

Analyzing Patterns and Relationships Around a Bond of Common Text: Purposes, Dilemmas, and Possibilities Of a Virtual Community

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Abstract

The article documents a two-year interpretive case study of fourth through sixth grade students engaged in a problem-based telecollaboration exchange between classrooms in Laramie, Wyoming, and Monteverde, Costa Rica. Problem-based learning was viewed in concert with a constructivist perspective to guide examination of global issues. The investigation of participants in sites that were separated by nation, language, and culture informed a framework for problem-based learning collectively across international boundaries. Issues of access to computer mediated technology in a world context and the importance of an agreed upon language of communication were also examined. Keywords: global networking, problem-based learning, international learning, literacy education, case study research.

No longer is learning viewed as something that occurs solely in the individual. It is something we do together as we socially construct meaning from shared experiences. (Frazee & Rudnitski, 1995, p. 7).

The use of technology as an educational tool to create global networks of students and teachers is not a novel idea. During 1924 in the rural mountain village of Le Bar-sur-Loup, in southern France, Célestin Freinet and a colleague in the town of Brittany initiated an exchange project between classrooms that transformed their teaching and paved the way for the founding of the Modern School Movement (Cummins & Sayers, 1995). Their students collected essays, photographs, and maps as cultural artifacts to exchange between sites. Freinet and his colleagues employed new technologies such as printing presses and the French postal network as they became available. Their practices were not driven by technology, but rather based on sound teaching practices that were continually tested and refined through decades of collaboration, reflection, and accomplishment. At Freinet's death in 1966, this network had grown to include more than 10,000 schools in 33 nations (Cummins & Sayers, 1995).

The historical and pedagogical legacy of Freinet and the Modern School Movement exemplify the continued and expanded efforts in global networking through computer technology. Yet it is important to note that throughout time, contact between groups has never automatically led to intercultural competence nor to the development of a knowledge infrastructure between students separated by region or nation (Coleman, 1998). Kern (1998) confirms that this is also the case for virtual interactions in a global arena. Despite the plethora of descriptive reports regarding electronic learning projects, little appears to be

known about what students actually gain from interaction in a global environment mediated by Internet technology.

This article documents a two-year study of fourth through sixth grade students engaged in a problem-based telecollaboration exchange between two classrooms at the University of Wyoming (UW) Lab School in Laramie, Wyoming and one classroom at the Friends School in Monteverde, Costa Rica. The overarching aim of the project was to involve students in collaborative international efforts to examine global issues that have in one way or another transformed the lives of almost everyone. Ideally this focus served to generate a genuine desire for additional inquiry about and a deeper consciousness of the world.

REVIEW OF THE LITERATURE

Technology has shaped the discourse of education and schooling from its earliest history. Until recently, education technology has oftentimes been taken for granted and assumed to be neutral, whether in the form of markers and a whiteboard, mathematical manipulatives, textbooks, or computers. Worldwide, this trend is rapidly changing, due to the availability of digital technologies that directly impact classroom learning in areas such as literacy (Kinzer & Leu, 1997; Leu & Kinzer, 2000) and international education. The vast communicative potential of teleconferencing, electronic mail, data sharing, electronic bulletin boards, and a host of other functions is a primary focus of technologically savvy individuals and organizations worldwide. Yet while innovative possibilities for classroom environments are worthy of investigation, most of the established resources serve to guide learners to present and access information (Leu, 2000), rather than to acquire knowledge or to use it in productive ways.

The majority of educators accept that technology is integral to the teaching-learning process. In terms of Internet technology, an important issue for educators at all levels is whether it is superior to face-to-face instruction. Most would agree that the option to connect participants with a wide access to cross-cultural professional and learning communities is valuable (Gorski, 2001). At the K–12 levels, a pertinent challenge of computer technologies is their integration into classroom environments (Mayer, 1997). Although researchers report a high level of engagement, interest, or positive attitude among both teachers and students when new technologies are utilized (Office of Congressional Assessment, 1995), they have not always been appropriated or systematically integrated in the curriculum (Gordon, 2000). Oftentimes computer technology is not integrated into the core day-to-day classroom instruction, but rather is used at the edges of instruction—for example, to reward students who complete their work quickly, to provide drills for others who struggle with specific skills, or for extra-curricular activities (Gordon). In this respect, the immense investments in technology as state and federal programs aim to provide universal Internet access for schools and integrate technology into instruction are promising (Quality Education Data, 2001).

With increased accessibility of modern information and communication environments such as the Internet, a broader vision for utilizing technology for

meaningful literacy experiences has been established that includes both teacher-directed and student-directed learning. Never before have so many initiatives for the convergence of literacy and Internet communication technology in an international setting been developed and made available for educational purposes. In terms of research, common understandings of literacy education in a single culture have been defined, but little attention has focused on the influences of literacy experiences as reading, writing, speaking, and listening within a shared and equitable international arena. Past research in this area has typically focused either in the domain of literacy education (Cochran-Smith, 1991; Reinking, 1995) or information technology education (Ayersman, 1996; Mayer, 1997). Kamil and Lane (1998) reviewed a total of 437 research articles that spanned a five-year period from 1990 to 1995, and noted that only 12 of the articles examined technology issues of literacy. According to Kamil (1997), a number of articles pertaining to computer-mediated literacy education are available in journals other than the traditional literacy periodicals, yet generally they are less likely to examine issues within K–12 classroom settings.

Research examining foreign language e-mail exchanges between university students separated by nation fits this description (Cummins & Sayers, 1995; Meagher & Castaños, 1996; Warschauer, 1997). This body of research is useful for review, given that the multitude of documented exchanges at the K–12 levels is based on description. Some studies involving university students suggest the potential for developing intercultural competence and bringing about a change in participants' perspectives as a result of involvement in e-mail exchanges are promising (Kinging, Gourvés-Hayward, & Simpson, 1999). In this respect, computer-mediated technology is used to promote positive self-concepts and foster constructive relationships between students in geographically diverse areas that often include an emphasis on the concept of multiple perspectives. These interactions typically utilize videoconferences, computer conferences, interactions on the Web, and e-pals (Cifuentes & Murphy, 2000).

