2009-01-01

Bridging The Digital Divide: Infusing Digital Storytelling To Improve Literacy Instruction Among Students In Rural Bhutan

Khendum Gyabak
University of Texas at El Paso, kgyabak@miners.utep.edu

BRIDGING THE DIGITAL DIVIDE: INFUSING DIGITAL STORYTELLING TO IMPROVE LITERACY INSTRUCTION AMONG STUDENTS IN RURAL BHUTAN

KHENDUM GYABAK

Department of Teacher Education

APPROVED:

Heriberto Godina, Ph.D., Chair

Concha Delgado-Gaitan, Ph.D.

Brian Giza, Ph.D.

Peter Golding, Ph.D.

Francisco Soto Mas, Ph.D.

Patricia D. Witherspoon, Ph.D.
Dean of the Graduate School

Dedication

For my students at the Bayta Community School, "I will forever be in awe at your curiosity"

Literacy alone is no longer our business. Literacy and technology are. Or so they must become.

- Cynthia L. Selfe

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by

KHENDUM GYABAK, B.S., M.A.

THESIS

Presented to the Faculty of the Graduate School of

The University of Texas at El Paso

in Partial Fulfillment

of the Requirements

for the Degree of

MASTER OF ARTS

Department of Teacher Education

THE UNIVERSITY OF TEXAS AT EL PASO

May 2009

Acknowledgements

For my parents, Apa for being the efficient driver and technical support and Mom for being the best research assistant in Phobjikha.

I want to thank Dr. Heriberto Godina, my thesis advisor and chair for patiently guiding me through this work.

My deepest gratitude to Dr. Brian Giza, for inspiring me with new ideas and being available amidst your busy schedule.

I thank the Dean, Dr. Tinajero for supporting the backpack program and my research to Bhutan.

I thank Dr. Delgado-Gaitan, Dr. Soto Mas and Dr. Golding for being a very patient committee and for your sincerest advices to making this thesis a reality.

I thank my brother Jojo and Meghana for helping me with the logistics of copying and sorting out this document.

I thank my friends at work; Jeremy, Tanya, Luis and Vanessa, for your constructive criticisms on my thesis and acting as punching bags whenever I suffered from a thesis crisis.

I thank the Ministry of education in Bhutan for being welcome to my research.

Lastly I want to thank the people in the Bayta community school for their kind hospitality.

Abstract

The purpose of this qualitative study is to examine the digital divide among public school students in rural Bhutan. The study presents several broad themes relevant to technological innovation, integration of technology initiatives into educational practices and social structures in underdeveloped and developing countries. The aim of this study is to address the possibility of integrating digital storytelling and through the use of these new literacy practices, understand whether technology education could be a sustainable process for empowerment among public school students in rural Bhutan. This study should be of interest to educators and administrators concerned about the future development of educational technology in rural schools.

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Chapter 1: Introduction

We live in a world where our dependence on technology grows at the same rate that technology advances. We function by a click of a mouse that directs both our basic, everyday needs, such as shopping for groceries, paying bills, and our more advanced needs, such as healthcare, education and financial security. Just a decade ago, communication mostly consisted of landline telephone services, but today communication is synonymous with podcasting, digital storytelling, instant messaging (IM), blogging, WiFi (Wireless Fidelity) and other innovative technologies: however, not all people have equal status in the digital age. According to Robinson (2003), the term "digital divide" was first coined by Lloyd Morrisette, the former Markle Foundation President, to describe the growing difference in access to Information Technology (IT). Later, the term helped publicize the findings of the National Telecommunications and Information Administration (NTIA) that described large differences in IT access of low-income groups, minorities, women, elderly, and other groups in society (NTIA, 1998).The digital divide has covers a variety of disparities in the United States; as well as disparities in technology access among people in underdeveloped or developing nations. In a socially specific context, Kellner (2000) describes the digital divide as that which refers to the "disparities in terms of access, training, skills, and the actual use of technologies to improve education and promote social justice."

Warschaeur (2003) emphasizes that there is no single factor that determines the digital divide. He further claims that Information Communications Technology (ICT) exists only as an external variable, a variable used to bring about results. ICT should not

only connote digital solutions, such as physical access to computers and technology but rather be interconnected into social systems to further its use in the process of social inclusion.

In 2000, for the first time, street children in India accessed computers with "*A hole in the wall*" initiative (Warschaeur, 2003). "*A hole in the wall*" was named after the idea of attaching five-station computer kiosks to the walls in the poorest slums of India in New Delhi. No training was provided, but the idea was to allow the children to discover and learn at their own pace and speed. Although the idea was deemed by the government as a groundbreaking project, upon closer observation it was determined that the children hardly used the internet. Neither education programs nor curriculums were made available, and the children's inability to speak English led them to just play computer games and use the "Paint" application. In spite of some recent evidence that reveals how children's engagement of video games reflects the development of unique literacy skills (Gee, 2007), parents and the members of the community determined that the idea of children learning on their own was harmful and not an effective educational practice (Warschaeur, 2003).

The "*A hole in the wall*" initiative exemplifies one of the seminal problems in establishing technological resources within marginalized settings. Specifically, how resources intended for good can be wasted or not used to their most successful capacity. The study proposed here is intended to address the importance of examining the effectiveness and integration of technology in a rural classroom setting.

1.1 Rationale

Norris (2001) emphasizes the need for digital inclusion in rural communities by stating that digital networks have the ability to broaden and provide accessibility to crucial information for underprivileged populations. The inclusion of digital technologies in rural societies has the potential to create accessibility and participation and allows rural populations to become active members of society. This study could provide educators with a perspective about the need for the integration of technology into education. The use of technology can also complement the preservation of local culture and traditions. The promotion of community culture adheres to the Royal Government of Bhutan's Gross National Happiness philosophy, which according to Gurung (2005), "requires using culture as a mediator in implementing the country's developmental activities." In addition, this study aims to provide a clearer picture of how schools can implement technology as a tool for enhancing literacy practices in rural communities.

1.2 Research Questions

The study will attempt to understand and correlate literacy, technology and empowerment. Educators and policy makers should be interested in how to become more aware of the digital divide that exists in rural Bhutan. The research questions that guided the study are:-

1. What is the current status of the digital divide in Bhutan and what is its relationship to students in a rural school setting?
2. How can digital storytelling be used to improve the quality of bi-literacy (Dzongkha and English) instruction in rural Bhutan?

3. How can technology education influence a process of empowerment for rural communities?

1.3 Theoretical Framework

The theoretical framework for the study synthesizes three main theories to help answer the research questions. One perspective will draw from the theory of technological diffusion as purported by Tarde and Sorokin (as cited in Norris, 2001, p.30), and later progressed by communication scholar Katz (1999). Their theories state that the most successful innovations, either in the field of medicine, technology or other sciences, commonly follow an "S" (Sigmoid) shaped pattern (see figure 1.1). The pattern explains how initially there is a slow adaptation to new technologies, followed by a substantial growth when diffusion levels come to a saturation point and the demand for the product gradually declines (as cited in Norris, 2001, p.30). Mansfield (1961) in explaining the S-shaped curve proposed that:

> *"The rate of diffusion is a function of the extent of economic advantage of the innovation, the amount of investment required to adopt the innovation, the amount of investment required to adopt the innovation and the degree of uncertainty associated with the innovation*."

Alternative approaches to the theory have been employed by various researchers who hypothesized that since innovation usually replaces existing products, such as services or technology, the dynamics of the process of replacement accounts for both the rate of the diffusion and the shape of the diffusion curve (Blackman, 1972; Sharif & Kabir, 1976). Similarly, Norris (2001) associates the theory of technological diffusion to the digital

divide by suggesting that those who have the resources, skills and knowledge to adopt these new innovations at an early stage will eventually be ahead of the curve. Technology diffusion will slowly be saturated in these strata of the society. Once saturation is complete, the theory predicts that technology will be economically feasible and attract new users and eventually allow a previously marginalized population to catch up and access emerging technologies. The initial period for adapting to the new technologies has the potential to widen social inequalities, but eventually the temporary gap should close.

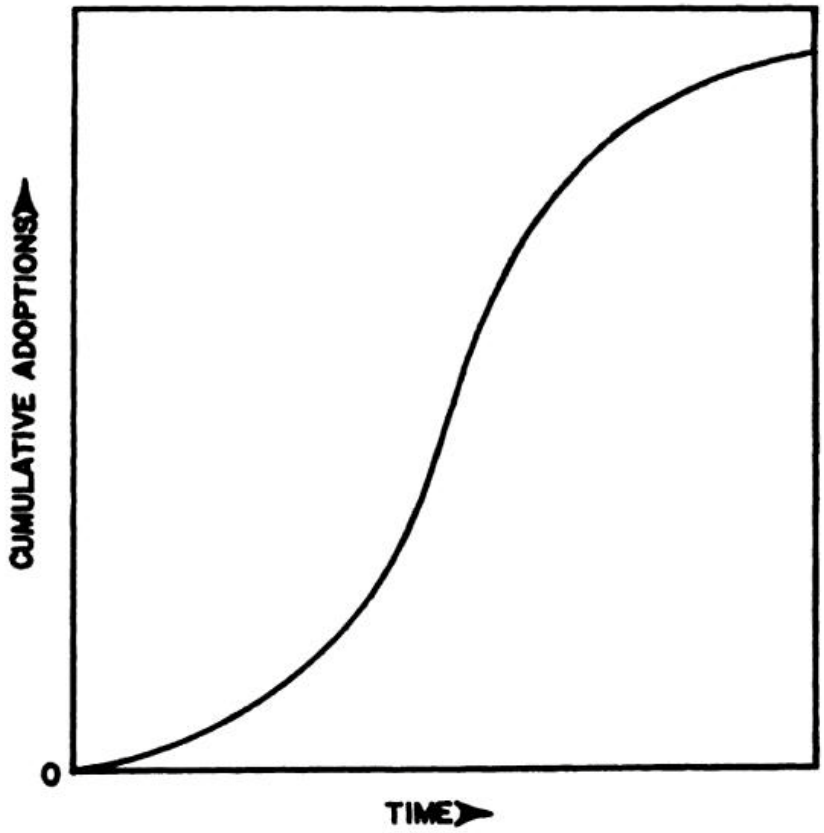

Figure 1.1: S-Shaped Diffusion Curve.

Information technology has changed our way of life, yet education has failed to take notice of these changes and continues to be dominated by a mind-set that is obsolete. Education technology faces a lot of criticism and is still denounced by some in education. Kellner and Hammer (2001) relate the indifference to a lack of understanding about the use of computers and how computers can revitalize education systems. The second perspective to support the theoretical framework is implemented in the study through Luke's (1998) theory of new literacy learning models. He states that previous models of literacy are not in sync with what modern societies are using and that educators need to change literacy instruction based on the New Literacies and that various kinds of literacies function especially in communities where students and teachers live and work.

Gee suggests that modern societies should not only learn how to use these new literacies, but also learn how to adapt to it, so as to tap into its maximum potential. He states that "Getting "in sync" with these other elements means not just controlling (coordinating) them, but adapting to (getting coordinating by) them." In coming to recognize the full existence of new literacies, it is important to understand how literacy is acquired. According to Coiro, Knobel, Lankshear and Leu:

> "*literacy acquisition is defined not by acquiring the ability to take advantage of the literacy potential inherent in any single, static, technology of literacy, such as traditional print technology, but rather by a larger mindset and the ability to continuously adapt to the new literacies required by the new technologies that rapidly and continuously spread on the Internet.*"

Third, using a Freirean (1990) perspective on theory and praxis which correlates literacy and power, wherein the power of literacy is quantified through the promotion of dialogue

and peer interaction in education programs. To further support the paradigm of social empowerment is Delgado-Gaitan's (1991) theory on literacy empowerment and understanding power in a community. This concept of empowerment suggests empowering the people in the community to understand their role in the community relative to power but also to sustain the process of empowerment. Delgado-Gaitan (1994) relates to Freire's theory of empowerment and progresses it to her study of family literacy in Carpenteria. According to her the empowerment principles state:

> "*That people who have been historically underrepresented can organize and through a process of critical reflection recognize their potential and state their goals for access to resources, thus power*."

Delgado-Gaitain's (1994) take to addressing empowerment from the standpoint of concept and theory is to understand the process of identifying the key players in the educational process and construct a solid ground that involves dialectic cooperation between the community and school.

1.4 Background and Setting: A sense of Bhutan

Bhutan (see figure 1.2), one of the world's smallest and least developed economies, is a landlocked country located in the Northeastern Himalayas between China and India. 79 percent of the nation's population of about 700,000 lives in the rural areas, while only 21 percent lives in urban centers. There are approximated 31 living languages. The languages predominantly spoken are Dzongkha, English, Sharchagpakha and Nepali. Dzongkha is classified the national language and is spoken by 54 percent of the population (Gordon, 2005). With a land area of 38,394 square kilometers, the country is

administratively divided into 20 districts and 202 sub-districts. Basic infrastructure development, such as roads, water systems and electricity, had not been constructed until 1961, when Bhutan finally opened its doors to modernity and came out of centuries of self- imposed isolation.

