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Virtual Museum Projects for Culturally Responsive Teaching in American Indian Education

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Virtual Museum Projects for Culturally Responsive Teaching in American Indian Education

by

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Dedication

I dedicate this study to the memory of my father, Dr. Raymond E. Christal and to my Native friend, Sherman Black.

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Virtual Museum Projects for Culturally Responsive Teaching in American Indian Education

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This study consists of four case studies of virtual museum projects conducted in partnerships between tribally controlled American Indian schools and museums with Native American collections. The purpose of the study was two-fold: to examine virtual museum projects as an educational innovation, and to determine what contributions such projects might make to the development of culturally responsive teaching practice. The model of virtual museum projects that the case studies examined grew out of prior experiences with similar projects in the Four Directions project. Native American students worked with teachers, Native community members, museum professionals, and in one case, anthropologists, as they selected cultural items for a virtual exhibit to be included in a Web-based virtual museum. The students imaged their objects on a turntable using digital cameras to create three-dimensional QuickTime Virtual Reality media. They

researched the items they had selected with the help of the Native community members, teachers, and museum professionals to write essays about the objects for the finished virtual exhibits. Research data included participant interviews, videotapes of project activities, and other documents, including the digital virtual museum products. The interviews were transcribed and coded using Nud*ist software. By pulling out specific coded passages and correlating them with other research data, specific themes related to the conduct of and response to each case emerged. In a second level of analysis, the themes of all of the cases were compared and condensed into a comprehensive description of virtual museum projects that follow the model used in this study. Problems that were identified in each of the projects suggested specific solutions that were added to a prescriptive description of virtual museum projects. In a separate chapter, coded statements relating primarily to student and community responses across all of the projects were examined to determine how the projects worked as a culturally responsive practice. The culturally responsive elements identified included the affirmation of culture, Native people saying who they are to the world, collaboration, hands-on learning, the familiar and familial aspects of the objects, and student choice. The projects were responsive to the Native communities as well.

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Chapter 1: Introduction

With the infusion of rapidly changing computer technology into nearly every sphere of contemporary life and the very recent explosion of the World Wide Web (WWW), American education has been presented with a plethora of challenging approaches to improving classroom practice that make effective use of these technologies. At the same time, the changing demographics of the student population has presented a different challenge to American education: how to provide equitable education to all children who come to school with highly varied cultural backgrounds. To provide equitable education, many education scholars argue that curriculum and pedagogy must address the differences that non-mainstream children bring to the classroom due to their home culture and language (Banks, 1992; Gay, 2000; Ladson-Billings, 1994b; Smith, 1998).

American students come from families representing hundreds of different cultures. Native American students, for instance, represent not one monolithic culture, but over 500 distinct tribes, many of which still retain unique languages, cultural values, and world views (Bureau of Indian Affairs, 1998; Indian Nations At Risk Task Force, 1991). Addressing this vast diversity in the curriculum is an important but daunting task. For most teachers, the primary expression of the curriculum is embodied in the classroom textbook. However due to the economy of scale in book publishing and the domination of the large state-wide textbook

adoption states (Texas, California, and Florida), textbook publishers find it profitable to focus on educating the students from the mainstream (Apple, 1993; Apple, 1996). Customizing texts to address myriad specific cultural differences is cost-prohibitive. Moreover, earnest efforts to address diversity in textbooks are often met with resistance from conservative, neo-liberal, and religious right activists (Apple, 1996).

As for pedagogy, the treatment of cultural difference in education has been undergoing a reconceptualization—as an asset rather than as a deficit—since the mid-1980s (Sleeter & McLaren, 1995). This change in addressing cultural difference in the classroom continues to evolve. It is an interdisciplinary effort drawing from findings in many different disciplines, such as multicultural education, critical pedagogy, sociolinguistics, ethnography, and cognitive psychology (Smith, 1998). Teacher education programs are just beginning to incorporate the new and evolving culturally responsive teaching practices into their training (Villegas & Lucas, 2002). Teacher education is necessary but not sufficient to bring about change in classroom practice. Culturally responsive teaching involves such dramatic changes from traditional teaching practice that its widespread implementation is often connected with systemic school reform (Banks, 1994; Banks, 1997).

The call for school reform is being made from many contradictory positions, but given the common goal of improved learning for students, reformers can sometimes find common ground in their recommendations. The adoption of modern educational technologies, though questioned by some

advocates of culturally responsive education, is one change that is occurring rapidly in the nation's schools (Apple, 1991; Cuban, 1986; Cuban, 1993; Hayes, 1995). Many educators of minority students are finding that educational computing and telecommunications can also play a role in supporting culturally responsive teaching (Allen et al., 1999; Clemens, Mose, & Spanier, 1995; Cummins & Sayers, 1997; Digranes & Digranes, 1989; George, Malcolm, & Jeffers, 1993; Gooden, 1996; Loop, 1986; Roy, 1998).

Regarding the focus group of this study, technology has played a role in supporting effective approaches for teaching Native American students in culturally responsive ways (Allen et al., 1999; Clemens et al., 1995; Sower, 1987). Language programs that specifically address the difficulty some Native American students have in mastering English as a second language have been developed. In indigenous communities, where concern for the loss of tribal language exists, special fonts, dictionaries, and language tutorials have been created for CD-ROM and online access (Jacobs, Tuttle, & Martinez, 1998; Jojola, 1998; McCurry & Kleinfeld, 1986). Native students are communicating with peers and mentors online to share their experiences, discuss issues, and find solutions to the problems shared by their communities. Students are helping to preserve indigenous knowledge by creating multimedia programs presenting stories, legends, and lore passed on to them by their elders (Gooden, 1996; Hamilton, 1993; Roy, 1998). One technology-supported instructional strategy that is just beginning to be implemented by teachers of Native American children

is the development of virtual museums of Native culture (Resta, Roy, & Christal, 2000; Roy & Christal, 2000b).

VIRTUAL MUSEUMS

The concept of the virtual museum is being developed and explored by both the museum profession and by educators. Virtual museums are multimedia exhibitions on the World Wide Web (WWW) that simulate the kinds of experiences a person would have visiting a physical museum. For the museum profession, the development of the virtual museum concept was a natural outgrowth of the digital automation of their collections that had been taking place since the 1960s. Museum computing has evolved along with the capabilities offered by information technologies (Jones-Garmil, 1997). Initially, computer programs were designed to store systematically information about museum collections that enabled museums to share descriptions of their collections with museum professionals. With the improvement of the multimedia capabilities of computers, museums could add graphical displays of their collections to their records. When the first graphical Web browsers emerged in 1993, several museums posted publicly accessible virtual exhibitions from their collections. Today, a great number of museums supplement the public displays in their physical facilities with online virtual museums (Gradwohl & Feldman, 1998; Jones-Garmil, 1997). Virtual museums extend the outreach of museums to their public, giving people who cannot readily visit the museum facilities access to museum collections. Virtual museums have become a new strategy museums use

to fulfill their mission as educational institutions that promote the heritage of the communities they serve.

The role of technology in education has continued to expand and evolve in much the same way it has in the museum discipline. Educators have been exploring information technologies for the purpose of improving teaching practice in a number of ways. By the advent of the microcomputer in the late 1970s, a number of teaching approaches had been developed that make use of the computer as a tutor, tool, or tutee (Taylor, 1980). Educational computing practice continued to evolve as the capabilities of and access to technology improved. In the late 1980s, teachers began exploring the uses of multimedia in classroom practice, a strategy that was stimulated further by the advent of the WWW and graphical Web browsers (Office of Technology Assessment, 1995). By the mid-1990s the term "virtual museum" was being applied to web-based student learning projects (McKenzie, 1996). Student-developed virtual museums can be fairly elaborate, collaborative learning projects in which students research, record, design and implement a multimedia presentation that simulates the kind of experience a museum visit might offer. As a teaching strategy, virtual museum projects implement several aspects of school reform, such as student-centered learning, collaborative learning, authentic learning, multidisciplinary thematic instruction, and integrated computer literacy instruction. Some school virtual museum projects have been done in collaboration with museums, which combines the recent trends in educational computing and museum informatics (McKenzie, 1997; Roy & Christal, 2000a).