An emphasis on the concept of multiple perspectives is noteworthy. Banks (1995), a leader in the field of multicultural education, identified five interrelated dimensions to serve as benchmarks for educators committed to diversity in formal settings: (1) content integration, (2) the knowledge construction process, (3) prejudice reduction, (4) equity pedagogy, and (5) an empowering school culture and social structure. The idea of multiple perspectives is embedded in the second benchmark, *the knowledge construction process*. Its utility as a lens for teachers and students to investigate and determine how cultural assumptions, frames of references, and biases influence the ways that knowledge is constructed is well established. The notion of multiple perspectives promotes acceptance of differences as a frame of reference in lieu of the knowledge construction process, as opposed to a narrow stance based on individual life experiences, academic background, and personal ideas.

The work of Merryfield (2000) exemplifies this foundation. She used threaded discussions to involve students of diverse cultural and national backgrounds in the examination of multiple perspectives while also investigating personal ideas about cultural diversity. Within the context of multicultural edu-

cation, Merryfield supported students in creating knowledge and in identifying how their personal experiences, assumptions, and social positions limit the process of knowledge construction. As an instructional tool, threaded discussions facilitated the use of students' stories and experiences as an essential component of the knowledge construction process.

Other scholars in the field have indicated that these exchanges often result in little more than superficial pen-pal projects in which information is traded without reflection and without the challenge for participants to reflect on their own lifestyles or stereotypical views of other cultures. For example, in an e-mail exchange between students in Mexico and the United States, Meagher and Castaños (1996) observed that students who were asked to compare different attitudes and values developed culture shock and negative feelings towards other groups. Based on his work with electronic exchanges, Fischer (1998) cautioned that students typically react to contrasting perspectives negatively, dismissing them as strange or "typical" of a particular culture, as opposed to using their distant partners' messages to reflect and learn about differences.

This research suggests that virtual communities built on self-serving principles are ineffective, both for individual participants and for the general contribution to a content-based infrastructure. As endeavors guided by opportunities for foreign language and intercultural learning, they lack clearly defined frameworks based on serious scholarship. Although well intentioned, the affective goals of intercultural learning and intercultural competence, fashionable in the world of foreign language methodology, should not replace sound scholarship. Participant emotions and personal opinions of different cultures are understandable, and should be utilized as a beginning for serious inquiry of ongoing ideas grounded in content, as opposed to serving as the focal point of instruction.

A vast array of computer networking resources are available that deliver a point of departure from this emphasis. The International Education and Resource Network (I*EARN), a non-profit international telecommunications network in 21 countries, enables students to collaborate efforts on projects that make meaningful differences in the world. The Institute for Global Communications (IGC) provides computer networking tools for international communications and information exchange, including EcoNet, PeaceNet, and ConflictNet. These resources highlight the study of topics that may generate emotion and, at times, controversy when potentially volatile global problems are discussed in classrooms. Beyond this they are aligned with opportunities for students and teachers to hone reasoned, evenhanded approaches to content-based topics that are extended by participant involvement in virtual simulations of foreign policy negotiations or discussions of works of literature.

LINKING RESEARCH TO A CONTENT-BASED FRAMEWORK

Development of a framework for the telecollaboration project was fashioned in response to key considerations outlined above. One of the principal aims was to foster a sense of global responsibility through collaborative reading and writing activities for shared academic goals. This was accomplished by drawing

from key concepts of international education. As a theoretical lens, international education is not a set of cultural activities, informational materials, or approaches, nor should its boundaries be defined in alignment with those of multicultural education and/or global education. These areas of study overlap in goals to develop multiple perspectives, intercultural competence, respect for human rights, and to contest discrimination (Bennett, 1994). Beyond these links, international education strives to embody knowledge, skills, and experiences that stem from in-depth study, work, and collaboration with groups and individuals in other countries and with international students and scholars in United States institutions.

As a discipline, international education infers the study of educational, socio-political, economic, and environmental endeavors by globally oriented individuals worldwide (Roberts, 1999). It involves individuals participating in discourse that is sparked by the respectful study of relevant issues to the lives of people, yet in these issues participants retain autonomy and recognition for their particular country contexts and institutions. This focus prompts the integration of knowledge across national boundaries and fosters interdisciplinary studies of global significance that are high priority for K–12 education and related areas.

Interdependency is an important concept of international education. Its utility within the education arena contextualizes effective models and measures for the academic welfare of children and for reforming schools with approaches that are appropriate, established, and feasible. In this respect, the purpose of the telecollaboration project is not to rank schools and place them in competition with each other. Rather, based on the tenets of international education, an alliance is formed between educators and students to study global forces that affect the environment. The intrinsic local responses of students are framed with respect to their particular country context. The idea that access to equal and equitable education extends beyond national boundaries as a right of all children is respected and consequently, hegemony of individual nations is discouraged. Interdependency highlights the idea that although systems around the world confront problems, the resolutions proposed by transnational organizations such as the World Bank or UNESCO are not always viable. Rather, solutions that are incorporated from a top-down perspective, as opposed to a bottom-up perspective, oftentimes lead to inequitable consequences and counterproductivity.

As a curricular resource, the philosophy of constructivism complements the guiding ideas of international education. Constructivism asserts that knowledge resides in individuals and cannot be transferred intact from a teacher to students (MacKinnon & Scarff-Seatter, 1997). Communication among students is fundamental to challenge and further new knowledge as they attempt to link it to prior experiences. The teacher's responsibility is to facilitate the learning process through the provision of an environment that promotes the development of new understandings.

Problem-based learning (PBL), as an instructional practice, was viewed in concert with constructivist teaching and learning to guide examination of pre-determined world issues and concepts. This involves a process of student guesses based

on prior understanding, followed by the development of a hypotheses, and in turn, making tentative conclusions (Bruner, 1960). Curriculum researchers suggest that PBL provides engaging and worthwhile learning experiences. Savoie and Hughes (1994) note that it expands the transfer of concepts to new problems, enhances intrinsic interest in subject matter, and supports self-directed study skills. They outline three key facets of PBL that lead to authentic teaching and learning: (1) construction of knowledge that guides students to synthesizing, generalizing, hypothesizing, and arriving at conclusions to produce new understandings; (2) disciplined inquiry in which students address ideas central to the respective discipline with enough thoroughness that conceptual relationships can be explored and complex understandings produced; and (3) values that extend beyond school to help students make connections between disciplinary content and either public problems or personal experiences. As an instructional practice, Moursund (1998, p. 60) describes several key characteristics of PBL that were incorporated in the curricular framework of the project:

- a learner-centered environment in which students maintain some choice of content and sources
- authentic content and purposes that are real-world, complex, and conflicting
- intellectual challenges that are shaped by a time commitment, resources, discovery learning, and higher order skills
- a product, presentation, or performance as the culmination of learning
- collaboration among a group of students and/or classes of students
- incremental and persistent development as the learning proceeds
- teacher facilitation as guides, mentors, resources, and/or learners
- explicit goals
- an overall framework consistent with the constructivist philosophy.