Until the advent of western forms of education in the 1950s, the only form of formal education available in Bhutan was monastic education. Computers were introduced in the early 1980s, but it was only on June 2, 1999, that Bhutan introduced the internet and cable television to commemorate the 25th year of enthronement of His Majesty the King Jigme Singye Wangchuck. Pek (2001), in an article on Bhutan's introduction to the internet, highlights that ICT is a great help to Bhutan's development, especially in overcoming challenges, such as its high mountainous terrain and scattered populations.

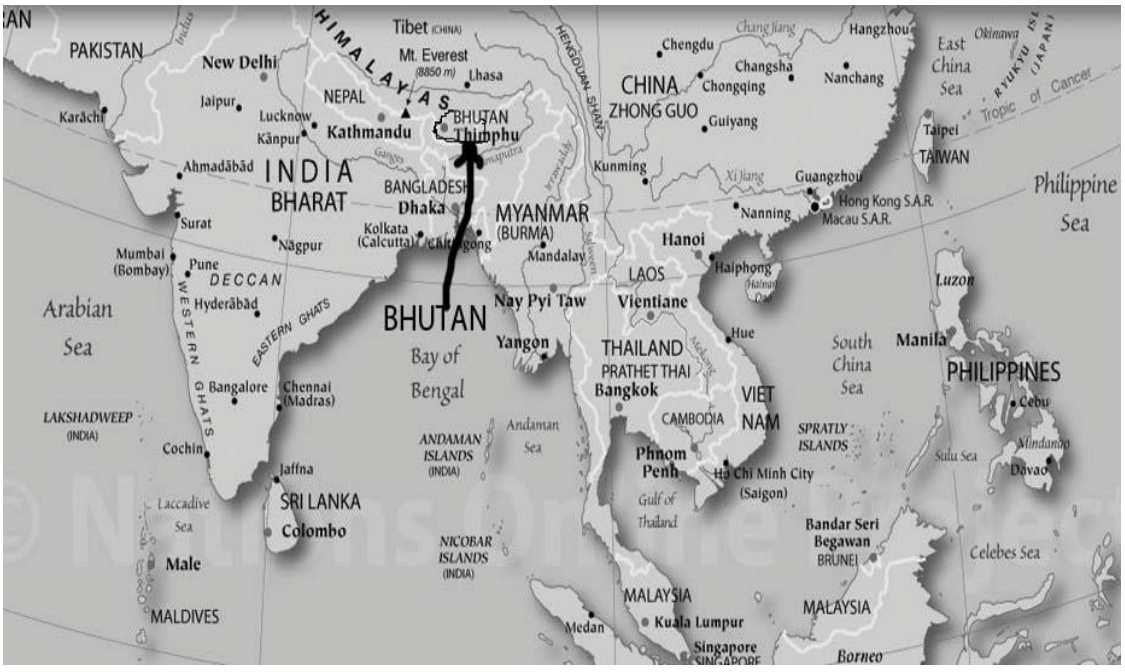

Figure 1.2: Map of Bhutan.

Although 79 percent of Bhutan's population lives in the rural areas, Bhutan is rapidly transforming from a predominantly agrarian economy to a market economy. The people in the rural areas are deprived from participating in the development process because of inadequate infrastructures and lack of access to information. The rapid transformation from an isolated agrarian economy has contributed greatly to the rift in development between the rural and urban areas. In this aspect, Pradhan (2007) has similarly noted that ICT can play a very important and effective role in bridging the rift and allowing rural communities to participate in the development of the country. The head of the Bhutanese Government, Lyonpo Yeshey Zimba claims that, "ICT is an industry where young Bhutanese can learn the latest and the best and be on an equal footing with everyone else" (Pek, 2001, p.18). There has been a significant move towards providing training and information for new technology. Pek (2001) further states that the Bhutanese Government strongly believes that ICT is the medium to "reach the unreached," and that plans have already been drawn up by the government to introduce Information Technology (IT) in all high schools and eventually to reach all students.

Reddi and Sinha (2004) claim that as globalization slowly increases its influence in Bhutan, young Bhutanese, especially those from rural areas, are no longer satisfied with the traditional pursuit of agriculture and view education as an important step for employment in other industries. Bhutan is already facing problems in relation to unemployment for well-educated citizens that have led to a need for new avenues of development. Gilhooly (2001) highlights the incorporation of ICT as one of the major factors for economic and social development: "*In the area of programmes, we must incorporate ICT as a major piece of the development portfolio. We need to fully integrate*

programmes with policy measures and ensure that they are innovative, well matched to local needs, and address market failures, poverty alleviation and social exclusion. Moreover, policies that increase creative cooperation between sectors such as public private partnerships are necessary for the effective spread and optimal use of ICT as an enabler for development."

Technology is already beginning to play an important role in the national economy and in education. Pek (2001) observes that Bhutan is envisioning a master plan for IT as an important tool for realizing the country's developmental goal of *Gross National Happiness*, which is a combination of economic development, environmental conservation and the promotion of identity and culture. In the master plan, IT will play an important role to enhance good governance, generate employment and improve the quality of life through programs such as telemedicine and distance learning.

In Bhutan, the rural communities remain extremely isolated from the urban centers, mostly because the mountainous terrains that prevent the construction of motor roads. As a result, residents do not have access to important market and agricultural information, proper health care and a better quality of education. Bhutan's rugged terrain has been a major challenge in establishing information networks in the country, but even given the challenging geography, there is considerable coverage of telecommunication services in all the 20 districts. The extent of telecommunication service covers remote locations in 113 blocks. 79 percent of Bhutanese live in rural areas spread over 201 village blocks. In sum about 2,000 villages in the 20 districts. They account for less than 10 percent of the total telephone connections and less than 1 percent of internet connectivity in the entire country. The number of houses per village numbers from two to 100, with an average of

43; more than 50 percent of the population lives a few hours walk from the nearest road, and some villages are as remote as a five-day walk. Rural projects are usually hindered by economics, and most governments face difficulty in providing technology solutions for rural areas. Tensin (2003) observes that each internet line costs about $2,500 US dollars. In overcoming the digital divide, governments have to also consider the technological feasibility in rural areas. In the case of Bhutan, the sustainability of a technological infrastructure is not feasible due to its geographical conditions, so policy makers should find an inexpensive strategy for bringing the most pertinent and feasible materials to rural communities.

1.5 Coming to Terms

Blogs - The word blog roots itself from the word *Weblog*. Blogs are usually displayed in a journal or log entry format, which is publicly accessible and updated frequently by individual persons or a company. Blogs often reflect the personality of the author or the company employees they represent (Blog, 2009).

Community – certain group of individuals interacting in a common location (community, 2009).

Culture - the customary beliefs, social forms, and material traits of a racial, religious, or social group (Culture, 2009).

Digital Divide – a division or gulf between those who has extensive use and accessibility to digital technologies to those who do not. Also refers to the perceived social or educational inequality resulting from this divide (Digital Divide, 2009).

Digital Storytelling – the combination of digital content (images, sound, and video) and narrative to create a short movie that has an emotional impact. The purposes include instruction, persuasion, historical documentation, and reflection (Baggett, 2008).

Empowerment – the definition of empowerment here is in an educational context wherein the people empower themselves by taking responsibility for their own learning (actively engaging as teachers as well as students), by increasing their understanding of the communities in which they live, and through this understanding they have the confidence and ability to develop structures and policies that are better suited toward their needs (Freire, 1990).

Gross National Happiness – is a development philosophy proposed by the fourth King of Bhutan, who believes that happiness is an indicator of good development and good society and that the country should prioritize happiness and welfare of the people than pursuing the economic goal of the Gross National Product. A Gross National Happiness society means the creation of an enlightened society in which happiness and well-being of all people and sentient beings is the ultimate purpose of governance (Gross National Happiness, 2009).

Information Communications Technologies - are the computing and communications facilities and features that variously support teaching, learning and a range of activities in education (Information Communications Technologies, 2009).

Information Technology- processing information by computer. Information Technology is an umbrella term for the entire computer industry and its latest moniker, which took hold in the 1990s (Information Technology, 2009).

Infrastructure - A collective term for the subordinate parts of an undertaking such as a substructure or a foundation (Infrastructure, 2009).

Internet – a global network providing a vast array of information and communication facilities to its users. This network consists of a loose confederation of interconnected networks which use standardized communication protocols (Internet, 2009).

Instant Messaging – an interactive way of exchanging text messages in real time between two or more people logged into a particular instant messaging (IM) service (Instant Messaging 2009).

New Literacies – New Literacies of the Internet and other ICTs include the skills, strategies, and dispositions necessary to successfully use and adapt to the rapidly changing information and communication technologies and contexts that continuously emerge in our world and influence all areas of our personal and professional lives. These new literacies allow us to use the Internet and other ICTs to identify important questions, locate information, critically evaluate the usefulness of that information, synthesize information to answer those questions, and then communicate the answers to others (Leu et al., 2004).

Podcast - a digital recording of a broadcast, made available on the Internet for downloading to a computer or personal audio player (Podcast, 2009).

Rural – of or relating to the country, country people or life, or agriculture (Rural, 2009).

Storytelling – the art of relating anecdotes, reciting tales, or writing stories (Storytelling, 2009).

Social Inclusion – the ability to not only take to importance the physical availability of computers and the Internet but rather make use of those technologies to engage in meaningful social practices (Warschaeur, 2003).

Technology - applying a systematic technique, method or approach to solve a problem. Much of today's technology implies the use of computers (Technology, 2009).

Technology Literacy – the ability to use computers and other technology to improve learning, productivity, and performance (Baggett, 2008).

Wireless Fidelity – popularly known as Wi-Fi, it is specifically defined as any wireless local area network (WLAN) products that are based on the standards of the Institute of Electrical and Electronics Engineers (IEEE) 802.11 (Wireless Fidelity, 2009).

Chapter 2: Literature Review

The literature review is organized according to the themes of evolutionary aspects of technological innovations, integration of technology education into school curriculum, and adaption of new literacy models and social empowerment in rural community schools. The literature is intended to ground the theoretical framework in the study's research questions. Since literature on Bhutan in the area of education technology is scant, I will be drawing upon literature from similar studies conducted in other developing and under-developed countries.

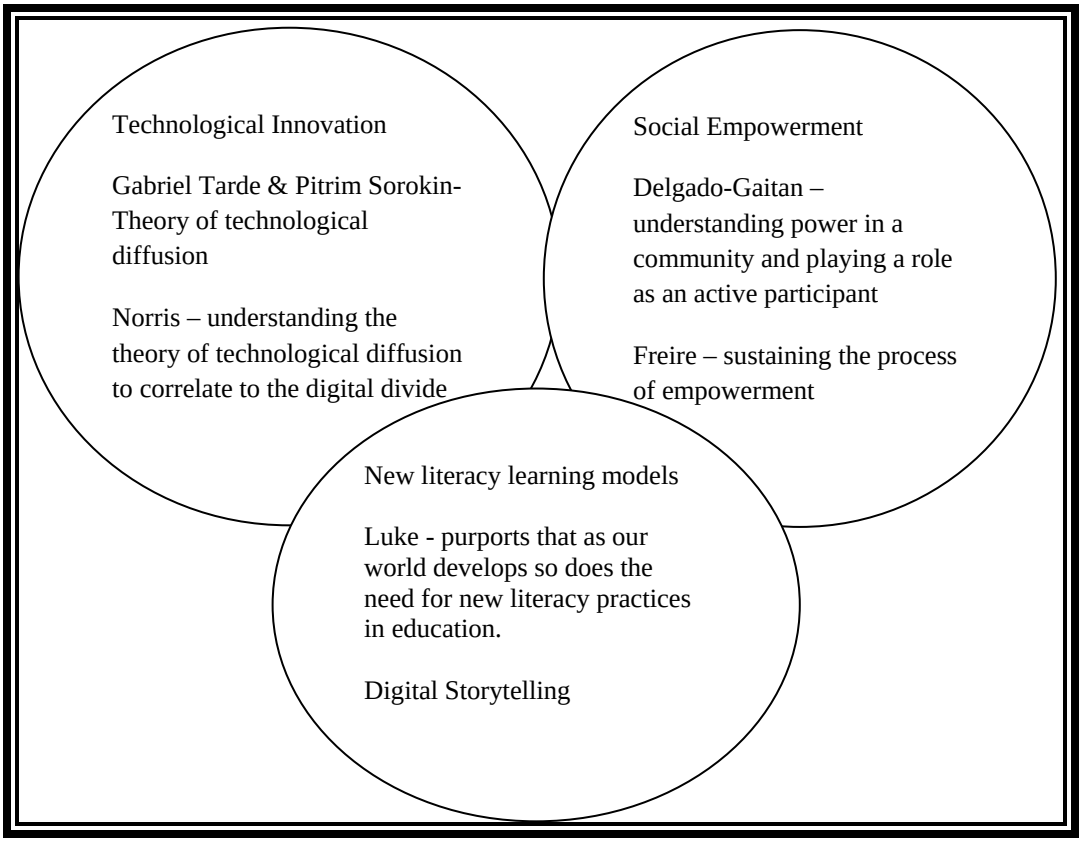

Figure 2.1: Framework of Related Literature.

2.1 Approaching the Digital Divide

The question of bridging the digital divide will be answered through three approaches (see figure 2.1); the technological approach will delve into studies that answer the issues on the digital divide and also describe the technological infrastructure in Bhutan. Secondly, the pedagogical approach will look into the growing relation of technology and literacy and explore how these emerging literacy practices could be successful especially in a bi-literate environment. This review will not only look at the success of New Literacies in rural communities but will also explore the possibilities and disadvantages of using these New Literacies in marginalized communities, and thirdly, the social approach will also bring into context the role of power and culture in a community and take into consideration all these elements so that a new literacy practice could be viable.