School virtual museum projects are beginning to have a special relevance to educators of Native American students, especially when they involve collaboration with museums with substantial American Indian collections. One result of the long history of the relationship between Native Americans and European Americans has been the loss of the close cultural connection Native Americans once had to their ancestral past. There is a great desire among Native Americans to reclaim their connections to their heritage and preserve as much of their culture as possible for future generations (Indian Nations At Risk Task Force, 1991). Since the mid-1960s, Native Americans have been gaining tribal control of their own educational institutions (Szasz, 1977; Tippeconnic III, 1999). Education, which had long been used as a tool for assimilation into mainstream European-American culture, is now being changed into a tool for cultural conservation. Museums have a wealth of material that can help Native Americans reclaim their cultural heritage. In the 1990, the Native American Graves Protection and Repatriation Act became federal law. The law required museums and other institutions to repatriate human remains of American Indian and sacred artifacts to the tribal communities to which they belonged (Merrill & Ahlborn, 1997). The law requires museums to cooperate with tribes regarding repatriation efforts. Initially, many museums were concerned that their American Indian collections would be gutted by repatriation efforts. After ten years, those fears were proven unfounded, but the law did lead to a new era of understanding between museum and tribal communities (Kinser, 2000). Native Americans do desire ready access to the important cultural items in museum collections, and

school-museum collaborations for the creation of virtual museums offer a way of digitally repatriating these materials to the communities that need them. Educators of Native Americans see an additional importance to such school-museum collaborations (Roy & Christal, 2000a; Roy & Christal, 2000b). They can be an effective strategy for implementing culturally responsive education.

VIRTUAL MUSEUMS AND CULTURALLY RESPONSIVE PEDAGOGY

I explained above how recent trends in information technologies have led museums and schools to collaborative virtual museum projects and how teachers of Native American students have found important uses of information technologies for implementing culturally responsive curriculum. Next, I will examine school virtual museums and culturally responsive pedagogy more closely to show how they might be combined to create new strategies for teaching Native American students.

In the education literature the term "virtual museum" has been applied in various ways that can make the concept very broad or somewhat narrow. For instance, McKenzie (1996) applied the term virtual museum quite broadly, perhaps too broadly, to an educationally effective use of the Internet that involves students researching a given subject, creating their own digital content, and publishing a multimedia presentation as a web site of their own design. Lamb (1998), however, used the term virtual museum more restrictively as one of many possible metaphors for student-created web sites.

For the purpose of this study, "virtual museum" will be applied more specifically to technology-supported learning projects that are collaborations

between schools, the communities they serve, and museums. Such virtual museum projects provide students an authentic learning experience in which they research and digitally record cultural artifacts held in museum and private collections for the purpose of creating World Wide Web or multimedia products that serve a culturally responsive approach to learning. In the process of engaging in these technology-supported projects, students gain access to and skills in using sophisticated, cutting-edge technologies, such as digital photography, digital video, virtual reality imaging, and the latest Web and multimedia authoring tools.

VIRTUAL MUSEUM EXAMPLES

It is not difficult to find school virtual museums on the Web. Many of these will not be labeled "virtual museum," but will easily fit into the broad definition proposed by McKenzie. A few examples will help us define what the concept can entail.

The First Peoples' Project: Indigenous Global Art Gallery is an online display of indigenous art from schools in Thailand, the United States, Argentina, Hungary, and Australia (I*EARN, 2002). Student art illustrated the themes "My Self, My Family, and My Culture" in the first year and "Traditional Stories" in the second year of the project. Student writing accompanies most of the art. The project is hosted by I*EARN, an educational organization that has been organizing Internet projects that are multicultural, multilingual, and international since 1988. These projects are inspired by a critical literacy pedagogy involving cultural sharing that was pioneered by French educators Celestin and Elise Freinet in the 1920s (Cummins & Sayers, 1997). Today there are I*EARN schools in 60

countries speaking 29 languages, which comprise a global community of young people and educators.

The Indigenous Global Art Gallery is a publicly accessible aspect of the I*EARN First People's Project. The student art is one component of a culturally responsive learning project that includes writing, discussions on indigenous issues, interaction with non-indigenous students and humanitarian efforts to assist indigenous peoples.

Nah Tah Wahsh PSA is a Hannahville Potawatomi school in Michigan that has an ongoing virtual museum project on the school's Web site (Nah Tah Wahsh, 2002). Their virtual museum features Potawatomi baskets, gourd rattles, bead work, clothing, quill work, and other cultural items submitted by members of the community. Students have digitally recorded these items with digital cameras and in QuickTime Virtual Reality (QTVR). The QTVR technology enables the students to create virtual objects that allow one to "handle" the items on a computer screen by clicking on them with the computer mouse cursor and rotating the object to see it from many different angles. Students have also researched the items and have written the essays that accompany the exhibits on screen. Some of the essays are also included as audio files in the students' voices.

The virtual museum also includes a section dedicated to Hannahville history. It features historical photographs and documents from regional libraries and museums and from the community. The two sections of the virtual museum are supported through grants, one through the U.S. Department of Education, the other through the Institute of Museum and Library Services.

A third example of a virtual museum is the Mound Builders virtual museum created by students at the culturally diverse Marie Murphy Junior High School near Chicago, Illinois (Illinois State Museum and Brookfield Zoo, 2000). This site was the result of one of a hundred proposals accepted by Museums in the Classroom, a state-funded project led by a consortium of the Illinois State Museum and the Brookfield Zoo. Staff from the participating museums shared their expertise in research and technology, and the museums gave schools access to their collections.

The Mound Builders web site focuses on the use of bird imagery in the artifacts of the prehistoric Adena, Hopewell, and Mississippian cultures that left monumental mound structures throughout the mid-continental United States. Students produced a wide variety of media to present their learning to the world community on the World Wide Web. The virtual museum included scans of original student art, illustrations from archaeology texts and museum catalogues, a time line of world cultures, a map showing Mound Builder sites, and student-created photographs and QTVR media of Mound Builder artifacts. Consulting with museum educators, archaeologists, anthropologists and biologists, students produced essays on multiple perspectives of Mound Builder cultures and the regional bird life that may have influenced them. The project overview made it clear that the students had created the web site from their own original materials and that the virtual museum project was fully integrated with the World Cultures and pre-algebra curriculum.

These three examples illustrate several aspects of school virtual museums have that have important implications for education. If one considers the virtual museum as a process for implementing student-centered curriculum, several aspects emerge from these three examples. Virtual museum projects

1. may be done in collaboration with museums
2. may be done under auspices of grant project or non-profit education organization
3. can invite community participation
4. can include both ethnic minority and ethnic majority student participation
5. can be a springboard for other learning activities

Virtual museum projects place students at the center of the teaching-learning process. Students working on virtual museum projects:

1. research and write essays on virtual museum topics
2. consult with experts and community members
3. collaborate with peers in different schools, in different cultures, in different countries, and in different languages
4. have access to museum collections for research and recording
5. use a variety of technologies (Web authoring, digital cameras, scanners, computer art, digital sound recording, virtual reality, etc.)
6. publish products of their learning to a world-wide audience

When one considers the content these virtual museum projects offer learners, other important aspects emerge:

1. integrated core academic curriculum, including science, mathematics, reading, composition
2. student-created art and digital media
3. content relating directly to the cultural heritage of the student
4. content that reflects authentic community concerns
5. the virtual museum itself, that becomes an authentic information resource for students in other schools and learners of all ages worldwide

The fact that museums will welcome students and teachers into their programs and give them access to their collections opens tremendous possibilities for education projects for American Indian students, who may have limited access to their own historic and material culture. Virtual museum partnerships with museums having substantial American Indian collections also offer their potential for education projects that fit a culturally responsive pedagogy.

CULTURALLY RESPONSIVE TEACHING

Culturally responsive teaching is a term applied to certain educational approaches that seek to improve education for minority students who have historically fallen below the norm of academic achievement. Some authors have defined culturally responsive teaching narrowly, identifying it with teaching practices that have been termed *culturally compatible* and *culturally congruent* (Au & Kawakami, 1994; King, 1994; Ladson-Billings, 1994b). Culturally congruent pedagogy recognizes specific mismatches between the culture of school and the culture of a student's home life and seeks to redress the mismatch using teaching practices that are more congruent to the knowledge, beliefs,

language, and social structures of the student. Culturally congruent teaching practices are based on anthropological and sociolinguistic research done within specific cultural communities and in the schools that serve them. Au and Kawakami (1994) have identified four research sources to guide the design of culturally congruent pedagogy: research on dialect speakers, on participation structures, on narrative and questioning styles, and on peer group interactions. Rather than taking a deficit view of the cultural knowledge a student brings to the classroom, culturally congruent teaching practices seek to build on the cognitive strengths students bring to the classroom environment (Au & Kawakami, 1994).

One example of a culturally congruent teaching practice is the use of "talk story" in Native Hawaiian classes. Instead of using the traditional turn-taking or teacher led recitation in reading discussions, teachers took advantage of the style of discussion common in the student's homes. Talk story discussions involve a collaborative performance of two or more children that weave cultural and personal narratives into the exposition in a way that actively seeks to draw participation by others into the story. Incorporating talk story into a model for classroom discussions, teachers were able to improve student participation and focus on a topic. Increased achievement that resulted from this culturally congruent approach was thought to be a result of the improved discussion of student readings (Au & Kawakami, 1994).

