? “Lighter than heaviest sea mammal, the blue whale.” 3000 times lighter? Dane! Wait a minute! It’s just a clue! “Sea otter eat shells!” S, a, e. Is that how you spell it?

Eddie: Sea otters (*April 23<sup>rd</sup>*)

Upon Josh’s request, Eddie stepped into the role of researcher and carried out his newly emerged responsibility by asking a research question about what sea otters ate. Then his loyalty to the new division of labor led both of them to find more interesting facts about their animal. It became such a collaborative effort between the two students that neither of them minded who was typing or who was doing the research. The above



transcript also showed Eddie and Josh as responsive partners who shared responsibilities to achieve the same goal for the TELE-Web Animal Web project.

At this stage of the Animal Web project, Eddie's participation was expanding to that of researcher, which was designated for him at the start of the activity. He also began to take a more active stance towards his position in this setting. In one occasion during their work on Animal Web assignment, Josh took over the mouse and typed animal facts in a category of the TELE-Web Idea Organizer, leaving the book standing right before him on the computer table. Eddie had no tools in his hand after having agreed to switch to the researcher role for a moment. It was then that Eddie threw Josh a question in a challenging tone: "ARE you typing?" Later, taking over the mouse and keyboard, Eddie played with typing in the Idea Organizer. This move made by Eddie signified his request for clarification of the partner's roles in the activity. It also suggested that he identified with the typing role that he had been assigned to earlier. His clarification question mirrored the interaction between the two participants in the beginning of this second stage of Animal Web activity when Eddie asked Josh: "Who's typing, Josh? Who's typing?" and Josh answered: "You are!" That Eddie reaffirmed his role again later in the activity implied that he attempted to have some control over his own participation and identity in this activity setting, especially when he was unsure of his roles, such as when Josh took responsibility for both typing and researching.

During the second phase of Animal Web project, Josh continued to play a big part in keeping both of them in line with the goals of the Animal Web assignment on TELE-Web, setting up division of labors, and regulating the flow of task by reminding Eddie of the rules and procedures for participation. He was also an important resource for Eddie

who needed assistance in reading the book and spelling. He also made a decision of saving their work on TELE-Web when he felt they would not have enough time to finish the web that particular day.

The third set of boxes in the figure marked the third stage of the students' participation in the Animal Web assignment. For the first time, Eddie asked a question that was explicitly pointed to his growing interest and identity in the collaborative TELE-Web work as they entered TELE-Web. Then he also paid attention to the topic of their Animal Web on the TELE-Web Idea Organizer. The conversation was as follows:

(The students clicked open the Animal Web assignment on TELE-Web)

|        |                                   |
|--------|-----------------------------------|
| Eddie: | That's ours?                      |
| Josh:  | Yes, that's ours. Sea otter, see? |
| Eddie: | Sea otter.                        |

Josh pointed at the center of the Idea Organizer Animal Web on TELE-Web screen to show Eddie the topic of their Web. TELE-Web Idea Organizer acted as a mediator that helped Eddie learn about the title of the Web as a way to help him build a sense of belonging to this collaborative activity. In the third phase of TELE-Web Animal Web activity, Eddie also went a step further toward the center of participation enabled by the flexibility in the division of labors and by the newly found sharing feature on TELE-Web. When Eddie found it necessary to be in the role of researcher, he complied by holding the book up for Josh to see or arranging the position of the book so that it stood well before Josh when he was typing. Eddie was seen also to be flipping through the pages of the book in search of animal facts that he could read. By accident, Eddie hit on the share button on TELE-Web, which opened a new way for both students to engage

with and participate in TELE-Web Animal Web activity. The conversation was presented below:

Josh: Eddie, Eddie, what did you do?  
Researcher: Oh, you must have clicked on the 'share' button. Are you done with the web? You can share your web with other people on TELE-Web when you are done.  
Josh: Yeah. We can share it after we are done.  
(Josh went back to the Web.)  
Josh: We are done!  
(Eddie looks at the TELE-Web screen.)  
Eddie: Share. Where's share? Where's share? Like share, the thing we just did.  
Researcher: You can do that again. Do you want to do that now?  
Eddie: Uhm, yeah!  
Researcher: But let's save it first.  
(Eddie clicked on 'save' button.)  
Josh: I don't want to do it again, Eddie. Don't save it. You wanna share?  
Okay, share.  
(Josh searched through all the students on TELE-Web to share their web and finally clicked on 'Everybody on TELE-Web.)

Eddie's accidental clicking on the share button on TELE-Web was at first thought by Josh to be an interruption to their work. When the researcher intervened and introduced the purpose of sharing function, Josh welcomed the new tool as something they could do after they were finished with researching the facts for the Animal Web for that particular session. Realizing that he was actually helpful in discovering a new function on TELE-Web, Eddie was excited and demanded further attention to this newly found tool. As a result, Eddie saved their work first and then with Josh's help, shared their facts on the Animal Web with all people in the TELE-Web community. The use of save and share functions on TELE-Web added to the repertoire of Eddie's literacy practices in the TELE-Web mediated activity setting. It was also noteworthy that Josh asked Eddie if he wanted to share their work, a gesture made to indicate that Eddie had more agency, ownership, and power in his participation in the activity.

In the fourth phase of Animal Web project, Eddie displayed a wider range of skills that enabled him to practice being a central member of the activity. One of the first things he picked up from his past work in the TELE-Web Animal Web project was to purposefully hit on the save and sharing button without being reminded to do so. He knew the importance of saving the work and sharing it with the TELE-Web audience after having accidentally hitting on the sharing button before, learning about its functions, and observing Josh and the researcher use the saving and sharing tools around TELE-Web. Eventually, he adopted this practice for himself. By saving their own work on TELE-Web first and then sharing it, it was obvious that Eddie realized that his actions of hitting on save and share buttons would be recognized as important and legitimate. Eddie not only took these actions but also showed his partner that he understood what he was doing, suggesting a sense of confidence in his roles in this activity.

Another very important pattern emerged at this phase of Eddie's participation in the Animal Web activity setting. The division of labor had become such that Eddie and Josh were less fixed in their pre-decided roles as either the typist or the researcher of the animal facts. Eddie positioned himself and was also positioned by Josh to be in the researcher role. First and foremost, Eddie showed more reading behaviors and took increasing initiative in searching for facts for the Animal Web. He read the book on animals, read the topic of their Idea Organizer on TELE-Web, and shared with Josh what he had just read. Sometimes Eddie adjusted the mouse to make it more convenient for Josh to type in the TELE-Web text boxes. It seemed that Eddie had more grasp of his own identity and capacity in the activity setting as he became more familiar with the Animal Web project. Meanwhile, Josh was no longer in a dominating relationship with

Eddie. An important characteristic of the participation patterns for this stage was in fact that Eddie became a resource himself, making suggestions and reminding Josh of punctuation and ideas to put in the web. Correspondingly, Josh was no longer the only expert and competent one who controlled the flow of the task and input of ideas into TELE-Web Idea Organizer. Josh even asked Eddie questions about life cycle category facts, read with Eddie the facts they had put on their Animal Web, and asked Eddie what else to write about. The following table suggested some of the active roles taken by Eddie in his participation with Josh to construct the TELE-Web Animal Web in this fourth phase of Animal Web project.

Table 5.5 Eddie's Roles in his Participation in Animal Web at Phase 4

|                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• <i>Active Inquirer and researcher</i></li> </ul>                                              | <p>Eddie: What's this word?<br/> Researcher: Whale<br/> (Eddie is looking at the book and murmured Sea otters.)<br/> Eddie: "Sea otters are always/"<br/> (I gave him the word 'always' when he read.)<br/> (At the same time, Josh is putting more information under 'life cycle")</p>                                                                                                                                                                                                                                                              |
| <ul style="list-style-type: none"> <li>• <i>Resource Person</i><br/> <i>Spell Assistant</i><br/> <i>Researcher of Facts</i></li> </ul> | <p>Eddie: What are you trying to spell? Sea otter?<br/> (Josh is reading their Life Cycle category on the TELE-Web Idea Organizer)<br/> Josh: "Then it grose into a sea otter".<br/> (He took the book again and Eddie scrolls down the screen.)<br/> Josh: What does it say here Eddie?<br/> Eddie: Here? Sea otter is/<br/> Josh: Physical characteristics, Eddie, go back the other way Eddie.<br/> Eddie: I'm on this one b-a-b-e-e-d-l-f-e,<br/> (Josh is using the mouse to put in the category of habitat.)<br/> Eddie: Erase the period.</p> |
| <ul style="list-style-type: none"> <li>• <i>Expert</i></li> </ul>                                                                      | <p>Josh: Eddie, <u>what do you think we should write?</u><br/> (He has just deleted what they already put under food.)<br/> Eddie asked me: What does sea otters eat?<br/> Xiuwen: Crab, fish, abalone?<br/> Eddie (to Josh: put fish)</p>                                                                                                                                                                                                                                                                                                           |

Josh put: A sea otter is carn,

---

- *Typing and Spelling Assistant*

(Looking at the book.)

Josh: (typing in 'very' and 'smart')

Eddie looks at it and reads: v-e—r-y, -s-m-arter.

Eddie: 'then it grose into a sea otter', reading the fact from life cycle.

In the examples of conversations shown in Table 5.5, Eddie, located himself in various roles that enabled him to make positive contributions as a participant of the Animal Web activity setting. As an active researcher of the animal facts on sea otter, Eddie solicited the author's help in reading the books that contained the information about sea otter's eating habits. This role for Eddie had emerged gradually after the pair worked on Animal Web assignment for several times. Josh at first was the one who was most responsible for reading and gathering the information. In the second transcript example in the table above, Eddie tried to make himself available to Josh as an equally contributing member by finding out where Josh was typing, volunteering assistance for the spelling of words typed in by Josh, and then reading what they had written so far in the Life Cycle category. As Josh requested him to look at another category, Eddie insisted in finishing his reading about a fact contained in the life cycle category, which was "I'm on this one b-a-b-e-e-d-I-f-e". He held on to his legitimate right to participate in this activity in his own way. When Josh moved the cursor back to the Habitat category, Eddie made a suggestion asking Josh to remove the extra period he had observed.

In a way, Eddie had also become an expert in the activity. The third transcript in the table showed that Josh asked Eddie a question of "Eddie, what do you think we should write?" Josh began to treat Eddie as an important co-worker after having gone

through several working sessions on TELE-Web for their Animal Web project. Upon hearing this question, Eddie did not directly answer Josh. However, Eddie engaged the researcher in helping him read the books for more information on their chosen topic of sea otter. After obtaining the necessary information, Eddie suggested to Josh that he put “fish” under the category of food in the Idea Organizer. In summary, Eddie’s participation in the fourth phase of the Animal Web project was marked by increased awareness of his possible roles in the activity setting that was mediated by the TELE-Web Idea Organizer, which inclined the teachers to create a collaborative setting, or division of labors, which all interacted with each other to produce a changing and dynamic participation pattern for Eddie.

Toward the end of the project, Eddie was into his role as a researcher of book on animals. He spent more time reading and finding interesting facts about sea otters. Holding the book in his hand, he read: “on the surface the sea otter swims up to mile per hour, only stopping to ask me how to pronounce the word ‘surface’”. He then moved to a section titled ‘Do you know?’ As the participant observer, I provided assistance as needed by the students. Eddie not only read from the book but also read aloud the facts they had written in the Idea Organizer on TELE-Web. Sometimes, Josh helped Eddie read what they had written in the categories. Both students were more skillful with TELE-Web functions such as “save” and “share”:

Josh: Could we share?

Researcher: Yes, Eddie, do you wanna share?

Eddie nodded. You have to decide whom to share with.

(Josh is looking at all the classes and clicked on some students’ names.)

Josh: I didn’t know Shawna is on TELE-Web.

In this example, Josh initiated the idea of sharing their Animal Web. He browsed through the names listed in the TELE-Web sharing page and found that a new student in

his class was also among them. Eddie complied with Josh's request to share their web, since he himself first found the sharing function on TELE-Web and then suggested to use this function even before they were done with the assignment.

In summary, the Animal Web project seemed to allow Eddie and Josh to negotiate their participation and collaboration in a process of defining and redefining their roles in a context mediated by TELE-Web. In the beginning, Eddie was rather passively positioned in the work. His goals were confined to typing letters in the text box of the TELE-Web assignment and he tried to perform the role he was assigned in the collaboration: the typist in the pair work. In the second phase on TELE-Web Animal Web, Eddie began to expand his engagement by asking questions concerning the common goal of the activity, such as "Is that ours?" It was also the session when he began challenging his responsibility as only the person who typed into the computer. There was emerging negotiation of the two boys' roles around TELE-Web Animal Web assignment. This negotiation continued to enlarge their roles such that Eddie and Josh began to switch jobs and truly complement each other with diverse roles and identities. During their engagements with the Animal Web activity on TELE-Web, the students also became more skillful with using online TELE-Web tools such as save and share, which in turn transformed their repertoire of participation in this setting.

The final project done on TELE-Web was called Animal Report. It used Supported Paragraph as the format to provide textual scaffold containing a series of text boxes that gives the step-by-step assistance to the students in writing a report: title, topic sentence, sentence # 1, sentence # 2, Insert Sentence box, Topic sentence, sentence # 1, Insert Sentence button, Add Paragraph button, and a concluding sentence box. There are



also Spell Check boxes beside each sentence box. By observing the same pair of students, the study showed that both Eddie and Josh were influenced by the set up of the cognitive scaffolds as represented by these text boxes on TELE-Web. In the Animal Report activities, these TELE-Web features mediated the students' thoughts and actions in many ways. The following examples will be discussed to reveal how the two students interacted with TELE-Web Supported Paragraph features during the Animal Report project.

(Josh and Eddie are working on "Animal Report" for the first time on TELE-Web:)

Josh is thinking about the topic sentence.

They have some difficulties with writing a topic sentence.

Josh: I was thinking about doing wolves but that was taken away. So we have to do sea otter.

Researcher: Let's look at the booklet... Is there a sentence that shows the readers general things about sea otter? Here it asks a question like "did you know?" So maybe we can ask a question like 'Did you know about sea otter? Or, we are going to tell you about sea otter, tell you about physical characteristics...etc. about sea otter.'

However, Josh typed "Sea otters eats sea shells" in the topic sentence box.

... Josh just clicked on "Inserted a sentence".

The first sentence is: "A sea otter is pretiter."

*(May 23<sup>rd</sup>—First time working on Animal Report)*

This was the first time they ever worked with TELE-Web Supported Paragraph activity for their animal report. Josh again positioned himself as the leader of the conversation when it came to a new assignment. He looked at the topic sentence text box and began to think about an appropriate topic sentence for their sea otter report. It seemed that they had difficulty producing a topic sentence. Josh then said to himself that this was not originally what they wanted to write about. They had hoped to write about wolves but that topic was chosen. Eddie did not utter one word at the start of this activity. At this moment, the TELE-Web researcher stepped in to provide some guidance on what topic

sentence meant and how they could find some clue for topic sentence from reading the book on animals. Although Josh did not adopt any of the topic sentences provided by the researcher, he moved on to write his topic sentence box as “sea otters eats sea shells”. This sentence was drawn from one of the facts they had found for sea otters during their work on the previous Animal Web Idea Organizer, which was printed out for each pair of students and used as tools to help them write a full report on the animal of their choice.

What Josh wrote could be better described as a detail sentence under the topic of sea otters’ food. On the other hand, Josh next typed in the Sentence # 1 box: “A sea otter is prettier”. This second sentence resembled more a topic sentence. However, since it was the second fact “A sea otters are prettier” in the food category of their animal idea organizer, Josh just converted this fact into the second sentence in the report. What Josh changed was to create a more appropriate sentence based on the predator fact contained in the idea organizer. They did not use Spell Check function on TELE-Web when writing their sentences at this point. In another sense, it could be attributable to their stronger focus on meaning rather than spelling. They kept in mind that the eventual goal for the report was to present it in front of fellow students and their parents or grandparents.

Seeing that Eddie was not active engaged in the activity, the researcher intervened again in order to involve Eddie to move to the center of participation:

Researcher: It looks like Eddie wants to type.  
Josh: Do you want to type?  
Eddie: Uhm, okay.  
Josh: S-e-a, space  
Eddie: S-e-a, (hit space),  
Josh: Press A. (He is ready to hit on the letter himself) Sea, o-  
(Josh did a space for Eddie)  
Eddie: E-r, sea otter, Space,  
(May 23<sup>rd</sup>)

Having been immersed in Animal Web activity for an extended period of time, Josh knew that this activity required collaboration and shared responsibilities. He responded to my intervention by deferring to Eddie the typing role he preferred. Seeing that this was an entry for him to participate in the Animal Report activity, Eddie accepted the opportunity. Then Josh helped Eddie in his typing function by assisting Eddie with word spellings. This pattern of participation was representative of Eddie at the start of a new activity. He needed time and opportunity to find his roles first and then moved on to more central participation.

As both students became more familiar with the Animal Report (TELE-Web Supported Paragraph) activity, Eddie positioned himself in a more important or central role. He began to take on responsibilities such as researching to add more details to their finished web and report. For example, the next transcript showed such a shift in identities and roles:

(Josh and Eddie were pulled out to the room 104 to do the report.)

Josh: Eddie, you think we should change the sentence, "the sea otter is lighter than a blue whale"? Because everyone knows it's lighter than a blue whale?

Eddie: Uhm, yeah.

Josh: Okay, (will say) "a thousand times lighter than the blue whale."

(Josh is putting "a sea otter is 400, times l-I-g-h"... (Sounding out the word 'lighter' at the same time.)

Josh: B-l-u-e-w-h-l

(Josh has put in the topic sentence box "A sea otter is 400, times lighter than a blue whale"...

Josh came back.

He put in the first sentence "A sea otter is very"..

Eddie reads something off TELE-Web...something that Josh has typed.)

Josh: S-m-a-r-t. Smart. Period.