2.1.1 Technological Approach

It is important to realize the growing digital divide in most developing countires, especially in the rural communities. As Chambers (1983) states in his findings from his extensive study on the relevant education for poor rural communities in third world countries, rural communities lack the accessibility to information in physical and social aspects of rural life, such as :- soil erosion, diarrhea, “the political economy of *pastoralism,*” and the “drudgery-reducing technology for rural women,” proper management of irrigation systems, information on proper nutrition, and other important issues that further increase poverty. Because of these prevalent issues faced by the rural population, he states that schools in rural communities cannot afford to be detached from

rural development efforts by the government and private sectors. Arunachalam (2002) also highlights the importance of ICT empowering the rural poor by suggesting that ICT can bring about equity amongst the reached and the unreached. For instance 10 villages near Pondicherry in Southern India have knowledge centers which facilitate information about medical aid, farming tips, and other information that have been very useful in the rural community.

However, ICT should not be misunderstood as the ultimate answer to solving the problem of poverty. Dagron (2001) in his report to the Rockefeller foundation highlights that ICT and internet connectivity is not the solution for underdevelopment, and that ICT should be recognized as only instruments for development.

At the advent of Bhutan's opening up to the internet, the United Nations Development Programme (UNDP) colloborated with the government of Bhutan to provide internet training in schools within the capital city of Thimphu. Later, the program slowly extended across the country. Bhutan's slowly growing ICT sector was supported by the UNDP, and in the initial stages of its introduction to the internet, UNDP helped establish Druknet, the nation's only Internet Service Provider, which now boasts of 800 subscribers and an estimated 2,500 internet users. (Pek, 2001, p.18) UNDP also helped fund training activities amongst telecommunication staff during the government's establishment of the Department of Information Technology which is now the core promoter of ICT development nationwide. UNDP Resident Representative Murata, also claims the importance in ICT development in Bhutan by stating that considering the rugged geographic conditions of Bhutan, the significance of ICT will be of great use for obtaining information for the vast majority of the people, and that the UNDP wants to

help close the global information gap by providing access to IT for every man, woman and the youth of Bhutan. (Pek, 2001, p.19)

Tensin (2003) highlights the objectives of the 9th Five-year Plan in Bhutan for rural telecommunications development by the telecom sector, in providing at least ten telephone lines per village block. Although these projects prove to be technically challenging and require huge investments, 76 village blocks already have access to telephone lines and the remaining village blocks will get telephone coverage soon in a project that deploys a combination of technologies, such as the Wireless Local Loop (WLL), Voice Over Internet Protocol (VOIP) and Very Small Aperture Terminals (VSAT). Tensin (2003), in his report at the International Telecommunications Union states that, "*The mountains and valleys make installation of communications infrastructure difficult and expensive, and hinder transportation even between main cities. Low population densities and low household incomes make it difficult for the government to recoup the cost of telecommunications investment.*"

Like many other developing countries today, the majority of Bhutan's population lives in rural areas; most development projects have proven that rural communication services are unprofitable although recent competition in the communications infrastructure market is slowly proving otherwise. Souter and Jensen (2000) note that the network infrastructure costs have gone down in recent years making it easier for governments to invest in fiber optics, wireless and satellite infrastructure in rural areas. Based on their study in rural Africa, they have noted the following:

> "Cost estimates for the provision of telephone lines in rural Africa have dropped from an average of over two thousand US dollars per line a few years ago to less

> than five hundred US dollars per line today…In particular the potential use of the Internet for transactions radically increases the value that can be added by new infrastructure, and therefore the incentives to invest in its deployment…Technology has advanced tremendously from the days of rural radio telephone networks, and wireless systems are now a serious alternative for the full range of telecommunication services (p.3)"

One of the educational technologies designed especially for schools in rural communities because of its innovative design and minimum requirements, is the One Laptop Per Child (OLPC) initiative taken by MIT professor Nicholas Negroponte in 2002. Inspired by the constructionist theories of learning proposed by Seymour Papert, Negroponte experienced how laptops transformed the lives of families and their children in a rural Cambodian village. The phenomenal "One hundred dollar laptop" also known as the "XO" laptop is already being adapted by many governments in developing nations as means to promoting digital inclusion in rural communities. One unique feature the laptop offers is the mesh network, which is a low-cost solution to network accessibility in areas with poor technological infrastructure. In an effort to test capabilities of the mesh network in the XO laptop, some university researchers from Brazil performed several experiments and concluded that the XO laptop is an ideal tool in remote and developing areas. (Carrano, Martins & Magalhaes, 2007)

OLPC's main goal is "to provide a means for learning, self-expression, and exploration to the nearly two billion children of the developing world with little or no access to education" (one laptop per child, 2006). This non-profit organization created the dynamic XO laptop that is making waves in children's learning in many developing

countries. Pogue says, “The laptop is now called the XO, because if you turn the logo 90 degrees, it looks like a child.” (Pogue, 2007) The XO laptop uses comparatively less power than the conventional Windows or Mac built laptops and is especially designed to run in areas where power is scarce. Having a specially built color identity in bright sunlight, this laptop can be used by children in rural communities where most of their learning is usually done outside of the classroom. Offering regular wireless internet connection and mesh networking, allows the XO laptop to connect to other XO laptops even without an internet connection (Pogue, 2007).

2.1.2 Pedagogical Approach

Today, technology is closely intertwined with literacy, so- much- so that it is important to understand the relationship between these two, and find out how technology impacts the very core concepts of literacy (Alexander, 2006). It is inevitable to realize and embrace today’s emerging literacies. Luke (1998) points out that our students already face the complexities of “new times”, which is to say globalized economies, new communication technologies that transform traditional print, and “ways of words” that generate a whole new form of expression. In trying to understand how these “new times” influence our student’s lives, it is important for both educators and students to be “engaged as critical participants in these new cultures and media”. Kellner (2000) notes that education systems can help in bridging inequities in terms of information literacy and the digital divide by suggesting that:

> “The disconnect and divides can be overcome, however, by more actively and collaboratively bringing students into interactive classrooms or learning situations

in which they are able to transmit their skills and knowledges to fellow students and teachers alike. Such a democratic and interactive reconstruction of education thus provides the resources for democratic social reconstruction, as well as cultivating the new skills and literacies needed for the new global economy and cyber-culture (p.14)"

Schroeder (as cited in Alexander, 2006, pp. 58) draws on embracing emerging alternative discourses by paying attention to student's literacies (i.e. their relation with communications technologies), by doing this he believes that teachers would be able to develop a good pedagogical practice that consists of well constructed and meaningful literacies. He emphasizes that "if the literacies of the classrooms that we construct have political and aesthetic values and enable students to construct their own, then we have fulfilled the promise of education."

Distance education, commonly known as e-learning, is a teaching system that is specifically designed to be used in remote schools via electronic communication. Distance education is one method of bridging the digital divide in rural communities. In most cases, rural schools in developing countries are deprived of technology infrastructure due to geographic and socio economic conditions. Alexander & McKenzie (as cited in Saheb, pp. 4) highlight the benefits of online distance education. They explain that the program allows students to interact with other students and teachers in a more sophisticated environment. Butcher (2000) identifies the growing trends of distance education methods in developing countries by claiming that the trend in distance education methods have grown tremendously in the 20th century, and there are several reasons for these changes. Firstly, there has been a growing need to provide access to

students who have and will be denied access to traditional education because of work commitments, geographical distance, or poor quality or an inadequacy to a good educational foundation. Secondly, there has been a necessity to expand access to education to larger numbers of learners, and thirdly, there has been a growing need to shift the way the government's economic policies in providing education services to a larger number of students.

Yu & Wang (2006) in their study on the use of educational technologies in central elementary schools in the rural village of Cun Wan Xiao. They noted a project called the Modern Distance Education Project established by the Ministry of Education in China, aimed at developing education in rural China through the use of modern distance education technologies. Under this project, schools used satellite teaching-receiving stations were equipped with satellite-receiving systems, computers, televisions, DVD players, and instructional CD-ROM courseware. Networked through the China Educational Satellite Transmission Network, their schools quickly received high quality educational resources and could be immediately used for teaching. The type of educational technologies available these days are plentiful, and many of these new technologies are being implemented by governments in their developmental programs.

Free education is provided by the government of Bhutan, from primary to the tertiary levels of schooling. Based on the National Statistics Bureau (2007), the schooling system covers kindergarten to grade twelve. Instruction in these schools is given in English and there are about one hundred and ninety thousand students enrolled in about five hundred and twelve schools. The country's school enrollment is 95 percent and the national literacy rate is about 60 percent. Until lately the IT curriculum was borrowed

from the Indian syllabus and taught in grades nine and ten, and computer courses mainly based on theory were offered in grades 11 and 12, but a new local IT curriculum was implemented in 2008 for grades 11 and 12.

In 1995 the Samtse College of Education in Bhutan, introduced for the first time the Distance teacher education program (DTEP), a teacher education program providing access to students who needed an extra teaching certification. The DTEP students live primarily in community schools in rural and remote locations, and before the internet was introduced, telephone service was used as a medium for student support. According to a survey conducted by the DTEP residential school in 2005, 74 percent of the students had access to telephones at home. Seven regional education resource centers around the country now provide internet access and basic facilities such as printing, telephone, and fax to provide asynchronous modes of communication to students who do not have access to these facilities at home. In an addition to the courses they are provided with in the DTEP program, students are also given computer literacy classes with an emphasis on the use of computer mediated communication methods for student support. Jamtsho & Bullen (2007) note the possibility of these resource centers growing into an environment for activities such as peer tutoring, faculty visits, arrangement for local tutors and that there are plans by the DTEP to gradually introduce a wider range of audiovisual materials, including radio and audio-taped instruction, and other supplementary television and video materials. Warschauer (2003) observes that the “characteristics of online instruction have special significance for groups that are socially or economically marginalized.”

In an effort to provide appropriate training in rural schools, Yu & Wang (2006) state that in order for distance education programs to be of success, educational materials must be replaced with the creation of instructional materials that are more suitable for a rural educational environment and also that the distance education methods can complement the traditional classroom education by covering issues that traditional education could not cover like focusing on fostering student's critical thinking and hands-on abilities, and creating and organizing more online activities suitable in a rural social situation. It is important to realize the state of rural schools in most developing countries. Ndandani (2001) examines in a case study conducted in rural schools of Mafikeng in South Africa that schools in rural villages are situated mainly in poor communities, and most of these schools are very far from towns and cities. The teachers work on "bare minimum resources," leaving them little enthusiasm to teach their students properly. As in the case of many developing countries, the infrastructure for using ICT is limited, expensive and not very reliable, further constraining development for distance education. Butcher (2000) also notes the resource constraints for infrastructure development in developing countries and that distance educators in African countries share a common complaint about the difficulties of relying on postal services to support communication with geographically dispersed students. This proves to be one of the impediments for most distance education programs in the region. Apart from the geographical constraints, the cost of communication, limitation to transportation in rural areas is one of the difficult challenges faced by students and distance education teachers.

After looking into distance education and understanding the constraints implied to the economics and infrastructure, educators in rural communities should also consider

other models of incorporating technology into their teaching practices. One new literacy learning model especially feasible in rural community schools is digital storytelling. According to Lambert (as cited in Chung, 2007, pp. 17), "a story is a narrative account of an incident, person, event or position." Bruner (1990), states that storytelling is a powerful method to help students make sense of their experiences and of their world.

Derived from the time honored practice of storytelling, the Digital Storytelling Association (as cited in Chung, 2007, pp.17) calls this practice a "modern expression of the ancient art of storytelling. Digital stories derive their power through weaving images, music, narrative and voice together, thereby giving deep dimension and vivid color to characters, situations and insights." Barrett (as cited in Sadik, 2007, pp 490) emphasizes the importance and use of digital storytelling by stating that digital storytelling contains the four student-centered learning strategies: student engagement, reflection for deep learning, project-based learning and the effective incorporation of technology in the teaching method.

Ohler (2006) notes the benefits of digital storytelling especially among children who are shy. He says that "digital stories give voice to quiet students and to especially those students who do not fit the conventional academic model". Digital Storytelling is the practice of using computer-based tools to tell stories. As with traditional storytelling, most digital stories focus on a specific topic and contain a particular point of view. However, as the name implies, digital stories usually contain some mixture of computer-based images, text, recorded audio narration, video clips and/or music. Digital stories can vary in length, but most of the stories used in education typically last between two and ten minutes. The topics that are used in Digital Storytelling range from personal tales to

the recounting of historical events, from exploring life in one's own community to the search for life in other corners of the universe, and literally, everything in between.

2.1.3 Social Approach

The perspective of social empowerment provides a context for literacy practices that take place in a rural environment, where the school and community are one and not a separate entity. Literacy for empowerment is based on Friere's (1994, 1990) emancipatory theory which suggests that people can only get educated if they get involved in a participatory relationship that positively affects historical, cultural and social changes. Godina (1998) suggests that the literacy for empowerment is closely "aligned with Friere's belief that literacy can be a vehicle for social emancipation of traditionally subordinated people."