Other authors have used the term culturally responsive education in a broader sense. These authors have taken aspects of culturally congruent teaching and added educational approaches drawn from critical theory to give added

dimensions to the term culturally responsive curriculum (Bartolome, 1994; Bowers & Flinders, 1990; Delpit, 1988; King, 1994; Pewewardy, 1999; Pewewardy, 1994). Pewewardy (1994), who used the *term culturally responsible pedagogy* interchangeably with culturally responsive education, stated:

> Culturally responsible pedagogy involves providing the best possible education for children that preserves their own cultural heritage, prepares them for meaningful relationships with other people, and for living productive lives in the present society without sacrificing their own cultural perspective (p. 83).

By adding the concern of preserving cultural heritage, this definition aligns culturally responsive curriculum with many issues vital to minority communities. For Native American communities in particular, this means preserving Native languages and aspects of tribal culture that have been eroded by the dominating influence of European-American culture, mass culture, and the historic political policies that sought to forcibly assimilate Native Americans into the mainstream. By adding these types of concerns to its goals, culturally responsive education begins to resemble the approaches described as *culturally centered*, by King (1994) and *culturally relevant* by Ladson-Billings (1995). Along with Pewewardy's, these approaches add the dimension of social critique. Teachers learn to help students recognize, understand, and critique social inequities with the goal of improving their own education as they learn to improve society for everyone.

The critical approaches to culturally responsive teaching attempt to redress the social, political, and economic subordination of cultural minorities without denigrating or eroding the viability of their cultures. Delpit (1988) stressed that

education for subordinated cultural groups should focus on gaining the codes and cultural capital that will lead to success in the mainstream culture, but to do this in a way that affirms the value of their own culture. Rather than taking the child's home culture as a deficit to be corrected, such an approach makes use of the cultural knowledge students bring from their home and community life as an asset to build on. Bowers and Flinders' (1990) concept of *responsive teaching* makes a connection to cognitive theory, maintaining that effective teaching of cultural minority children requires gaining a working knowledge of the prior knowledge, the cognitive frames and schemas, and dominant metaphors that students must use to make meaning out of new information.

In attempting to describe specific educational approaches for students of subordinated cultural minorities, researchers have found it beneficial to use labels such as culturally congruent, culturally compatible, culturally centered, and culturally relevant to make careful distinctions between their recommendations. We have seen how some researchers have used the term culturally responsive to be synonymous with culturally congruent practices, and others have used the same term to apply to more critical approaches that are more similar to culturally centered and culturally relevant approaches. Because this study will be examining unique approaches to educational computing, I found it beneficial to start off with a broad conception of culturally responsive education and let a more specific formulation emerge as the research progressed.

To help focus my research I tentatively describe culturally responsive teaching as follows. Culturally responsive teaching

1. is a strategic approach to classroom practice that takes advantage of the cultural knowledge a student brings to the classroom to provide a challenging education capable of sustaining long-term academic success.
2. is a multicultural approach that seeks to improve education for minority students who have historically fallen below the norm of academic achievement.
3. means abandoning the deficit view of the minority child, and taking strategic advantage of the child's culture, language, social and political situation, and community relations as a positive base for classroom instruction.
4. addresses issues that are important to the students' wider communities such as social and political problems and the preservation of endangered language and cultural heritage.
5. provides students with the knowledge, codes and cultural capital needed to be successful in mainstream society, but does so while valuing and affirming the students' own culture.

Because the virtual museum projects I examined in this study involved Native American students researching their tribal history and culture, I hypothesized that such projects would demonstrate some aspects of culturally responsive pedagogy.

THE RESEARCH QUESTION

In this chapter I have presented three recent trends in information technology and education to identify an emerging teaching strategy. These trends

have been the uses of information technologies by museums for the creation of online virtual exhibitions, the uses information technologies by schools to implement virtual museum projects, and the uses of information technologies by educators of Native American students to implement culturally responsive teaching strategies. These three developments overlap in the emerging teaching strategy of school-museum partnerships for the creation of virtual museums of Native American cultures by Native American students. Educators of Native American students are pursuing these projects because they feel that they are appropriate for their students. To reveal more clearly the potential such projects have for Native American students, this study addressed the following overarching question:

> **Research Question:** In what ways do virtual museum projects support a culturally responsive teaching practice for Native American students?

To help focus the research activity, there were two component research goals that were addressed by the study:

> **Component Research Goal 1:** To give a description of an emerging strategy for culturally responsive teaching by comparing several virtual museum project case studies.
>
> **Component Research Goal 2:** To determine how virtual museum projects might contribute to the understanding of culturally responsive pedagogy.

SIGNIFICANCE OF THE STUDY

Virtual museum projects that are collaborations between schools, school communities, and museums is an education strategy that is only beginning to

emerge, and there is a paucity of research on the approach. The case studies of such virtual museum projects reported here will help to fill this void in scholarship. Examining virtual museum projects as an example of culturally responsive teaching has not been done to my knowledge, so the study was unique in opening up inquiry into a fresh area of study. Indeed, very little work has been done that examines educational computing approaches in general as applicable to culturally responsive teaching, though some scholars have recognized the potential for that connection (Damarin, 1998). So it is my hope that the study will be relevant to wider issues regarding the uses of technology for educating minority students.

The study focused on a specific cultural group, Native Americans. Readers of this research should judge how its findings might apply to other minority groups who would benefit from culturally responsive approaches to educational computing. Some aspects of the study may also apply to mainstream students as well.

Chapter 2: Review of the Literature

In chapter one, I outlined recent trends in educational computing and Native American education to give a context to the focus of the present study, which was to examine virtual museum projects as a culturally responsive teaching strategy for Native American students. In this chapter I will examine some of the literature related to the study. First, I will take a brief look at the literature concerning Native American education today, examining in particular the concerns Native American communities have regarding education. I will also examine the literature that shows how teachers of Native American students have used educational computing. Next, I will look at the small amount of literature that exists regarding virtual museum projects and the potential these kinds of projects might hold for Native American students. Finally, I will present a more comprehensive review of the literature that leads to the concept of culturally responsive pedagogy, which is one of the core concepts of the study.

NATIVE AMERICAN EDUCATION TODAY

Nearly two million persons identified themselves as American Indian or Alaskan Native on the 1990 census, which is a little less than 1% of the total U.S. population (National Center for Education Statistics, Pavel, Curtin, & Whitener, 1997). This figure is more than twice the previous Census figure for Native Americans, indicating a rapid growth in the American Indian populace (Reyhner, 1992). This population, representing approximately 500 tribes, is widely

dispersed throughout the United States, though more than half live in the 12 westernmost states (National Center for Education Statistics et al., 1997).

A recent survey found that about 492,000 Native Americans were enrolled in K-12 BIA/tribal schools and public schools. Nine percent of these students attended BIA/tribal schools and 38% attended schools with high Indian student populations (having 25% or more Indian students). Most of the schools with substantial American Indian populations are located in remote rural areas (National Center for Education Statistics et al., 1997).

BIA figures in 1997 show that 49,213 K-12 students were enrolled in 187 BIA/tribal schools. Of these schools, 82 were operated by the BIA and 105 were operated by tribes using federal funding (contract and grant schools). These schools were located on 63 reservations in 23 states (Bureau of Indian Affairs, 1998).

As an identified racial/ethnic group, Native Americans rank as the most disadvantaged on numerous measures of the human condition. As a group, they are the poorest Americans, having the highest rate of infant mortality, suicide, and alcoholism, and the lowest employment rate (Huff, 1997; Jaimes, 1992). The poverty is reflected in the fact that 85% of students in BIA-funded schools are eligible for reduced-price or free lunches (National Center for Education Statistics et al., 1997).

Educational indicators show Native Americans to be behind most racial/ethnic groups, but there are some positive trends as well. Nationally, Native Americans have an alarming dropout rate of 36%, and in some places it is

as high as 50 to 60 percent (Indian Nations At Risk Task Force, 1991). This dropout rate is almost twice the dropout rate for white students (Pewewardy, 1999). Standardized test scores should be interpreted cautiously for minorities, but if used to give an indication of educational achievement, they show a mean for Native Americans in BIA-funded schools in the first quartile on nearly all achievement tests in all grades (Office of Indian Education Programs, 1988)

On the positive side, the number of Native Americans seeking university degrees has increased dramatically over the last 30 years. Only about 1,400 were enrolled in 1963, but by 1968 the number of American Indian university students had more than doubled to over 3,000. Ten years later, in 1978, the number of Native college students had increase ten-fold to about 30,000 (Noriega, 1992). In spite of this increase in absolute numbers of students, some scholars who are Native American stress that American Indians continue to be greatly underrepresented proportionally in the college population, especially in programs for advanced degrees (DeLoria, 1994; Lomawaima, 1995).