Josh: I'm not gonna click on any spelling check. We don't need ...  
Josh: I can't believe it... They always put sentence number 1, 2..  
Eddie: You are on sentence 2 again?  
(Josh pointed to the computer to indicate that he was on another sentence 2.)

Josh: Eddie, do you think you can hold this? It's getting hard.

(Eddie put the paper on the screen of computer and it got pasted on the screen...)

Josh: Sweet!

(Josh put it on another side of the screen.. also allows him to type.

But then the paper went off again.)

Eddie: You want me to hold it?

Josh: ... "is the lightest sea mammal".

Josh: Now we are on life cycle.

(Josh is reading the 'life cycle' of the web.)

Josh: Do you wanna start, let's say, sentence 2?

Josh continued with topic sentence of life cycle.

Josh: All right! Sea otter! (He just looked at what he typed in 'sea otter')

Josh: l-I-f-e, life, space, c-y-c-l-e. life cycle l-s, a baby,

(Eddie is making a bit of noise.) then, g-r-o-w-s, grows, space, it grose up. Period.

Josh clicked into the sentence #1 box.

I asked them to save first. I don't want the work to be lost.

Eddie: Sea otters can swim better than...

Researcher: Than what?

Eddie: Fishes?

Researcher: It's a good swimmer?

Eddie: Yeah.

I let Josh insert another sentence box for the life cycle one.

He did that successfully.

Josh typed in: "A mother sea otter can", (whatever Josh is typing in now.)

Josh added "a mother sea otter" on the computer. They didn't originally had that phrase on the web.

I showed them to go down to the bottom.

Josh: It is a concluding sentence... not a closing sentence... I think we will just save now.

Josh: I think that's a concluding sentence.

Researcher: It's the same as closing sentence. Isn't it that Mrs. Jones always asks you to have a closing sentence?

Josh: Yeah, 'that's all we know about sea otter..  
 Josh: Oh, I think of one.  
 (He typed in "That is wet we wrote about sea otter. You can finde mor info")  
 Researcher: mation,  
 Josh: I abbreviate  
  
 Josh: ... four words, did you like it?  
 Eddie: What?  
 Josh: Like for "my question": di dyou like it?  
 Eddie: Yeah.  
 Josh put that in the question box.  
 (May 28)

The above observations contained many clues about the students' changing participation in the ongoing TELE-Web Animal Report activity. In this episode, Josh asked Eddie for his opinion on whether a sentence about sea otters' physical characteristic made sense or not, arguing on the ground that everyone possessed the prior knowledge of the weight difference between a sea otter and a whale. Eddie was obviously in the same opinion shown by his answer "Uhm, yeah". Next, Josh changed the sentence by adding an important detail on how much lighter a sea otter was than a blue whale. Eddie was seen to observe Josh in his composing action and read their support written so far on TELE-Web, suggesting that Eddie took a more active and collaborative stance towards his participation at this stage of the TELE-Web Animal Report activity.

In the next segment, Josh made a choice on whether to use Spelling Check function on TELE-Web or not. He decided not to use it at that moment. This decision was in line with his previous encounters with Spell Check on TELE-Web Animal Web project. It seemed that the children focused on meaning for both Web and Report assignments with the final goal of presenting them in front of a large audience composed of other students and family members. The sentence #1 and sentence #2 text boxes on TELE-Web did not appeal to Josh because he had to put a sentence in one box at a time.

This feature also drew the attention of Eddie who noticed that sentence #1 and #2 boxes appeared throughout the TELE-Web writing screen to prompt them to think about topics they were going to introduce. Eddie commented at this feature as he observed Josh type in the sentences for the report: “You are on sentence 2 again?” Here, the text boxes on the TELE-Web interface again became the mediating factor for both the LD and the general education student to form a language that was unique to the TELE-Web activity setting.

The next segment of the above field note showed that Eddie stepped into the cooperative persona by holding the book for Josh to see while typing in the Supported Paragraph sentence boxes. At this moment, Eddie was a full participating member of the TELE-Web Animal Report setting and thus was reciprocated with deferring of typing role by Josh who asked “Do you wanna start, let’s say, sentence 2?” In this activity structure, the two participants interacted with TELE-Web features and texts, which allowed them to change roles, collaborate, reciprocate division of labors, and form a language that mediated their thinking about composition. The writing on TELE-Web and interactions between peers also promote further identity of Eddie in this learning experience. In the later actions, Eddie was seen to be actively thinking about sea otters in comparison with fish, one of the food sea otters ate according to their Web and report on TELE-Web. As a participant, Eddie was created through the identities and roles afforded him in this activity setting, and at the same time he also created what TELE-Web activity meant in the intricate relationships among participants, tool, division of labors, and their goals for the Animal Report.

The last segment of the above field note showed Josh as the expert on concluding sentence, which was brought to the students’ attention through the TELE-Web

Concluding Sentence text box in the Supported Paragraph format. At first, he was confused between closing sentence and concluding sentence. But he immediately saw that they were the same and for the concluding sentence of their TELE-Web Animal Report the sentence “That’s all we wrote about sea otter. You can find more information.” It was an important action by Josh because his talking aloud of the concluding sentence served as modeling for Eddie’s exposure to concluding sentence. His interaction with TELE-Web and with Eddie provided explicit links for Eddie as a participant with the TELE-Web tools and other elements of the activity structure. In the final part of the field note, Josh, for the first time, found that there was also a text box prompting them to ask a question of the potential audience on the TELE-Web. He put in this box “Did you like it?” and asked what Eddie thought of this question. There were two implications as a result of this action: both students were brought to the attention of potential audience for their animal report on TELE-Web through the Ask a Question box. Eddie was invited to participate in thinking about their text on TELE-Web as writing for a larger audience than themselves.

In summary, Eddie and Josh pair was an example of how a LD student could engage with TELE-Web activities from the periphery to the center of participation.

Literacy Practices embody ways of engaging in an activity and achieving certain goals. In the TELE-Web mediated activities, the students, especially LD students gained an expanded repertoire of participating in the literacy practices. Eddie, for example has become a more assertive and contributing member of the Animal Unit assignments on TELE-Web.

Persistence in Learning. An examination of the students' participation in TELE-Web activities also suggests that these settings provided an alternative learning experience in which special education students used TELE-Web to engage themselves persistently in a process of constructing meaning of writing in the classroom. One of the assignments on TELE-Web Desert Animal Story offered examples of how special education students, LD students in particular, were absorbed with writing on TELE-Web. Russell was a second-grade LD student in this inclusion classroom. When Desert Animal Story was created and assigned to the students, Russell had only been transferred from another school to Amy and Cathy's room for no more than three weeks. He had less exposure to TELE-Web use and learning than other students. According to Cathy, Russell was a cognitively very low student, especially in writing which was hard for him. Behaviorally, he could get very reactive. However, observing Russell working on the TELE-Web Desert Animal Story assignment showed that he embraced the writing activity and assumed the identity as a persistent writer in spite of difficulties he encountered in the setting.

First of all, it took Russell several minutes to just log in TELE-Web with his own user name and password because of the networking speed at the time in the elementary school. When Russell finally logged on, he could not find the assignment sent by the teacher, due to reasons associated with a breakdown in the sequence the teacher should have followed in assigning the activity to the students. Subsequently, I helped Russell by creating this writing format with the same teacher instructions and prompts for him on the spot so that he could work on the Desert Animal story writing. The topic he chose for this writing was snakes. The first two sentences that Russell wrote were: "Snakes eat animals.



They live in the desert.” As he stopped after these two sentences, I asked Russell whether it was easier or more difficult to write on TELE-Web than on paper. He responded that writing on TELE-Web was much easier for him. Then, the computer froze and Russell had to wait for the computer to switch on and reboot, which did not frustrate him. Instead, he waited, logged on TELE-Web, pulled out this assignment, and checked his writing.

Another student Justin, an EMI first grader, joined Russell in the computer area. Justin was a very low-functioning student whose writing was limited to a combination of letter strings and invented spelling. But Justin loved computer and playing with it. Although a lower performing writer, Justin was invited by Russell to be his co-participant in the Desert Animal Writing activity. At this moment, other students had moved out to recess outside of the building but Russell insisted staying in the classroom to finish composing and typing the story. The following field notes recorded the conversation and behaviors of the two students around TELE-Web Desert Animal Story writing:

Justin:       What does snake eat?  
Russell:       Animals.

(They began searching animal books and found one good book.)

Russell:       Oh, here, this one! Justin, come here, you can copy off me.  
                  Where’s the food at?

(Justin is still searching through the book.)

Xiuwen:       Oh, this is King Corbra.  
Russell:       Oh, I want to do this one!

(Justin Lake decided to sit together with Russell. Justin Lake accidentally pushed the power button and they are out of power. Russell reentered the free writing activity on TELE-Web. Then, he began copying from the page “The King Cobra”. Put in the title: snake bites”, looks at the screen, and “oops”, and then put a space between snake and bites. He read aloud each letter as he typed the title in.)

Russell:       How could I get my thing back?

(It's already lost. Russell began copying the first word under the paragraph "Snake Bites". The first word he put down is: "poisonous".)

Russell just simulated a finger space in between words.

Russell: Justin, if you need a space, just use your finger. There!

(The space turns out to be big... as big as the finger)

(Justin now also began copying off the words on the book now "poisonous")

Justin: Makes more space.

Russell: Yeah.

(Justin also makes a large space now in between words. Russell actually measures the space by finger each time...)

Justin: I'm way ahead.

Russell: Hold on, wait for me, Justin.

Justin: I'm already done. I'm way over here.

Russell: Wait, I got to have space.

(Justin began telling Russell the letters to be typed in. The classroom is engaged in writing. They are writing about grandma—then they type it in the computer. Mrs. Jacobs is helping with typing and printing off some students' work.)

*(May 7<sup>th</sup>, 2002)*

At first, the two students were using different computers and working on their own Desert Animal Story assignments on TELE-Web. Justin asked Russell a question about what snakes ate. This question related to Russell's choice of animal prompted Russell to invite Justin in searching information about snakes together through the books available to them. Furthermore, Russell encouraged Justin to be a member of this writing community found on TELE-Web by giving him the permission to copy off his written text on snakes while Justin worked on the computer beside the one Russell was working with. Russell and Justin then began a partnership as they researched for information and began writing their reports as they sat together in front of one computer.

It seemed that TELE-Web became a place for Russell to exert power to form a learning community that fits his own purposes and interests in pursuing the topic of the

animal he chose. This was also a time when half of the class had been divided into paper groups and TELE-Web groups for the Animal unit researching and writing projects.

Russell and Cindy, another third grade LD students had been partners in the TELE-Web Animal Web and Report activities. Therefore, the students were very much absorbed in the animal-related information research and writing, which reflected Russell's information writing style for the Desert Animal Story assignment.

In the middle of their research, I provided a clue by reading a title in the book *The King Cobra*. This helped Russell to find exactly what he was interesting in saying about snakes. He expressed great excitement over finding the topic of cobra snakes in the book. However, at this moment, Justin pushed a button accidentally that shut off the computer. An unfortunate accident such as this could have been so disastrous after a series of difficulties encountered by Russell that he might just quit from this writing activity on TELE-Web. What he did though was to switch on the computer, reenter TELE-Web assignment area, and began to copy words from the King Cobra book. He also wrote entitled his story as *Snake bites*.

During this latter part of their work on the animal story, Russell found that he had lost what he put in the TELE-Web text boxes when the compute was inadvertently shut off, because he didn't save his work. Russell copied a key word from the cobra book "poisonous" which was quite relevant to his title of "snake bites". Russell's next action was to put his finger after the words so that there were finger spaces in between his words in the text. What's more, Russell also assumed the role of an expert by suggesting that Justin, who was now sitting in front of another computer, do the same thing for his writing on TELE-Web too instead of writing in letter strings. Justin complied with the

spacing rule by doing the same thing: measuring words spaces by finger. In addition, Justin also typed in “poisonous” in his Desert Animal Story text box on TELE-Web. This was an improvement in writing for Justin because his typing so far hardly contained any space between words on his TELE-Web Desert Animal Story assignment. In the end of their work, Justin showed off to Russell by announcing that he was way ahead of Russell in this writing, which was not accurate because he just typed more letters in later. Russell responded by emphasizing the quality of his own writing as having spaces between words and hence his writing was appropriate and real writing.

To sum up the two students’ work on TELE-Web *Desert Animal Story* assignment, Russell showed great persistence in using TELE-Web tool to help him complete the research and writing process. His interaction with TELE-Web suggested a process in which the LD student positioned himself in favor of the activity, self-regulated his goals, and assumed a central role in control of his writing that was personally meaningful to him. In spite of the technical difficulties Russell encountered, he did not succumb to them and instead, he set his mind to the goal of learning about cobra and snakes in general. He also brought a student with a cognitive impairment as his partner to form a community of learning around this TELE-Web work. He became a capable learner and an expert in writing as a result of the literacy practice mediated by TELE-Web Desert Animal Story activity.

Another example indicating students’ persistence and enjoyment in working on TELE-Web was Cindy, a third grade LD student. In a computer center activity, students were asked to work on Desert Animal Story on TELE-Web. Cindy logged in and clicked on the assignment. Both teachers were busy providing guided reading lessons to other

students. Cathy had mentioned the requirements of the Animal Story assignment to the students before assigning the students to the center activities. The teacher had only enough time to suggest to Cindy to look over animal information among books on a table near the computers. Cindy chose the topic of rattlesnake as her topic. It was noteworthy that Cindy chose to stay and continue working on this TELE-Web assignment even after it was time for whole-class writing lesson. Cindy was totally absorbed in the research and writing process. She also displayed thinking aloud and reading aloud behaviors while working on this assignment on TELE-Web, which was not usual for her involvement in non-TELE-Web assignments. The following field notes and transcriptions illustrated Cindy's persistent participation in this activity setting.

(She grabbed a book and said to herself: "Let's look in here.")

Cindy:            Okay, they are mammals.

(She is reading the page about "Cobra Snakes")

Cindy:            'The body temperature'

Cindy:            What does it say?

Researcher:      Surroundings.

Cindy:            "More than 2400 uhrg". What is this?

Researcher:      Kinds

Cindy:            Ooh... 413...poisonous!

(She kept reading the book.)

Cindy:            Ooh!! Ouh-oh, just learned something. These are poisonous.

Cindy:            Okay, where was I? 'The king cobra feeds food ...' Okay, I learned a lot of things.

(She kept reading the book. Now that Cindy has finished reading about cobra snake, she began writing in the text... She is actually putting information.

Researcher:      How are you doing?

Cindy:            Getting more details to it.

...

Cindy:            We can write that too "the ...snake is startled by the boy"

(She mispronounced the word 'startled' as 'spied'.)

Researcher: So do you think it will fit in your story?

Cindy shook head.

Cindy: Not yet (smile).

(She wrote: "snakes are reptiles" in the text box and 'whichmeanstheyhave dry,scaly skins')

She is copying from the book and nto putting space between the words.

(Now writing the fourth sentence:)

Cindy: Yeah, this (the part about the boy) could be part of this. (Her story)

(Then she wrote in "thekingcobrahasbeenstartledbythe oby".)

Researcher: You have four details!

Cindy: One two three four, I want to have lots more!

Mrs. Wilson: Mrs. Crones says for you two to stay in here?

Cindy: Yes.

(Cindy is still reading the page and trying to find more things to put in her writing.)

Cindy wrote down: "it can measure 18 feet long".

[Teacher is teaching writing on the special memories of the children's chosen special persons.]

Cindy is writing more details.

(She is pointing her hand on the page and copying at the same time.)

Researcher: Don't you need some spaces?

Cindy: I know how to read it.

(She read it to me.)

*(May 8<sup>th</sup>, 2002)*

In the above conversation, Cindy engaged in this TELE-Web writing activity with enough interest and persistence to make her want to stay and finish researching and writing about her snake topic even when the other students were all in the whole-class writing lesson. Throughout the activity setting, this student was bent both on creating the object which was the animal story on snake, and on the achieving the goal of learning as much information as possible through engaging herself in this assignment on TELE-Web.

The primary tool in this setting was TELE-Web Desert Animal Story, a writing which allowed the student to put in title and write her story in the text box on TELE-Web. The second tool was the book available for the student, who read for information and later on copied some of the information onto the TELE-Web writing area. The subjects involved in this task consisted of Cindy mainly, and the researcher who provided scaffold when necessary for the child actor. As revealed in the transcript, Cindy was not only a reader whose intention was to search interesting facts about snakes, but also she was involved in the TELE-Web activity in which TELE-Web served as the primary tool mediating Cindy's learning and production of the Desert Animal Story. The two simultaneous roles were made possible by the use of this technology that enabled the student to be motivated in coordinating her competence in two areas.

In the first part of the field note, Cindy talked aloud to signify her focus on cobra snakes, their temperature, and what else was provided under this animal category in the book. Having read enough of the book, Cindy concluded that she had learned a lot of things about king cobra and began putting what was learned about this kind of snake into TELE-Web writing area. The second part featured her as copying some "details" she copied from the book onto TELE-Web, including the line of "the snake is startled by the boy" in the book. Saying that "we can write that too: "the snake is startled by the boy", Cindy seemed to have included the researcher as part of her community of doing this Desert Animal Story activity. Later, Cindy included more relevant information about snakes: "Snakes are reptiles which means they have dry, scaly skins." However, as she typed in more information, she neglected the spaces that were needed in between words on the TELE-Web screen. Dismissing my comment about the spaces, Cindy answered

that she could read the words with no difficulty, which seemed to be an assertion of her ownership to this piece of writing. She was seemingly more absorbed in putting down ideas and information about snakes rather than worrying about spellings and conventions of writing. She kept reading the book to find things to put in her TELE-Web work. In summary, this Desert Animal Story allowed this LD student to have great interest in learning about the animal and searching as much information as possible to put in the TELE-Web writing. The student showed great persistence in working toward the goals of learning and creating the final product on the TELE-Web.