In the case for community empowerment in rural communities, it is crucial to understand family literacy because family literacy contains the power to create accessibility to participation and also has the ability to get rid of social isolation. Tumusiime (2006) highlights that accessibility to technology is not the only answer to bridging social inequalities but rather the need to empower a community by stating that " *ICTs can indeed make a difference in the lives of rural people. However, besides investing in technology, there is need to invest more in empowering the people themselves with skills, particularly literacy, to enable them to use ICTs productively.*" Empowerment is necessary for a sustainable process of a new knowledge or literacy in a rural community because without the feeling of self esteem and self confidence on the use of these new technologies, the people in the community will always feel marginalized.

2.2 Summary

The idea of bridging the digital divide in rural communities seems like an ideal goal and based on previous studies and multi- million dollar projects to bridge the digital divide in numerous under-developed countries around the world have been received with both success and failure. Oftentimes these projects make groundbreaking news and then frizzle away with time, due to the lack of human resource or many other technical inadequacies people face in a rural setting.

Through these three approaches literature was presented that focused on technology feasibility, literacy and social practices in a rural community in order to understand the best and feasible approach to a sustainable technology education in a rural community school in Bhutan. The literature on appropriate technology presented various technological tools that were available for a rural community, and from many studies I learned that rural communities were oftentimes marginalized in terms of network infrastructure because of the lack of economic feasibility, and most underdeveloped nations invested more money in the urban areas.

The pedagogical approach presented teaching practices in rural communities and on the attractiveness and usability of adopting New Literacies in rural public schools. Based on Luke's New Literacies theory, this approach provided a fresh perspective to new literacy practices and could be one of the methods to bridging the digital divide.

Lastly, the social approach presented an understanding of a community and the idea of empowering a community. This approach was adopted to understand family literacy practices. As mentioned in chapter one, there have been many multi-million dollar projects that bring in technology education in marginalized communities. Having accomplished their goal of connecting rural communities, governments will oftentimes move on to new projects, and these communities will face problems using the technology. In most cases the technology will be left to collect dust in the boxes. These

problems are often explained by the project's inability to understand the community culture.

Chapter 3: Methodology

I have chosen to implement a qualitative approach to the study on the basis that this methodology has allowed me to step back from delving in technical information, but also gain insight on the cultural and linguistic characteristics of the Gangtey community in rural Bhutan (see figure 3.1). The study will consist of observations, interviews, focus group discussions and an intervention. Interviews and focus group discussions will be conducted both before and after the intervention. With the use of a digital audio recording device for the interviews, I will also be documenting the study through photographs of the community, school, students and teachers.

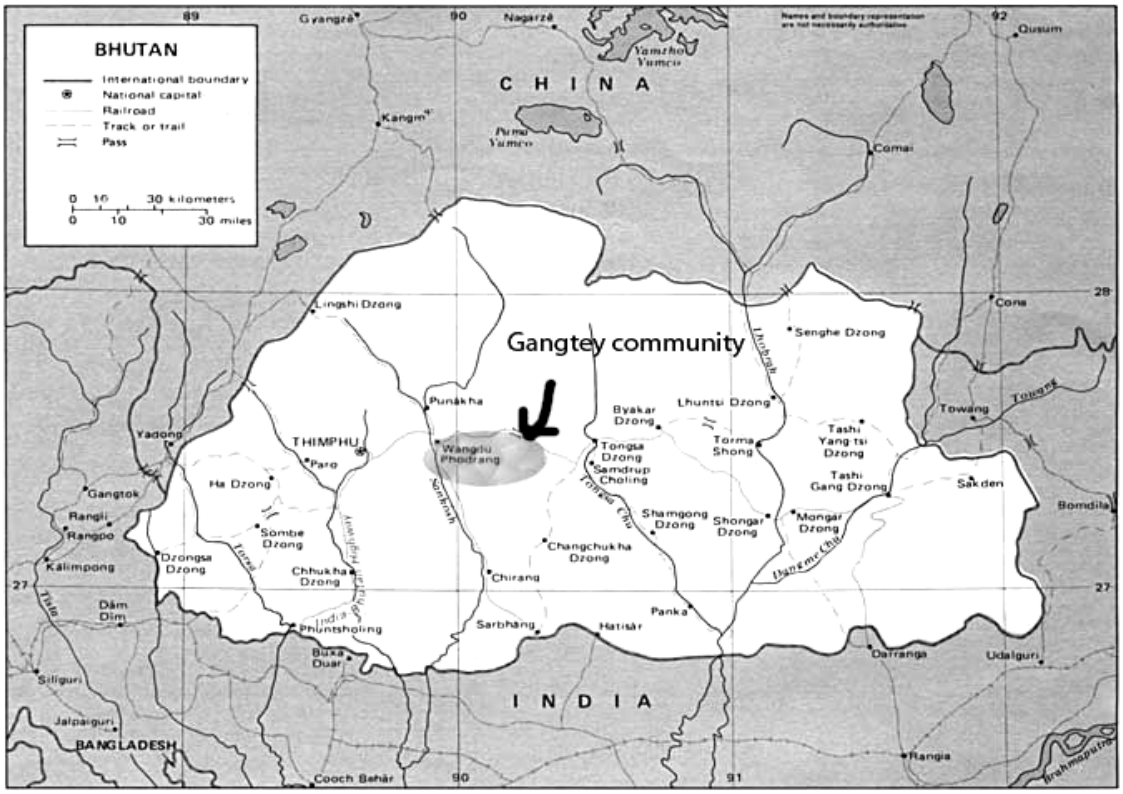

Figure 3.1: Map of Bhutan indicating the Gangtey community.

3.1 Setting: Bayta Community School

The study was conducted within a five-month frame at an elementary grade school in a rural village of Wangdiphodrang district. Established in June 2005 in the lower Phobjikha valley of Gangtey community, the community school was built by the community and the headmaster. The Bayta Community School derives its name from the term "*Betya*" meaning coins made from copper in Dzongkha. The school children chose to call it the "frog school" as the word "Bayta" means frogs, and the valley has rain throughout the year causing a lot of frogs to gather around the school campus.

The school has an enrollment of 160 students (see figure 3.1), and the average size of each class is about 35 students. The school is surrounded by a pack of gigantic crows during the day and class hours are oftentimes disturbed by the constant crowing. The parched white-washed walls in the school display student's paintings and class activities in chart paper. Some of the art on the wall have run out of glue and are practically substituted by interesting objects such as a sound box magnet. Ranging from grade one to grade four, the subjects taught in the school are English, Mathematics, Dzongkha and Science. Other classes provided without examination are the SUPW (Socially Useful and Productive Work), these classes cover value-education and physical education.

As one walks into the Bayta community school compound, one notices the school is guarded by a pack of dogs, looking suspicious and following the children from their homes to the classroom. Most of the children come from nearby villages and walk for more than an hour to get to school. Both the two teachers and the headmaster have living quarters in the school campus. Having adopted a rural lifestyle, they venture by

themselves to the forest to collect firewood. Everyone observes a close sense of community among the teachers, parents and students, and it shows by the informal and jocund conversations that they share among themselves.

Figure 3.2: Student Enrollment Demographic Chart

There is a strong sense of pride among the children in the existence of the black-necked cranes in their valley. Below is an art work of the black-necked crane drawn by one of the students (see figure 3.2). The black-necked cranes have been labeled as an endangered species of birds that fly all the way in the winter from Siberia to the Phobjikha valley in Bhutan. These migratory birds are the main reason why the Bhutanese government did not bring electricity into the community as it would disturb the birds. Maintained as an ecological site, the members of the community have been educated by the people of the Royal Society of Protection of Nature on how to co-exist with the birds without disturbing their natural habitat.

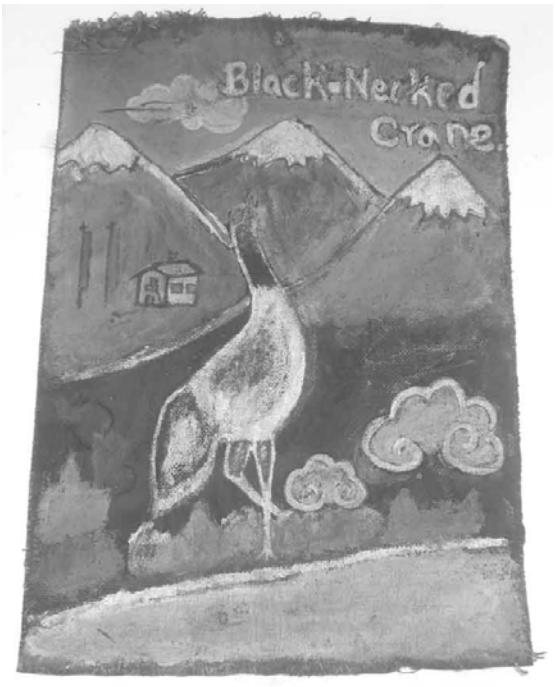

Figure 3.3: A drawing of the black-necked crane by one of the students.

3.2 Participants

3.2.1 Primary Participants

Upon receiving permission to conduct research from the Ministry of Education in Bhutan (see Appendix C) and the Institutional Review Board of the University of Texas at El Paso (see Appendix B), from an fourth grade class eight students were requested to participate in the research. The participants were four female and four male subjects with ages ranging from nine to eleven. The participants were assigned pseudonyms in the study to protect their confidentiality and also to avoid any situation that might coerce them. The criterion for selecting the participants was their fluency and aptitude in the English language. This was a requirement because the software used in the study was English-based. Therefore the participants were required to be reasonably competent in

English. Table 3.1 illustrates the demography of the students that were involved with the research.

3.2.2 Secondary Participants

The two-trainee teachers, the headmaster, and the parents closely were also involved in the study. All parents of the eight primary participants were illiterate and most of them depended on the yearly potato harvest as their primary means of income. I selected the parents to be interviewed because they were one of the key participants for understanding literacy in the home and community. The two-trainee teachers and the headmaster although not native inhabitants of the community, had been living at the community school for a good number of years and were interviewed to gain understanding of literacy and learning among the primary participants.

Table 3.1: Student Background Information

Name	Gender	Age	Grade Level
Dawa	Male	11	4
Pema	Male	12	4
Sangay	Male	13	4
Dorji	Male	13	4
Sonam	Female	12	4
Tashi	Female	11	4
Dechen	Female	12	4
Metho	Female	12	4

3.3 Data Collection Procedures

Data collection occurred in two phases of this study. The first phase of the study was conducted in the winter of 2008. It consisted of background information on the community school, introductory interviews with the participants, and a brief intervention was also held. The second phase of the study convened during the spring of 2009. It consisted of a post-intervention interview, informal feedback from participants and the documentation of the setting through photographs and video.

Five types of data were collected for the study:

1. Descriptive, open-ended interviews
2. Informal interviews
3. Participant observation
4. Focus-group discussions
5. Intervention
6. Pictorial and video ethnography

3.3.1 Interviews

Interviews were conducted in formal and informal situations. Most of the interviews took place in informal settings, so the participants would feel comfortable and open to answering questionings. A total of 10 hours of interview data were collected from both the primary and secondary participants. All interviews were recorded using a digital audio recorder and transcribed by the investigator. Interviews were conducted in both Dzongkha and English. The primary participants spoke mainly in Dzongkha during the interviews but code-switching did occur at times. Since this was the first time the primary

participants were exposed to a new technology, I restrained myself from asking too many questions. I noticed most of them were very shy, but however open-ended my questions were framed, the replies I received towards them were “yes and no.” I allowed a week to pass for the primary participants to feel comfortable with my presence before I interviewed them on a one- to-one basis prior to the digital storytelling activity. Interviews were conducted, in-order to gain information about the children’s knowledge of computers and culture and their interest in storytelling. The interview questions were framed by the following domains: knowledge, behavior, attitude and training towards technology education. The formal structured interviews followed a protocol of questions. For example, the questions asked before the digital storytelling activity mainly delved into the children’s knowledge of computers and their interest in storytelling (see Appendix H).

Secondary participants were interviewed during the first week of research. The parents of the primary participants were asked questions that focused mainly on their involvement in their children’s education, knowledge and awareness of technology education and culture of storytelling in their homes. Most of the parents were receptive towards being interviewed. The teacher and headmaster were also interviewed in the beginning of the research. The headmaster was asked questions related to the establishment of the school, literacy practices, yearly enrollment, and other topics that allowed me to gain a better insight of a community school. The teacher interviewed was the class teacher of the eight primary participants. He was asked questions that were based on his teaching methods in the classroom, computer literacy, and his interest in

new technologies and ideas of integrating new literacy practices into his teaching (see Appendix G).

3.3.2 Observations

Observations were made from day one of the study. After the initial interview, observations were conducted in the classroom, school compound and the community. Information that was collected from this observation helped in framing the information gained from the initial interviews. During the initial interviews, the primary participants identified their interest in technology and storytelling and explained their keen interest in reading, especially stories about local mythical heroes. While the primary participants where observed, I observed their reaction and interest towards the XO laptop, their interest in storytelling and their interaction with one another. When observing the teacher and headmaster, I looked into their teaching practices, their relationship with the primary participants, and their relationship with the parents. Observations in the community were documented through notes, photographs and videos. Community observations took place in the marketplace, monastery and playgrounds. This observation was useful in order to understand the social, cultural and literacy practices of the Gangtey community.