A 1980 survey found that over 18% of American Indian high school sophomores had at least one parent with a college degree (compared to about 13% for both Black and Hispanic sophomores and 26.8% for White sophomores) (Office of Indian Education Programs, 1988). Many of these Native college graduates act as motivating role models for Indian youth and powerful advocates for the interests of their nations.

NATIVE AMERICAN CONCERNS FOR EDUCATION

Through the nineteenth century and into the early twentieth century, it has been U.S. policy to use education as a tool to assimilate Native Americans forcibly into mainstream American culture. This was seen by U. S. policy makers as an ethical alternative to the extermination or extinction of Native American peoples after the achievement of "manifest destiny"—the 19th century view that the United States was destined to conquer and absorb North American territory from the east coast to the west coast, dominating the continent economically and politically. In exchange for the loss of their home lands and through the agency of Western-centric education, the American Indians were to be stripped of their cultures and their languages and transformed into farmers, trades people, or crafts people, so that they could take their place in the society of White Americans (Adams, 1988; Adams, 1995; DeJong, 1993; Lomawaima, 1995; Noriega, 1992; Reyhner, 1992). This educational task was to be accomplished by a system of boarding schools deliberately designed to keep Native children away from the recidivist influences of their homes and tribes for long periods of time, so that the effects of Western-centric education and indoctrination might have maximum effect. This system was largely unsuccessful. Some Native Americans accommodated to White man's education in order to gain the ability to survive in a world dominated by European Americans, while others actively resisted all attempts at forced assimilation. Many Native Americans who succumbed to the assimilationist agenda found that they were accepted by neither European

American nor Native American society (Adams, 1988; Adams, 1995; DeJong, 1993; Reyhner, 1992).

By the 1930s, American Indian education policy became more progressive. The nurturing function of the child's family and community became a valued aspect of the Native child's well-being that was to be respected and supported in American Indian education. The Bureau of Indian Affairs (B.I.A.) attempted to dismantle the system of boarding schools, replacing them with day schools on reservations, but was only moderately successful. Students were no longer prohibited from speaking their Native languages and participating in the religious practices of their tribes. Educators of Native Americans began to recognize the need to accommodate schools more toward the students' home and community cultures, but the focus and purpose of education in B.I.A. schools remains Eurocentric (DeJong, 1993; Szasz, 1977).

Beginning in the late 1960s, the trend in American Indian education has been toward self-determination. New laws and policies have made it possible for tribes to gain increasing control over schools and colleges for Native Americans (Tippeconnic III, 1999). In the past 30 years progress has been made in several areas related to Native American education. State and local education agencies have recognized the need to improve the education of their American Indian student populations and have created studies and programs for that purpose. Tribally controlled schools and public schools with high American Indian enrollment have developed programs for parental participation in early childhood education and other school programs affecting Native children. The numbers of

Native teachers, administrators, and university professors in the nation's educational institutions have increased. New programs for addressing the linguistic, cultural, academic, health and social needs of Native students have been developed. New curriculum materials incorporating Native American culture have been developed. Students have developed positive self-concepts and attitudes about their Native cultural identities. The numbers of Native Americans attending and graduating from colleges and graduate programs have increased, and the numbers of tribally controlled schools and colleges and Indian controlled public schools have increased (Indian Nations At Risk Task Force, 1991).

In spite of these improvements, Native Americans still recognize that great problems still exist in their communities, and they call for improvements in American Indian education that addresses those problems. Closely allied with concerns for the improvement of education for their children is the very survival of their cultural heritage and languages. The Indians Nations at Risk Task Force, consisting of respected members of many American Indian tribes, expressed these deep-seated concerns eloquently in their 1991 report:

> American Indians and Alaska Natives, with languages and cultures found in no other place in the world, are in danger of losing their distinctive identities. Many members of the younger generation know little or nothing about their Native languages, cultures, rich histories, fine arts, and other unique features of their cultural identities. The knowledgeable Elders, once important teachers in transmitting the historical, cultural, and practical knowledge to the young, are no longer a part of the educational systems. In addition, the intellectual leaders—the historians, the spiritualists, the medical experts, the philosophers—are no longer trained through a formal tribal process of education during the youngsters' upbringing.

> If Native cultures remain important today, as many Native political and educational leaders believe they do, they must again become a part of the educational process. Tribal groups must develop educational structures built on their cultural priorities and foster continued development and growth. Schools must do their part in supporting this movement.
>
> Partnerships between schools and Native communities and tribes must become one of the schools' highest priorities. Schools must encourage positive political relationships, recognize the value of a people's language and culture, and support broad community participation in the schools (Indian Nations At Risk Task Force, 1991, pp. 31-32),

Native American concerns for education today call for a reversal of the forced assimilationist role of American Indian education as it was implemented in the nineteenth century. Education should still provide Native American children the knowledge and skills they require to succeed in the wider mainstream society, but not at the expense of the loss of traditional language and culture. Indeed, added to that role is the goal of proactively preserving Native cultures and language. Native American education has a bicultural goal requiring a culturally responsive approach to teaching (Pewewardy, 1999; Pewewardy, 1994; Stokes, 1997; Van Hamme, 1996). In keeping with the focus of this study, I will next look at the role technology has been playing in these new directions in American Indian education. Appropriate uses of technology in Native American schools will be apparent when they address the concerns that Native Americans have expressed for education for their children.

EDUCATIONAL TECHNOLOGY AND NATIVE AMERICAN EDUCATION

Perhaps the greatest rationale behind the use of educational computing in American Indian education is the need for locally produced curriculum. In mainstream education, the curriculum is supported primarily by the textbook. For

most teachers, the curriculum is the textbook. Unfortunately, the textbook is subject to economies of scale and ends up expressing the "official knowledge" that is subject to the political power struggles of the dominant society (Apple, 1993). Indeed, one of those political struggles has been for increased multicultural content in textbooks, but the overall the progress in that direction has been mixed (Gay, 2000). There can be no expectation that textbook publishers will produce texts with the kind of language instruction and cultural knowledge that Native American communities wish to see that will help preserve their heritage. Lacking mass-produced textbooks for these purposes, Native American schools will need to produce their own curriculum materials that answer to their unique needs. Educational technologies can play a role in the production of language and culture curriculum materials. Technology can also play a role in supporting the kind of classroom practice that does not rely on existing texts but uses a learner-centered, constructivist pedagogy (Means, 1994).

Computer Software Adapted to Native American Curriculum

Digranes and Digranes (1989) reiterate the need for alternatives for curriculum content in multicultural education, and they identify computer applications as offering possible solutions to the problem:

> Locating instructional materials specifically designed for various cultural groups is difficult because such materials are typically limited or non-existent. The teacher's options are to create new instructional materials or to adapt other available materials to the special cultural needs. Creating new instructional materials is a labor and time-intensive process. Teachers will often choose to adapt existing instructional materials. Computer software applications, such as word processing, databases, and graphics programs, are commercially available instructional materials that can be easily adapted by teachers to meet special cultural needs (p. 20).

They then proceed to catalogue several educational computing uses that have been applied in culturally responsive ways in Native American classrooms. Word processing applications have been used by Native American students to document oral histories, myths, and their own stories and poems. Teachers have also used word processing to simulate tribal businesses and offices by having students write business letters, voter registrations, and housing notifications. Database programs have been used to simulate cultural business environments where students create and access such database applications as tribal rolls. Databases have also been used to support social and historical research, enabling students to amass and organize information they have researched and make their finished product a research tool that may be used by other students and tribal members. Spreadsheets have been used to simulate tribal business practices such as keeping track of accounts for various offices such as housing, health services, tribal land, and tribal rolls. One class used spreadsheets to document changes in tribal population and forecast the future population of the tribe. Graphics programs have been used to illustrate student writing projects and create signs and banners for the school. Other programs Digranes and Digranes (1989) have found being used productively in Native American classrooms include storybook programs, crossword puzzle programs, music programs, spelling programs and desktop publishing programs.

In the 1980s, Logo programming was promoted as a computer application that potentially enhanced students' cognitive abilities for any number of subjects

(Papert, 1980). Several studies using Logo have been tried in Native American schools. Bradley (1985) used Logo with urban Native American students in the Boston area. He failed to find enhanced ability to learn mathematics with Logo alone but found that teachers could use the programming environment to stimulate mathematics discussions and that students were able to work with interest for longer periods of time compared to a control group. Students also enjoyed the creative freedom of Logo projects and tended to self-select projects incorporating Native American designs.