Students' Awareness of "Permanency" of Their Work. During students' use of TELE-Web tool for writing Animal Web and Animal Report, they internalized a heightened awareness of saving their work on the web and transferred this internalized knowledge to other computer settings. The following field note (May 18) illustrated this point:

Eddie finished that line (typing in 21) for Justin K.  
Eddie:           How do you spell did?  
Xiuwen:        D-I-d  
Eddie put in the same box: "did hehave a green ston.

Now Brandon comes and sits by Eddie and read the last line. Eddie helped him read the last line.

Eddie said:    Oh, we didn't save! (*May 18<sup>th</sup>*)

This was one of the two times captured in my observation when Eddie reminded others of saving what they had done on computer. In this case, Eddie was working on a computer center activity, which asked them to explore the [www.gigglepoetry.com](http://www.gigglepoetry.com) web site. He went into that site, opened an exercise requiring him to create the last line of a short poem. After he finished his line, Eddie offered to help a first grader Brandon by



reading the poem to him. As they were done with the poem exercise and went to another activity, Eddie realized that he didn't "Save" the work. That Eddie realized the importance of saving his work suggested that TELE-Web activities afforded new knowledge not only of their ownership of writing but also of the meaning of their writing as being permanently stored and easily retrievable. Children's

### Characteristics Reflected in Student Interviews

This classroom ecology was composed of diverse populations varying in abilities, grades, and personal orientations towards literacy learning. According to Nardi & O'Day (1999), diversity is essential to the continual evolution and development of information ecology. In an information ecology, there are different kinds of subjects or participants who find different niches and resources useful for their individual interests. In this classroom locale, I conducted both structured and informal interviews with representative students in order to gain insight into their individual characteristics as diverse keystone species of the classroom. The formal interviews tapped into their academic and social backgrounds, attitudes towards reading and writing, computer knowledge, background, and their opinions of using computers in general and of using TELE-Web technology in the classroom. Informal interviews took on the form of conversations held with students immediately after their engagement with TELE-Web. The results showed that the students, whether general education or LD students, all reported positive knowledge and opinions of TELE-Web. In the following section, I would present the results of their interviews in connection to their construction of TELE-Web in this classroom. At the same time, I would also present a whole-person snapshot of student cases (both LD and Non-LD) as readers, writers, and participants in the classroom literacy activities, so that

the students as keystone species were discussed in view of who they are, what they like to participate with, as well as how they viewed technology such as TELE-Web.

### Eddie

Reading. Eddie had a positive attitude towards reading. He described reading lesson as simply 'read a book'. His observation of good readers in his class was made while passing others in class or reading with friends in the library. The good readers were seen as getting words right and 'reading very good'. In Eddie's mind, good readers must have practiced reading whenever they can: at home, at school, and in the library. To become a good reader, he thought, it was important to practice reading and keep on reading everyday. Sounding out words helped too. Eddie's conceptualization of reading was formed on the basis of his observation of what other children did in his classroom, mostly external behaviors exhibited by these students when they got words right and read well in lessons. Word skills constituted major parts of what counted as good readers too.

Writing. For writing, Eddie and his sister often wrote at home about Jesus because both of them attended church school. Writing was about using what kinds of pencils to write. In order to become a good writer, Eddie believed that it was necessary to practice writing cursive and spelling. His writing on the special-person topic in class was about his grandma. He thought that everyone in her class was a good writer. Reading and writing was fun for Eddie as he reported himself practicing them on bus ride or at home/school and he played school at home. Writing was also about writing neatly. His definition of writing seemed broad so as to include the fact that he was a good writer in math. In this sense, writing was associated with using a pencil and write down something on paper for practical purposes. Eddie was sensitive to the differences between the rooms across the hall. He was quite confident when he said that he was a good writer 'across the

hall' where Cathy had her group of kids for center and guided reading activities. Cathy's group consisted of mostly higher-grade level students of the classroom, including third-grade LD students. In the room 104 across the hall, Amy took charge of another half of students during center time and guided reading lesson. She had more lower grade students in their first and second years than Cathy. The split of groups during certain time of the school might explain Eddie's knowledge of him as one of the good writers in the classroom opposite 104.

School/Home Literacy. Both at home and at school, Eddie seemed to have a fixed repertoire of books to read. At home the book was "Cat in the hat". At school he read about bears, a topic which corresponded to the animal theme at that time.

Subjects. Eddie liked reading and writing and going on computer and play. He also mentioned playing with friends and watching squirrels/birds as very fun thing to do. When he had free time such as Friday free time, he would go on computers to play games (basketball games).

Computer/Technology/TELE-Web. Eddie enjoyed the fact that he could engage in TELE-Web activities with a partner. Computer was considered a place where you could write on and have partners "when you do TELE-Web". When asked about his knowledge of computers and what they could do for him, he provided the following roles that computers played in his class: check up information about a field trip place, find pictures, playing games, and so on. He was particularly fascinated by the field trip the class took a while ago. Before the trip, the teachers used computers as a place to get information and pictures about the place they were visiting.

As for the question of what TELE-Web could do for him, Eddie's response, interestingly, revolved around a good recall of facts he had learned through doing TELE-Web animal report on sea otters: "...you can write about sea otters eating shells, you can put sea otters on the thing" (the TELE-Web text input box). He associated the technology with what he learned from the last collaborative activity in particular, partly indicating also that TELE-Web was different than any other technologies ever used in the classroom as it acted as a certain learning scaffold and place for literacy practice for this student.

Other functions also were manifested in Eddie's interview. For example, he indicated that he had published one story on TELE-Web and he used the web function on TELE-Web for writing which he described as : "circle in the middle and write another circle..." Further more, he believed he used the self-start function before on TELE-Web. This was a place where the students could select the various activities that had been created and made available for public use in the TELE-Web activity database. Eddie's experience with TELE-Web revealed his accumulating knowledge about the content of writing you could do on TELE-Web (Animal in Eddie/Josh pair), the buttons he was supposed to click on, the research process, typing in text boxes and so on. In addition, Eddie understood the functions of sharing his work on TELE-Web and enjoyed reading his own stories on the Web.

When asked whether he liked computers, Eddie indicated that he liked to play games on the computer and "playing on the TELE-Web". Interestingly, he attributed his enjoyment with TELE-Web partly to being able to work with a partner. He loved to type and do research (involved in the TELE-Web animal report assignment). The process of

working with another student to produce a report constructed by them was a fun thing to do on TELE-Web. He liked the part that he and Josh switched jobs during the process too, as TELE-Web provided the student a legitimate alternative space and norm for participating in reading and writing with a fellow student that was normally not available to him. Josh, who was Eddie's partner, was not originally one of the friends that Eddie would feel comfortable working with besides Marquis and Travis. Josh was not even in Cathy's group across the room 104. The teachers' and the researcher's co-construction of the TELE-Web Animal Web and Report activities have contrived the space for this new partnership between Josh and Eddie who, for an extended period of time, engaged in the Animal Web and Animal Report activities together. Consequently, Eddie found himself a good partner and role model. Having a partner has become associated with one of the salient benefits of working on TELE-Web, as Eddie expressed in his answers to the question about his computer knowledge in general: "You can write on them, play games, or you can have partners when you do TELE-Web."

TELE-Web has also captured Eddie's attention as an important part of the daily literacy practices and routine in this inclusion classroom: "Sometimes we play games with them and sometimes we do TELE-Web and our computers show us lots of pictures." The activities installed over the period of the whole semester gradually set them apart as one distinct set of activities to supplement the regular processes of learning to read and write in this class. In order to discover how the students made sense of TELE-web activities, the study also probed them with the question of "What are all the things you can do on TELE-Web?" followed by TELE-Web functions. To this question, Eddie answered as follows:

You can write about sea otters, or things that live in the ocean and things that live in a jungle. You can write about monkeys, tigers, a lion, and a bird, something like that. You can do on TELE-Web, you can do, write about sea otters, or you can write about sea otters eating shells, sea otters breaking shells with rocks. You can put sea otters on the thing, and type your name in it. You can see a lot of animals. (*May 28<sup>th</sup>*)

The above transcript of Eddie's interview suggested that for him, TELE-Web was a place where the students could engage themselves in the expression of their knowledge about sea animals. This technology was analogous to a distinct writing curriculum in itself. Not only could they write about sea animals such as sea otters, a topic chosen by Eddie and Josh, but also they could read or "see" a lot of other animals on TELE-Web that had been published by other students. Although Eddie referred to the TELE-Web Idea Organizer topic box as 'the thing', he nonetheless remembered the actions he had engaged in, suggesting that the student internalized the function of topic boxes on TELE-Web, a scaffold for his writing process. It seemed that TELE-Web had become an alternative place in the classroom for Eddie to construct meaning about animals with the support surrounding the use of TELE-Web Idea Organizers and Supported Paragraph formats. The same point was proven also when he was asked how he would introduce a new student in his classroom about TELE-Web:

I will tell them that TELE-Web has a lot of animals on it. You can click on an animal that you want. You can write about the animal and copy a book about the sea otter, or panda bear, or monkey something. You can do all of it and when you are finished, the teacher will probably help you type it. (*May 28<sup>th</sup>*)

A list of features and functions were also listed in the interview for the students to decide which ones they had used in TELE-Web activities. Eddie indicated in the interview that he published a story, did a web activity, and self start activity. These all corresponded to his implementation of TELE-Web in reality. He did share their stories and worked on Animal Web together with Josh. This knowledge about TELE-Web

helped the student understand that they were part of the TELE-Web community, an alternative space for them to engage in a meaning process of reading, writing, and sending their stories for publication.

He also learned that TELE-Web allowed the students to have their own user names, share, and save their work on the Internet.

Send people to write back, I think so. You can put your names, like your name and your partner name. If I were with Josh, it will put me and Josh's name on the TELE-Web, and when we get off the TELE-Web, the thing will still be on there. (May 28<sup>th</sup>)

Thus, the student came to internalize important tools that supported writing on TELE-Web as well as online features that allowed him different ways of using the computer. However, the affordance of TELE-Web to Eddie went beyond the scaffolds of the online writing tools. The affordance occurred also in terms of the unique relationships between participants in their division of labors involved at the level of the TELE-Web mediated activity settings. Actually, as Eddie reported, he enjoyed the collaborative work by Josh and him in the pair work for Animal Web and Animal Report:

Type. I want to type and research. Like you look for something that you can put on computer. It's fun to type and it's fun to do the other (research). Like me and Josh can switch like I do the TELE-Web thing and... put on the computer and he can be typing and then we can switch, I be the typer and he can be the TELE-Web thing. (May 28<sup>th</sup>)

In summary, Eddie's interview revealed that this LD student recognized TELE-Web as an important part of the classroom learning through his immersion in the extended literacy practices in the TELE-Web activity settings. TELE-Web also came to be associated with a salient writing curriculum itself in Eddie's minds as he expressed TELE-Web not as a place to simply type and play, but as an important source of studying animal facts and sharing information on the Web. For Eddie, another most important

meaning of TELE-Web was the collaborative division of labor between him and Josh. It was the first time for Eddie to gain a formal partner with whom to work together on an extended project. Through the cooperative teamwork, Eddie had utilized this new technology to achieve the goal of becoming knowledgeable about sea otters as shown by his recall of the facts he and Josh had researched and reported on the TELE-Web site through the Animal Web and Animal Report activities. Further, Eddie internalized some of the functions he could use on TELE-Web: save, share, and topic text box for the Idea Organizer. This might be a good indication that TELE-Web mediated this LD student's conceptualization of what writing meant on TELE-Web: working with a partner, read others' work on animals, save and share, and put topics which was the central thing they wrote about on TELE-Web.

### *Josh*

Josh was Eddie's non-LD partner. Cathy referred Josh as a "younger but bright" student. He was paired with Eddie because Cathy thought they two could cooperate well with each other. About this pair, the teacher also had the following to say:

Josh is more outgoing and Eddie is quiet. So you have at least one of the partners who is able to ask questions. Cognitively, Josh functions a little higher. He can bring more to the group. Not that Eddie couldn't bring anything, but it's just a matter of I think he was the right one to pull out certain things in Eddie's personality. That would help with the assignment. (*May 8<sup>th</sup>, 2002*)

In fact, Josh was also an articulate student when it came to thinking and talking about reading and writing. As a first grader, Josh thought that usually 2<sup>nd</sup> and 3<sup>rd</sup> graders had higher reading levels, judged by the number of books they brought back home or the kinds of books they read (chapter books). A good reader, according to him, knew how to sound out words and recognize word families. Josh identified himself as reading at a



beginning or middle level. However, he was pretty specific about where he was at by talking about what level books he was reading now and where he was shooting for. Josh paid much attention to the content of books he read and he had a clear idea of what kind of books he enjoyed reading. In general, he was a strategic and self-directed reader.

Josh has an emerging sense of the writing process: writing down on paper, reading the text, then making changes, reading over again, making more changes, and writing the final copies. His understanding of writing lesson indicates that he is aware of the meaning of writing. He knew that he could use mapping tools to organize ideas and write down what he has learned from an informational story. The transcripts below illustrated Josh's view of writing:

We read book, if it's informational book, we kind of write down what we learned. Sometimes, first make a web, write down on paper. (*May 29<sup>th</sup>*)

According to his observation, a good writer wrote a lot and made few mistakes in writing. It also matters that writing should be a way of expressing oneself: "You can write a song or anything you want or an event." He himself kept some flexibility when writing. He knew how to balance different facets of writing quality. If he were in a hurry, he would not mind the neatness too much. If he were not in a hurry to write, he could take his time to write neatly. Josh wrote both for external and internal motivations. Sometimes he wrote for external rewards such as extra points. Other times he felt like writing about something he experienced or something he just made. It appeared that Josh did not usually run out of things to write about if he wanted to. His mind could be seaming with ideas to write about. But it was about balancing quality against time for him:

When I have to do it very neatly, I kind of take my time, on rough draft.. (if I have to hurry up), I (wrote) still neatly, if in a rush.. I can just hurry up and write it down. Sometimes I like writing if I keep records, tally marks or points. Sometimes I just want to write because I just want to write about, write when I made something, like a Lego, or a gift I get like in Christmas. (*May 29<sup>th</sup>*)

Josh was purposeful with his writing. If he were hard pressed with time, he would hurry up the writing process and reduce the length of the writing as he expressed in the interview above. But he never was short of ideas he was writing something of interest to him. Amy, the general education teacher also echoed this point that Josh could get lots of information out. This transcript also suggested part of the reason why Josh and Eddie did not write lots of facts and details in their Animal Web and Animal Report assignments on TELE-Web.

Josh learned a lot about computer from his father. He visited his father's office and learned about Internet web sites. He also learned about viruses. Josh is quite computer savvy. About TELE-Web, he knew that he could read and write on TELE-Web. He had published/shared once with Eddie during the animal report project. He liked TELE-Web and he learned about it as a tool that helped him in reading and working on writing.

Some computers are made for controlling robots and some computers are made to go into other computers. Some computers get viruses and you almost like have to erase everything and do everything over again.

My dad, he kind of works with computer a lot so he usually is the one who deals with all kind of computer stuff. He told me one time when our computer has an anti-virus that some computers were made to get into other computers and give them viruses.

His competence in computer distinguished him from the rest of the students and helped him gain an advantage in the computer-related projects. When asked what TELE-Web helped him personally in this classroom, he reported: You can do special assignments that you need to do or they want you to do. You can do kind of big and sometimes we need a couple of days to do the assignments.

You can go look at other people's stuff, what they wrote and you can share yours, what you wrote. (May 29<sup>th</sup>)

In the above answer, Josh conveyed the idea that TELE-Web was a useful tool that provided him special assignments that were considered 'big' or challenging. It typically took more effort and time. On TELE-Web, he also realized that he could read other people's work and shared his own writing so that other people could learn more stuff, just as he and Eddie shared their writing of sea otters and at the same time read some other animal information written by other students on TELE-Web during the Animal unit project. TELE-Web has utilized and expanded Josh's repertoire of knowledge with computer and what's more, expanded his literacy practices through the 'special assignments' for him to read, write, and share on TELE-Web. Like Eddie, he also told in his interview that he had used web and shared stories on TELE-Web.

When Josh was asked to introduce TELE-Web to a new student in his classroom and what TELE-Web had done for him personally, he said:

I'd say that TELE-Web is a good website. We do our stuff on it. I think it could help me do some really hard homework that I might have to do. And if it's an assignment on TELE-Web I could just go to TELE-Web and do it. I can write. I can do an assignment on it that I don't think you can do on any other web site. (May 29<sup>th</sup>)

It was obvious that Josh had a heightened sense of TELE-Web as a special web site that had different purposes than other web sites. For one thing, he could do an assignment any time by just logging on with his own user name and he would find the assignments. Second, he valued the facts that TELE-Web allowed him to do hard homework and to write that no other websites had allowed him to. That is, TELE-Web is not only a technology. It represented literacy practices in which the child found motivation and personal interest in reading and writing on the Web. And yet the most

impressive work Josh reported that he had done was the TELE-Web Animal Report activity. The reasons were articulated as follows:

Because you get to learn a lot about a certain animal. And know so much about. Get to know a lot about it and get to share with other people and they learn about it. (*May 29<sup>th</sup>*)

Like Eddie, who almost associated TELE-Web with the Animal Web and Animal Report assignments, Josh embraced this project for another unique reason of his own. For him, Animal Report project provided unique learning opportunities. Over the extended period of time, he had taken away from the project desirable knowledge about the researched animal and at the same time, he and Eddie could have an audience to share their knowledge with people on TELE-Web. This work gave him additional sense of audience and meaning of writing. No wonder he said: "I think I need some TELE-Web work, yeah, like more learning assignments."(*May 29<sup>th</sup>*)

In addition to the academic benefits of TELE-Web, Josh thought positively about TELE-Web and working with a partner on the idea organizer task and animal report assignments on the computer. One thing he mentioned was that he and Eddie took turns researching and typing on the computer. This might be one more reason why he liked this assignment.