3.3.3 Documents

Certain artifacts (see figure 3.2 and 3.3) were collected to gain an understanding of the literacy practices of the school. The artifacts were collected through photographs and included writings and drawings by the students that were posted on the walls of the

classroom and outside on the school bulletin board. These artifacts allowed me to understand how the students were exposed to certain environmental print.

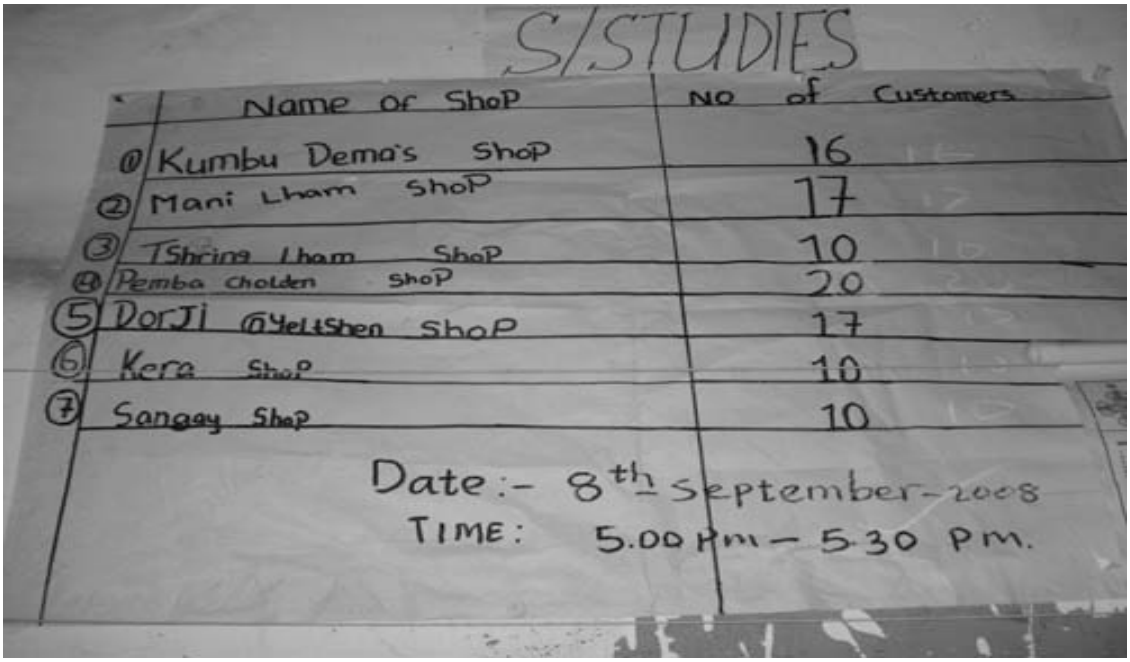

Figure 3.4: Social Studies lesson on the community market

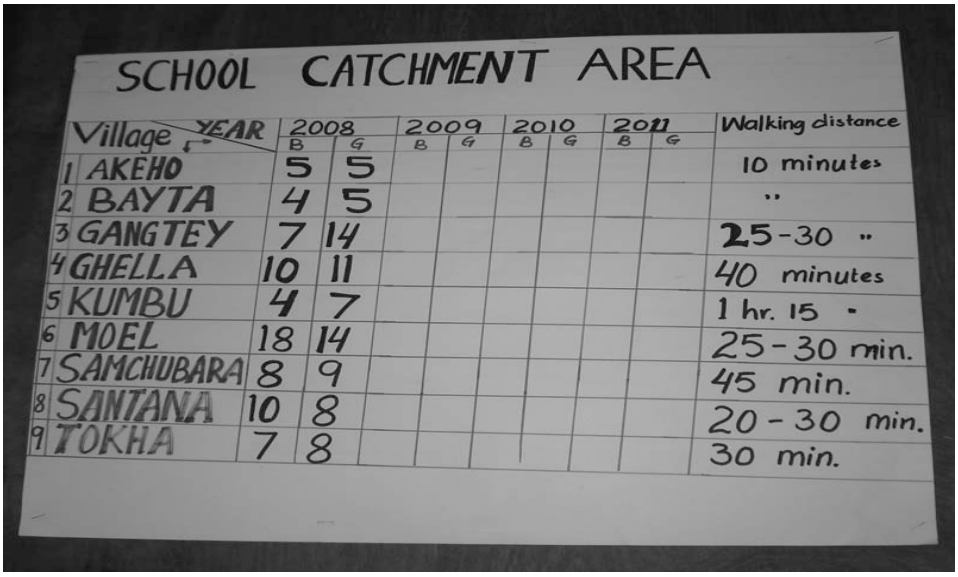

Figure 3.5: Village distance to the Bayta Community school

3.3.4 Focus Group Discussions

The focus group discussions were basically open-ended questions asked among the primary participants, the headmaster and the teachers that related to interest in education technologies, the appropriate use of these technologies, and literacy practices in the school. One of the main aspects of creating focus groups is group discussion, which is known to generate richer data than individual interviews (Hansen et al., 1998; Morgan, 1988). Through the dynamics and interaction between the two divided groups, that is the “teachers” and “students”, more open feedback was gained. Although group discussion has its advantages of generating rich data, this method however, holds some disadvantages, like the outspoken individuals in the group may dominate the discussion while the shy ones remain silent. Since focus groups work towards 'consensus', my role as a moderator was to see that every participant contributed to the discussion.

3.4 Intervention: Digital Storytelling Activity

The intervention was conducted to familiarize the primary participants to the XO laptop and get them to start recording digital stories. The intervention was held over a span of four weeks. The activities (see table 3.2) were divided into four tasks, wherein the first task was to introduce the primary participants to the XO laptop (see figure 3.6) and teach them some basic functions such as turning the computer “on” and “off.” I wanted the primary participants to explore the XO for at least a week. This was done so that they could feel comfortable with it and to also observe their interest in technology.

The second task was to make them write a short essay about themselves and read it in front of the class (see figure 3.7). This was done because I noticed the children were used to the rote and drill of learning and hardly asked any questions and also usually

shied away from my questions and felt very uncomfortable standing in front of the class to read something they had written for themselves. I also conducted this activity so that they could prepare to write stories and allow for their imaginations to run wild.

The third task involved introducing the primary participants to an open source multimedia tool called *Audacity*. *Audacity* is an open source software tool for recording and editing sounds (Audacity, 2009). The audacity software was chosen primarily for the reason that it was free and was an easy program to learn for grade four children. In this activity they were taught basic recording functions (see figure 3.8).

The third and final task was to garner all the knowledge from the previous activities and create a digital story using the audacity tool. The participants were shown how to build a road map for creating a storyboard (see figure 3.9). The participants were then formed into a group to create a digital story. Since they liked to tell stories about animals, they decided to create an animal fable about the community. Each participant was assigned an animal character and they even added sound effects to make the story captivating.

Table 3.2: Description of Activities

Date	Activity	Task Description	Time Frame
12/08/08 - 12/14/08	Exploring the XO laptop	- on and off functions - maneuver through home page - plug in USB drive and learn how to save data on USB drive	One week

		- keyboard functions	
12/15/08 – 12/21/08	Personal essay	- descriptive writing about oneself - write in either Dzongkha or English - reading personal essay in front of the class	One week
12/22/08 – 12/28/08	Introduction to Audacity	- install audacity software from USB drive on to the XO - maneuver through Audacity - learn basic recording functions - learn how to save recordings to the USB	One Week
12/29/08 – 01/04/09	Digital storytelling	- Assign a group writing activity to create a story. - Learn how to create a storyboard - Assign characters - Start recording story	One Week

Figure 3.6: Learning how to use the XO laptop.

Figure 3.7: Reading a personal essay in front of the class.

Figure 3.8: Exploring recording functions in Audacity.

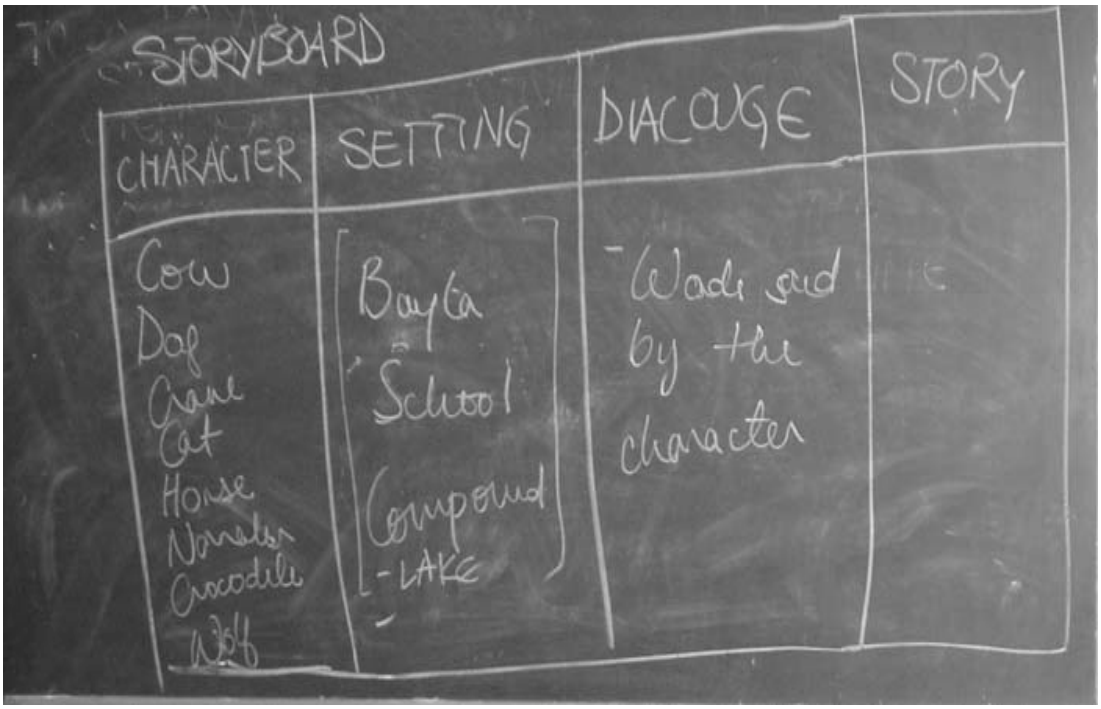

Figure 3.9: Lesson on how to create a storyboard.

3.5 Data Codes

Data has been analyzed using Glaser and Strauss's (1967) "constant-comparative method". Throughout the course of the study, data has been managed by the principal investigator. Codes have been developed to address the primary and secondary participant's knowledge, behavior, attitude and training towards technology education. The primary participant's literacy and technology interest were documented by analyzing data from my observations, document collection, and interviews with the secondary participants who were involved with the students: their class teacher, parents and the headmaster.

Data analysis took place through the transcription of the recorded interviews and also the typing of the notes I had made whenever I visited the research site. The next step I took, after collecting data from the observations, interviews and focus group discussions, was to create an organized filing system. Upon completion of organizing the data I divided the data into portfolios for the home perspective, which involved the parents and the community at large, for the school perspective, which involved the school administrators, and the teachers, as well as for each of the eight primary participants. I then set out to code the data set (see Appendix L). I applied the unitizing task of the constant-comparative method to help me create my codes for analysis. I did this by using different colored post-it notes and assigning each color to a categorized pattern of behavior that I derived from my interview and observation notes (Glaser & Strauss, 1967).

After the coding was completed, a case study was developed for each of the primary participants. Each of the codes was based from the research questions and

themed from the previous chapters. For example the code “INT” was developed to entail the primary and secondary participant’s interest in New Literacies, such as technology integration into the classroom. This interest determined the third research question which inquired if technology education could be sustainable process of empowerment in rural communities. Appendix M shows the description of the coding framework.

Chapter 4: Analysis

4.1 Qualitative Assessment of Findings

The data that was analyzed is primarily based on the interviews that were taken before and after the digital- storytelling activity and the observation field notes. Codes (see Appendix M) were created to describe the knowledge, culture and interest in new technologies among the primary and the secondary participants. The coded data that was analyzed from the interviews and observations presents information about the children's literacy practices in the school, home and community. Information is also presented on their awareness and interest in new technologies. Prior to the digital storytelling activity, when asked on their knowledge of computers, most of the children replied "No." Although most of the responses were negative, it was interesting to note the different viewpoints of the students. These data have been assessed and will be themed in with the theoretical framework and research questions.

4.1.1 The digital divide

It is evident that the digital divide exists at the Bayta community school. The divide is mainly attributed to accessibility and knowledge. In this part I will analyze the digital divide based on these three major issues which are:

4.1.1.1 Electricity

The absence of electricity at the Gangtey community is acknowledged as one of the main obstacles in bridging the digital divide. During the course of the study the school made use of a generator from one of the government offices. Although the laptops

were charged every day, because of the inconsistency of power supply the laptops kept discharging and could not be switched at times. Due to the unavailability of electricity, most of the primary participants hardly had any access to technology.

4.1.1.2 Accessibility

Accessibility is a key in understanding the digital divide. Dechen tells me that "*computers will give us a lot of information about things that are happening around*." While most of the primary participants believe that accessibility to computer education gives them an opportunity to be in sync with the outside world, their parents also believe that computer education will provide their children the opportunity to choose careers in engineering, education, medicine and other professional fields.