Sower (1987) used Logo and Bank Street Writer with Navajo and Hopi students at Tuba City Arizona Boarding School. She found motivational effects similar to Bradley. She also found that female students were just as capable and motivated to use computers as boys. Her main finding, however, was how the computer classroom changed student and teacher roles in ways that enhance student language use in the classroom. The difference in discourse between regular classrooms and the computer classrooms was dramatic. The infrequent student talk in regular classrooms was always in English and consisted of short responses to teachers' questions, unauthorized whispers to fellow students, or to ask directions or permission.

In the computer classroom, there was a great deal of talk. The teacher mainly spoke to give explanations of new computer concepts and responded to many student-initiated questions. Students conferred with each other a great deal in Navajo interspersed with computer terms in English in order to accomplish sophisticated thinking and programming tasks using their native tongue. The

teacher's role changed from a lecturer and a "provider of knowledge" to that of a facilitator and guide. Students engaged in a more active role in conducting their own learning in an environment where their peers were teachers and their teacher was a co-learner. The changes Sower described are reminiscent of the kinds of changes in classroom discourse that take place when teachers engage in culturally congruent teaching (Au & Kawakami, 1994; King, 1994; Ladson-Billings, 1994b).

At Monument Valley High School, students used Logo programming as a part of a summer program called *Ndahoo'aah*, a Navajo word meaning "relearning and new learning." In the program, tribal elders teach students the traditional arts of basket making and weaving. Logo was used to create designs for weaving and basket projects that the students planned to create. The Logo programming stimulated students to learn mathematics and geometry concepts in a way that is naturally connected to their culture (Clemens et al., 1995).

Computing Projects for Native Language and Culture

When the forced assimilationist education policy was initiated in the United States in the late 19th century, there were 604 American Indian languages, most of which were healthy and alive. Today, only 206 American Indian languages survive, and some 50 languages are approaching extinction with fifty or fewer living speakers (Skinner, 1999). It is little wonder that Native Americans stress Native language as a priority in American Indian education. Language is seen as a carrier of Native culture. First Nations Elder Eli Taylor explained that

> Our Native language embodies a value system about how we ought to live and relate to each other. . . . It gives a name to relations among kin, to

> roles and responsibilities among family members, to ties with the broader clan group. . . . There are no English words for these relationships because your social and family life is different from ours. Now if you destroy this language, you not only break down these relationships, but you also destroy other aspects of our Indian way of life and culture, especially those that describe man's connections with nature and the Great Spirit and the order of things. Without our language, we will cease to exist as a separate people. (quote in Skinner, 1999, pp. 113-114)

There are two issues related to Native languages in American Indian education. The first is in bilingual education, where students use their Native languages to learn academic content while they are acquiring fluency in English. The second concern is language revitalization or recovery, where the Native language is in danger of being lost and inclusion of the language in school helps to maintain it. Educational computing has played roles in addressing both of these concerns.

McCurry and Kleinfeld (1986) used a computer authoring program to develop English tutorials for Athabaskan students that addressed the common errors they make in English due to the Native language influence upon their dialect of "village" English. They described a development approach that analyzed the types of writing mistakes students made, and using contrastive analysis, designed interactive writing exercises that addressed the types of standard English errors they are likely to make. Also, the exercises were based on stories and situations familiar to the students such as a dog sled race or duck hunting. After the program was introduced, average reading and writing scores on standardized tests increased from below the 10^{th} percentile to just under the 40^{th} percentile.

Jojola (1998) traces current trends in computer-supported Native language projects to the Selectric typewriter, developed in 1960. Special type balls were developed for the Athabaskan font, which also worked for Navajo and Apache languages. For the first time, local bilingual programs could create typed materials for students in these tribes. Type balls for other Native languages were soon developed. The computer era of font support for Native languages began as early as 1984 when a Navajo ROM (Read-Only Memory) chip for the Digital Rainbow 100 PC was developed for the Rock Point Community School, enabling the school to create bilingual programs and projects for preserving the Navajo oral tradition.

Bennett (1987) worked with Hupa, Yurok, Karuk, and Tolowa tribes in California to explore computer-supported bilingual projects that made use of a Macintosh Unifon font that enabled students to create bilingual dictionaries. In a multi-grade 3-8 class, older students teamed with younger students to form teams of 2-3 students to produce bilingual pages of a dictionary of plants and animals important to the students' tribes. Older students served as role models for the younger students, making them feel more comfortable about their contributions. Tribal elders were invited to contribute their knowledge of the natural world for the students. Student teams would then write sentences in their own language describing what they learned about a plant or animal and translate the sentences in English. Much like Sower's (1987) experience with Navajo and Hopi students, Bennett discovered that the type of activity supported in this computer class changed the roles of the students and teacher in ways that stimulated the use of

language in the classroom and made the class more culturally congruent with student's social interactions at home.

The Zuni School District has been making use of computers to support literacy while giving students opportunities to create documents for preserving cultural heritage and revitalizing Zuni language (Souder, 1990). In one project, students learned how to use desktop publishing software and worked with teachers and tribal elders to create a book on the use of natural materials in Zuni culture. Middle school students and high school students worked with community elders in the production of an interactive electronic dictionary of the Zuni language. Zuni words could be accessed via a list of English words. Clicking on the English word causes the Zuni entry to appear along with several buttons. One button brings up a Zuni sentence that uses the word. Another brings up an illustration for the word.

The creation of the Tewa Language Project CD-ROM illustrates an exemplary relationship between the University of Washington and the San Juan Pueblo in New Mexico (Jacobs et al., 1998). The project began as an attempt to recover the Tewa language program materials that were lost in a fire at San Juan Pueblo Day School in 1983. All of the audio and video recordings made by Tewa elders in the 1970s were destroyed.

The University of Washington participants served as consultants who created a Tewa computer font and scripted the CD-ROM contents using Toolbook, a multimedia development program. The San Juan Pueblo community provided tapes and videos to use as program source materials. Tewa elders

volunteered to speak Tewa words and sentences for the interactive programs. The finished project used images, sounds, as well as text to convey content. Among the several modules included on the CD-ROM were an interactive Tewa dictionary, tutorials on Tewa grammar, and illustrated Tewa stories told by elders.

The creation of the Tewa Language Project CD-ROM required a community-wide effort fraught with issues of repatriating cultural capital and ascertaining intellectual rights to Tewa stories and lore. Project participants had to negotiate and renegotiate the ways in which sensitive cultural and linguistic information could be accessed. Elders made their stories available for the CD-ROM in order to assure that their descendents would have access to them. Because the Elders believed the stories and the language itself were imbued with spiritual qualities, they did not want the materials shared outside the tribe, and the Tribal Council decided that access to the CD-ROM and its contents would be restricted to tribal members.

At Pine Ridge High School on the Pine Ridge Indian Reservation, students have been using sound, video, animation, and desktop publishing make their Oglala Sioux heritage the center of their learning (Gooden, 1996; Hamilton, 1993). The school's English teacher began with assignments that had students use HyperCard to compare Lakota stories and Western myths. These early experiments became formalized into a Myths and Legends curriculum that stimulated the entire school. Soon students were learning how to add animation to their multimedia productions to show, for example, a dramatic moment in a Lakota story when the Devil's Tower erupted from the ground. Students soon

were developing literally hundreds of HyperCard stacks that illustrated elder's stories, tribal history, and their own creative imaginations, such as an interactive paper doll stack that mixed Native dress and contemporary fashion. The school's culture teacher soon took up the technology to have students work on an interactive Lakota dictionary. Students also wrote dramatic stage plays based on Lakota legends and presented them annually to the school community. Students also used desktop publishing software to create an annual publication of student writings and artwork called *Sparkling Silence*.

TELECOMMUNICATIONS

The Internet has also been having an effect upon educational computing in Native American schools (Resta, 1992). The first network dedicated to Native American education was the Educational Native American Network (ENAN), a federally funded collaborative project between the University of New Mexico and the Bureau of Indian Affairs. It has supported over 300 sites in 23 states with Internet access and toll-free dial-up service. The user base includes 40% students, 35% teachers, 20% administrators, and 5% supporting partners. Students have been able to participate in a number of online activities that gives them opportunities to practice writing skills and learn science and mathematics content. University professors and scientists from Sandia National Laboratories, Lawrence Livermore Laboratory and other national laboratories work with students on science projects. Native American students in schools across the nation share information for learning projects. Teachers confer with each other, educational

specialists, and scientists to devise appropriate classroom materials for their students and brainstorm collaborative learning projects.