In summary, the first-grade general education student Josh had positive experiences learning with TELE-Web. On the one hand, TELE-Web provided various functions and assignments for him to engage in writing, sharing, and learning from others' writings. This technology also allowed him to work on hard or big assignments that challenged him to practice writing. On the other hand, Josh made his own sense of TELE-Web and chose to like it because TELE-Web suited his own sense of writing as

expressing ideas. TELE-Web was meaningful to him also because it was more than technology. It was better than “other websites” he had known, as TELE-Web gave him flexibility in terms of accessing it and finding assignments right there, with which he could engage in a learning process. He chose Animal Report as his favorite activities on TELE-Web, as it enabled him to learn a lot about animals, which suggested that TELE-Web meaning was inseparable from the use it was made through teachers’ and students’ enactments of this innovation. TELE-Web also provided him with a great venue to practice his literacy skills by engaging him fully in challenging tasks such as the writing projects he had worked on with Eddie.

### Cindy

Cindy, a third-grade LD student involved, was another interesting case. Cathy described this student as “outgoing and being able to help lower functioning students to read.” In fact, she was often used as a helper too in this classroom. In the student interview, Cindy herself valued peer help as an important tool that helped her read. She also positioned herself as helper in some occasions. Reading was also associated with reading with partners, most of whom are students or friends who were more or less at a higher or same reading level as Cindy’s. Cindy loved to read and did not seem to fear challenge. For Cindy, good reading was also related to quantity (how many books are read) and quality (easy book versus chapter book).

Writing was a harder subject for Cindy. She thought that good hands and practice would make someone a good writer. Writing was about writing neatly, in cursive if possible, write letters and words, keeping on writing, remember things the teachers say and make them stay in the brain, and sounding out words. Cindy suggested using scrape paper to assist in writing (for writing down words that they don’t know) or having the

teacher write down words in red ink on top of what the students wrote. She regarded herself as a good writer too, along with many students such as Joe, Travis, Taylor, Shaquitta, and Tyler. Some of them were in the same reading group as her. She reported “‘remembering to write very good’ was important for good writers.” Her interpretation of writing was largely influenced by the belief that memorizing words and remembering what the teachers told them to do was key to good writing.

As a matter of fact, Cindy considered writing her favorite subject. Reading was also a subject she loved. She viewed reading and writing as useful for getting to know more words and reading more books.

Writing is, uhm, it’s very hard. ...a word you don’t know, if it’s in your head, you sound it out. And then you write it down. You have a scrap paper you write down on. And if you don’t get it right, our teachers will write it with a red pen.

If you write, you will be a good writer. If you write in cursive, you will be very good in cursive. Keep on writing and writing a lot of words, letters. If you get it right, the teachers get it right. The teachers write it over the top, if you get it wrong... (*Interview: June 3<sup>rd</sup>*)

Her conceptualization of writing was very much limited to words, practicing letters and cursives on paper and pencil, and copying what the teachers had fixed on the paper. Good writing meant having good hands that helped her write neat cursives. Her understanding of writing did not include planning and organizing ideas to make coherent stories.

We have very good hands. We write **neatly**. And we write **cursive** too. I got very good hands. Whenever we get to read and write, we be **quiet** at our tables and... we have to go to table, table 1, table.. Good hands, means hands get working better. (*Interview: June 3<sup>rd</sup>*)

Cindy knew how to type and fix something on computer, such as printers.

She learned about computer from her friend's dad up north. She does math and type a lot of things on computer (such as science, social studies, reading, etc.) It seems that Cindy had a love for computers and she had some personal experience with computer at home.

We type a lot of things. We type like in social studies, science, and reading, with a lot of friends. I like to read with Joe, Tyler, I like reading with my whole class except Terry. (*Interview: June 3<sup>rd</sup>*)

Cindy thought that work on TELE-Web was fun. She could read other people's WORDS and stories, as well as her own stories. She was not quite familiar with the TELE-Web interface terminology yet. For example, she mentioned 'going back to the thing and reading other's work', when she talked about sharing function on TELE-Web. She shared her work once on TELE-Web. "TELE-Web is fun to go on". In Cindy's mind, TELE-Web has become a tool to help students read and write. She valued the fact that they could send messages on TELE-Web. Apart from this interactive feature, her favorite activity on TELE-Web was reading and writing. When asked what were things she could do on TELE-Web, she answered:

TELE-Web is **fun** to go on. Because we can go **read other people's words**, like what we are doing today. I can read my own stories because I, we can read other people's stories. It was by ...jetopsky? I can remember ...by going back to the beginning of the thing, and if you wanna read, go back to the thing and read other people's work. (*Interview: June 3<sup>rd</sup>*)

In this transcript of her interview, Cindy revealed that she liked TELE-Web because it allowed her to be engaged in reading and writing her own words as well as other people's stories published on TELE-Web database. She had done this when he was on TELE-Web and exploring other things, including sharing function. She was also aware of sharing and sending messages to the authors on TELE-Web: "TELE-Web is fun

to go on. You can send your message, if you want to, to other people who you know.  
 TELE-Web helps people learn how to read and how to write.”

*Other Students*

Interviews with other students have also revealed positive participation of students using TELE-Web as mediators of their learning processes. Alexis, a first grader, and Taylor, a first grader, was a pair of students involved in working in TELE-Web Animal Web and Animal Report activity settings. While Alexis bordered on special education referral, Taylor was a high-functioning student of the same grade. The results of their interactions with each other and with TELE-Web were illustrated in the following table with their interview transcripts. Alexis was the one who were more expressive about TELE-Web during the interview. Taylor sometimes even asked Alexis to add on what she said. The following table 5.6 was extracted from the interviews with Alexis and Taylor who were partners during the TELE-Web Animal Web and Report activities (*June 4<sup>th</sup>*).

| Table 5.6 Alexis/Taylor informal interview transcripts                                                                                                                                                                      |                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alexis                                                                                                                                                                                                                      | Taylor                                                                                                                                                                                                                                                                         |
| How did the projects go?                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                |
| Good. [The TELE-Web report is good.] It was so fun I wanted to do it again. It was fun typing and information is okay. You get to read a book and like type. First you have to see what you have to do when we first do it. | We learned about type, we looked for information about tigers. And we had fun because we took turns and we got typing and writing and what else Alexis?                                                                                                                        |
| Alexis: When we are done with TELE-Web, we are excited because we are finished.                                                                                                                                             |                                                                                                                                                                                                                                                                                |
| Yeah. We are on our book because she did one and I did one and that made four. She made one about the big mama and I got one with a cub and she did one with the mama...                                                    | Yeah. And right now we are on our first page. Well we did all of our coloring and drawing stuff and now we are on our book). But we have to make two more pages because me and Alexis are going to have our own stories. So we have to draw two more tigers, by me and Alexis. |



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How did you do it?

On TELE-Web. And we get partners and we see what we want and see if we like the choice so we did tigers and we like tigers. And the jungle and the monkeys and snakes. We went on the computer and then we typed what we wanted. First we type what we wanted to say and we talked about the baby cubs too, not just the tiger, we talked about the little ones too. We like our ideas, we love being partners.

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If you do another report, would you prefer doing it on TELE-Web or paper?

Prefer on TELE-Web. Because I like TELE-Web and it helps us much more better, because you do a second paper and you get to draw and then you'll gonna be finished with all four choices... all on the computer. If you are done with everything, you are done with TELE-Web.

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From the joint interview results shown in the table, it might be implied that Alexis and Taylor talked about this TELE-Web project in terms of both process and products. They mentioned tigers and the kinds of knowledge associated with tiger as a result of their using TELE-Web to research and learn about this animal. They also referred to the final product of the project, which was a report with all four areas or categories of information about this animal. It seemed that the goal set for the entire project had been an important motivation for the students in their engagement with TELE-Web. The goal was sort of different than that in other existing activity settings because in this setting, the students had some choices over the animals they wanted to report and they were given a different tool to carry out the project. Another characteristic reflected in their interviews

was that Alexis valued the fact that they could work on the Animal Web and Reports on TELE-Web instead of paper because it was much faster and they learned much better that way. In addition, they both enjoyed the fact that they were paired up in this project. The collaborative nature of the work has become one of the common factors that facilitated the students' participation in this project. In a sense, this suggested that the activity settings mediated by TELE-Web was a complex entity, in which students were intentional learners and interactions between the tool and the students as well as relations among student participants were all part of this complex set of relationships existing in the effective TELE-Web mediated activities.

A glimpse of the interview with another high-functioning second grade student Travis also revealed that TELE-Web was their preferred tool for learning and engaging in the Animal unit activities.

You don't have to use paper and pencil. You just got to type. And it's kind of faster cause you got first button set up right and in words.. press the button and just type out the words. Like t or something...and it will make that letter. Working with partner) is fun. It was not difficult to work on TELE-Web. I just got to look at the keyboard. It also helped me be a fast typer. I prefer to do it on TELE-Web. (*Interview: June 3<sup>rd</sup>*)

Terry, a second student with POHI and ADHD, embraced TELE-Web as he found this new tool much more preferable than paper and pencil which had given him great trouble and struggle in writing:

Because I get to, we get to type and we don't have to write. It's hard for my hand. And I have reading problems when I am writing. At the same time, he also benefited from the interaction with his partner, which allowed him to both receive help and be a contributor to the entire activity. Because we get to learn a lot of stuff about that and we [?] work.. and I can't read and my friends read. (help each other) a lot. We both are really good friends and we don't fight at all. (*Student Interview: June 4<sup>th</sup>*)

In summary, the students who have worked with TELE-Web for the Animal Web and Animal Report projects benefited from this technological tool in terms of the following aspects: efficiency with writing, various writing features such as save and share which allowed them to read others' writing as well as sharing their own work, interaction with peers, and expanded opportunities for learning and literacy practices.

Similar questions were asked of students who had been engaged in paper and pencil groups for the Animal Projects. A second grader, Wisney, indicated that he enjoyed working on paper for this project. But he also enjoyed typing up the finished product on the computer. When asked how the project went, he summarized what he learned about the animal of his group:

Dolphin eats the little fish and lived in the ocean and if it's in the sun too long it can burn. The skin can burn. Sometimes they attack sharks when they have to. And they like human as long as you do nothing bad to them. (*Student Interview: June 3<sup>rd</sup>*)

A question was directed at the student's inclination with tool use. He stated that he liked computers because he could look at the keys that got letters. Wisney liked the partner aspect of the Animal Project: "You got to write the same thing as your partner write. I helped writing and I helped typing. We didn't fight." (*June 4<sup>th</sup>*)

Wisney's interview suggested that he recalled the things he learned about dolphin when I asked him about how it went with his animal report (done with Kayelin). He didn't mention paper and pencil as tools to help him learn. By contrast, students who have used TELE-Web often praised the tools as being helpful in the learning process (for reading and writing). Maybe this suggests that tool mediation might stimulate students' awareness of tools as regulating their learning behavior.

My second questions tested his knowledge of writing a report. He knew that he needed to put what he is going to write about first. However, he didn't tell me specifically what a report is and about the four categories.

He liked typing the report on the computer after he is done. He didn't fight with the partner, which he thought is why their work had been fine.

### Kayelin

Kayline was a third-grade LD student who worked on the Animal project with paper and pencil. Wisney, her partner, was a second grader. She said that one of the good things about computer was that she could type, play games, write poems, read, looked for information, and all kinds of stuff on computer. As to TELE-Web, she knew about the reading and writing function, sending messages function. However, she was not right about playing games on TELE-Web. She was also confused between TELE-Web and some other web sites she had gone into (containing poems). She was confused about whether she sent messages to her friends on TELE-Web or elsewhere. (I think she has not used message function at all on TELE-Web.) The following interview transcript with Kayelin was recorded:

You can write to people, they can write back to you. Sometimes you can send it to him, and in TELE-web, you can do all sorts of stuff. Sometimes, there's a game, stuff like that. I write sometimes. I shared it with people. I send it and people like read it. Sometimes I write poems, funny poems. I send it and sometimes they read it. And sometimes I get messages back. I write my name down below. Yeah, I shared before, stuff like that, I write down and shared it. TELE-Web is fun and you can learn a lot of stuff from it. Help you read and learn and write. Help you keep the eyes on the work. (*Interview: June 3<sup>rd</sup>*)

She was aware of the various functions on TELE-Web such as sharing and reading other students' work on the Web. However, she mentioned poems and funny poems, which were experienced in another web site during one of the computer literacy

center activities. All the TELE-Web activities sent to her during the whole semester included two WordShop activities and one compare/contrast activity titled *Safety Rules*. However, Kayelin only had the opportunity to do a Create Word activity in which she use the letters given by the teachers to put together as many words as she could. This limited exposure to TELE-Web also constrained her formation of a clear conceptualization of TELE-Web. Hence she mixed up the other web sites with TELE-Web. However, Kayeline still regarded TELE-Web as a useful place for practice writing, share, and get messages, which she probably had learned through the special education teacher's presentation of TELE-Web functions.

She also reported using webs on TELE-Web in the interview. TELE-Web was viewed as fun and helpful in terms of learning to read and write. She also believed TELE-Web could help her to fix her eyes on the work.

During the paper and pencil projects, Kayeline felt that she had fun working on them. The interview asked her how the projects went and she stated:

Right now we are doing dolphins. We are writing about dolphins and we are going to tell a whole bunch of people about dolphins. And when we are done with the report, we just got to type. We are going to stand up and read to people. The next person they will tell us about an animal. (*Interview: June 3<sup>rd</sup>*)

Having her mind set to the larger goal or object of the activities seemed to have helped the student in this project. The fact that she had a partner with whom she could share responsibilities also contributed to Kayelin's positive attitude toward the paper and pencil Animal Web and Report activities in general. She revealed in her interview that although working with a partner took some patience, it paid off and they both learned a lot of stuff that she didn't know of.

We both (and Wisney) really did the same. We had a circle. We had four lines, circles. We wrote down what we were talking about. We had squares, four squares, we tried to write about home, where it lives, food, ... yeah habitat, I forgot... I helped Wisney and he helps me. I'll write ...word and he'll write it down. I'll think of a sentence, and he'll think of a sentence, he'll tell me, I'll write it down and he'll write it down and we take turns back and forth. We just need to type. (*Interview: June 3<sup>rd</sup>*)

As for support, she said that Amy the general education teacher helped me spell words and read. And sometimes she would write down things that they could copy from. In general, LD student Kayeline's knowledge of TELE-Web included sharing, reading, and writing for enhancement of literacy practices. Nevertheless, she had limited opportunities working with TELE-Web and her interview reflected corresponding lack of understanding of what this new tool meant for her in terms of working on Animal Web and Animal Report that could be different than on paper and pencil.

The researcher also gave an informal interview to a first grade student named Brandon who worked in the paper group during the Animal Web and Report projects. Brandon was one of the lower-functioning students in the classroom but he had been catching up with the grade level in the semester of the study. The following was the transcript of the short on-site interview during the animal projects:

Researcher (R): What do you like about working with another person?

I don't know.

R: Do you like writing on paper this time?

Yes.

R: What did you like it about?

It's fun.

R: What did you learn about writing a report this time?

I don't know. First, you have to you got to put your name and date and after that, you start writing... We do it by ourselves sometimes. We write about animals and stuff like that. (*Interview: June 4<sup>th</sup>*)

The conversation with Brandon showed that his reaction to the paper and pencil Animal projects was different than that of Alexis's, a first grade LD student reported

earlier. While Alexis reported on the fun learning experience on TELE-Web during the project, Brandon show little awareness of his own engagement in the paper and pencil group. The interview with Brandon also revealed that he did not seem to remember the details of the animal facts he and his partner had chosen, whereas Alexis indicated that the affordances of TELE-Web tools were manifold: efficiency, collaboration with the partner, direct composition of text on the computer, and acquisition of a great deal of knowledge associated with the animal they reported. TELE-Web tools played important roles in mediating the younger children's understanding of the tools as well as enhancing their participation in the learning process.

#### Summary.

With its own defining components for a curriculum serving both special education and general education students, TELE-Web also took on identities shaped by the participation of these keystone species of students in this special ecological system. The section presents analyses of the co-construction of TELE-Web functions embedded in the students' literacy practices. The use of the new technological tool within the larger activity settings of the class implied complex relationships between TELE-Web and the students' characteristics, participation, and other important existing literacy learning practices of the classroom.

Since this study is a situated examination of ongoing TELE-Web use in the multi-grade inclusion classroom, it attempts to understand the meaning of TELE-Web as it unfolds and interacts with the participants in specific activity settings

Students, especially LD students in the study, played great parts in actively engaging in TELE-Web and formulating their diverse understanding and participating in

the activities that were mediated by TELE-Web. Analyses suggested that TELE-Web technology was employed by LD students to bring new meanings to various aspects of their literacy practices. In fact, use of TELE-Web following ways. In fact, a key outcome of using TELE-Web was the technology's mediating role in transforming the repertoire of existing literacy practices of students in the activities from various perspectives: From peripheral to central participation, expanded literacy practices, persistence in learning, exploration of new identities, and students' awareness of their writing as 'permanent'.

The above results indicated that whenever writing was involved, the LD students tended to display a similar set of repertoires in their participations. The combined results of ethnographic analysis and student interviews showed that the students, especially LD students, were more motivated in TELE-Web work; they moved from the periphery to the central stage of the activity setting. Eddie's involvement in all the TELE-Web assignments was evidentiary of his growing participation and increasingly strong role in the activities. Another mediational effect of TELE-Web on the students was that the new technology promoted the students' persistence in the literacy practices and strengthened their awareness of their writing as being permanent due to their use of the 'save' button. One of the most important factors contributing to the students' growing participation has something to do with the activity setting with its changing matrix of relationships between components of the activity structure mediated by the use of TELE-Web.

Table 5.7 will use the Activity Structure triangle to highlight the relationship between the components of the writing activity settings, which reveals the construction of the individuals embedded in the existing writing literacy practices using TELE-Web



tools. Table 5.7 represented the inner relationships among and between the components of the writing activities based on an adaptation of the framework created by Hung et al. (2000). Numbers 1 to 5 indicated the various subsystems in the Activity Structure developed by Engestrom (1987), corresponding to the separate triangles marked out in figure 5.3.