4.1.1.3 Awareness

In terms of knowledge related to technology literacy, I accessed that while some of the primary participants barely knew what a computer was some of them had a fair knowledge of computers. When asked about her knowledge of computers, Tashi replied to this question with "*I don't know anything. Maybe it is some kind of message*." while Dawa answered with "*Well! We students can play games, write letters and almost everything which we students like to do*." Upon further informal inquiries about themselves it seemed Dawa was more travelled than the rest of the students and spent most of his vacations in his uncle's house in the city of Thimphu. I have assessed that there lies a keen interest in the students' to learn computers. Most of them believe that if they get the opportunity to learn how to use computers they will do better in their studies and can compete with other students at a national level.

4.1.2 Digital storytelling and its relationship to improving bi-literacy

When it came to observing the bi-literacy practice in the school, I found out that all the eight participants were reasonably fluent in English but felt comfortable while spoken to in Dzongkha. Three out of the eight participants was better and more confident in replying back in English and showed a keen interest in reading English story books which they borrowed from the headmaster's office. I found out that almost seventy five percent of the students in the school enjoyed reading story books. The school often held reading competitions either in Dzongkha or English. In every morning assembly a student was asked to read a speech in front of the whole school. During the intervention period, I noticed that most of the students hardly asked any questions in class and most of them were used to listening and writing down notes. This observation is explained by the transmission model of learning that is mostly adopted by the education system of Bhutan. I noticed this pattern in the interviews. Most of the students would relate their answer to what their teacher taught in class. For example I had asked if they knew what a computer was and Dorji answered, "*My teacher said computer helps in communication*." I noticed that most of the student's did not really know the meaning of a computer and oftentimes relied on the memorized lesson response from their classes.

I also wanted to understand the influence of family literacy and social practices of the community at large. Based on the coded data from the interviews, field notes and observations with the primary and secondary participants, I have accessed that there exists a strong culture of storytelling in most homes of the children. One of the parents explains the need to tell stories at home "*If we don't tell stories about our community to our children, then how will our tradition survive? Even when we were young our*

grandparents used to tell us stories." The rich culture of storytelling helped the children with the digital storytelling activity, and I noticed that they all seemed very confident and creative. Most of the students in the Bayta community school were bi-literate, and I noticed that it was because of code-switching that the children were shy and embarrassed. Zentella (1997) explains this phenomenon by saying that children who code switch are oftentimes stigmatized because it reflects on child's lack of control and knowledge of the two languages. I learnt that though the students held a keen interest to learn computers since the interface was in English they faced some difficulty and automatically became unconfident. I observed that this was the case especially among the female participants.

4.1.3 Technology education as a sustainable process

Friere (1990) suggests that a process of empowerment usually works in a community where the teachers and students live and work together. The Gangtey community is mostly a huge potato farming community. During harvest season the teachers help the students and their parents in the field. When the school requires renovation, most of the families in the community get together and contribute to the renovation work. There is a close camaraderie among the teachers, students and the parents.

Empowerment of a community does not happen instantly, it closely depends on confidence and support. Dechen's mother feels that technology education motivates the children. She says that the children felt that by selecting their community school to conduct research was an encouragement for their children to feel special. Burton (2002) explains this perception about new technologies through the concept of "affordances" and

"culture" by explaining that some users understand technologies as something that uplifts their status as being modern in a community. The headmaster describes the parent's and the children's excitement:

> "*They were happy because they think they are the first ones to use computers and even there parents were happy about it. When we selected eight students for learning computer most of the parents were insisting to put their children too as they want their children to learn more*."

Most of the parents of the primary participants were very much involved in their children's education, one parent told me that although she didn't know how to read and write she made sure that her son would revise the lesson he learnt in school and no work was given to him so that he could concentrate on his studies. Upon inquiry about the practice of new literacy integration into the school's existing resources and curriculum, I found that the headmaster and the teacher's had already built a small computer room adjacent to a new classroom. The transformation was significant because during my initial visit the XO laptops were still packed in its boxes and sitting on the headmaster's book shelf. One of the teachers tells me that he is already planning to use digital storytelling in his teaching lesson. He says that "*it will dramatize his lessons and capture the children's interest*." He also tells me that his earlier perception of technology had changed. Earlier he thought that technology was just for communication but from the study he realized that so much could be done with technology and that it is a very useful tool in empowering rural communities. He mentions one his students was telling him how she felt privileged learning how to use computers and that during the winter holidays she taught her brothers and sisters about the lessons she had learnt.

Chapter 5: Discussion

5.1 Discussion of Findings

The study was completed in a period of five months. The data collected from the interviews, observations and focus group discussions were analyzed and drawn to a conclusion. The following section discusses the major findings of the study. The three research questions provided a direction for the study and were:

1. What is the current status of the digital divide in Bhutan and what is its relationship to students in a rural school setting?
2. How can digital storytelling be used to improve the quality of bi-literacy (Dzongkha and English) instruction in rural Bhutan?
3. How can technology education influence a process of empowerment for rural communities?

The findings were primarily based and derived from these questions and I will present the major findings through the three research questions. In addressing the first question, I bring forth the existing technological infrastructure available in rural Bhutan, the knowledge of technology integration in school from the perspective of the primary and secondary participants. In addressing the second question, I answer the question of literacy perspectives towards the integration of a New Literacy model in rural schools in Bhutan. In addressing the third question, I present the community school and the community as a whole being empowered to confidently integrate technology in their literacy practices and practice this New Literacy so that it may become a continual practice among future generations of rural Bhutan.

5.1.1 Research Question One

The first question inquired on the current status of the digital divide in public schools in rural Bhutan. This question can be answered through the review of literature found on Bhutan's availability of technology in rural areas of the country. Information to answer this question was also acquired from the interview and observation data. The lack of electricity is a hindrance for the school to have access to technology but with the government's plan of bringing in electricity by the end of 2009, that problem will be solved soon. Based on the data accessed from the primary and secondary participants, there is evidence that shows a huge gap in terms of accessibility and information to digital technologies among rural school students in Bhutan. Although the school was donated eight laptops before the research took place, none of them were opened because of the school teacher's lack of knowledge about how to use the devices. Technologically, there is a feasibility to incorporate computers in this school after the community receives electricity. Luke(1998) suggests that children are receptive towards emerging technologies. Agreeably, I observed that the student's showed a lot of interest towards computers and their keenness to learn could be one of their greatest strengths to bridging the digital divide.

5.1.2 Research Question Two

The second question explored the possibility of digital storytelling improving bi-literacy (Dzongkha and English) instruction in Bhutan. This question is answered through the field notes and observation that took place during the digital storytelling activity. This question is also answered through the interviews I conducted with the headmaster and the teachers in the school. There is a clear possibility that digital storytelling could improve bi-literacy instruction in Bhutan. I learnt that most of the teachers taught in both Dzongkha and English and hence the students were used to a lot of code-switching. The digital-storytelling activity entailed the students to work in both Dzongkha and English.

They recorded the story in Dzongkha and used the English interface of the XO laptop. Sometimes they would write short dialogues in English and then read it out in Dzongkha. All eight of the primary participants felt they had improved their English during that time. One of the teacher's found switching from one language to another a bit confusing but he told me that the children were used to that practice and said that he noticed that the eight participants had a tendency to become fluent in both the languages if they carried on with more digital storytelling activities. From the findings it is understood that the culture of storytelling among families and friends at the Gangtey community is still alive. This rich culture can be preserved through new literacy practices such as Digital storytelling.

5.1.3 Research Question Three

The third research question finally inquires if technology education could become a sustainable process of empowerment in rural communities. Though accessibility was created many communities hardly get empowered in the terms of social empowerment because of the lack of knowledge and the community involvement in these projects. It is always an outside person coming in and going out. I wanted to create community involvement in this research so that when I left they would be able to understand their roles and still continue with the process. Delgado-Gaitan's (1991) theory on literacy empowerment and understanding power in a community allows the children to understand their role in the community and be active participants in playing the role in documenting stories of their community through the digital stories.

Freire's (1990) idea of restructuring education systems, envisages education as a dialogical, experimental and democratizing practice. Digital storytelling has the ability to

break free from an authoritarian teaching method and create a classroom environment where both the teacher and student learn from one another. Hence, during the intervention period, I observed that the activities enabled the primary participants to be both the teacher and student. This allowed them to gain confidence and created more participation in the classroom. This study will not seek to bridge the digital divide as an absolute solution to the widening technological inequalities, but will attempt to use technology as a vehicle of social inclusion wherein the children could be active historians in documenting stories about their life and community, and understand their role in the process of acquiring and sustaining this new knowledge. The parents and the teachers were also closely involved in the process. I learnt that during the winter break the primary participants shared their new experiences with their peers and parents and in the new school year they planned to tutor their peers with using computers.

5.2 Subjectivity and Reflection

In this part I would like to describe my presence as a researcher in this study and how I attempted to be both a participant observer and a silent observer. I believe it is important to address subjectivity because of the “emic” and “etic” perspectives. There is a growing awareness of the emic or insider perspective especially among qualitative researchers (Godina & McCoy, 2000). A native of Bhutan, I situate myself within the realms of an emic perspective yet at the same time, I was born and brought up in an urban area and so some issues of subjectivity emerged that reflected on my inability to understand rural and community life.

Bhutanese people are known for being friendly. It is uncommon for a Bhutanese person not to offer his own bed and the best food in his house even when a stranger knocks on his door begging for food. Although this trait has slowly vanished among the urban people, it is still very prevalent in the rural communities and villages. I was a new face in the school and all the students including the teachers and headmaster was very amicable and extremely polite towards me. I was blessed to feel welcome but I also hoped that they would behave in their own normal manner because this affected the answers I received from them during my initial interviews. Most of the answers I noticed were very polite and none of the primary participants really voiced out their opinion. It was only later in a week's time that they became comfortable with my presence and started being more open in the interviews. I had noticed that both the primary and secondary participants acted very formal whenever I conducted an interview with them and particularly felt uncomfortable having the conversation recorded in the digital recorder so in the next interviews I tried to write or type their answers to create a more comfortable environment for them.

5.3 Implications

This research has been a learning journey for me. I walked into this research thinking I would figure out all the problems in the world and come up with a solution but here I am still, asking questions and realizing that its not the problems that have to be fixed but rather the need to develop new perspectives on understanding the problem and finding realistic measures to dealing with the situation.

5.3.1 Educational

It is uncommon to find a nine-year old who knows that the term “bug” can not only mean an insect but also a virus in the computer. Most of this knowledge acquired is usually from the media and peer acquaintances. In a period of dramatic technological and social change, education needs to be aware of this change and break away from conventional literacy practices and make current pedagogy relevant to the demands of this contemporary time. Kellner (2000) says, “*As new technologies are altering every aspect of our society and culture, we need to comprehend and make use of them both to understand and transform our worlds*.” There is a growing need to for educators to restructure schooling and constructively respond to this drastic change, to progressively adapt to these changing times.

5.3.2 Research

As mentioned in the earlier chapters, this is the first research ever conducted in Bhutan or in any of the developing countries. Technology education is a new field of study and most countries around the world although having implemented technology education in their school systems usually does it on a trial and error basis without grounding it on any substantial study. A pilot study, this research has a lot of potential to spring-board into a bigger study. There has been clear evidence that shows the need for more research to be done in this area of study.

5.4 Limitations

There is a lot of potential to this pilot study spring boarding into a larger study. I have demonstrated through various studies the benefits of technology education and the need for schools in rural societies to get involved in this information age. I believe this study should mention the flipside to approaching the digital divide, in order to create a balanced study. Information we acquire from the media and technologies is plentiful and overwhelming. With accessibility to computers most people fail to distinguish from good and bad information (Burbules & Callister, 2000). Another challenge the adaptation of new technologies brings is social isolation. Social scientists have addressed this phenomenon of computers and social isolation especially among the adolescent. In a study on internet and computer use conducted by (Kraut, et al., 1998), they found out that an increased use in these technologies decreased family communication and that the youth were more susceptible to depression and loneliness.

I was fortunate to find a school in rural Bhutan that received laptop donations from some tourists. This allowed me to gain entry into a rural school without having to look for funding to buy computers. The XO laptops were reasonable competent and delivered most of the task such as running the Audacity software, had a good camera and an inbuilt microphone. Since it was built on a sugar platform and not the conventional Windows or Mac environment, when the computer just hung or wouldn't start up it was very difficult to fix the problem for one reason was the lack of internet connectivity and the other was lack of expertise on the XO system. Even through online connectivity there wasn't much support, as the system was created in an open-source environment by multiple users it was difficult to find accurate solutions to the problem. The inconsistency of online technical support hampered time constraints to the research.

One of the main limitations that existed was the lack of electricity in the community. The school owned a generator that ran at certain times to charge the electronic devices. As the community was located in a high altitude area, the XO laptops hardly held its charge and the batteries ran out very quickly. I sometimes had to have the children share the laptops when this happened.

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Appendix A

Research Proposal

4. Title

Bridging the Digital Divide in Bhutan: Infusing Digital Storytelling to Improve Literacy Instruction among Students in Rural Communities

5. Investigators (co-investigators)

Khendum Gyabak (Primary Investigator)
Heriberto Godina (Faculty Advisor)

6. Research Questions

i. What is the current status of the digital divide among students in rural Bhutan?

ii. How could technology improve literacy education in rural Bhutan?