The *Vanishing Species of the Southwest* is one online project offered on ENAN that was initiated by the University of Texas and the Texas Memorial Museum. Students in the Southwest learned of endangered plants and animals in their region and were invited to study the lore and uses of these species in their communities. They shared this information with each other over the network. *Portraits: A Collaborative Writing Project* had students on the network each write a chapter of a novel on a common theme. The novel was distributed in electronic form and hard copy. An archaeology simulation allowed students to learn about archaeology in ways that were sensitive to American Indian concerns regarding sacred sites and burial grounds. Students and teachers were also able to engage in an on-going *Electronic Seminar* that included prominent members of the American Indian community, such as authors, tribal leaders, scientists, and congressional leaders.

Apple computer has made its corporate network, AppleLink, available to schools that have been awarded Apple education grants. Pine Ridge High School made use of the network to create a relationship with another Apple grantee, Edgewater High School in Orlando, Florida (Gooden, 1996). Edgewater is a culturally diverse school, with nine nationalities in one participating English class. Students in the two schools shared a facility with HyperCard and created multimedia biographies to share with each other. They also shared myths and

legends, expanding the Pine Ridge multimedia curriculum into a cross cultural exchange that spanned the continent.

The Four Directions Project

The Four Directions Project was a 5-year federally funded project involving 19 Native American schools, which focuses on the uses of technology to support culturally responsive curriculum. I was a participant in the project since its first year, so it is relevant to the current study, as the cases that I present here will have grown out of the Four Directions project.

Four Directions was an education reform initiative with specific goals for the improvement of education in American Indian schools. The goals include the implementation of culturally responsive learning environments for Native American students, integrating the use of technology throughout the curriculum, providing ongoing professional development for staff in participating schools, and developing an online database of locally developed educational resources (Roy, 1998). In addition to the 19 American Indian schools in the Bureau of Indian Affairs system, the project had four university partners that provided technology and curriculum consulting and teacher professional development workshops on-site and at annual summer institutes. The project was ambitious and its use of technology was extensive, so a thorough discussion of its activities is beyond the scope of this review. A few of the activities will be discussed here to put the project into context with the other trends in educational computing in Native American schools discussed above.

Telecommunications was a key technology that offered a spectrum of strategic uses in the project. Consequently, the B.I.A. made the Four Directions schools a top priority for networking and Internet connectivity (Allen et al., 1999). Partners, teachers, administrators, and students in the project acquired accounts on a flexible, Internet-accessible groupware conferencing system, FirstClass, which was used for a number of project activities. Email may be exchanged with other users on the system and other Internet account holders. Special conference areas on the system were set up to meet various communication needs of the project, including a teacher conference, a partner conference, student conference, a help conference, and several download areas. The system allowed easy file sharing through email attachments. A secure chat feature lets users communicate in real time. The system was used by teachers for collaborative projects between participating schools and to support online curriculum design courses offered by the University of Texas (Allen et al., 1999; Roy, 1998). Several times the chat capability was used for special activities, such as Net Day, an annual celebration of school Internet capacity. Parents and community members were invited to the open house celebration to see school web pages developed by students and teachers and to see live chats between students, community members, and political leaders in progress. In one chat, U. S. Senator Jeff Bingaman of New Mexico interacted with grade school students who quizzed him about education policy (Allen et al., 1999).

Native Americans believe it is important to have their communities and cultures accurately depicted on the Internet, so the ability to create school web

pages has been a particularly empowering outcome for Four Directions schools. Nearly every Four Directions school had a Web site that described their programs and highlighted important people and features in their communities. Nah Tah Wahsh school in Hannahville, Michigan, used its web site to deliver a number of educational resources on community history and language. With help from partners at the University of Kansas, teachers and tech-savvy students have produced an interactive Potawatomi language tutorial for the web, replete with streaming sound files (Allen et al., 1999).

The project offered free graduate level online courses in curriculum development to project participants every school semester. The course was delivered via a combination of a Web site, FirstClass conferences, and on-site visits to the schools by the course instructor. The courses focused on thematic curriculum design and culturally responsive pedagogy for Native American students. Guest speakers participated in the course, offering information on topics such as oral history and evaluating course materials for Native American children. Teachers who took the course created lesson plans for their classes and, when appropriate, share them on the Four Directions curriculum database (Roy, 1998).

The Four Directions curriculum database was another key component of the Four Directions project, and it is maintained on the University of Kansas server as a free service to educators world-wide. Participants in the project produced a great deal of curricular materials that are targeted for their student populations. To enrich the multicultural curricular offerings of teachers not in the Four Directions project, participants were encouraged to contribute their lesson

plans to the database. After the materials were approved as appropriate and sharable by the school communities, they were uploaded to the database, classified according to tribal affiliation, subject area, and grade. The database is searchable according to all of the categories given to the materials (Roy, 1998).

The Four Directions Mentoring Project was another educational initiative that makes use of telecommunications. It was a spin-off of Harris' Electronic Mentoring Project, a project that had been offered through the University of Texas for seven years. Four Directions solicited volunteers in the Native American community to engage in an email mentoring relationship with Four Directions students. These included Native American leaders and professionals who take great interest in helping Native children plan for their future. The searchable database of mentors contained short biographies of the volunteers, enabling teachers to find mentors for their students based on mutual interest. After submitting choices for mentors to the project coordinator, a match was made, and the mentor and student engaged in email exchanges at an agreed upon frequency for a period of time (Roy, 1998).

Telecommunications was not the only instructional technology promoted by Four Directions. At the summer institutes and in on-site visits, teachers were given training in a wide range of technological skills including computer repair, word processing, spreadsheets, graphics software, multimedia development, digital video editing, sound recording, digital sound editing, digital photography, and virtual reality. The Four Directions teachers made use of these new skills in

all areas of their teaching, especially for learning projects that fostered language revitalization and cultural preservation.

One project partner used font creation software to make a cross-platform font for the Quileute language for Quileute Tribal School in Washington State. The font is being used to digitize the Quileute dictionary and create interactive Quileute language tutorials. Students have been entering Quileute words and their English definitions into a spreadsheet that will eventually be turned into an interactive dictionary. One student used HyperStudio to create a multimedia pronunciation guide that allows learners to click on a word that exemplifies one of the Quileute phonetic letters and hear it spoken by a Quileute elder. The font has been installed on all of the school's computers so that students can include Quileute words in their writing (Allen et al., 1999).

Lummi school developed a cross-grade thematic unit on "The Ways of the Water" that explored this Washington state tribe's ancient connections to the ocean and salmon-running waterways. The tribe's Aquaculture Project helped second graders raise Coho salmon from eggs in an aquarium in their classroom. Fourth graders worked with the Lummi Natural Resources department to learn about the ecological problems of local freshwater streams and worked to enhance water quality. The whole community celebrated the project in a ceremony in which the second grader's salmon were blessed and released into a stream. The school's culture teacher created a salmon dance for the occasion that was performed in the school gym. Students and teachers recorded the project on videotape, and teachers used their digital video editing skills to produce a 30-

minute professional-quality documentary video about the curriculum project (Allen et al., 1999).

One cutting-edge technology that has been promoted in the project is QuickTime Virtual Reality (QTVR). This is a relatively new "immersive" media that permits the representation of interactive virtual spaces and virtual objects on the desktop computer. Training and virtual reality kits have been provided for all of the Four Directions schools, and they have been encouraged to use this showcase technology to create virtual museums with the project's museum partners, the Smithsonian National Museum of the American Indian in New York City and the Heard Museum in Phoenix, Arizona (Cocks, 2000; NMAI Runner, 1999; Roy, 1998; Roy & Christal, 2000a; Roy & Christal, 2000b). These projects represent a new model of school-museum collaboration, which is the topic of this study. More about the Four Directions experience with virtual museums will be presented in the next section.

VIRTUAL MUSEUM PROJECTS

In Chapter 1, I reviewed three examples of student-produced virtual museum projects in order to empirically derive some potential attributes these projects have for classroom practice. The reason that approach was taken was because the literature on the topic of virtual museums is quite thin. I have had more success finding examples of virtual museums than locating scholarly articles on the practice. Now I will take a closer look at the small body of literature on virtual museums.

McKenzie (1995; 1996; 1997) has done the most thorough treatment of the subject of virtual museum projects as a classroom practice. He first began conceptualizing the notion of virtual museums in 1995 when working with the Bellingham, Washington School District, which had passed a six million dollar bond proposal to provide access to the World Wide Web in its 18 schools. To answer the question, "Why?" he proposed three categories of educational uses of the World Wide Web: virtual museums, curriculum pages, and the research cycle.

Curriculum pages were teacher-created Web link pages that gave quick access to Web sites with accurate and age appropriate information that were the fruit of intensive searches for useful information to supplement classroom curriculum (McKenzie, 1996).