**Table 5.7 Activity Structure in Writing Settings Mediated by TELE-Web**

| <b>Learning Dimension<br/>(Students' Participation)</b>       | <b>Activity Structural Relationships</b>                                                                           |                                                    |                                                                                     |                                                                                                                                                      |                                                                                   |
|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|                                                               | <b>1. Objects and Outcomes</b>                                                                                     | <b>2. Mediation al Tools</b>                       | <b>3. Management and Timeframe</b>                                                  | <b>4. Roles</b>                                                                                                                                      | <b>5. Process and Products</b>                                                    |
| <b>Relationships in the sub-systems of activity strcuters</b> | Student-Tool-Object                                                                                                | Rules-Tool-Division of Labor                       | Student-Rules-Community                                                             | Community-Object-Division of Labor                                                                                                                   | Student-Community-Object                                                          |
| <b>Key questions relevant to each triangle</b>                | What instruments are available?<br>What student-student or teacher-student interactions exist to enhance learning? | How do tools mediate the roles of the individuals? | How do the students interact with the tools to enhance the community relationships? | Who are the key agents in the tool use and application of procedures?<br>How do they divide their responsibilities in their accomplishment of goals? | Who constructs the goals and evaluates the outcomes in the community of practice? |

|                                         |                                                                                                                                                                                                                      |                                                                                                                                                                     |                                                                                                                                                            |                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Existing literacy practices             | <p>Traditional tools such as paper, pencil, and markers, etc.</p> <p>Interaction with both peers or adults limited to spelling questions</p> <p>Objects: written texts on paper to be submitted</p> <p>Outcome:</p>  | Independent work; the individuals were responsible for completion of their own writing or other tasks. They assumed roles pursuant to their abilities.              | They were engaged in hands-on or other cooperative tasks during literacy centers. These tools helped them build cooperative relationships with classmates. | The individuals participated in the activities pretty much by themselves. The more capable students were key participants and took lead in most of the activities in the classroom.                 | Mostly, the teachers set the objects of the existing activities. Or, the higher functioning students set goals. The teachers were responsible for evaluation of outcomes.                                                                                                                                   |
| Literacy practices mediated by TELE-Web | <p>TELE-Web tools: various formats for writing and reading; online prompts and features.</p> <p>The interaction occurred on both personal and interpersonal level with TELE-Web as the medium for communication.</p> | The students could assume increasingly important roles in the TELE-Web activities in the process of interacting with the TELE-Web features and with their partners. | TELE-Web allowed the students to work together collaboratively .                                                                                           | Students could become their own key agents in their learning processes mediated by TELE-Web. They participated at a periphery level at first and then moved gradually to the central participation. | The students and teachers jointly constructed goals as they interacted with TELE-Web tools. Objects kept changing as the students learned more about TELE-Web and engaged it for literacy practices. They also came to participate in evaluating the TELE-Web tools and their writing on the TELE-Web site. |

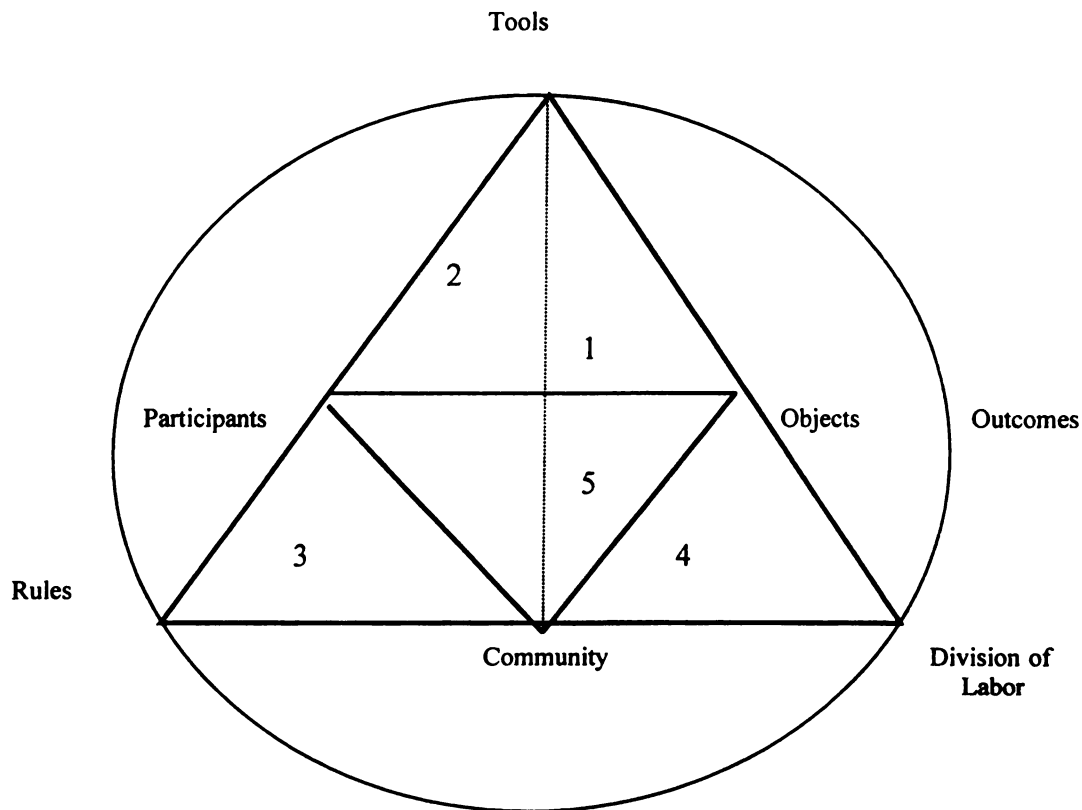


Figure 5.3 Activity Structure Subsystems

## CHAPTER 6

### CONCLUSIONS AND IMPLICATIONS

This study was an investigation into the implementation of a technology-based literacy environment, TELE-Web, in a lower elementary multi-grade inclusion classroom. The theoretical frameworks guided by perspective such as activity theory (Engestrom, 1995), technology as information ecology (Nardi & O'Day, 1999), and transactional view of technology and literacy (Bruce, 1998) determined the focal issue in the study: the constituency of TELE-Web in dynamic relationships with other local constituencies. Specifically, I aimed to answer the following questions:

1. What is the nature of the existing literacy activity structures in the classroom?

(a) How did the teachers' instructional practices and beliefs influence their implementation of TELE-Web?

(b) What key factors influence mutual construction of TELE-Web and teachers' practices?

2. How does TELE-Web, as a new technological species of the class, function and interact with students, especially LD students?

This kind of study was in line with recent focus in technology research on the contextual examination of the actual implementation of technological innovations in actual settings. It placed emphasis on the unpredictability of technology use in the local environment. Technology is not stand-alone, but rather inseparable from the cultural realities of the social relationships and cultural practices in complex and dynamic relations with existing artifacts, activities, beliefs, and so on (Bruce & Hogan, 1998; Heidegger, 1977).

In the past, extensive research has been done to reveal the impact of technologies on the students' performances by separating out the technological features from the contextual variables. Relatively fewer studies were concerned with teachers as active agents in shaping the use of these technologies, rather than recipients of new ideas, approaches, or technologies. This study contributed to the lack of this line of research by understanding the teachers' roles in how they arrange the students working with the technology and TELE-Web construction as it is in use by the LD students in this classroom. Through this lens, I direct the researchers' attention to the issues of implementation and technologies interacting with existing social and cultural factors of

teaching and learning. Furthermore, the research questions were important ones for studying the role of TELE-Web in mediating the special education students' performance in the activity settings of the inclusion classroom. By studying the evolving meaning of TELE-Web in use in this local ecology, I could also gain valuable insight into the activity structures components that might facilitate or constrain the use of TELE-Web tools for enhanced literacy performance.

This last chapter aims to highlight the research findings about teachers' and students' construction of TELE-Web in the inclusion classroom and provide concluding reflections on the study's implications for theory and practices. First, I recapture the results delineated in chapter 4 and 5—the realities underlying the realization of TELE-Web embedded in the complex activity systems and the affordances of the technology for the LD students' participation in the TELE-Web mediated activities. Second, I discuss the implications of the findings for both theory and practices concerning technology use in the inclusive classroom setting. Last but not least, reflect on the limitations and future direction for the kind of research.

### Recapturing the Implementation Process

#### The Existing Activity Structures

A situated examination of how technologies are used in the classrooms entailed a detailed account of the structures and practices involved the literacy activity settings before TELE-Web was introduced into the inclusion classroom ecological system. The major activities comprising the literacy curriculum were literacy centers, guided reading instruction, and writing. Running on a center system, the teachers integrated reading and writing in the literacy centers mediated by various types of tools: traditional technologies

such as paper, pencil, marker, work sheets, and materials for hands-on learning, or the more modern technology—computer. According to Cathy, the center was “a time where you are not only reinforcing the skills, integrating your themes and your subjects, but it provides independent working activities for teachers to then go to the guided reading groups also.”

The analysis of the structural components of the center activities based upon the activity theory framework revealed a noticeable emphasis put on the rules and procedures involved in participating in these activities. Specifically, the teachers established a community of practice within the centers maintained by two types of rules: the social and the academic. As a member of the community, the students were required to obey the rules governing the social behavior within the centers, such as using the tools properly, making smooth transition between activities, cleaning the centers, and cooperating with one another. Academically, the teachers selected centers for evaluation and assignment of points to the students with teacher-made writing rubrics. These social and academic rules were routinely reinforced throughout the center time. The teachers usually started the centers with explaining and assigning the activities to the students while reminding the students of obeying the rules and earning more points for their groups. They ended the centers with counting the points each group earned which was based on the students' adherence to the rules governing their social behaviors and their writing performances as evaluated by the rubrics.

The salient emphasis on the rules bore strong relationship to an important goal set up by the teachers for the center time, which was to give the students independent working time so that the teachers could pull the students out for guided reading

instruction simultaneously. Thus the major role for teachers during the center activities boiled down to maintaining a functional and organized community governed by the rules reinforced through the literacy centers in which the students assumed responsibilities of monitoring their own behaviors and proceeding through centers without too much teacher intervention. The roles for the students also included cooperating with one another in the activities employing hands-on methods or demanding the sharing of tools and materials. The division of labors in activity settings not only incorporates allocation of responsibilities and teacher roles and student roles, but also norms of participation, that is, the allocation of tasks and leadership among the participants. The finding concerning this aspect of division of labor was that students tended to assume responsibilities in monitoring each other's behaviors in terms of obeying the normal rules and procedures set in for the centers, especially during the cooperative types of activities. This might be attributable to the teachers' accentuation on the rule facet of the activity structure in the centers. The students viewed their participation also in terms of maintaining smooth actions in the activities and smooth transitions between different centers. In the more individual-oriented centers such as journal writing, the students worked on the writing mostly by themselves.

Overall, the literacy centers were structured in a way that inclined the students to work independently without teacher intervention, assume main responsibilities of following the rules, monitoring behaviors, or completing their individual tasks. The division of labors of the centers seemed to be intertwined with the rules and procedures in this community as the students took up responsibilities shaped by the teachers' emphasis upon the rule-governed community of practice. These activity structural components

underlined the teachers' beliefs and practices associated with centers as venues to provide opportunities for independent work and learning, and for cultivation of peer support and cooperation through some of its activities. That is, through application and reinforcement of these rules, the students could eventually be better in monitoring their own learning behaviors in the center context. In this sense, the teachers' intentions or the goals for the center activity settings were to create a space for independent exploration and practice in literacy. The other purposes of the center activities included reinforcement of skills and integration of subjects and thematic units. As a result, the existing tools were utilized with which the students could interact with, explore, and hopefully reinforce their literacy skills within activity settings in which they either worked alone or participate in the procedures of the activities with cooperating peers.

#### Computer Use Situation

Computer technologies were made available on a daily access to the students before the teachers signed up on the TELE-Web project. Used mainly during the literacy center time, the computers allowed the students to play theme-related games, exploring literacy websites and their multimedia texts, and read poems. The students could also get on computers and play games including Reader Rabbit and MathBlaster during the Friday free time. The teachers considered the computer literacy center as a place where all students were exposed to technology, practice basic computer skills, reinforce reading and writing skills learned in other Language Arts lessons, and just have the experience of having fun with learning on computer.

The activity structure for the computer literacy center embodied a similar set of relationships between the elements of rules and procedures, objects or goals, and division



of labors. These activities were individual-based by nature, whether they be keyboard drilling through a typing tutor, a writing task contained in a CD-Rom software, playing of a game, or exploration of a school district's literacy website designed for elementary children. However, The students also helped one another when they entered a website that demanded higher reading levels and navigation skills and consequently assuming experts or novice roles in respect to their reading or computer skills. In the latter situations, peer support and interaction were more manifest to create a more cooperative division of labor than other centers.

Mainly as an explorative and motivating place for the students, the computer centers were only evaluated against the social rules applying to all center activities. No completed product was required for evaluation, which was contributable to the teachers' perception and use of computer technologies as a tool that provided their students with motivation in studying literacy and a real-world work experience like adults, apart from basic skills such as developing computer keyboarding and navigational skills.

The teachers' roles in the computer centers were the same as in other centers except that they might need to help the children find the right link in a website, fix a technical problem, or read a couple of lines of information. The priority of the teachers was still the guided instruction reading, which precluded much time spent to be around the students during the computer center activities.

### The Activity Context of Centers

In the literacy center setting, the teachers employed multiple tools including computer technology, the functions of which arose from the interactions unique to the cultural context mediated not by a single too or combination of the available tools, but by

the mutually affecting relationships between elements of the activities. The activity analysis showed that the individuals were part of a community mediated by the rules and procedures, which were geared toward independent students' work so that the teachers could concentrate on giving guided reading lessons. This influenced the division of labor among students who mostly worked on their own at the tasks, assumed responsibilities for individual completion of tasks or took on roles as rule monitor in work demanding more cooperation. At the activity level, the structure mediated by rules, community, and division of labor shaped the individuals' set of actions in achieving the goals, including how they used tools. In the case of computer technology, for example, the identity of the technology emerged when understood as an artifact situated in the cultural context or the local ecology of the literacy centers. The computer was mainly used as a tool with which the students explored independently most of the time the various web sites or games in a fun, motivating, and generally unregulated way. Such relationship between the computer technology and rules, community, and division of labor also contributed to reinforce the goal of the activity itself.

The structure of the center's cultural context had important implications for the role of TELE-Web as a new technology in this community. According to activity theorists, when introduced into an activity, the new artifact interacts with the kinds of existing social processes that influences how it will be used in the new environment. The forgoing analyses of the teaching practices provided a situated understanding of the social and pedagogical structural conditions in which TELE-Web was incorporated. The results on the TELE-Web use are discussed next.

### Teachers' Construction of TELE-Web

The timeline of the assignments created with TELE-Web over the course of the study revealed the quantity and quality of TELE-Web use in this classroom. The teachers' implementation of the first several assignments was based on their belief that it took time for both the teachers and the students to get familiar with the new technology. Between Feb and middle and March, four activities were created in order as testing activities in which the students could become accustomed to the TELE-Web format. I termed this stage as phase 1 implementation of TELE-Web—Explorative use of TELE-Web.

Incorporated into the center setting, these activities consisted of the essential structural components pertaining to the cultural practice of computer centers in the existing literacy curriculum. The existing cultural context of the centers influenced the individuals' use of the TELE-Web tools in this center activity context. The students worked by themselves at the computers, while the teachers gave instructions in guided reading groups. Rules applied to other center activities also were in effect for this TELE-Web computer center. The teachers reminded the students to obey rules, complete tasks before moving on to other centers, and cooperate with one another in the center time. At this stage of TELE-Web implementation, the teachers were cautious and explorative in their use of TELE-Web. Time was a significant concern in influencing the teachers' use of TELE-Web. For one thing, the teachers were consumed with preparing the students with a major technology called 8's Great, which took up their energy in planning the integration of TELE-Web activities in their current curriculum.

Another aspect of the teachers' concern for time was that they needed to feel comfortable enough with this new technology before implementing TELE-Web in a

larger way, more than for trial purposes. That is, when the teachers Amy and Cathy introduced a new technology into their classroom, they conceptualized implementing TELE-Web in small steps so that the teachers could practice in creating a simple assignment and the students became used to the functions and operations of TELE-Web as Cathy stated in her survey. The object for the teachers in these TELE-Web activities was to accumulate experiences while getting the students ready for more future TELE-Web activities.

It was interesting to find that while the structure remained much the same for the TELE-Web computer center activities during the first explorative phase, the new technology left traces of influence in its mediation of the participants' involvements in these activities. For "The Cat Story" assignment, the first one on TELE-Web, the teachers used the online TELE-Web features such as prompt and directions to remind the students of what should be included in the story structure. Cathy utilized these online scaffolding tools on TELE-Web were utilized as she created the assignment, which was markedly different from other computer centers where the teachers' roles did not include putting in written reminders for the students on the website.

The selection of About a Picture story also confirmed Cathy's tendency to introduce the technology incrementally by first practicing creating assignments and getting used to TELE-Web. She found from the TELE-Web database an existing About a Picture writing activity with the cat picture, which was created and made public by someone else before. This indicated that the teacher did attempt to learn about this new technology in this phase.

Although limited in scope, the use of TELE-Web in this classroom already contributed to a shift to wider roles the computer technology could play in this classroom. According to the interview and survey, the teachers reported that the computer had been used mainly for the teachers' preparation of instruction, or for the students, as instrumental remedial education, classroom management or incentives, development of core curriculum skills, and training of keyboarding, and practice of mouse skills, which were realized through word processors most of the time. However, the first trial and explorative phase of TELE-Web implementation indicated that the computer use in this classroom expanded to various formats provided by TELE-Web, such as About a Picture, Make a Word, and Spelling activities. The additional online scaffolding tools also differentiated the TELE-Web activity settings with previous computer center contexts through the online tools such as text-to-speech, prompts, and teacher directions on the TELE-Web site.