7. **Background and Significance**:

Bhutan, one of the world's smallest and least developed economies, is a landlocked country located in the Northeastern Himalayas between China and India. About eighty percent of the nation's population lives in the rural areas areas, while only twenty percent live in the urban centers. With a land area of 38,394 square kilometers, the country is administratively divided into twenty districts and two hundred and two sub districts. Basic infrastructure development, such as roads, water systems and electricity was not started until 1961, when Bhutan finally opened its doors to modernity and came out of centuries of self-imposed isolation.

The significance of this study is to identify and realize the growing digital divide in rural communities in Bhutan. Before starting off this review it is important to establish a clear understanding of the term *digital divide.* According to Robinson (2003) a Stanford University scholar, the term "digital divide" was reportedly first coined by the former Markle Foundation President Lloyd Morrisette to describe the growing difference in Information Technology (IT) access among groups in societies. Later this term was used to publicize the findings of the National Telecommunications and Information Administration (NTIA) national surveys of the 1990s that showed large differences in IT access by low income groups, minorities, women and the elderly, among other groups in society. This term has also been widely understood to cover a variety of

disparity in the American society, as well as differences between the US and other Western countries to the rest of the world.

It is important to realize the growing digital divide in most developing countires especially in the rural communities, as Chambers (1983), on his findings in his extensive study on the relevant education for poor rural communities in the third world countries, states that there is a deep ignorance amongst the rural communities on the physical and social aspects of rural life, such as ;- soil erosion, diarrhea, "the political economy of *pastoralism*," "drudgery-reducing technology for rural women," proper management of irrigation systems, information on proper nutrition, and other important issues that further increase their poverty. Because of these prevalent issues faced by the rural population, he states that schools in rural communities cannot afford to be detached from rural development efforts by the government and private sectors. Arunachalam (2002) also highlights the importance of ICT empowering the rural poor by suggesting that ICT can bring about equity amongst the reached and the unreached. For instance ten villages near Pondicherry in Southern India, have knowledge centers which facilitate information that such as; - medical aid, farming tips, and other information that have been very useful to the rural community.

Although computers were introduced in the country in the early 1980s, it was only on June 2, 1999 that Bhutan introduced the internet and cable television to commemorate the twenty-fifth year of enthronement of the fourth King Jigme Singye Wangchuck. Pek(2001) in an article on Bhutan's introduction to the internet, highlights that ICT is a great help to Bhutan's development especially in overcoming challenges such as its high mountainous terrain and scattered population. Pek notes that the head of the Bhutanese Government, Lyonpo Yeshey Zimba says, "ICT is an industry where young Bhutanese can learn the latest and the best and be on an equal footing with everyone else" (Pek, 2001,p.18). Thus, it is against this historical background that the internet, as well as other forms of media were introduced. Since then, there has been a significant move towards providing training and information on this new technology. Pek (2001) further states that the Bhutanese Government strongly believes that ICT is the medium to "reach the unreached", and that plans have already been drawn up by the government to introduce IT in all high schools and eventually to reach all students.

Reddi and Sinha (2004) claim that as globalization slowly increases its influence in Bhutan, young Bhutanese especially those from rural areas, are no longer satisfied with the traditional pursuit of agriculture and see education as an important step to employment in other industries. Bhutan is already facing problems of rising unemployment for the well-educated citizens, creating a need for new avenues of development and the rising importance of ICT education. Gilhooly (2001) highlights the incorporation of ICT as one of the major factors to development, writing:

> In the area of programmes, we must incorporate ICT as a major piece of the development portfolio. We need to fully integrate programmes with

> policy measures and ensure that they are innovative, well matched to local needs, and address market failures, poverty alleviation and social exclusion. Moreover, policies that increase creative cooperation between sectors such as public private partnerships are necessary for the effective spread and optimal use of ICT as an enabler for development (p.8).

In the advent of Bhutan's opening up to the internet, the United Nations Development Programme (UNDP) colloborated with the government of Bhutan to provide internet training in schools within the capital city of Thimphu, later slowly extending this program across the country. Bhutan's slowly growing ICT sector was supported by the UNDP and in the initial stages of its introduction to the internet, UNDP helped establish Druknet, the nation's only Internet Service Provider, which now boasts of 800 subscribers and an estimated 2,500 internet users. UNDP also helped fund training activities amongst telecommunication staff during the government's establishment of the Department of Information Technology which is now the core promoter of ICT development nationwide. UNDP Resident Representative Murata, also claims the importance in ICT development in Bhutan by stating that considering the rugged geographic conditions of Bhutan, the significance of ICT will be of great use for obtaining information for the vast majority of the people and that the UNDP wants to help close the global information gap by providing access to IT for every man, woman and the youth of Bhutan. (Pek, 2001,p.19)

As Bhutan develops, ICT will further influence lives of the Bhutanese people and heighten their access to and understanding of the Internet. Technology is already beginning to play an important role in the national economy, as well as in education. Pek (2001) also observes that Bhutan is envisioning a master plan for IT as an important tool towards realizing the country's developmental goal of Gross National Happiness, understood as a combination of economic development, environmental conservation and the promotion of identity and culture. In the master plan, IT will play the role to enhance good governance, generate employment and improve the quality of life of the people through programs such as telemedicine and distance learning.

8. Research Method, Design, and Proposed Statistical Analysis:

This study will implement qualitative methodology for observations, questionnaires, surveys and focus group discussions. Participants will include students, teachers and parents from the rural Batya community school in Bhutan.

9. Human Subject Interactions

a. <u>Sources of potential participants.</u>

The participants in the research are eight students ranging from the ages of nine to eleven. They are four female and four male subjects. The participants are students of grade four and five from the rural Batya community school in

Gangtey district in Bhutan. The participants will be given pseudonyms in the study to protect their confidentiality and the study will not create any risk that will coerce them to risks and undue influences. The participants are being selected based on their aptitude in English in the class as the computers are English based Linux models, it will be easier for the participants to be fluent in the language and the Audacity software also requires the user to be reasonably competent in the English language.

Human subject involvement will begin from the first week the project begins as they will be needed for observation and interviews and focus groups. The project will end the second week after an intervention of introducing the Audacity software. Since the parents of the participants are uneducated and are unable to speak English the consent forms will
be created for parents in the Dzongkha language.

b. Procedures for the recruitment of the participants.

The headmaster at the Batya community school has been contacted and has taken the initiative to select the participants for the research based on their aptitude in the English language.

c. Procedure for obtaining informed consent.

Appendix I : Consent forms
Appendix II: Assent forms

D. Research Protocol.

The study will be conducted in a classroom at the Batya Community School in Gangtey District, Bhutan. The study will take a week to conduct where in the first three days the participants will be observed when exploring the XO laptop and then interviewed. The interview will be taken to find out the participant's interest and knowledge in technology. The last four days will involve an intervention of introducing the Audacity software where the participants will be required to work on a project.

Appendix III: Questionnaire
Appendix IV: Survey
Appendix V: Sample questions for non-structured interviews and focus group discussions

E. Privacy and confidentiality of participants

This is a blinded study and privacy and confidentiality of participants will be ensured.

F. Confidentiality of the research data.

Data will be destroyed six months after the study is completed.

G. Research resources.

The study will be conducted in a period of one week and requires a classroom and computers (XO laptops). The school has agreed to provide the necessary resources.

VII. Potential risks

N/A

10. Potential benefits

The participants after the study is completed will gain a fair knowledge to use the computer and the Audacity software. No risk is anticipated towards the participants and the society.

11. Sites or agencies involved in the research project

The Batya Community School will be involved in the research project and attached in appendix VI is the approval letter from the Ministry of Education in Bhutan.

12. Review by another IRB

N/A

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Appendix B

THE UNIVERSITY OF TEXAS AT EL PASO
Office of the Vice President for Research and Sponsored Projects
Institutional Review Board
El Paso, Texas 79968-0587
phone: 915 747-8841 fax: 915 747-5931

DATE:	January 30, 2009
TO:	Khendum Gyabak, BS, MA
FROM:	University of Texas at El Paso IRB
STUDY TITLE:	[99074-2] - Bridging the digital divide in Bhutan: Infusing digital storytelling to improve literacy instruction among students in rural communities
IRB REFERENCE #:	
SUBMISSION TYPE:	Revision
ACTION:	APPROVED
APPROVAL DATE:	January 30, 2009
EXPIRATION DATE:	January 29, 2010
REVIEW TYPE:	Expedited Review

Thank you for your submission of Revision materials for this research study. University of Texas at El Paso IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This study has received Expedited Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All SERIOUS and UNEXPECTED adverse events must be reported to this office. Please use the appropriate adverse event forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

Please report all NON-COMPLIANCE issues or COMPLAINTS regarding this study to this office.

Please note that all research records must be retained for a minimum of three years after termination of the project.

Based on the risks, this project requires Continuing Review by this office on an annual basis. Please use the appropriate renewal forms for this procedure.

If you have any questions, please contact Lola Norton at 915-747-8841 or irb.orsp@utep.edu. Please include your study title and reference number in all correspondence with this office.

ROYAL GOVERNMENT OF BHUTAN
ཨཱཡ་རེ་གཱ་ལྡན་ཁཱ།
MINISTRY OF EDUCATION
DEPARTMENT OF SCHOOL EDUCATION
THIMPHU : BHUTAN

Ref. No. MoE/DSE-1/2008/2112

3rd November 2008

Khendum Gyabak,
Research Assistant, Edu 100,
University of Texas,
EL Paso, U.S.

Sub: Approval for research at Bayta Community Primary School

Dear Khendum,

The Department of School Education is pleased to approve your research "Empowering technology education among rural students" at Bayta Community Primary School, Gantey, Wangdue Phodrang.

Yours Sincerely,

(Tshewang Tandin)
DIRECTOR

Copy to:

1. Principal, Bayta Community Primary School, Gangtey, Wangdi.
2. DEO, Dzongkhag Administration, Wangdi Phodrang.

Telephone No . 02 - 325325 Fax No : 02 - 325141

Appendix C

Appendix D

Consent Form

University of Texas at El Paso (UTEP) Institutional Review Board

Informed Consent Form for Research Involving Human Subjects

Protocol Title: Bridging the digital divide in Bhutan: Infusing digital storytelling to improve literacy instruction among students in rural communities

Principal Investigator: Khendum Gyabak

UTEP: College of Education

In this consent form, "you" always means the study subject. If you are a legally authorized representative (such as a parent or guardian), please remember that "you" refers to the study subject.

Introduction

You are being asked to take part voluntarily in the research project described below. Please take your time making a decision and feel free to discuss it with your friends and family. Before agreeing to take part in this research study, it is important that you read the consent form that describes the study. Please ask the researcher to explain any words or information that you do not clearly understand.

Why is this study being done?

You have been asked to take part in a research study of using technology to learn to create digital stories. Approximately, eight students will be enrolling in this study at the Batya Community School. You are being asked to be in the study because you are one of the top students in English in your class. If you decide to enroll in this study, your involvement will last about seven days.

What is involved in the study?

If you agree to take part in this study, the research team will conduct interviews, observations, questionnaires, focus groups and take photographs of you in the class and school compound.

What are the risks and discomforts of the study?

There are no known risks associated with this research

What will happen if I am injured in this study?

The University of Texas at El Paso and its affiliates do not offer to pay for or cover the cost of medical treatment for research related illness or injury. No funds have been set aside to pay or reimburse you in the event of such injury or illness. You will not give up any of your legal rights by signing this consent form. You should report any such injury to Khendum Gyabak at 9156674769 or kgyabak@miners.utep.edu, and to Lola Norton of the Institutional Review Board (IRB) at UTEP at (915-747-8841) or lola@utep.edu.

Are there benefits to taking part in this study?

There will be no direct benefits to you for taking part in this study. There is an educational and information benefit to you, such as; you will have the opportunity to use a computer, you will learn how to use software such as the audacity software to explore your creativity and use that in enhancing your learning experience.

What other options are there?

You have the option not to take part in this study. There will be no penalties involved if you choose not to take part in this study.

Who is paying for this study?

Internal Funding:
Funding for this study is provided by UTEP Department of College of education.
External funding:
There is no external funding provided to support this research.

What are my costs?

There are no direct costs. You will be responsible for travel to and from the research site and any other incidental expenses.

Will I be paid to participate in this study?

You will not be paid for taking part in this research study.

What if I want to withdraw, or am asked to withdraw from this study?

Taking part in this study is voluntary. You have the right to choose not to take part in this study. If you do not take part in the study, there will be no penalty.

If you choose to take part, you have the right to stop at any time. However, we encourage you to talk to a member of the research group so that they know why you are leaving the study. If there are any new findings during the study that may affect whether you want to continue to take part, you will be told about them.

The researcher may decide to stop your participation without your permission, if he or she thinks that being in the study may cause you harm.

Who do I call if I have questions or problems?

You may ask any questions you have now. If you have questions later, you may call Khendum Gyabak at 9156674769,kgyabak@miners.utep.edu.

If you have questions or concerns about your participation as a research subject, please contact Lola Norton of the Institutional Review Board (IRB) at UTEP at (915-747-8841) or by email at lola@utep.edu.

What about confidentiality?