Recognizing that traditional methods of research were not adequate for the unorganized tangle and questionable quality of the Web's information offerings, teachers looked for procedures that would guide student research on the Web. The research cycle is a process developed by a team of teachers that guided students in their research on the World Wide Web for their papers and reports. It guided students and student teams through stages of questioning, planning, gathering, sorting and sifting, synthesizing, evaluating and reporting (McKenzie, 1996).

The virtual museum was a rubric to help teachers conceptualize collaborative classroom projects that had students design Web pages as the product of their learning activities. The conceptualization came as something of

an epiphany. Teachers searched the WWW for examples of school Web pages and found pages of little substance, content, or utility—typically a few pictures of buildings and principles and mission statements. Then they encountered some world-class virtual museums, created professionally with stunning graphic content and engaging information. This was to be a model for student-created Web pages that illuminated some component of the curriculum:

> Students act as curators under the tutelage of teachers who help them learn the special coding necessary for Web page design, . . . as well as the skills of gathering and interpreting artifacts and information. Virtual museums are a great way to engage students in "making meaning" while publishing globally. They challenge students to learn in a fully constructivist manner, building meaning into cyberspace (1996).

In a more recent article, McKenzie (1997) developed the idea of student created virtual museums further, arguing for a virtual museum community that would support an ongoing and evolving virtual museum that could involve numerous students over several years of development. Such a project might include partnerships with museum institutions and involve students' families and members of the school community. He defined a virtual museum as follows:

> Virtual museums live on the World Wide Web . . . the Internet.
>
> The door to the virtually museum is electronic. You drive up for a visit on the Information Highway, but you need no car. A computer and an Internet account serve as your entrance ticket and transportation combined.
>
> A virtual museum is an organized collection of electronic artifacts and information resources—virtually anything which can be digitized. The collections may include paintings, drawings, photographs, diagrams, graphs, recordings, video segments, newspaper articles, transcripts of interviews, numerical databases and a host of other items which may be saved on the virtual museum's file server. It may also offer pointers to

> great resources around the world relevant to the museum's main focus (McKenzie, 1997).

As this definition describes professional museum sites as well as student created sites, McKenzie distinguished between two types of virtual museums: learning museums that offer substantial online learning resources and marketing museums that serve to advertise the offerings a physical museum has, giving schedules of events, opening hours, entrance fees, and in some cases, museum shop sales. When he discussed virtual museums as student created learning projects, he was referring to learning museums.

Creating virtual museums offers several beneficial outcomes for students:

1. They promote student-centered learning, real world problem solving, and an opportunity to do real research for authentic learning. Many of the problems students encounter involve the same kind of problem-solving museum professionals engage in, such as how to organize and display objects in the exhibition, how to interpret the artifacts, how to follow sound principles of accuracy and scholarship, or how to design displays for certain target audiences.
2. They give students responsible roles that prepare them for the workplace. They must work collaboratively with their peers to make decisions in ways that mirror the adult work world.
3. They help to preserve the heritage of the students' local communities. Community-based virtual museums are a place where memories, artifacts, photos, and letters of the elders of a community may be preserved and help students learn about the history of their ancestors.

4. They are global. They give students the opportunity to create knowledge products that may benefit other students and life-long learners all over the planet.
5. They are dynamic, multidisciplinary, and multisensory. Student virtual museums can become an evolving multi-year, multi-grade endeavor that grows and changes on a regular basis. It can involve learning that crosses the lines between disciples—including art, music, mathematics, science, social studies and writing. They are multisensory, giving students the opportunity to create knowledge in many modal forms and offering visual, aural, spatial, and textual modes of learning to museum visitors (McKenzie, 1997).

McKenzie made a case for partnering with museums to support such projects. Museum professionals have important skills to teach students about the work of museums. Students may divide their own work on virtual museums along the lines of museum specialization such as curator, researcher, collection manager, exhibition designer, educator, public relations, fund raiser, editor, graphic designer, and photographer. Also, museum professionals can tutor students in the serious ethical issues faced by museums, such as intellectual property and copyright issues and the importance of accurate and sensitive interpretation of artifacts and historical events.

McKenzie made a plea to museum professionals for partnerships with schools to create learning virtual museums of their collections. Learning museums (as opposed to marketing museums) extend the reach of museum

collections to people who would never have an opportunity to visit the physical facility. They give visitors an opportunity to study the collection before making an actual visit, so that they will be "primed" for an optimal museum experience. They also offer visitors different options on how they might enjoy a museum's collection. In some cases the school side of a school-museum partnership might have better expertise in web publishing than the museum, making the relationship a balanced *quid quo pro*. A school partnership gives museum educators an opportunity to extend and deepen their educational mission and improve public outreach. School-museum partnerships can also lead to funding opportunities from education and museum funding agencies. School-museum partnerships give both parties the opportunity to create new models of collaboration and develop innovative ideas regarding the missions of both museums and schools.

This is a comprehensive vision for virtual museums, but little other literature exists that presents a case study of such partnerships. Lewis (1995) described her experience creating a virtual tour of a museum in Red Deer, Alberta. Her class made two trips to the museum, the first to examine what the museum had to offer and to try out the school's digital camera. Students were able to experiment with HTML and the digital pictures taken during the first visit. The second visit was well planned—students knew what to record with the camera and were focused in their research activities. The museum curator visited the class to look over the first draft of the virtual tour and made several corrections and suggestions. The final version of the tour went on the school's web page. The class invited parents to view the tour, and the response was very

positive. Lewis' experience with the project demonstrated that eighth grade students could master the technical skills needed to produce professional virtual tours. From the museum visit and creating the virtual tour students learned about the history of their community, learned to value museums, and gained valuable information on the operations of museums.

The Four Directions Experience

The Four Directions project had two museum partners, the Smithsonian National Museum of the American Indian (NMAI) and the Heard Museum in Phoenix, Arizona. In the first few years of the project, Four Directions participants gained knowledge and skills in several technology areas that would serve well the implementation of a virtual museum partnership. In particular, schools gained experience in creating web pages, using graphics programs, using digital cameras, and creating QuickTime Virtual Reality (QTVR) media. In the summer 1998, Paul Resta (1998) at the University of Texas drafted a concept paper for a virtual museum partnership with the NMAI. In the proposal he provided the following rationale for the importance of such a project:

> For many years, Native American culture was undervalued and suppressed in America. Although the richness of Native American historical and contemporary cultures has begun to be recognized, exemplary curricular materials based on this richness are rare. In addition, in a rapidly changing world, much traditional wisdom will be lost before there is an opportunity for Native American students to learn about their own history and culture, and to share what is sharable with the world community. Teachers trained in methods of cultural sensitivity and in the use of technology may provide leadership in the accessing, preserving, and sharing of Native American culture with the world community. One means of doing so is for Indian schools and communities to use technology to collaboratively develop *virtual museums* (p. 3).

Objects from the museum collections were to be selected by students and teachers in close consultation with community elders, who would help determine which objects were sharable and to add their own knowledge, and perhaps their own voices, to the virtual exhibition.

Resta gave five guiding principles for the NMAI/Four Directions collaboration that may also be applied to similar school-community-museum partnerships:

1. Virtual museums should be designed to help American Indian students learn about and value their own culture, language, and knowledge, as well as become familiar with the new learning technologies that will become important for their future in an information society.
2. Virtual museums should serve to preserve and revitalize American Indian language and culture. Virtual museum technologies offer yet another way to preserve American Indian knowledge and cultural heritage on durable media. They also offer another way to disseminate cultural information to American Indian communities.
3. There should be a continuing reciprocal relationship between the museum, schools, and communities that form the partnership. American Indian students and adults should be not only knowledge users but knowledge producers as well. They should be empowered to tell their own stories through the resources offered in the virtual museum. Ongoing communication will help assure the appropriateness and accuracy of the cultural property displayed in the virtual museum.

4. The focus of the virtual museum will be on individual tribes, rather than the NMAI collection, so that the virtual museum may foster access to important multisensory cultural information by local community members across vast distances.
5. Each tribe is unique, with different notions of cultural restrictions and allowable behaviors. Therefore, tribal leaders will have the right to restrict access to any information, images, sounds, or other media that they deem inappropriate.

Local community participation and development were priorities in the original concept paper. Each school community that was to participate in the virtual museum project would send a team of students, teachers, and community elders to the museum to work on selecting, recording, and researching the materials to be included in the virtual museum. In addition, a summer program was proposed for each participating school community. In the summer program, community members would bring valuable cultural materials to the school so they might be recorded in digital photographs or QTVR for a local virtual museum. Local landmarks, natural settings, and historical sites would also be recorded. Students could record tribal elders speaking about important objects, people, events and places in English and their Native language to add to the community's local virtual museum. Some of the sharable locally-created materials might be used to supplement the virtual museum offered to the general public on the museum's server. In exchange, the media created at the museum could be "digitally repatriated" to the local community for use within the community.