The second phase of TELE-Web implementation symbolized the teachers' entry into an adaptive use of TELE-Web in closer connection with the literacy curriculum. During this month, only one Compare/Contrast assignment titled "Safety Rule" was created on TELE-Web. Nevertheless, this activity combined the concurrent theme topic of "health and safety" and Venn diagram, an important writing strategy emphasized in the curriculum. The adaptation of TELE-Web for the purpose of practicing Venn diagram was the first thing mentioned by the teachers at the start of their involvement in the project. In this phase, the instructional need influenced the teachers' decision in choosing the Compare/Contrast activity, as its format resembled the Venn diagram taught in the class.

In addition, unlike previous TELE-Web activities, the students engaged in the “Safety Rule” activity not only during computer centers but also in the writing time. Rather than picking activities on explorative and trial bases, the teachers shifted their objects for the literacy activities they created on TELE-Web and geared them toward expansive practicing of core curricular skills such as Venn diagram. Apart from the distinctive object, the activity setting of “Safety Rules” assignment was different than that involved in other computer center activities in that the Compare/Contrast activity was built on a division of labor characterized by pair work. With the same partner, the students worked collaboratively on the Compare/Contrast writing toward the goal of practicing the strategy of Venn diagram. Pairing students up for the activity was embedded in the tradition of the literacy practices in this classroom: peers as resources for each other. It also suggested that the teachers increasingly incorporated the use of TELE-Web into the instructional decision-making processes. The teachers’ implementation of TELE-Web went deeper as it was adapted for curricular purposes.

During the third phase, thematic unit became a stronger factor characterizing the choice of TELE-Web activities: Desert Animal Story, Animal Web, and Animal Report. Moving out of the first two phases, the teachers were ready to look into other TELE-Web activities as alternative ways of literacy practices. Cathy acknowledged the important role that TELE-Web could play in supporting the students’ paragraph-writing skills. She also agreed that the Idea Organizer format on TELE-Web was ideal for the students to organize facts on their chosen animals in the animal thematic unit before they composed the report on TELE-Web. In order to compare the use of TELE-Web versus paper, the class was divided in half with one group working on the animal report project on paper

with Amy, and the other on TELE-Web with Cathy. With the TELE-Web group, the students were also paired up for a collaborative research and writing process.

This arrangement was a result of negotiation process between the research and the teachers.

During the phase 3, the TELE-Web activities demanded more complex procedures as Cathy and the students learned to use such features on TELE-Web such as “insert sentence”, “add paragraph”, and “read paragraph” buttons, besides “title”, “Body”, and “Concluding Sentence” boxes. Such activity procedures provided scaffolds that were important for the students’ writing and editing processes. The teachers’ prompts consisted of reminders for the students to pay attention to punctuations and details. The Animal Web and Animal Report activities became a project with the use of two different set of tools: Idea Organizer and report on paper/pencil for one group; TELE-Web Idea Organizer and Supported Paragraph for the other.

#### Factors Influencing the Use of TELE-Web

In the same chapter 4, I discussed package of factors influencing the teachers’ decision-making process regarding the three-phase trajectory of the teachers’ implementation of TELE-Web. The main factors included ease of management, demand of resources, and, minimized cognitive load, which along with the teachers’ general perceptions of computer technology and beliefs about the potentials of TELE-Web, shaped what TELE-Web activities were assigned to the students and how they were implemented. Concern for time was one constant source of problems the teachers had expressed for their incremental use of TELE-Web. The teachers needed time to explore the new technology. On the other hand, they suggested that time was an important

instructional consideration because the students needed knowledge, both technical and academic, so that they could accomplish their activities on TELE-Web. These perceptions inclined the teachers to use the TELE-Web activities incrementally through the exploration stage to the third phase in which more time could be invested in the more complex activities on TELE-Web. Time issue was a major dimension of the “ease of management” factor.

Another dimension was related to the teachers’ emphasis on the rules and the kind of community maintained through the historically established rules in the classroom literacy settings. Governed by these rules, the students were expected to work according to proper social and academic behaviors. The introduction of a new technology such as TELE-Web posed challenges for the teachers in keeping the level of the students’ behaviors at the similar level as before. The teachers’ actions based on this consideration were revealed through their attention to details related to the grouping and pairing of the students assigned to the TELE-Web activities during the second and third phase, as well as through their emphasis on the incremental use of TELE-Web.

In chapter 4, the factor of ‘demand of resource’ was brought up to suggest that the availability of team-teaching mode and presence of four adults including the researcher might have facilitated the teachers’ implementation of TELE-Web in an increasingly integrated fashion as represented in the third phase. With an inclusion class of 22 students, who were both in general education and special education, ranging from first to third grade, it was challenging for the teachers to implement TELE-Web without the human resources already available during the study.



Cognitive load increased to affect how the teachers approached TELE-Web during the implementation process. When technical glitches occurred to the Spelling activities during the first phase, the teachers articulated feelings of stress as they were not prepared for the technical contingency that prevented them from devoting necessary attention to the guided reading instruction. The teachers also realized that they might need alternative lesson plans in order to accommodate this type of situation. Therefore, additional cognitive burdens arose at this explorative use stage to produce another factor influencing the teachers' decision-making as to widening the use of TELE-Web in daily curricular activity settings.

#### Practices Within Practices: TELE-Web is not Neutral

The findings on the teachers' implementation of TELE-Web offered a unique understanding of the technology as situated and constructed in the reality of the multi-grade inclusion classroom. Nardi and O'Day (1999) explicated their metaphor of technology as information ecology, a local system in which a new technology comes into contact with: its practices, different people, tools and artifacts, and so on. Of central importance in their perspective is the role of keystone species in the identity formation of a new technology, which depends on the participation and perception of people involved in a particular ecology with its practices and other contextual factors. The two teachers in this inclusion classroom were inevitably the keystone species that held major power in using the TELE-Web technology for literacy intervention in their classroom ecology, productively or nonproductively. In this perspective, TELE-Web must be evaluated first as a new species or a functional organ, whose meaning and development were defined through the teachers' dynamic participation in the use of this technology. That is, TELE-

Web was a functional organ shaped by the existing practices and perceptions of the teachers on an ongoing basis throughout the three phases during the course of the study.

The changing functions of TELE-Web in use indicated the teachers' active adaptation of the TELE-Web activities constituting different structural components: division of labor, objects/goals, community, and rules and procedures. The first phase of the implementation represented a period of cautious explorative use of three types of activities offered by the new technology: About a Picture, Spelling, and Create a Word. The major goal of these teacher-produced TELE-Web activities was to familiarize both the teachers themselves and the students with the technology. The participants' involvement in this phase was operational in nature as they tested the procedures and various features offered by the TELE-Web reading and writing assignments. In the second phase, Cathy intended to create an assignment on TELE-Web that might allow her to connect the concurrent thematic theme and Venn diagram. The resulting assignment was "Safety Rules", a Compare and Contrast activity resembling the format of Venn diagram used in the classroom. Paired up in this activity, the students engaged in this writing activity during both computer center and subsequent writing time, suggesting expanded participation and more important roles played by this TELE-Web activity. The division of labor also changed in this setting in that Cathy, unlike in the previous TELE-Web activities, provided demonstration and scaffolding assistance for the students while they worked on the Safety Rules assignment. The teachers became more intertwined with the TELE-Web tools both before and during the implementation of these phase 2 activities.

In the last phase, the use of TELE-Web was characterized by three theme-based writing assignments: Desert Animal Story, Animal Web, and Animal Report. An outstanding characteristic of the teachers' engagement in these TELE-Web activities was that they made TELE-Web available for the students as a major tool integrated in an animal research process. The teachers, especially Cathy, collaborated with the researcher of TELE-Web and participated in making decisions on the processes involved in implementing the Animal Web and Animal Report projects on TELE-Web. Specifically, Cathy's participation included careful selection of student partners for each pair working on the TELE-Web activities, detailing of procedures such as modeling the use of Idea Organizer and Supported Paragraph formats for TELE-Web Animal Web and Report activities, and setting the pace for the students' weekly engagement in these activities over an extended period of time.

The analysis of the TELE-Web implementation process illustrated that TELE-Web was not a fixed entity or an aggregation of technological features. Designed as a comprehensive set of effective practices for literacy intervention targeting LD students as well as general education learners, TELE-Web appealed to Amy and Cathy with its potentials in helping the students to learn important literacy skills and strategies, as well as developing the social dimensions of the literate community of practice. However, the reality of TELE-Web use revealed unpredictability and complexity of introducing into a classroom the learning environment featured on TELE-Web. The implementation was incremental and the evolution was slow for TELE-Web to become fully integrated into the current literacy curriculum. This process was referred to by Bruce (1993) as

*realization of technology*, which, led by the innovation, represented practices potentially different from those intended by the developers.”

In a similar vein, the activity theorists propose that activities are goal-oriented and occur at both individual and social levels. On the individual level, the realization process of TELE-Web signified a process in which the teachers actively constructed the forms and roles of TELE-Web based on their perceptions of this innovation such as their beliefs about potentials of TELE-Web activities and to what extent it could improve the academic performances of the students at various levels and labeled in diverse categories. On the social level, the teachers did not make decisions merely according to their individual conceptualizations of TELE-Web innovation. Their decision-making process incorporated the histories of instructional practices, the existing literacy activity settings, and their changing interaction with TELE-Web—the activity structures of the classroom ecology. Thus, TELE-Web was introduced to an inclusion classroom environment possessing its own social and cultural properties that are meaningful themselves reflected in the objects, rules and procedures, and division of labors of the activity structures. What counted as literacy environment of TELE-Web was bound to the practices of learning embodied in the kinds of entities, physical and culture that already had been existing and functioning for the community. As time passed, the teachers followed a trajectory of evolving and developing their TELE-Web practices, first on a more operational basis, to the last stage where their objectified motives for the TELE-Web activities became that of deepened integration of TELE-Web into the curriculum.

What this implied was that the TELE-Web was not simply a neutral set of technological tools whose meaning was fixed by the developers’ intentions based on the

principles guiding effective practices of literacy performance for at-risk students. Instead, TELE-Web was part and parcel of a practice in itself, which, coupled with the existing classroom practices, engendered a literacy curriculum co-constructed by the teachers' decisions and perceptions.

#### TELE-Web as a Mediating "Tool": Affordances for Teachers

The study further revealed that, as much as TELE-Web depended upon the teachers as keystone species for meaning, its relationship with the existing practices was bi-directional. On the one hand, the teachers participated in an ongoing construction of a TELE-Web mediated literacy curriculum, or a boundary for TELE-Web roles, guided by the current activities with a set of cultural and social structural components. In this boundary, the teachers made conscious choices about how they wanted their values to influence practices and TELE-Web in the classroom information ecology. On the other hand, TELE-Web, a viable practice in itself, was not neutral. It had its affordances which left traces in both teachers' and students' participation of TELE-Web activity settings.

One kind of affordance for teachers' practices was reflected in the instructions associated with TELE-Web. Using activities as units of analyses, the study found that TELE-Web exerted influences through mediating the complex activity structures of the activity settings. First of all, TELE-Web fitted the teachers' valued goal of using computer technology as a source of motivation and incentive for the students to engage in literacy studies. Secondly, TELE-Web reinforced and enriched the teachers' repertoire of activities that provided alternative opportunities for the students to practice either basic skills or higher-order thinking strategies. For example, the Animal Web (TELE-Web Idea Organizer) and Animal Report (Supported Paragraph) assignments, according to Cathy,

allowed the students to have access to needed practice in paragraph writing. The teachers considered these activities as “formal” or “bigger” assignments that were “enriching” to their existing curriculum. In this sense, the use of TELE-Web mediated the teachers’ practices by enabling the teachers to have access to the literacy activities that both reinforced their objects and facilitated the realization of their goals.

Secondly, TELE-Web necessitated the teachers’ re-conceptualization of technology use at the activity level, especially represented by the rules and procedures, and division of labor structural components of the activities. Prior to the implementation of TELE-Web, the teachers’ use of computer technology were limited to the computer centers, where computer acted as a stand-alone technology for the students to explore web sites or games mainly for fun under non-regulated conditions. In contrast, the new technology demanded the teachers’ attention to the instructional contexts underlying the TELE-Web activities. For one thing, the use of TELE-Web provided the teachers an alternative place for emphasizing the importance of rubrics in the students’ work through the online prompt feature on the TELE-Web site. The teachers could also customize the directions for the TELE-Web activities assigned to the students. Thus, the TELE-Web activities were more regulated and goal-oriented with the availability of the various online functions. Another finding was that the teachers attached greater importance to the division of labors involved in the TELE-Web activities, especially those that engaged the students in the practices of higher-order thinking skills and strategies in the writing assignments.

The mediation of TELE-Web in the teachers’ practices in terms of the division of labor also resided in the expansion of teacher roles in these activity settings. When Cathy

was asked to provide reflections on the use of Compare/Contrast TELE-Web assignment, she indicated that modeling and giving examples were important instructional environments accompanying the TELE-Web activities. The study showed that Cathy felt more impelled to provide modeling lessons prior to sending the students to work in the TELE-Web context because this enabled the students to be better prepared in terms of prior knowledge of the TELE-Web procedures and literacy content. It was noteworthy that such teachers' views of their roles only emerged as a result of their implementation of TELE-Web. The expanded role also prompted Cathy to use TELE-Web in both computer centers and writing time where she could monitor and assist the students' task performances. The shift of the teacher's perception of her roles and adoption of more instructional responsibilities in the TELE-Web mediated activity settings suggests that TELE-Web carried with it implied practices or ways of using the technology in the information ecologies of the classroom. In other words, TELE-Web engendered instructional spaces.

Finally, the study also showed that TELE-Web enhanced instruction in computer literacy. An interesting result of using TELE-Web in this classroom has been the students' exposure to more sophisticated and advanced knowledge about computers. TELE-Web created necessities for the teachers to introduce the format of an online learning environment, a different way to interact with assignments on the Internet, or just the basic navigation skills in using a different computer technology interface on TELE-Web. The teacher's modeling on how to navigate through TELE-Web pages on the Internet and go through the procedures of a TELE-Web assignment was a valuable educational experience enabling the students to learn more about what computer

technologies could do. Teachers would not have provided this sort of experience with the word processors and other software in this class.

### TELE-Web Affordance: Students' Participation

A study of a classroom study of technology implementation and the educational processes mediated by the innovation cannot preclude the examination of the students' enactment of the technological tools. Chapter 5 centers on the learners' perceptive and use of TELE-Web in the ecology system, especially with regard to the affordances of the emerging social practices in the alternative activity settings mediated by TELE-Web. The cases unfolded in response to the teachers' realization of TELE-Web over a semester's period of time. The activities evolved in all major aspects of their structure: goals, participants, division of labors, and the kind of engagement with TELE-Web tools in these environments. Corresponding to the three phases of the implementation of the innovation, the students' participation in the TELE-Web literacy activities shifted from individual-oriented center work to collaborative activities aimed to accomplish a research inquiry. The activities were again the basic units of analyses employed to look at how TELE-Web mediated students' participation in literacy activities.

First, the characteristics of the existing literacy practices available to the LD students and general education students were examined. The discourse segments drawn from the various scenarios of LD students' engagement in these activities were used as important observational data to shed light on their learning processes afforded through these activity settings. Within the traditional activity settings, the children, especially LD students represented by the case of Eddie, were afforded limited space for participation. The repertoires of practices signifying the student's actions as a result of the student's



participation in the existing activity structures included asking for spelling questions, working without adult or peer scaffolding on writing tasks, and answering the teachers' questions in a IRE type of discourse communication mode in situations such as guided reading.

In the course of working in TELE-Web activities, not only did TELE-Web change in meaning and roles for the Eddie, but also he learned to be an actor who grew more into a central player in these activity settings. By the third time he worked on TELE-Web, Eddie already knew more about the rules and procedures involved in TELE-Web activities, which enabled him to extend his participation a little further beyond what he could last time. Another way he became active was that he saw his role as being a competent member in contributing, as seen by his comment on punctuation and capitalization of the letters typed in the text boxes. In this particular activity, the students' roles and identities were not fixed. Rather, they kept changing through constant negotiations and explorations of what they could do within the practices mediated by the use of TELE-Web tools. Although Eddie was a LD student, he was aware of and made use of the unique participation spaces created in the activity setting mediated by TELE-Web. He learned that he could negotiate his roles by saying "no" to the division of labor designated to him as a member of this specific learning community. Then he changed decisions by saying "Okay, go ahead" which allowed him to position himself as the one who set up the division of labor.

Another indication of Eddie's experimentation with roles was the fact that he tried to see to what extent he had control over the object of the activity by typing words that didn't pertain to the writing. In the process, the two students engaged in the negotiation

of the roles and responsibilities involved in working in a TELE-Web mediated learning environment. The LD student moved between legitimate peripheral participation to more active participation in the fluid and dynamic construction of students' roles and identities. The general education student in this setting also served as a resource for Eddie to try out his roles and extend literacy practices rather than a sole authority figure that controlled the discourse and participation. The rules and norms in this TELE-Web activity served to improve Eddie's power of participation through his accumulated knowledge about how to use TELE-Web technology to log on, for example, and through other procedures involved in the work.

In conclusion, the analysis of the TELE-Web activity settings revealed a unique learning ecology, in which Eddie and his general education student partner negotiated roles, identities, and moved fluidly between periphery and central stages of participation through engaging in TELE-Web-mediated rules, norms, procedures, and division of labors. The outcome was increased repertoire of participation for the LD student as a contributing and purposeful member of the TELE-Web learning community.

Students, especially LD students in the study, played great parts in actively engaging in TELE-Web and formulating their diverse understanding and participating in the activities that were mediated by TELE-Web. Analyses suggested that TELE-Web technology was employed by LD students to bring new meanings to various aspects of their literacy practices. In fact, a key outcome of using TELE-Web was the technology's mediating role in transforming the repertoire of existing literacy practices of students in the activities from various perspectives: From peripheral to central participation, expanded literacy practices, persistence in learning, exploration of new identities, and

students' awareness of their writing as 'permanent'. The students, especially LD students, exhibited stronger motivation in TELE-Web work; they moved from the periphery to the central stage of the activity setting. Eddie's involvement in all the TELE-Web assignments was evidentiary of his growing participation and increasingly strong role in the activities.