World issues were connected and woven into a curricular framework from a vast array of scholarly sources developed by Diaz, Massiallas, and Kanthopoulos (1999) in their text *Global Perspective for Educators*. This text was utilized as a basis for developing the project curriculum. The case method was an ideal medium for presenting topics because it compels students to understand and apply theory rather than receive it passively (Silverman, Welty, & Lyon, 1992). Using an adaptation of the Biological Science Curriculum Study (BSCS) model, selected topics included issues surrounding drought, human rights, population, environmental protection, and health. The study of human rights, for example, offered students the opportunity to compare and contrast their own perceptions of human rights versus those from other countries. Inherent to this topic is the responsibility of national governments to assure adequate nutrition and a standard quality of daily life for all citizens. Related to this issue are overpopulation and the distribution of food and medical attention from first world to third world countries. Lastly, topics developed around issues pertaining to the environment and protection of it leads to an examination of the processes of human activity such as overpopulation, food production, and energy usages that cause pollution and global warming.

DESCRIPTION OF METHODS, ANALYTIC TECHNIQUES, AND THE RESEARCH SETTINGS

Introduction: Settings and Researcher Roles

As the principal investigator, I collaborated with three classroom teachers. In a team spirit, we functioned as naturalistic investigators, establishing and sustaining a many-sided and relatively long-term relationship in the participating classrooms (Lofland & Lofland, 1995). The teachers whose students were involved in the pen pal project served in the role of classroom researchers. They agreed to incorporate the pen pal project in their classroom curriculum. Along with this, the classroom researchers copied each set of pen pal letters, agreed to participate in focus group interviews, allowed me to make scheduled classroom observations, and submitted end-of-year summaries.

The research spanned two academic years, 2001–2002 to 2002–2003, and followed the format of an interpretive evaluative case study. The research sites included two classrooms at the UW Lab School in Laramie, Wyoming and one classroom at the Friends School in Monteverde, Costa Rica. The Lab School is a public multiage kindergarten through ninth grade setting that is housed on the UW campus. The teachers and students' activist approach to project-based learning and their commitment to maintaining a classroom community suggested an ideal partnership with the Costa Rican Friends School. Lab School teachers utilize a variety of active classroom strategies to create attractive, engaging, and productive learning environments within the school setting. Learners are invited to share in active experiences thereby creating a communal frame of reference that emanates from the investigation of an idea or problem. With support of the school Spanish teacher, students are involved in numerous projects that integrate a Spanish language component with issues of international importance.

The Friends School is a multiage preK through twelfth grade school that was established in the early 1950s in Monteverde, Costa Rica. The school is accredited by the Costa Rican Ministry of Education, yet unique due to its foundation in the Quaker philosophy and a student body that is bilingual in the Spanish and English languages. The school curriculum stresses community and global service and autonomy in learning. Teachers and students are committed to the Quaker philosophy of fostering non-competitiveness and collaboration within their vision of a classroom learning community.

The rationale to partner with the Friends School as a research site was threefold. Both students and teachers were able to communicate in English fluently. The option to use English as a common language lessened the challenges of a distance project between young students. Native English-speaking teachers are attentive to and respectful of Costa Rican culture, as more Costa Ricans choose to send their children to the Friends School. Foreign language education, both Spanish and English, has practical and ideological significance in the school and as a result the Monteverde community has embraced it as a sign of cross-cultural respect. Along with this, the Friends School had the infrastructure to successfully sustain a comprehensive study using computer-mediated technology as a tool.

Approximately 35 Lab School students in the fourth and fifth grades and 15 Friends School students in the fifth and sixth grades participated in the project. Initially the project was presented as an optional classroom activity. At both sites, 100% of students choose to participate. All classrooms were multiage, which meant that the majority of the same students participated during the project years of 2001–2002 to 2002–2003. Each Friends School student had two to three Lab School pen pals. Typically, they spent more time writing return letters and/or chose to combine ideas in a common return letter to their multiple pen pals.

Data Collection in Response to Case Study Research

Case studies are increasingly used to explore the unique situational contexts of technologies within classroom settings (Garner & Gillingham, 1996). Yin (1989) defined a case study as “an empirical inquiry that investigates a contemporary phenomenon within its real life context, when the boundaries between the phenomenon and context are not clearly evident and in which multiple sources of evidence are used” (p. 26). Merriam (1998) views a case as an individual, a program, a class of students, a school, or a community. She fashions the distinctiveness of qualitative case studies as particularistic because of the focus on one social unit, descriptive because they result in a rich thick portrait, and heuristic because the process sharpens readers’ understanding while leading to new meanings. With this in mind, the following research questions are presented:

1. In terms of content-based learning, what do participants gain from collaboration in a global environment mediated by Internet technology?
2. What are the defining considerations of virtual collaborations regarding the convergence of academic learning and computer technologies in an international context?

Data sources included student letters that the classroom researchers copied and made available, transcribed focus group interviews with the classroom researchers, summaries of scheduled classroom observations, classroom researchers’ end-of-year summaries, and a field journal. These data sources were the primary means through which to explore students’ and teachers’ engagement in the project and the meanings that emerged as a result. Data collection was ongoing, yet complementary to the academic school year:

Phase 1 (September–December, 2001): Identify technology needs at both sites. Conduct pilot study from Friends School site.

Phase 2 (January–May, 2002): Collect each set of letters beginning with introduction of case study. Complete 2–3 classroom observations at each site. Conduct 1–2 focus group sessions at each site with classroom researchers. Collect end-of-year summary from classroom researchers.

Phase 3 (September–December, 2002): Collect each set of letters beginning with introduction of case study. Complete 2–3 classroom observations at each site. Conduct 1–2 focus group sessions at each site with classroom researchers.

Phase 4 (January–May, 2003): Collect each set of letters beginning with in-

roduction of case study. Complete 2–3 classroom observations at each site. Conduct 1–2 focus group sessions at each site with classroom researchers. Collect end-of-year summary from classroom researchers.