1. Your part in this study is confidential. None of the information will identify you by name. All records will be maintained by the primary investigator and you will be given a pseudonym when recording your participation in the research.

2. Every effort will be made to keep your information confidential. Your personal information may be disclosed if required by law. Organizations that may inspect and/or copy your research records for quality assurance and data analysis include, but are not necessarily limited to:

- The sponsor or an agent for the sponsor
- Department of Health and Human Services
- UTEP Institutional Review Board
- Ministry of Education or designate in Bhutan

Because of the need to release information to these parties, absolute confidentiality cannot be guaranteed. The results of this research study may be presented at meetings or in publications; however, your identity will not be disclosed in those presentations.

All records will be transcribed to digital format and saved in folder with a security password that is only known by the primary investigator.

Mandatory reporting

If information is revealed about child abuse or neglect, or potentially dangerous future behavior to others, the law requires that this information be reported to the proper authorities.

Authorization Statement

I have read each page of this paper about the study (or it was read to me). I know that being in this study is voluntary and I choose to be in this study. I know I can stop being in this study without penalty. I will get a copy of this consent form now and can get information on results of the study later if I wish.

Participant Name: _____ Date: _____

Participant Signature: _____ Time: _____

Participant or Parent/Guardian Signature: _____

Consent form explained/witnessed by: _____

Signature

Printed name: _____

Date: _____ Time: _____

Appendix E

Assent Form

University of Texas at El Paso (UTEP) Institutional Review Board
Assent Form for Research Involving Human Subjects

Protocol Title: Bridging the digital divide in Bhutan: Infusing digital storytelling to improve literacy instruction among students in rural communities

Principal Investigator: Khendum Gyabak
UTEP: College of Education

I am being asked to decide if I want to be in this research study because I am in the top standing in English in my class.

I know that to be in this study I will:

- Follow the timeline below
- No compensation will be provided

Date	Activity	Length of visit (Hrs)
10/12/08	• Be interviewed • Be observed	• 2
11/12/08	• Given to explore the XO laptop	• 3
12/12/08	• Introduced to maneuvering the XO laptop	• 3
13/12/08	• Introduced to the Audacity software	• 3
14/12/08	• Will be given a project to create a digital story through audacity	• 2
15/12/08	• Work on the given project	• 3
16/12/08	• Complete the project	• 2

I am free to ask and will receive answers to my questions. I know that I can ask questions about this study at any time.

I know that I can stop being in the study at any time without anyone penalty of any kind. I will not get in trouble if I stop being in the study.

I know that only the people who work on this research study will know my name.

I want to be in the study at this time. I can freely ask about what happened in the study and the use of data and information collected.

Child's Printed Name: _____

Child's Signature: _____ Date: _____

Witness or Mediator: _____ Date: _____

I have explained the research at a level that is understandable by the child and believe that the child understands what is expected during this study.

Signature of Person Obtaining Assent:

_____ Date _____

Appendix F

Interview for Parents

University of Texas at El Paso

Bridging the Digital Divide: Infusing Digital Storytelling to Improve Literacy Instruction among Students in Rural Bhutan

Parent Name:

Date:

1. How are you involved in children's education?
2. Do you know what is computer?
3. Do you tell stories to your children? Is story telling a tradition in your community?
4. Do you think story telling is important for your children's education?
5. Do you think telling stories about your community is important to keep your tradition alive?
6. How are the children engaged during the vacation?

Appendix G

Interview for Teachers

University of Texas at El Paso

Bridging the Digital Divide: Infusing Digital Storytelling to Improve Literacy Instruction among Students in Rural Bhutan

Teachers Name:

Date:

1. Do you think that technology is important for children to education?
2. Apart from classroom lessons, do you tell children stories? If so what kind of stories?
3. Are you proficient in using the computer?
4. Have you ever had any kind of formal computer training?
5. What do you think of technology inclusion in literacy instruction?
6. Do you feel technology in the classroom could improve literacy instruction?
7. If you could use technology in your teaching methods, how would you use it?
8. What is the children's attitudes to
9. Does the school have an annual magazine where children could publish their articles and stories?
10. How do you think this technology could help children explore their creativity?

Appendix H

Interview for Students

University of Texas at El Paso

Bridging the Digital Divide: Infusing Digital Storytelling to Improve Literacy Instruction among Students in Rural Bhutan

Date: **Name:**

1. Do you know what a computer is?
2. Do you know what a computer can do?
3. Have you ever seen or used other electronics or technology related device?
4. Have you ever seen a computer?
5. Has your teacher ever taught about computers in class?
6. Do you like reading books and listening to stories?
7. Does your parent ever tell you stories?
8. Do you like telling stories?
9. Are you interested in learning how to use a computer?

Appendix I

Sample questions for non-structured interviews and focus group discussions

University of Texas at El Paso

Bridging the Digital Divide: Infusing Digital Storytelling to Improve Literacy Instruction among Students in Rural Bhutan

Date: **Name:**

1. Issues that will be discussed among the teacher focus groups are:

    a. What ideas do you have for the inclusion of technology that the children will learn about in your classroom?

    b. Could you have a separate computer class for the children?

    c. How do you think the children could benefit with the use of technology and the recording of digital stories?

2. Issues that will be discussed among the student focus groups are:

    a. Do you have any ideas that could allow you to perform better in class with the use of the technology that you learnt?

    b. Do you think recording stories about your community and your life is important to you?

    c. After the program, do you feel more comfortable using technology, and if so--how?

Appendix J

Interview for Teachers after the digital storytelling activity

University of Texas at El Paso

Bridging the Digital Divide: Infusing Digital Storytelling to Improve Literacy Instruction among Students in Rural Bhutan

Date: **Name:**

1. Do you feel more comfortable with the XO laptop now?

2. Have you been able to use the computer in your classroom?

3. From our last activity with the children, do you think you could incorporate these activities in your teaching method?

4. What do you think of the language barrier, in the sense that the XO laptop ‘s interface is in English and the children are more fluent and comfortable in Dzongkha?

5. Do you think this switching from Dzongkha and English could benefit the children to be more fluent in both the languages?

6. Could you describe any changes that you have noticed in the children’s attitudes towards the computers?

7. Has this activity of digital storytelling opened you especially the shy children?

8. Did you think the last activity was only about bridging the technology gap for these rural students?

9. What ideas and suggestions could you make on a more realistic and better teaching approach that could incorporate technology in the classroom?

Appendix K

Interview for Students after the digital storytelling activity

University of Texas at El Paso

Bridging the Digital Divide: Infusing Digital Storytelling to Improve Literacy Instruction among Students in Rural Bhutan

Date: **Name:**

1. Do you now know what a computer is?
2. Do you feel comfortable using a computer?
3. What do you think of having a computer in the classroom now?
4. Would you feel more comfortable if the computer interface was in Dzongkha ?
5. Do you think this switching from Dzongkha and English in the computer has any benefit to you?
6. After our last activity of creating a digital story are you excited about creating new stories?
7. Has this activity of digital storytelling opened you up and made you less shy?
8. What do you think this whole activity was about?
9. Could you describe your experiences of sharing the ideas and knowledge from the last activity with your friends and peers?

Appendix L

Interview Codes

Codes	Meaning	Description
KAA	Knowledge Access Awareness	Status of the digital divide
CS	Culture of Storytelling	Exploring use of digital storytelling
CR	Culture of Reading	Exploring use of digital storytelling
INL	Interest in New Literacies	Exploring use of digital storytelling
BLD	Bi-Literacy Development	Using computers to improve bi-literacy practices

Appendix M

Description of Codes

The data codes described here pertains to the codes that were used for both the pre - post interview data and also data derived from the intervention and the observation. The code “KAA” shows or describes the primary and secondary participants existing knowledge and awareness of technology and also indicates their existing accessibility to technology in the classroom, home and community. For example the primary participants were asked a question on what he/she believed a computer to be? Some of them defined their knowledge of a computer as a “mouse” while some were just familiar with the term but did not really know what a computer was.

The code “CS” primarily focused on the primary and secondary participants literacy culture in the school, among their peers, at home and in the community as a whole. For example, I observed that there was a very strong interest in folk tales in the community and the children kept talking and in any of their conversations would make a reference to the black-necked crane.

The code “CR” indicated a culture of reading among the primary participants. The culture of reading is closely related to the culture of storytelling because there was a pattern in the primary participant’s interview which explained those who enjoyed and had an interest in reading automatically liked to tell stories and this also reflected on the culture in home environments. For example, Pema one of the primary participant loved reading the stories of Ling Gesar, a legendary king of Tibet, and told me that his grandfather would always tell stories of local legends every evening.

The code “INL” describes an interest in technology and the integration of technology in the classroom. The primary participants where interviewed in this aspect in order to understand the interest they had for technology. The secondary participants were

also interviewed in this regard to find out if the school was ready to practice a New Literacy. One example includes how even without having electricity, the headmaster would borrow the generator from a government office so that he and the teachers could practice using the XO laptop.

The code “BLD” focuses on how technology and the practice of digital storytelling could explore possibilities of improving bi-literacy development among the primary participants. The computers were in English and the students were more confident and fluent in Dzongkha. Although a lot of code switching occurred in the activities that were conducted during the intervention, it was evident that the students could practice and improve both languages.

Curriculum Vitae

KHENDUM GYABAK

kgyabak@miners.utep.edu

EDUCATION

Master of Arts in Education (MA);University of Texas at El Paso, El Paso, TX
May 2009

- Master's Thesis: Bridging the Digital Divide in Bhutan: Infusing Digital Storytelling to Improve Literacy Instruction among Students in Rural Communities. Master's Thesis Committee: Professor Heriberto Godina (chair), Professor Concha Delgado-Gaitan, Professor Brian Giza, Professor Francisco Soto Mas, Professor Peter Golding.

Bachelor of Science in Information Technology (BSIT); AMA Computer University; Quezon City, Philippines

2001 – 2004

- Bachelor Thesis: Bachelor of Science (BS) in Information Technology; AMA Computer University; Quezon City, Philippines. Bachelor's Thesis: *Online Catalog of Children's Statistics for Barbara Micarelli Street Children Foundation.* Bachelor Thesis Committee: Professor Jethro R. Nuesca (chair), Professor Darwin T. Evangelista, Professor Lilia P. De Leon, Professor Melinor A. Mangalonzo (Thesis Adviser).
- AMA Honors Society
- Dean's List

Yangchenphug High School, Thimphu, Bhutan 1998 – 2000

- Graduated with distinctions in the Indian Certificate for Secondary Examinations

WORK EXPERIENCE

University of Texas at El Paso, *Research Assistant,* El Paso, Texas, USA
2008-2009

- Collaborated with professors on writing a grant for research in participatory community health literacy
- Currently working on research that focuses on empowering technology literacy in rural communities in Bhutan.

Bhutan Telecom, *Software Engineer,* Thimphu, Bhutan 2005 – 2007

- Developed the Telecom web portal
- Installation in laying out CISCO networking in telecom offices to main office
- Developed the Closed Users Group marketing package.

United Nations Development Programme, *Intern,* Thimphu, Bhutan 2005

- Helped build web modules for the e-documentation project
- Developed the United Nations Country Team website.
- Worked on creating a meeting management system

Aditya Birla Group of Companies, *Intern,* Manila, Philippines 2004

- Helped develop an employee monitoring system

Barbara Micarelli Street Children foundation, *Thesis coursework,* Manila, Philippines 2004

- Helped develop an online data management system

TRAININGS AND OTHER ACTIVITIES

Organized a seminar on Information Communication Technology and its impact on the local Economy at AMA Computer University, Philippines. 2004

Served as literary editor for *The Dataline*, official publication of the AMA Computer University, Philippines. 2003

Organized a seminar for high school girls on the role of women in the IT industry and IT awareness at Laguna, Philippines. 2004

Invited as a guest speaker on an Information Communications Technology (ICT) youth forum funded by the United Nations Development Programme (UNDP), on the theme "The future speaks for the future" in Thimphu, Bhutan. 2006

Attended a training on Open source web programming at Maintec Technologies in Bangalore, India 2006

Attended a training on Java programming at TMC academy, Singapore 2007

Attended a training on Managing an Academic network at the University of Groningen, Netherlands. 2007

Invited to sit on the panel for Gross National Happiness in Bhutan, at the Himalayan Cultures Workshop at the University of Texas at El Paso, USA. 2008

Invited as a speaker on Gross National Happiness in Bhutan for grade 7 & 8 students at the Wiggs High School in El Paso, USA. 2008

Worked as a volunteer for the Smithsonian Folk life Festival in Washington D.C, USA. 2008

Presented at the Texas Association for Bilingual Education (TABE) conference on Globalization, Identity and Language Diversity: Perspectives from Future Educators in Arlington, Texas, USA. 2008

TECHNICAL SKILLS

Turbo Pascal, Turbo C, C++, Assembly Language, VB.net, Visual Basic, ASP, PHP, MYSQL, SQL, Java Scripting, Desktop Publishing, Web Development on various platforms, CISCO networking, SPSS

RESEARCH SKILLS

Knowledge of quantitative, qualitative and participatory research methodologies and analysis.

LANGUAGES

Dzongkha (Native), English (Fluent), Spanish (Fair), Hindi (Fair), Nepali (Fluent)

Permanent address: 2020 North Kansas Street

El Paso, Texas 79902

This thesis was typed by Khendum Gyabak