### Implications for Theory

The study was a classroom-based inquiry designed to provide a situated understanding of the implementation of TELE-Web learning environments in actual contexts and the process of learning supported by such innovation. The local context of the multi-grade inclusion classroom constituted one venue for iterative studies of technology in education, among other cases involved in the larger TELE-Web Project. The present case study of an inclusion classroom was an endeavor in both theoretical and practical terms. Underlying the theoretical frameworks of the study was the social constructivist theory of learning and technology. Specifically, activity theory was drawn upon to suggest a systematic analysis of the activity settings, in which tools and artifacts including technology mediate the other components of an activity structure—participants (subjects), objects, rules and procedures, community, and division of labor (Engestrom, 1987; 1999; Cole, 1993; Nardi, 1999). Reciprocally, the meaning of tools also takes form during their uses and encounters with the other elements of the activity structures. An activity is constituted into three levels at any time: operation, action, and activity. At the activity level, the subjects operate tools automatically and direct their actions towards certain goals.

In the same vein, Nardi & O'Day (1999) proposed a metaphor of technology as information ecology, which suggested evaluating technology through the engagement and participation of human keystone species in a complex system of local setting. The central idea was that a technological innovation could not be singularly implemented according to the will of the designers. A technological innovation was like a functional organ, or a species in itself, which formed bi-directional relations with the participants of a local setting or ecology. The survival, growth, and development of a technology depended largely on how this new species was accepted and shaped by the diverse human actors in a co-evolution process. Through use, technology also left traces upon the ecology and thus bringing in possibilities of improvement for the information ecological system.

This study instantiated the mechanisms of activity theory and information ecology metaphor by providing a venue for both using the theoretical frameworks for analyses and testing the extent to which they were productively applied. The discussion of the results suggested the utility of activity theory especially related to the three levels of the activity systems and mediation of tools. In the mean time, the study also revealed possible areas for contemplation in future use of activity theory as method and theory.

### Three-Tier Activity System

The emerging three-stage implementation of TELE-Web showed the importance of a central tenet of activity theory—the hierarchical structure of activity. At the operation level, the subjects' interactions with the tools do not exhibit much motivation. Rather, they are involved in behaviors that are composed of a series of steps of functioning using the tools. Actions are realized through operations that become automatic skills when the participants learn how to work with the tools. Thus, actions are

conscious decisions directed towards certain motives. The activity encompasses not only actions and operations but also the actual conditions surrounding the people's behaviors and the orchestration of various levels of activity in pursuit of a goal or object.

In the study, the implementation of TELE-Web placed demands on both the teachers and the students in terms of moving between operation, action, and activity levels within the TELE-Web activity settings. For the teachers, knowledge about TELE-Web incurred extra plan and time spent on exploring its features. After their first-stage trial and testing of the new technology, the teachers felt more confident but it also was found that their concerns expanded to more of action and activity levels. What caught their attention was the need to secure legitimate goals and instructional plans that could support the accomplishment of the TELE-Web activities. These three levels of activity recursively impacted on the teachers' implementation of TELE-Web suggesting a learning curve they went through in adopting and integrating the technology. The concept of three levels of activity systems was useful in bringing the researcher's attention to the multi-faceted nature of TELE-Web technology. It was not a tool or collection of objects that only demanded the participants' engagement at the action or operation level. Actually, TELE-Web proved to be a comprehensive set of relationships among the three levels of activity. TELE-Web use was associated with social practices at the activity level incorporating all the interrelated elements that needed to be orchestrated by the teachers: goals, division of labors, the kind of community, and the rules and procedures brought to apply to the TELE-Web reading or writing activities.

### Interacting systems

Related to the hierarchical structure of activity was the existence of diverse and interacting activity systems within the classroom information ecology. This was not the key principle of the activity theory but gained highlighted importance through the results of the study. Before the entry of TELE-Web into the ecological environment, the classroom functioned on the existing structures applying to communities of practice across guided reading instruction, writing, and literacy settings. Within these settings, the students experienced routines that were both precursor to and subject to the subsequent use of TELE-Web tools for literacy practices. While they typically engaged in individual-based activities or shared tools in cooperative endeavors in the regular activity settings, the students' behaviors were mediated by the introduction of TELE-Web activities, resulting in their increasing involvement in collaborative efforts driven by a set of goals that shifted from the previous goals in the regular literacy communities. Even during the first phase of TELE-Web implementation, the students were exposed to About a Picture writing assignment with online TELE-Web prompts and instructions, which, along with the students, constructed a different activity system.

On the other hand, the TELE-Web activity systems also maintained large portions of the structural relationships unique to the regular activity settings. The students still obeyed the center rules when it came to the TELE-Web center activities. Rules were executed as an important source for the teachers in keeping the communities functioning. The literacy goals for TELE-Web activities stayed in line with those in the general curricular activities even though the implementation of TELE-Web enabled the classroom to extend and enrich the overall instructional possibilities through the afforded

activities on the TELE-Web sites and the students' collaborative learning in these activities. Therefore, the study brought to the foreground the interacting systems of activity settings in a local context.

#### Tool-Mediation Embedded in Other Instructional Elements

The changes effected by the tools in one activity structure, hence, are embedded in larger activity structures of the ecology, which consists of a complex net of interactions that govern how the tools are expressed, heard, interpreted, and responded to. As explained by the interacting systems of activity theory in the above, all the structural components formed instructional elements in the classroom. Some elements in different activities overlapped while others were extensions or even potentially transformative forms of the former ones. For example, the use of TELE-Web did show promises in changing LD students' repertoire of participation over time. In the processes of using TELE-Web, the students formed collaborative partnerships and shared knowledge through extended work on TELE-Web inquiry projects. The community was marked by a distributed intelligence and competence, creating spaces for the students' construction of different competence and identities. However, this process was not brought along by TELE-Web itself. As one element, TELE-Web interacted with existing as well as evolving structural components of the activity settings in the classroom. The TELE-Web study suggested a historicity, continuity, an implementation of the new technology embedded in the historical ways of doing and practicing. This historicity influenced the extent TELE-Web was integrated into the classroom. The teachers' perceptions and past practices in literacy curriculum also had bearings on how they used and how much they used this new technology in the classroom. In this sense, the mediation of TELE-Web

tools was just one aspect of diverse elements in the inclusion classroom. The activity theory helped us to view a tool, conventional or technological, as a medium through which participants are able to share their conceptions and verify or test their understandings. This view of tool mediation allowed researchers to understand the complexity involved in and the importance of understanding the conditions underlying the implementation of a technological innovation.

### Focus on Collective Knowledge

The use of activity theory as an analysis framework in this study further promoted the constructs of learning processes such as identity and what counts as knowledge in the classrooms. A situated examination of the student's implementation of TELE-Web revealed not only the participants' role in the construction of what counted as TELE-Web defined by the various structural components of the activities, but also the emerging collective knowledge and student roles as a result of the student's engagement in TELE-Web activity settings. In addition, various students reported positive experiences and emphasized the aspect of working with partner and utilizing TELE-Web tools for writing. Theoretically, the study provides further rationales for theories of learning that are oriented towards the social and collective forces in the processes of students' engagement in activities. One of the mediational roles of TELE-Web was the enabling of an alternative space for exploration and growth of different roles and competences. TELE-Web became a social practice in which the students moved from periphery to the central stage of performance, as other social cultural theorists have implicated (Rogoff, 1995; Wenger, 1998; Lave, 1993).



## Implications for Educational Technology Research

This classroom study of TELE-Web learning environments has important implications for both research and practices in applying new technologies in education. It was a study of TELE-Web in use: how it was realized in an actual inclusion classroom. The results showed that the implementation of technologies such as TELE-Web was a complex process—itsself an object mediated by many external “tools”. Situated in realities of an inclusion classroom with first to third graders, the new TELE-Web technology, like an organic species, entailed being treated so in research. That is, the study of TELE-Web in use was like a design process aimed at examining the ongoing bi-directional construction between TELE-Web and other structural components in the complex instructional ecology. The design was collaborative in nature soliciting knowledge and learning from both the teaching and research actors. Through this two-way communicative interaction, the study of TELE-Web in this ecology provided insights into the conditions underlying the implementation and affordances of TELE-Web.

### Longitudinal and Cross sectional—Technology in Use

One implication for researchers conducting educational technology studies is that technology needs to be understood and examined in use. This is not to deny the importance of the large-scale summative research aimed at generalizing the outcome of the effect of technology upon learning and teaching. However, researchers should not lose sight of two realities about technology implementation: the same innovation can be used in entirely differently ways across classroom contexts; the use of the technology in one locality can also change over time. The social changes generated by the process of

adopting a new technology may or may not be productive, depending on how the new species clashes or interacts with the existing practices. That entails viewing the technologies as mere external or instrumental tools facilitating the participants' actions. Rather, the technology should be interpreted as a practice itself, capable of bringing upon the existing practices its own set of relations among goals, community, division of labors, and rules intended by the designers or developer of the technological environment. Thus, the technology is intentional and meaning-loaded.

The adoption of a technology is a participant's engagement in shaping or making compromises of the ideas contributed by the new technology environment. It is critical that researchers gain comprehensive view of the existing practices as well as those signified by the new technology design. In this study, activity theory framework guided the interpretation of the existing curricular activities influenced by the teachers' perceptions, past instructional practices, tools and artifacts. The knowledge on these elements of instruction was a precursor of examining the participants' active construction of TELE-Web shaped by their perceptions of the demands and constraints engendered by the adoption of TELE-Web. Then, this knowledge led to interesting findings about the factors that determined how TELE-Web was used and how participants were engaged in the web-based activity settings. Specific characteristics of certain activity structures mediated by TELE-Web use embedded in the existing literacy framework were laid out to guide the interpretation of the affordances of TELE-Web subject to the particular implementation process in this inclusion ecology. Focusing on the longitudinal and cross-sectional aspects of class-based implementation of technologies, researchers is conducive can abstract and specify questions that are significant to be tested in future studies.

### Technology and Literacy Research

One of the central ideas explored in this study was the issue of what counted as TELE-Web in this classroom. I approached this problem with an underlying assumption that technology implementation by the teachers was process indicating not only the realization of an innovation in an actual reality, but also the participants' fundamental conceptualization towards literacy teaching and learning in this classroom. Further more, the process did not stay static as illustrated by the mutually constructive process between the technology and the contextual elements embedding the use of the tools. The study used activity theory to reveal that the activity structures in the existing literacy curriculum emphasized multiple ways of experiencing reading and writing, cooperative behaviors in compliance with the rules stipulated and reinforced across learning environments, and a community of practice focusing on providing the students with a variety of tools to motivate engagement with literacy content.

Subsequently, through examination of the teachers' and students' adoption of TELE-Web, I presented a historical trajectory of the changes in the activity settings mediated by the use of TELE-Web and hence the shifting participation framework for the students including those diagnosed as having LDs. It was found that the changes occurred within the existing literacy activity framework with overlapping rules and similar general goals for these tasks. The comprehensive results of the existing activity structures and the participants' constructive implementation of TELE-Web shed light on the literacy ecology of this classroom. Therefore, such kind of studies can help researchers make conjectures about the relationship between the nature of existing

literacy practices and a classroom's capacity in adopting and integrating the new practices symbolized by TELE-Web activities.

### New Technology and Special Education Research

In recent years, education technology has gained increasing status as an important source of intervention for special education students. IDEA requested that technology be made accessible to these students to level the battlefield and improve the social as well as academic performance of special education school population. In the face of ever changing technology and media produced for teachers, it is critical to look at what is really happening in an inclusion classroom where almost half of the students had mild disabilities. The up-to-date TELE-Web technology placed even greater demand in research extending to a broader focus on the implementation process and the technology's on-going affordances to the diverse population in the classroom.

This line of research also has implications for ongoing debates over the Least Restrictive Environment (LRE) in special education. Rueda critiqued the premise of current views of LRE by stating: "...same placement or setting can be either facilitating or restrictive, depending on the social organization of specific settings that comprise a given context." (p 25, Rueda, 2000). In this perspective, it is the context rather than location that is important to consider in the attempts to understand LRE for students with disabilities. The study then provides a case example of field-based research on inclusion classroom settings and the cultural activity system comprised of the following essential components of the activity structures as delineated by the activity theorists (Nardi, 1999, Engestrom, 1987, 1993; Leont'ev, 1978), which dynamically construct affording or restrictive learning environments.

The study has revealed that TELE-Web might be a beneficial context for some LD students in terms of their interactions with the online features enabling them to be more knowledgeable and contributing members of the community. The flexible division of labors accompanying the TELE-Web activities was an important factor underlying the successful participation framework. Whether TELE-Web is a significant context for students with learning disabilities and those who are in regular education, thus a LRE, was actually dependent upon the interactions among activity structural components: how teachers and TELE-Web compromised with each other on these multiple instructional elements involved in the activity settings.

#### Limitations and Future Studies

This study combines the sociocultural activity theory and technology as information metaphor to explore the implementation and affordances of TELE-Web learning environments in a multi-grade inclusion classroom. It provides an important classroom-based research body responding to the call for broader focus on technology integration in the actual classroom settings. This study was also tests the activity theory as both a theoretical and analysis framework, much needed by the researchers of activity theory. However, this study had a number of limitations including the following: (a) limited number of student cases; (b) length of study; (c) singular setting.

First, the students' construction of TELE-Web was largely based on observations of their participation on TELE-Web activities, especially focusing on two third-grade LD students: Eddie and Cindy. In addition, interview reports by other students of various grade levels and abilities were presented as important evidence supporting the positive affordances of TELE-Web activity settings. Although the employment of emerging

student cases was legitimate in the qualitative study, detailed examinations of larger number of students would add more strength to a systematic study of the students' construction of TELE-Web in the locality of this classroom.

Second, although much was revealed in a four-month situated investigation of TELE-Web's mediational role in the classroom, the study was limited still by this time framework in that I could not have enough time to examine the phases of the teachers' implementation of TELE-Web beyond the three stages observed in this study. Time and management have been major concerns for both teachers in their attempt to fit the new technology in the existing literacy practices. Given more extended time period, I would be in a better position of conduct further design studies to gauge the reciprocal mediation between the participants and the TELE-Web tools in the reality of their use.

Third, this study took place in a particular multi-grade inclusion classroom with specific characteristics in the activity settings and trajectory of evolving TELE-Web activity systems. According to activity theory and information ecology perspective, what the study revealed about TELE-Web implementation and affordances might be different than those found in other such classroom settings. Studies in other settings might show a complete different utilization of TELE-Web tools and activity settings. Further, the students' uptakes of this technology might be influenced by an entirely different aptitude on computer technology in general and their prior knowledge, which both were also functions of the existing classroom practices.

Future studies could build on the present study by following students' and teachers' use of TELE-Web over a longer period of time such as over the course of a school year to examine both participants' influence on the implementation of TELE-Web

and the technology's engineering effect upon the existing literacy practices. Additionally, some follow-up collaborative design experiments, such as the Animal Web and Report using TELE-Web Idea Organizer and Supported Paragraphs, could be implemented in the classroom. The communication between the teachers and the researcher in this study has helped to generate the last phase of TELE-Web implementation and reveal how the students' roles and knowledge were mediated as a result of using TELE-Web activities. Such designs could be improved with longer time frame so that they systematically and iteratively (Cobb, Confrey, diSessa, Lehrer, & Schauble, 2003) to test the mediation potential of TELE-Web as means for supporting learning, in an inclusion setting, through its affordances and constraints of use of technologies and artifacts, teaching and learning practices, and other forms of mediation involved in activity settings.

Eventually, the study about TELE-Web in the natural settings serves the important purpose of developing insightful teaching and learning models that facilitate students' learning, especially the development of LD students in an inclusion classroom setting. More systematic studies of TELE-Web in the actual classrooms also would reveal to us more about teachers' practices and co-evolution with such technology.

# APPENDIX A Technology and TELE-Web Survey

Name \_\_\_\_\_

School \_\_\_\_\_

- I. These questions will be used to determine the value of TELE-Web to you. Please rate the degree to which the following statements reflect your past personal and instructional practices. These questions exclude *Accelerated Reader* and *Accelerated Math* programs because these are required technologies already being implemented at some of the elementary schools in Lansing School District.