The amount of time dedicated to the project varied, depending on other curricular demands. For example, during holiday seasons or cycles of mandatory testing, students generally were allowed very little class time for the project. At other times of the year, two to four hours were scheduled on a weekly basis for the project. Between phases two through four students were introduced to approximately three case studies that were presented in the following five sequential stages:

Engage: Distribute copies of the case study to all participants at both sites. Students gain motivation to examine the case study in their home classrooms while beginning to make connections between what they know about related issues and why they are worthy of exploration.

Explore: Students are directly involved with the problem presented in the case study. As they work together, students build a base of common experience that assists them in the process of sharing and communicating ideas. Cooperative learning is utilized as a primary instructional strategy. Using the Internet as a tool, students are given opportunities to investigate self-selected issues that are related to the case study.

Explain: Students take ownership for their learning in the form of its direction and construction. Using the process approach to writing as a framework, students generate individual letters to their distant partners that include questions and answers pertaining to the case study under investigation. The letter writing interaction is viewed as an opportunity to make sense of what is learned by negotiating meaning, comparing what is known to new experiences, and resolving discrepancies between what is known and what seems to be implied by new information.

Elaborate: Students receive responses to their letters and in their home classrooms expand on the concepts they have learned, make connections to related concepts, and apply their understandings to the world around them.

Evaluate: Classroom facilitation of an ongoing diagnostic process that allows the investigators to determine if students are acquiring understanding of new concepts and knowledge, as well as associated skills.

Documentation and Analysis

Documentation using the Stenhouse (1978) categorization style of “case data,” referring to the bulk of data organized case by case, was utilized. Data was kept intact as a way to illuminate meaning and insights about case-by-case processes that would otherwise have been lost if data were sliced up into metathemes for general points across all cases under study. Data was coded with each case study cycle. The identification of patterns and meaning was recorded on 3x5 index cards to allow for sorting and for arrangement by theme. Stenhouse refers to the “case record” as the edited version of the case data.

Analyses was defined as a two-way process: a case-by-case analysis was first established, following case records that in turn generated primary themes. This

approach limited the possibility of losing the potential contributions of each case (Stenhouse, 1978). Primary themes were determined by the issues that participants returned to time after time after all the data were transcribed as case records.

SUMMARY OF RESULTS

Readers and Writers of a Virtual Community

The pen pal correspondence provided an authentic and motivating opportunity for participants to read and write. Students were not required to compose letters online or in an e-mail program. At both sites, they had the option of using word processors, alphasmarts, or paper and pencil. Clarifying the writing process and refining ideas, misconceptions, and stereotypes through letter exchanges highlighted the relevance of a framework based on constructivist learning. The principal investigator and classroom researchers agreed that letters would be submitted in a formal format and sent electronically as attachment files. In the beginning months this was a struggle for both sites, because formal letter writing had not been emphasized in the curriculum, nor had students experienced the process in their home environments. Learning about letter writing protocol was a slow process, which meant classroom researchers dedicated an extensive amount of curricular time to teach about the recursive stages in the writing process. Experiencing each of the five stages—planning, drafting, revising, editing, and publishing—and realizing that the process is recursive and takes time was an unanticipated challenge for both sites, as noted in the following summary of a focus group interview:

I know our students need to be good writers, not only to communicate their thoughts effectively, but to formulate and develop ideas, to analyze and synthesize information, and to persuade readers that what they have to say is of interest and significance. But before they can become skillful writers most need a good deal of practice in writing. This project has made me realize that this goal will take more class time than I ever imagined. (SFG 11-14-02)

The notion of corresponding with peers in another country held appeal and provided a positive model that embodied the message that letters and writing is valued. Internet-mediated technology enabled the timely exchange of letters that benefited both sites by contributing to the development of positive relationships, the encouragement of reluctant writers, and an emphasis on the range of possibilities for using English in a formal context. Participants constructed meaning as they absorbed new ideas from reading and responding to their distant partners' letters. The letters became artifacts of ongoing learning by immersing both sites in an interactive clarification of ideas and perspectives. This was due in part to a sense of audience, identified as a crucial aspect of a writer's progress (Fox, 1993; Graves, 1994) and to a sense of responsibility. Reluctant writers were motivated to correspond because they recognized that their distant partners expected return letters. This was in contrast to prior experiences with school assigned writing in which the majority of participants

had never corresponded with peers in another country around a bond of key ideas and issues.

Social and institutional factors in terms of language valuation and technological access influenced the outcome of exchanges between students. This was clearly evident during the early months when use of Internet technology potentially changed the literacy form and depth of letter writing. The second and third letter exchanges were copied from a common floppy disk, sent as individual e-mail messages, and received through a Yahoo e-mail account. The presentation of letters as e-mail messages, as opposed to a formal format, altered the focus of communication, language use, and length. In contrast to the other exchanges, return letters to the Lab School participants were short and superficial in content. Language use was informal, due in part to the issue of substance. Rather than asking and answering questions in response to ideas examined in the case study, these letters reflected the pervasive influence of television and other media—newly released movies, the Harry Potter books, sports, and upcoming school vacations were examples of key elements woven into the letters. In this case, electronic text created not only a new writing platform but also a new educational space that represented specific ways of viewing and interpreting the world.

The use of English as the common language of communication also became an issue worthy of consideration. Reliance on English created an inequitable social structure that positioned Lab School participants in the role of expert. Based on interviews and a review of letters, a portion of Lab School participants believed that they were helping their bilingual Spanish-English Friends School pen pals learn English:

In Wyoming we speak mostly English. I know you mostly speak Spanish. So it is good that I can help you speak English. (FSSL 24-09-02)

The perception of Lab School participants for their role as helpers was problematic in many respects; it marginalized the multiple voices using English as an international language and devalued the Friends School students' bilingualism:

Today I spent the morning in the Friends School classroom. I mostly observed until it was time to write return pen pal letters that had been started two days earlier. The teacher reviewed some key ideas to trigger information pertaining to drought. A whole group discussion followed. I answered questions students had about their pen pals and about some of the comments in their letters. A group of the students asked why the Lab School pen pals thought of themselves as better English speakers. They also wondered why the Lab School pen pals asked if they have ever heard of popular books such as Harry Potter or why they defined such common things such as roller skates. (Field Notes 9-25-02)

The Friends School students were confused by the idea that their distant partners were elevated to the status of experts of the English language; some of them suggested that both languages should be used for the letter exchanges.

This was never actualized because for the monolingual Lab school students it was not a viable option.

For planning purposes the criteria for language use must be established by participants at the onset of collaboration and in respect to the international environment within which they operate. The realization that using a language has various meanings that are determined by the diversity of speakers should be at the forefront of defining project goals. For example, the use of English as a language of communication should be contextualized as a reference point for diverse groups of students striving to bring disparate educational systems together within a shared international arena. Worldwide, English language education is increasingly accepted as a necessary element of K–16 schooling. Defined within a curricular system, English as an international language can serve to demystify the importance of shaping language use to the contextual needs of speakers and individual institutions in any given country. In other words, issues of language learning from the perspective of international education imply far more than a focus on various syntactic, phonological, and lexical diversity. Rather, attention is on the social positions of speakers and their struggle to create and find endorsement for varieties of English that are context specific but which are also aligned for use in an international arena.

The Essence of Interdisciplinary Learning in Virtual Collaborations

In respect to content learning, the project was successful because outcomes were determined prior to initiation of student collaboration. This set the stage for directing participants' focus on particular topics. Computer mediated technology served as the primary vehicle for immediate responses in regard to the exchange of ideas, visual images, and information. In contrast, communication between sites through regular mail would have taken three to four weeks for each exchange to arrive at its final destination. Reliance on computer technology allowed participants at both sites to construct knowledge through ongoing processes of making connections between new information, feelings, and their developing pen pal relationships. Hence, telecommunication had an important role to play in terms of linking the borders of the United States and Costa Rica as distinct nations. As a tool, it guided multiple views of the world in a timely and dynamic manner while creating meaningful possibilities for readers and writers in a global arena.

Given this, careful consideration of the pedagogical and content foundations from which teachers operate is worthy of attention. In both sites, the classroom researchers relied on an interdisciplinary approach that involved investigation of issues, problems, school content, and the world as a whole from many different perspectives, without a great deal of worry about whether at any given moment students were focusing on literacy, technology, or concepts of a particular discipline. As a result, the project provided interdisciplinary learning that was centered on themes or topics rather than on specific facts or concepts from within one discipline. Generally, an issue featured in the case study was selected based on appeal or importance in the real world, with the reality of that world often being driven by students' interests and needs.

Classroom researchers at both sites viewed the case study method and interdisci-

plinary focus as inextricably linked to inquiry learning. They reported that the use of webbing often served as a strategy to support students in the generation of questions for exploration. As an example, the following web was developed between the Friend's School classroom researcher and his students. The web visually illustrated key cultural similarities and differences between pen pal partners:

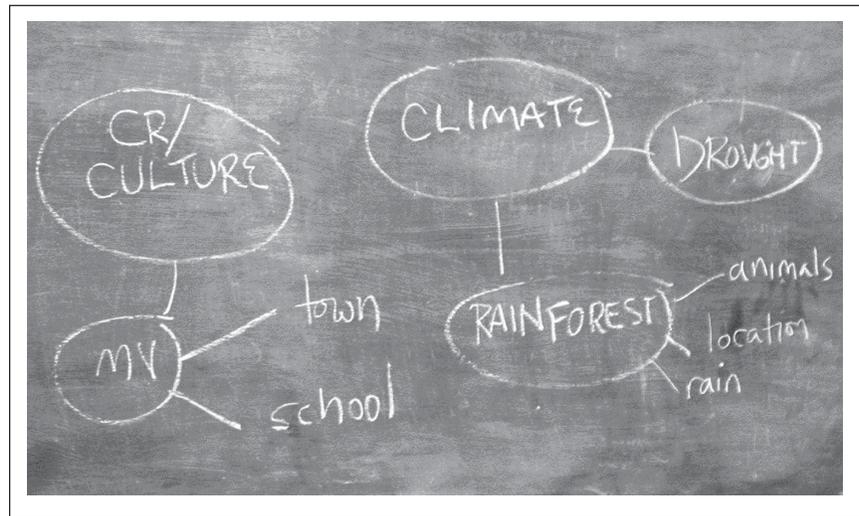


Figure 1: Webbing

Based on the generated web, questioning and problem-posing became an effective means of keeping discussions interesting and complicated. At times a single question generated by an individual student emerged and at other times there were several questions that groups or the class as a whole investigated with their pen pal partners. Sorting questions into defined strands formed central categories that in turn generated big questions with smaller ideas and topics:

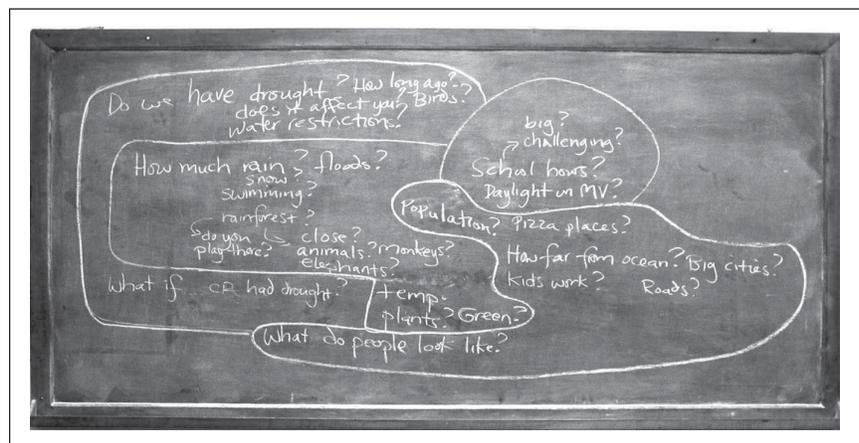


Figure 2: Sorting Questions

This process led students to list major open-ended questions they wanted to explore and study with pen pal partners and presented opportunities to interpret home cultures from a new perspective. Students were guided, not to seek justification for world problems, but rather to use their newly developing knowledge of the chain of causes to interpret key issues.