## I. How frequently do you or your students use computers for the following?

| How frequently do you use computers for the following Activities?                                          | Never | Yearly | Monthly | Weekly | Daily |
|------------------------------------------------------------------------------------------------------------|-------|--------|---------|--------|-------|
| Communication with parents (e.g., newsletters, e-mail, class Web page) .....                               |       |        |         |        |       |
| Teacher-student communications (e.g., response to written work, posting schedules and activities) .....    |       |        |         |        |       |
| Classroom management and/or incentives for students (e.g., reward for completed work) .....                |       |        |         |        |       |
| Record keeping (e.g., grades, attendance, IEP) .....                                                       |       |        |         |        |       |
| Preparation for instruction (e.g., lesson and unit planning, downloading materials such as pictures) ..... |       |        |         |        |       |
| Core curriculum skills development                                                                         |       |        |         |        |       |



|                                                                                                                    |  |  |  |  |  |
|--------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|
| (e.g., drill and practice on MathBlaster or Reader Rabbit)                                                         |  |  |  |  |  |
| Remediation (e.g., repeat a lesson, Accelerated Math, Jostens) .....                                               |  |  |  |  |  |
| Student to student communication (e.g., publish student work on a Web page, penpals, e-group projects) .....       |  |  |  |  |  |
| Student inquiry (e.g., student research using electronic databases, WebQuest) .....                                |  |  |  |  |  |
| Student expression and publication (e.g., Hyperstudio, PowerPoint collections of artwork, KidPics, i-movies) ..... |  |  |  |  |  |
| Keyboarding, mouse skills, trouble shooting) .....                                                                 |  |  |  |  |  |
| Use technologies (e.g., computers, wordprocessing, cameras, scanners, etc.) for your personal use. ....            |  |  |  |  |  |
| Use World wide web and internet for your personal use .....                                                        |  |  |  |  |  |

II. Please rate the degree to which you agree with the following statements.

|                                                                        |                 |               |   |   |   |   |            |
|------------------------------------------------------------------------|-----------------|---------------|---|---|---|---|------------|
| 1. TELE-Web is an attractive and motivational technology for students. | No Opinion<br>0 | Disagree<br>1 | 2 | 3 | 4 | 5 | Agree<br>6 |
| 2. TELE-Web is a                                                       |                 |               |   |   |   |   |            |

|                                                                                                              |                 |               |   |   |   |   |            |
|--------------------------------------------------------------------------------------------------------------|-----------------|---------------|---|---|---|---|------------|
| <b>useful tool for teachers.</b>                                                                             | No Opinion<br>0 | Disagree<br>1 | 2 | 3 | 4 | 5 | Agree<br>6 |
| <b>3. TELE-Web is highly flexible in matching teacher needs.</b>                                             | No Opinion<br>0 | Disagree<br>1 | 2 | 3 | 4 | 5 | Agree<br>6 |
| <b>4. TELE-Web will extend the publication and dissemination opportunities for students in my classroom.</b> |                 |               |   |   |   |   |            |
| <b>5. The TELE-Web teacher's manual is a useful resource to teachers.</b>                                    |                 |               |   |   |   |   |            |
| <b>6. The TELE-Web inservice and meetings are useful to help me begin implementation.</b>                    |                 |               |   |   |   |   |            |
| <b>7. TELE-Web can help students become better readers and writers</b>                                       |                 |               |   |   |   |   |            |
| <b>8. TELE-Web is easy to use.</b>                                                                           |                 |               |   |   |   |   |            |
| <b>9. TELE-Web allows customization of assignments for diverse learning needs.</b>                           |                 |               |   |   |   |   |            |

III. Please rate the following facets of TELE-Web for their potential value to you and your students.

| Please rate the value to you and your students. | No Opinion<br>0 | No Value<br>1 | Little Value |   | Some Value | Valuable | Highly Valuable |
|-------------------------------------------------|-----------------|---------------|--------------|---|------------|----------|-----------------|
|                                                 |                 |               | 2            | 3 | 4          | 5        | 6               |
| 1. Rubrics                                      | 0               | 1             | 2            | 3 | 4          | 5        | 6               |
| 2. Prompts                                      | 0               | 1             | 2            | 3 | 4          | 5        | 6               |
| 3. Feedback to Students from Teacher            | 0               | 1             | 2            | 3 | 4          | 5        | 6               |
| 4. Feedback to Students from Peers              | 0               | 1             | 2            | 3 | 4          | 5        | 6               |
| 5. Supported Writing                            | 0               | 1             | 2            | 3 | 4          | 5        | 6               |
| 6. Assign Activities to                         | 0               | 1             | 2            | 3 | 4          | 5        | 6               |

| Please rate the value to<br>you and your<br>students.      | No<br>Opinion<br>0 | No<br>Value<br>1 | Little<br>Value |   | Some<br>Value | Valuable | Highly<br>Valuable |
|------------------------------------------------------------|--------------------|------------------|-----------------|---|---------------|----------|--------------------|
|                                                            |                    |                  | 2               | 3 | 4             | 5        | 6                  |
| <b>Groups or Individuals</b>                               |                    |                  |                 |   |               |          |                    |
| 7. Chat Rooms                                              | 0                  | 1                | 2               | 3 | 4             | 5        | 6                  |
| 8. Bulletin Board                                          | 0                  | 1                | 2               | 3 | 4             | 5        | 6                  |
| 9. Student Book<br>Reviews (TELE-Zine<br>Library)          | 0                  | 1                | 2               | 3 | 4             | 5        | 6                  |
| 10. Community –<br>People of Tele-Web                      | 0                  | 1                | 2               | 3 | 4             | 5        | 6                  |
| 11. TELE-Zine<br>Newsletter                                | 0                  | 1                | 2               | 3 | 4             | 5        | 6                  |
| 12. TELE-World:<br>Publish stories on the<br>www           | 0                  | 1                | 2               | 3 | 4             | 5        | 6                  |
| 13. Wordshop<br>Activities                                 | 0                  | 1                | 2               | 3 | 4             | 5        | 6                  |
| 14. Comprehension<br>Activities                            | 0                  | 1                | 2               | 3 | 4             | 5        | 6                  |
| 15. Story Map                                              | 0                  | 1                | 2               | 3 | 4             | 5        | 6                  |
| 16. Character Maps                                         | 0                  | 1                | 2               | 3 | 4             | 5        | 6                  |
| 17. Venn diagram                                           | 0                  | 1                | 2               | 3 | 4             | 5        | 6                  |
| 18. KWL                                                    | 0                  | 1                | 2               | 3 | 4             | 5        | 6                  |
| 19. Idea Organizer                                         | 0                  | 1                | 2               | 3 | 4             | 5        | 6                  |
| 20. Picture (add<br>pictures to activities<br>and stories) | 0                  | 1                | 2               | 3 | 4             | 5        | 6                  |
| 21. Activity Creator<br>(create your own<br>activity)      | 0                  | 1                | 2               | 3 | 4             | 5        | 6                  |
| 22. Self-Start                                             | 0                  | 1                | 2               | 3 | 4             | 5        | 6                  |
| 23. Public                                                 | 0                  | 1                | 2               | 3 | 4             | 5        | 6                  |

| Please rate the value to<br>you and your<br>students. | No<br>Opinion<br>0 | No<br>Value<br>1 | Little<br>Value<br>2    3 |   | Some<br>Value<br>4 | Valuable<br>5 | Highly<br>Valuable<br>6 |
|-------------------------------------------------------|--------------------|------------------|---------------------------|---|--------------------|---------------|-------------------------|
|                                                       |                    |                  |                           |   |                    |               |                         |
| 24. Message Center                                    | 0                  | 1                | 2                         | 3 | 4                  | 5             | 6                       |

IV. Please rate the extent to which you think you will use TELE-Web.

| Infrequent |   |   |   |   |   |   |   |   |   | Frequent |
|------------|---|---|---|---|---|---|---|---|---|----------|
| 0          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10       |

V. Which activities do you think you would use the most? (See list above)

VI. Which activity would you use first?

VI. What types of support would be helpful to you in implementing TELE-Web?

VII. What type of involvement would you like with the TELE-Web project?

VIII. Directions: please select the choice that best describes your situation.

|                                                                        | Strongly<br>Disagree<br>= 1 | Disagree<br>= 2 | Mildly<br>Disagree<br>= 3 | Mildly<br>Agree =<br>4 | Agree =<br>5 | Strongly<br>Agree =<br>6 |
|------------------------------------------------------------------------|-----------------------------|-----------------|---------------------------|------------------------|--------------|--------------------------|
| 1. I encourage students to express opinions different from my own.     | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 2. My assignments require students to gather information on their own. | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 3. I teach students how to learn                                       | 1                           | 2               | 3                         | 4                      | 5            | 6                        |

|                                                                                                        | Strongly<br>Disagree<br>= 1 | Disagree<br>= 2 | Mildly<br>Disagree<br>= 3 | Mildly<br>Agree =<br>4 | Agree =<br>5 | Strongly<br>Agree =<br>6 |
|--------------------------------------------------------------------------------------------------------|-----------------------------|-----------------|---------------------------|------------------------|--------------|--------------------------|
| how to learn.                                                                                          |                             |                 |                           |                        |              |                          |
| 4. My homework assignments require students to think in new ways about what I have presented in class. | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 5. The class material I choose stimulates students to reflect on their values.                         | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 6. In my classes, I encourage students to interact with one another.                                   | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 7. My students must do more than learn basic facts.                                                    | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 8. I regularly give students a chance to discuss issues among themselves.                              | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 9. I regularly give students the opportunity to explore subject matter on their own.                   | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 10. I regularly engage students in questions and answer.                                               | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 11. Order and discipline come first in my classroom.                                                   | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 12. I try to instill a common set of values in my students.                                            | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 13. My lessons are based on                                                                            | 1                           | 2               | 3                         | 4                      | 5            | 6                        |

|                                                                          | Strongly<br>Disagree<br>= 1 | Disagree<br>= 2 | Mildly<br>Disagree<br>= 3 | Mildly<br>Agree =<br>4 | Agree =<br>5 | Strongly<br>Agree =<br>6 |
|--------------------------------------------------------------------------|-----------------------------|-----------------|---------------------------|------------------------|--------------|--------------------------|
| are based on explicit set of values.                                     |                             |                 |                           |                        |              |                          |
| 14. I require a quiet classroom.                                         | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 15. Students see me as someone they can look up to.                      | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 16. In my classes, I know what each student is doing.                    | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 17. In my classroom, I usually set a well-defined task for each student. | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 18. More than anything else, I set a good example for my students.       | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 19. I write detailed lesson plans.                                       | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 20. Students talk to me about their friendships.                         | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 21. Students talk to me about what they do outside of school.            | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 22. Students see me as a friend.                                         | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 23. Students know what I do outside of school.                           | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 24. I know a great deal about students ' families.                       | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 25. Students see me as someone they can relate to.                       | 1                           | 2               | 3                         | 4                      | 5            | 6                        |

|                                                                                              | Strongly<br>Disagree<br>= 1 | Disagree<br>= 2 | Mildly<br>Disagree<br>= 3 | Mildly<br>Agree =<br>4 | Agree =<br>5 | Strongly<br>Agree =<br>6 |
|----------------------------------------------------------------------------------------------|-----------------------------|-----------------|---------------------------|------------------------|--------------|--------------------------|
| 26. I try to keep a certain distance from students.                                          | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 27. So far as misbehavior is concerned, I rarely make exceptions for special cases.          | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 29. So far as missed examinations are concerned, I rarely make exceptions for special cases. | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 30. I refuse to negotiate with students about homework assignments.                          | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 31. Students rarely see me break a school rule.                                              | 1                           | 2               | 3                         | 4                      | 5            | 6                        |
| 32. I refuse to negotiate with students about grades.                                        | 1                           | 2               | 3                         | 4                      | 5            | 6                        |

## APPENDIX B

### The Teacher Interview Protocol

We want to understand what technologies teachers use and how teachers make sense of that technology.

1. What technology do you personally use?  
(Prompt: Ask about out-of-school and home uses)

At school?

2. What benefits, if any, do you experience from technology?
3. Do you ever do personal searches for information or 'surf the internet'?

◆ When do you find yourself searching the Internet?

◆ Do you use the Internet in place of the library? Why or why not?

4. How would you rate your degree of comfort with technology on a scale from 1 - 10 (with 10 being highly comfortable, and 1 being highly uncomfortable)?

| Uncomfortable |   |   |   |   | Comfortable |   |   |   |    |
|---------------|---|---|---|---|-------------|---|---|---|----|
| 1             | 2 | 3 | 4 | 5 | 6           | 7 | 8 | 9 | 10 |

5. What technology do you use in the classroom? (See table below)

| Type of Technology              | Frequency<br>(How often?) | In what areas of the curriculum? For what purpose/s? | Who uses the technology?<br>(Student users?) (Student managers) |
|---------------------------------|---------------------------|------------------------------------------------------|-----------------------------------------------------------------|
| Computers                       |                           |                                                      |                                                                 |
| Printers                        |                           |                                                      |                                                                 |
| Educational software<br>(names) |                           |                                                      |                                                                 |
| Scanners                        |                           |                                                      |                                                                 |



|                 |  |  |  |
|-----------------|--|--|--|
|                 |  |  |  |
| Internet        |  |  |  |
| Digital Cameras |  |  |  |
| Camcorders      |  |  |  |
| Others (list)   |  |  |  |

6. Please name three most frequently used technologies in your classroom. What are the advantages and/or disadvantages of using each of the technologies in the classroom? (How about TELE-Web?)

#### Teachers and TELE-Web

7. You're a new, and you've been using TELE-Web in both upper Elementary resource room and fourth-grade general education classroom) participant on the TELE-Web project. If you were explaining TELE-Web to a novice teacher or intern, how would you describe it?

(Some other prompts to use are as follows):

8. What do you think of TELE-Web?

- ◆ To what extent do you think teachers' opinions, perspectives and experiences can shape the design of the new TELE-Web?

- ◆ What are your goals for the TELE-Web assignments you have created for students?

- ◆ What is your role in the TELE-Web activities?

9. What helps you try TELE-Web or any other new technology innovations? In other words, what makes you comfortable in using a particular innovation?

What factors make you reluctant to use TELE-Web or any other technology innovations?

10. Overall, how would you rate your *students'* degree of comfort with technology on a scale from 1 - 10 (with 10 being highly comfortable, and 1 being highly uncomfortable)?

Uncomfortable

Comfortable

11. What do you anticipate will be the relationship of TELE-Web to your classroom instruction in reading and writing? To other content areas?

12. Discuss or rate the various potential values of the following features of TELE-Web for you? For your students?

|                               | Teacher | Student |
|-------------------------------|---------|---------|
| Student: Add/Edit Students    |         |         |
| Assignments and Activities    |         |         |
| Message Center                |         |         |
| Community Center              |         |         |
| Tele-Zine                     |         |         |
| Tele-Search                   |         |         |
| Collaboration and Publication |         |         |
| Self-start Activities         |         |         |

#### Literacy Questions

Explanation to the teachers:

We want to understand what literacy practices teachers use, and how teachers make sense of literacy instruction for those students who are at risk for school difficulties, and for students who are likely to experience success. We also want to design TELE-Web to be responsive to what teachers believe are the essential skills for readers, writers, and especially, students who face learning challenges in the classroom.

13. What are the characteristics of good readers?

14. What are the characteristics of good writers?

15. This year, what are your classroom goals in reading? Writing?

16. Are emergent readers and writers – or those students you consider nonreaders and nonwriters – different from good readers and writers? If so, how?

17. What kind of specialized instruction did special education students need?

18. Is that instruction different from the instruction that they should receive in general education contexts?

- ◆ Prompt: What helps special education students perform competently in general education contexts?
- ◆ What instructional modifications do you made for them in your classroom?

19. What do you believe are the most effective activities that you have used to teach your students to become better readers? Writers? Learners?

What activities were the least effective?

20. What are your beliefs about your *teaching role* in the classroom? What are your beliefs about your students' *learning role* in the classroom?

## APPENDIX C

### Student Interview

#### Literacy Identities

##### Reading

- ◆ What is reading?
- ◆ If a visitor from another country said to you what do you do during reading lessons, what would you tell him/her?
- ◆ Who are the best readers in your class? How do you know?
- ◆ What makes them a good reader?
- ◆ If somebody comes to you and says he or she wants to become a better reader, what would you tell them to do?
- ◆ How do you describe yourself as a reader?
- ◆ Please show me a book you like most. Why do you like it?

##### Writing

- ◆ What is writing?
- ◆ If a visitor from another country said to you what do you do during writing lessons, what would you tell him/her?

- ◆ Who are the best writers in your class? How do you know?
- ◆ What makes them a good writer?
- ◆ If somebody comes to you and says he or she wants to become a better writer, what would you tell them to do?
- ◆ How do you describe yourself as a writer?

#### Home and Literacy

- ◆ What do you read in school? At Home?
- ◆ When do you read in school?
- ◆ What do you write in class? At Home?
- ◆ When do you write in school?

#### Subjects

- ◆ What is your favorite subject? Why?
- ◆ What is your favorite thing (activity) to do in your class? Why?
- ◆ What do you dislike in class?
- ◆ What is the least favorite subject at school?

#### Computer technology/TELE-Web

- ◆ Do you like computers? Why or why not?
- ◆ What do you know about the computer?
- ◆ Where did you learn about the computers?

- ◆ Do you have computer at home? What do you do with it at home?
- ◆ What do you do on computer at schools?
- ◆ What do you know about TELE-Web?
- ◆ What are all the things that you can do on TELE-Web? Anything else?  
Have you ever published your stories on TELE-Web?  
Have you ever sent or received a message on TELE-Web?  
Have you ever used chat room on TELE-Web?  
Have you added a picture to a story?  
Have you ever self-started an activity on TELE-Web?  
Have you ever created a web or a map for your story on TELE-Web?  
Have you ever shared a story on TELE-Web?
- ◆ If you need help with TELE-Web, what would you do?
- ◆ If a new student comes to your class, what would you say to him or her about TELE-Web?
- ◆ What do you think TELE-Web can do for you?
- ◆ What is the most favorite thing to do on TELE-Web? Why?
- ◆ Would you like to use computers more often at schools? What would you like to use the computer for?

## Appendix D Eddie/Josh's Animal Web and Animal Report

*"Idea Organizer 04/15/2002"*

by Josh Newell (Josh)

Ms. Crone's Class

Instruction: After researching, put facts about your animal in the correct category.

Prompt: Put 3-5 facts in each category.

Food

seaotters food is

shells an clams.A

sea otters are pretiter.A sea otter

eats fish.

habitat

On the west coste of

the USA. allso east

coste of rusha.It

lives in blue water.

Topic:

Sea Otter

Life Cycle

a sea otter's

life cycle is

a babye then it grose into a sea otter.A

babye is clod a pup.

Can only sport oen pup.

Physical Characteristics

the sea otter is ligher then a bluewhale.A sea ottder is very smart.It is the lighist sea mammal.

*"Animal Report 05/13/2002"*

by Josh Newell (Josh)

Ms. Crone's Class

Instruction: Write a paragraph for each category in your animal web, using the information you and your partner researched.

Prompt: Remember to write complete sentences. Use capital letters and punctuation.

Sea Otter

A sea otter eats shells and clams. A sea otter is a predator. A sea otter eats fish.

The sea otter lives on the west coast of the US. They also live on the east coast of Russia. It lives in blue water.

A sea otter is 400 times lighter than a blue whale. A sea otter is very smart. A sea otter is the lightest sea mammal.

A sea otter's life cycle is a baby then it grows up. A baby sea otter is called a pup. A mother sea otter can only support one pup.

That is what we wrote about sea otters. You can find more information.



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