The interdisciplinary approach combined the personal with abstract thinking about global issues. It also minimized the superficiality of pen pal letter writing and maximized the connection to deep and meaningful ideas about world events that affect people differently depending on their location and sense of place in the world. As a result, the majority of discussions had a world justice theme woven throughout, as reflected in this student letter:

It rains a lot in Monteverde, but we still get droughts. How much does the drought in Wyoming affect you, and how? When there is a drought in Monteverde (where I live), which is not very often, people try not to use as much water but that is all. There is so much rain in Monteverde that a drought doesn't mean there's little rain, it just means less rain than normal. Have you gotten rain or snow lately? Have conditions improved? Are there restrictions on water use because of the drought? In Central America last year there were both droughts and floods. In Costa Rica there were floods on the Caribbean coast. The droughts and floods affected crops and the food supply. When there are droughts and floods there is help from neighboring countries and international organizations like the Red Cross. They help by giving food, clothing, blankets and other necessities. (FSSL 3-4-03)

In the United States education system, the utility of inquiry strategies to provide students with meaningful learning experiences are among the oldest and best of teaching techniques. Implications of the study suggest that these strategies are also viable in virtual communities of teachers and students who collaborate across national boundaries to investigate global problems. The aim of helping students recognize that there is a commonality to global issues lays the groundwork for developing attitudes of solidarity and for the recognition of patterns in world problems that can be conceptualized within immediate communities and nations. Realizing collaboration within the confinements of a virtual community required a consciousness that extended beyond the individualistic character of classrooms to draw on models of shared knowledge. The recognition that a fundamental element in changing attitudes and behaviors toward world issues is giving learners the opportunity to construct relevant knowledge that is powerful when translated into meaningful literacy experiences was a key implication. Learning in this context translates to helping students appropriate a culture of reason, analysis, and reflection, based on shared and equitable ideas with others.

Participants' ability and motivation to utilize ideas, principles, concepts, and information from various sources also facilitated an in-depth geographical focus on the study of place. In the beginning months participants were encouraged, through the foundation of problem-based learning, to increase awareness of the

world immediately around them. In response, learning about place was initiated as participants intentionally noticed, examined, and thought about their immediate and tangible environments in order to share their particular sense of place with pen pals. Participants drew from personal ideas as a foundation to explore the theme of place. Written comments such as: "I know the United States is a big place," or "Is Costa Rica like Puerto Rica?" reflected participants' initial and limited awareness of their pen pals' home environments in Laramie, Wyoming or Monteverde, Costa Rica.

Using letter writing as a forum provided ongoing descriptions of the physical and human characteristics of participants' home environments. Studied together, the physical and human characteristics of Laramie and Monteverde shared among pen pals provided clues to visually conceptualize the distinct nature of each place. Physical characteristics described in letter correspondence included elements of animal life:

I've seen lots of monkeys. They go in front of my house. Once I was walking in the rain forest and monkeys start throwing sticks at me. (FSSL 11-04-02)

The birds that you can find in Monteverde are: Tucans, Quetzals, Bell Bird, Mot-Mot, Humming Bird. What are the kinds of birds you can find in Wyoming? The kinds of animals you can find in Monteverde are: Chanco de Monte (Mountain Pig), Pizote (Coati), Dogs, Sloths, Cats, and others. What kinds of animals can you find in Wyoming? (FSSL 11-04-02)

Now the part I think you've been really curious about is the RAINFOREST! The rainforest is all around us. We don't have to go somewhere to see it. We're in it! In Wyoming you get 4 seasons: winter spring summer and fall. We only get 2: rainy season and dry season. But dry season doesn't mean that it never rains but it doesn't rain as much. There are lots of pretty animals. The birds are amazing. Everybody wants to come and see the Quetzal. It's the most beautiful bird in Monteverde. It's green red and white the tail is very long and it has a crest on it's head and it has a pretty voice. The Jaguar is the most endangered species. We have a lot of snakes. At the school there was a Pit Viper and they're very venomous and a biologist took it home! (FSSL 20-05-02)

Human characteristics of the landscape were noted in terms of architecture, patterns of livelihood, land use and ownership, town planning, and communication and transportation networks:

In are school they're building the multi-use sports court so trucks are coming and ruining our soccer field. Now they only let us play two

times a day. Our soccer field looks like it was in a drought. But we are not having a drought that affects our daily life. I go to the sea like two or once a year. We have to go down the road and it takes like four hours. (FSSL 24-09-02)

In Monteverde there are 4 pizza restaurants. Their names are: Tramonti an Italian restaurant, Palmeras a Costa Rica restaurant, Jonni's an Italian restaurant, and Mediteranio an Italian restaurant. (FSSL 24-09-02)

The use of more than one language also shaped the character of Monteverde as a multilingual place:

In your last letter you asked about the meaning of bilingual. Bilingual means that you write and speak two languages fluently. Many people in my school and community are bilingual. Spanish is my language but I am learning English for a long time. (FSSL 01-25-02)

As noted, the study of place provided participants with an authentic image of the richness and complexity of their pen pals' home communities that would not have been available through textbook instruction. As their learning about place matured, misconceptions and stereotypes began to emerge in the letter exchanges:

In your last letter you told me about the monkey's who sometimes bother you. What about the elephants? Do you see elephants when you walk home too? Are they common in the cloud forest? (LSSL 09-20-02)

Miss Amy showed us that our whole country can fit inside Wyoming. We are so small compared to you. I guess that is why the people and all things are so big in USA. (FSSL 09-13-02)

The act of writing misconceptions and stereotypes in the form of questions and comments, followed by timely responses from pen pals, became an unexpected avenue for meaningful collaboration between participants. Teacher researchers at both sites reported a sense of surprise upon reviewing some of the mythical, stereotypical ideas about the United States and Costa Rica that were embedded in pen pal letters. Their initial reaction was to ask participants to correct their misconceptions and stereotypes during the writing process. After careful consideration, the teacher researchers decided to use stereotypes and misconceptions as an opportunity for peer-to-peer learning.

In most instances, participants on the receiving end corrected their pen pals' misconceptions and stereotypes. This process provided a student-to-student forum, as opposed to teacher-directed, for corrections of misconceptions and stereotypes. In this respect, participants communicated honestly, in real voices,

and toward purposes that had legitimacy for all involved. Pen pals shared corrections using authentic ways of knowing about home communities and without passing judgment on their partners' contrasting opinions. These interactions set the stage for meaningful collaborations between pen pals.

All in all, participants had an abiding and ongoing interest in their pen pals' home communities that extended far beyond curiosity and motivation for the study of global issues. Participants were prompted to examine their sense of place from a new perspective through the questions and comments of their pen pals. The geographical theme of place, therefore, was central to participants' depth of learning. Yet the predetermined focus on global issues prompted participants' expanded investigation of the world beyond their immediate environments. An emphasis on peer-to-peer directed learning enhanced the overall collaborative spirit of the pen pal project, and the use of computer-mediated technology sustained interest for why and how participants' home communities were similar and different.

A Practitioner's Perspective of the Digital Divide

The United States K–12 system is in the midst of an explosion of multimedia digital technology. Computer-mediated communication has become a key dimension of students' and teachers' social, academic, and professional communicative activities. As a result, computers and all that goes with them are available in schools throughout the country. Approximately 98% of United States schools are wired for Internet use and nearly 70 million of the nation's households have online access (Quality Education Data, 2001). Although the national ratio is one computer for every 4.9 students at school, 61% of students claim to have superior computers at home (Education Week, 2001).

In the United States, innovative opportunities for exploring communication in a global arena using state-of-the-art technology are readily available. Yet in a world context, this situation is the exception. The utility of computer technology as a global tool is a taken-for-granted phenomena of wealthy nations such as the United States, where students and teachers have access to and extensive experience with modern computers in both school and home environments. In contrast, the Costa Rican system is centralized by the Ministry of Education, which suggests that in community settings such as Monteverde there are no local and regional initiatives that link layers of support for computer-mediated technology in K–12 schooling. As a nation, Costa Rica is well educated; its government realizes the importance of training citizens for computer literacy, as reflected in a serious attempt to provide computers and Internet access throughout the country. To date it is only readily accessible to the wealthy and urban societies. There are many educational centers that offer a wide range of computer classes, but too often the instructors are not qualified to teach in this area. Approximately 5.9% of Costa Rican public schools have Internet access and 29% of all K–12 students have some computer access. Most schools with access are located in metropolitan areas such as the capital city of San Jose.

The process of receiving and sending correspondence electronically from the Costa Rican site was a major undertaking in terms of time and effort due to outdated equipment, faulty communication lines, limited access to computers, and students' limited experience with keyboarding:

Today was a technological nightmare. The letters from the Lab School arrived and of course the kids were very anxious to receive them. They had been anticipating their arrival all week so I was ready to print the letters and deliver them immediately. I started in the morning and by evening I had a hard copy of almost all of them. I thought using the teachers' computer would be convenient; it's the only option at the school, given there is one computer between 75 students and 10 teachers. The connection was so slow that it took over an hour for one letter to print, then the printer jammed. After printing two letters, between sharing the computer with teachers, the electricity went off and when it came back on the Internet connection was off. Knowing the Institute has a satellite system I went to use their computers. Still the connection was very slow. I'm glad to be in Monteverde to work out all the frustrating problems of access because the classroom teachers will not and cannot take an entire day to print one group of letter exchanges. (Field Notes 2-18-02)

A UW-sponsored grant enabled the principal investigator to purchase computers and Internet access for the Friends School, with the goal of reducing the digital divide between sites. Although making the technology available was critical, it was only a first step. The Friends School administration and classroom researchers had less professional development to use technology than their associates at the Lab School. Along with this, technical support was insufficient, so that if a computer problem occurred that could not be solved, there were long delays before a technician was available to address it. As a result, the Friends School classroom researchers reported distrust for the use of computers and the Internet as the only mode of communication and access to resources. As such, an essential component of virtual collaborations in a global arena is to include plans for professional development, technical support, appropriate software, and curriculum integration.

CONCLUSION

In some parts of the world, such as the United States, technologically mediated learning is a commonplace phenomenon of the 21st century. Although it has become a key resource for the creation of innovative technology-based environments, the significance for education is still unclear. The aim of this article is to propose a curricular framework based on the combination of an international education community that can be facilitated by a virtual environment and guided by key pedagogical and content ideas. The investigation attempted to capture the interplay between these components, rather than to focus on the capacity of technology to revolutionize existing practices or the constraints of existing practices on computer-mediated learning. It is important to note, how-

ever, that the contrast between sites contributed to the project's positive communicative processes while in other unforeseen ways negatively impacted an equitable community of virtual learners. For example, the Lab School students' longstanding exposure and access to computer technology prompted specific cultures-of-use that had long been established in their particular academic setting prior to the exchange.

The collaboration of students and classroom researchers in sites that were separated by nation, language, and culture informed a framework for sharing problem-based learning collectively across international boundaries. Abstract concepts surrounding global issues were brought to life through students' motivation to use language for purposes beyond their immediate environments. Meaningful literacy experiences in the form of writing and receiving letters became a forum for distant partners' reflections on their lives and the world with an authentic audience. Letter writing in a virtual forum served as a reference point for literacy learning that extended beyond a singular intent of skill development to include experiences for the exploration of globally and personally significant social issues. Literacy skill development along with social insight formed connections between abstract knowledge and students' personal lives as a means of addressing vital world issues and concerns.

As noted, the new millennium encourages contemporary visions in education. Yet embedded within all systems are clearly defined structures to the process of education. Worldwide, these structures place pressure on educational institutions to become technologically savvy. Irrespective of the urgency to bridge the digital divide is the need to recognize that changes in curriculum require careful implementation and acknowledgment that each part of the system has its own goals and limits, from classroom teachers to school boards, and beyond to national and international entities. In this line of reasoning, the application of findings to practice should be contextualized in terms of studies performed by education researchers grounded in curriculum design who recognize how to exploit technology to facilitate meaningful depth of learning from the perspectives of individual classrooms to the conditions of a global arena. In all this the research provides a snapshot of the power of teachers and students in classroom settings who are not driven by the realm of "high tech fads" but rather by recognized and accepted practices that are authentic and relevant to their lives.

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APPENDIX

DROUGHT: Living with Nature's Vengeance

Wyoming



Cornfield in Eastern Wyoming

A farmer in Eastern Wyoming surveys his drought stricken cornfield. After three years of little rain, farmers in Wyoming are selling off their cattle and looking to the federal government for assistance and loans to help them maintain their farms and ranches.

Drought conditions threaten the very survival of the people in Africa. These fields should be bursting with sorgum- a maize-like crop—but the lack of rainfall has again ruined the latest harvest. In Zambia and Zimbabwe 13 million or two-thirds of the population in these countries are facing starvation because of dry conditions.

Zambia, Southern Africa



Sorgumfield in Zambia

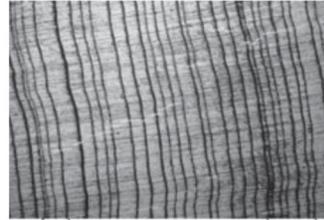
What Is A Drought?

Every year there are droughts somewhere in the world. A drought is when there is a less than a normal amount of rainfall for a given area. For example Wyoming receives an average of 14.5 inches of rainfall a year and is experiencing drought because it is receiving an average of only 9 inches. Hawaii which is also experiencing drought receives over 120 inches of rain each year but is presently receiving only half that amount or 60 inches.

APPENDIX, CON'T

Famous Droughts In History

Droughts are nothing new in the history of mankind. History is full of examples when populations of different animals and humans had to either move or were wiped out by extended periods of drought. Scientists studying tree rings have discovered that the Anasazi people in southern Colorado abandoned their villages in Chaco Canyon and Mesa Verde some 800 years ago around the time of a great drought that hit the area. Scientists also believe that a mega-drought in the late 1500s and early 1600s may have been to blame for the disappearance of the Roanoke Island "Lost Colony" and the starving time that killed more than one half of the Jamestown Colony. In more recent history a drought in the 1930s dried out the Great Plains, causing thousands of farmers in Oklahoma, Kansas and Nebraska to leave their land.

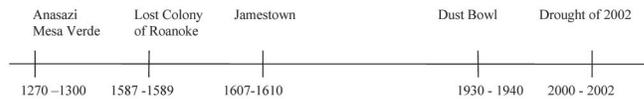


Lost Colony Drought: 1587-1589

Jamestown Drought: 1606-1612

By examining tree rings, scientist can date major periods of drought. Trees grow little during times of drought and rings are closer together. The drought of 1597 -1589 was the worst in 800 years.

Famous Drought In the United States



Information On Drought In Wyoming

<http://wy.water.usgs.gov/projects/drought/pdf/wsp2375.pdf>
<http://wy.water.usgs.gov/projects/drought/index.html>

How Do Droughts Affect People?

Droughts occur when less than a normal amount of rain falls over an extended period of time. When there is little or no rain, crops suffer or die and farmers are unable to grow a sufficient amount of food to feed their families and to sell. The grass on pasture lands dry out and animals die from a lack of food, are slaughtered to provide immediate food for a family, or are sold so that a farmer may buy food to feed his family. If the drought lasts only a year or two, farmers are able to survive because they may have food set aside for just such an emergency. Seldom are droughts the only cause of starvation, death, and hardship.

Hardship from drought comes from a number of factors. In Africa, Afghanistan, and the Middle East, wars have driven farmers from the land. Surplus food that has been set aside for such emergencies and seeds for planting the following year are eaten. Animals are killed by the fighting or are eaten. The drought only makes a bad situation worse.

The lack of water also leads to outbreaks of disease as people are forced to live closer together and compete for a limited amount of water. As the water supply is used up, existing water becomes less and less usable and a breeding ground for disease. Think of how a river or pond looks at the end of summer. At the beginning of summer the pond or river is fresh while by August the water level is lower and often becomes brackish and foul smelling. Demands by cities for water and poor irrigation and farming practices also have worsened the effects of a drought. For example flood irrigation wastes more water than a drip irrigation system. Also the lack of trees and cover plants allows water to evaporate quicker. During a drought, cities and farmers in many parts of the world including the United States pump water out of the ground faster than it can be replaced. The water table, which is the normal level of water below the ground, is lowered and during a drought becomes even lower making it nearly impossible to pump out enough for human consumption, crops, and livestock.

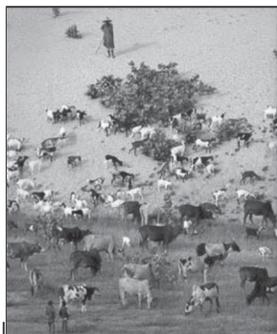


Farmers in southern Africa are now being forced to eat next year's planting seed just to survive. Now not only will they soon run out of food but also they will have no means of farming in the future

APPENDIX, CON'T

How Are Droughts Caused?

A drought occurs because atmospheric weather patterns change and rain does not fall in a given area. Recently weather patterns called El Niño and La Niña have been responsible for weather changes around the world. While some parts of the world are experiencing high rainfall and flooding, other parts of the world are experiencing drought. Scientists now believe that humans are partly to blame for droughts. The air above forests and areas with a lot of vegetation are cool and moist. When forests are cut down and pastures are over-grazed the air above the ground becomes warmer and drier. Rain clouds are less likely to form over areas that have been deforested and overgrazed. In many parts of the United States and around the world, the cutting of forests and overgrazing of land by livestock has worsened the affects of droughts.



Some studies suggest that by using the land for farming and livestock grazing, humans are responsible for bringing about the drought.



African countries in red are presently suffering from severe drought conditions. In the Horn of Africa, 10 million Ethiopians or a sixth of the population are at risk of starvation because of drought.

How Has The Drought Affected Wyoming?

Many parts of the world this year are experiencing severe drought conditions. The drought in Wyoming is similar to other regions of the world in that the lack of rain has dried out the land making it difficult to raise crops and pasture for livestock. Ranchers and farmers in much of Wyoming are being forced to sell off some of their herds because there is little grass on

the rangeland for their animals to eat. The lack of water is also making it difficult for ranchers to raise hay they feed to their animals over the winter.

Unlike other parts of the world, people in Wyoming do not face massive starvation during a drought. Only a fraction of the food eaten in the United States comes from Wyoming. In fact most of the food eaten in Wyoming comes from other states or even other countries. With modern transportation, animal feed can be shipped from states that are not experiencing drought to help feed livestock in Wyoming. The federal and state government also helps farmer with loans.



Hardly any grass is left on this pastureland in Eastern Wyoming. The drought has caused tremendous difficulties for cattle ranchers and wildlife that must share what little grass is left



The Laramie River near Bosler is all but dried up. Wyoming is facing one of the worst droughts in its history. The drought is having a negative affect on the wildlife population. Because there is little water in ponds and rivers, animals are moving into areas that do have water. This places an extra burden on the rangelands. Rangelands become overgrazed. The overgrazed rangeland then becomes susceptible to erosion and mudslides when it does rain.

Water Facts

- The earth has the same amount of fresh water as when dinosaurs lived on the planet.
- Around 71 percent of the planet is made up of water, yet fresh water makes up less than 3 percent of the water supply on the earth.
- Most fresh water on the planet is locked up in the polar ice caps or in deep groundwater aquifers. Only .01 percent of all fresh water is available to humans.
- One billion people (15%) on the planet do not have access to safe drinking water.
- In the sub-Saharan countries of Africa a person will use 10 to 20 liters of water a day. A person in Europe and North America can use as much as 200 liters a day.