Thus, there were potentially two virtual museums emerging from each museum-school community partnership, one offered by the museum and accessible on the World Wide Web that offered only materials that tribal leaders had deemed sharable in that venue and a second, local virtual museum that was to remain within the community, perhaps including more sensitive materials for community access only (Resta, 1998).

The Resta concept paper, replete with budgets and timetables, provided a negotiation instrument for meetings between the National Museum of the American Indian and the Four Directions partners. It also provided a "Four Directions model" of museum-school community partnerships for creating virtual museums. A student created Virtual Tour of the National Museum has resulted from the negotiations around that model. The story of the Four Directions Virtual Tour has been told in a number of articles (NMAI Runner, 1999; Resta et al., 2000; Roy & Christal, 2000a; Roy & Christal, 2000b).

Roy and Christal (2000a) described the decisions that resulted from the initial meeting between the NMAI and the Four Directions partners. In accordance with the concept paper, the virtual museum project would have two components, one a virtual museum developed at the participating schools using local materials and the second, a virtual tour of the NMAI permanent exhibits at the George Gustav Heye Center in New York City "as seen through the eyes of Native American children (p. 316)." A process was established for selecting two participating schools for the project. A call for participation was sent to the qualifying Four Directions schools. The schools that wished to participate sent

proposals and letters of commitment to the Four Directions office, which selected two schools: Santa Clara Day School (Pueblo) in New Mexico and Hannahville Indian School (Potawatomi) in Michigan.

The Santa Clara team, consisting of two fourth graders and two fifth graders, two teachers, and parent chaperones were the first to go to the NMAI to work on the Virtual Tour in February 1999. They set the pace and style of the work. Before going to the museum, the director of the museum Resource Center had sent exhibition catalogues to the schools so that students could select the items they wished to record. By the time the team arrived, a full schedule of activity had been choreographed for the project. Before the museum opened to the public in the mornings, students would shoot QTVR panoramas of the exhibition space. For the rest of the day, two students would stay in the photography studio, digitally photographing the items they had selected and converting the photographs to QTVR objects. The other half of the team would work in the museum's library, researching their chosen objects and writing the essays that would accompany them in the finished virtual museum display. Museum staff did all of the handling of the priceless objects and followed a rigorous schedule of deinstalling them for photographing and reinstalling them at the end of the day.

Later in the spring, the Hannahville team went to the museum to add their selected objects to the tour. A year later, one more school participated in the project, Marty Indian School, a Lakota school in South Dakota. The current version of the tour consists entirely of student-created media and student

interpretations of their own selected artifacts. The tour features 28 QTVR panoramas and 40 QTVR objects that were imaged by the participating students (Smithsonian Museum of the American Indian, 2000).

Recent developments in easy-to-use QuickTime Virtual Reality software and affordable high-quality digital cameras make the accessibility of this technology to schools feasible. Because QTVR was used so extensively in the virtual tour, Roy and Christal (2000a) describe the technology carefully:

> QuickTime Virtual Reality (QTVR) had been identified at the beginning of the Four Directions project as having a unique potential in educational applications. . . . There are two types of QTVR movies, . . . QTVR panoramas (panos) are made from a series of overlapping photographs taken from a tripod using a specially designed panning head. Software "stitches" the photographs into one seamless 360° scene. When viewed on a computer monitor, you simply press the mouse button and move the mouse cursor in the direction you wish to "look" and the pano scrolls in that direction. The second type of QTVR media is the object movie. It is made by placing an object on a turntable and taking a series of pictures at evenly spaced angles as the object is turned. To interact with a finished object movie, you press the mouse button and move the mouse cursor in the direction you wish to rotate the object. A specially designed object rig enables the QTVR photographer to move a camera around an object vertically in order to make more complex object movies with both vertical and horizontal rotation.
>
> You may zoom in or zoom out of both types of QTVR movies. Also, invisible regions called hot spots may be painted anywhere on QTVR movies. Hot spots trigger special actions when clicked on, such as launching a new web page, labeling a spot on an object or in a pano, or bringing up close details of an object (p. 317-318).

Both types of media were used to create a virtual reproduction of the NMAI exhibition. The QTVR panoramas provide a kind of user interface for the tour. The panoramas are accompanied by a floor plan of the museum, showing where the current panorama is located and where the adjacent panoramas are.

The user may navigate from one panorama to the next by clicking on its location on the floor plan, or by clicking on a hot spot on the panorama. The user can see the museum artifacts on display in the panorama. Each of the student-selected artifacts has a hot spot on it in the panorama of that area of the museum. If the user clicks on an object hot spot, the object will appear in a separate frame on the tour web page, accompanied by the student's essay.

Roy and Christal anticipate the issues that will be important for future virtual museums that are developed for community use. Will they promote the linking of education, culture, and power for Native American communities? Also, critical issues abound relating to intellectual and cultural property rights. They call for new guidelines to help determine the appropriate use of Native American cultural items in future virtual museum projects. In summing up their observations of this unique project, they note that it presents new challenges to museum practice and new opportunities for Native American students and their communities:

> It is an example of how museums can expand their educational program to include their primary clients in the development of educational resources. The virtual tour piloted an approach for Native people to become involved in telling the stories of their cultural objects. Here, children are modeling how other Native American children and their communities can plan and develop virtual museums that inform the world at-large while they return images of objects to their cultural homelands. . . . Created by Native people, it provides a venue for cultural exchange. It is an act of cultural recovery as it returns to the Native community objects long removed from their origins. It is a way for Native communities to "digitally repatriate" precious items of their cultural heritage (p. 326-327).

The Four Directions/NMAI Virtual Tour was the first project that was inspired by a "Four Directions model" for virtual museum partnerships described in Resta's (1998) concept paper. Since this first project, other Four Directions schools have begun their own virtual museum projects, and new ones are being planned, some of which became cases for this study. Since the research question deals specifically with how such projects support a culturally responsive pedagogy, an examination of that literature will be made in the following section.

CULTURALLY RESPONSIVE PEDAGOGY

A central focus of this study is on a technology-supported teaching strategy that is culturally responsive. The concept of culturally responsive teaching was explored briefly in Chapter 1, where I asserted that a precise definition of a culturally responsive pedagogy was still being formed. Here I will present a more thorough examination of the literature concerning culturally responsive pedagogy to help establish a better understanding of what it entails.

TOWARD A DEFINITION OF CULTURALLY RESPONSIVE PEDAGOGY

I use the word "pedagogy" in much of this discussion because it is a broader term than "teaching," which implies a closer connection to classroom practice. Sometimes scholars use an even more inclusive term, culturally responsive education. Pedagogy, or the science or profession of teaching, takes a broader look at the issues surrounding teaching practice, including learning theory, the nature of the curriculum, and teacher education and professional development. The literature of culturally responsive pedagogy embraces all of these overlapping concerns. Contemporary constructions of culturally responsive

pedagogy draw from three decades of educational scholarship on the understanding of non-mainstream cultures for the purpose of improving student academic performance.

MULTICULTURALISM

Culturally responsive pedagogy has grown hand-in-hand with multiculturalism, and may be considered either a component of multiculturalism or at least an educational practice that draws deeply from multiculturalism. Multiculturalism is much more broadly conceived. It is a "metadiscipline" that overlays education as an idea or concept, a reform movement, and a process that has the goal of educational equity for all students, whether they belong to an ethnic minority, a certain social class, a particular gender a sexual orientation or "exceptional" status (Banks, 1993; Gay, 2000).

Multicultural education grew out of the Civil Rights movement of the 1960s. Initially, African Americans and other ethnic groups demanded that school curriculum be revised to reflect their experiences, histories, and perspectives (Banks, 1993b; Sleeter & McLaren, 1995). This was met with hurried responses from State school boards and school districts to put together add-on curriculum units and programs that celebrated "Brown heroes and holidays" but did little to affect the underlying dominance of mainstream culture in the schools (Nieto, 1995). By the early 1970s, the feminist movement added momentum to multiculturalism by making critiques that questioned the domination of the White male perspective in textbooks and curriculum. Soon other marginalized groups were agitating for equitable status in education and

society at large. People with disabilities, senior citizens, gays, and lesbians all trace beginnings of social ferment leading to significant accomplishments for equity and against discrimination during the 1970s (Banks, 1993b).

The 1960s and 1970s were also important decades for political activism and advances for Native Americans. During these decades Native Americans struggled and won many political battles for recognition of treaty rights and self-determination. Significant American Indian movements and numerous organizations reinvigorated Native peoples and created a new awakening for American Indian identity and solidarity (Deloria, 1985; Senese, 1991; Steiner, 1968). These decades saw the creation of the century's first tribally controlled school, the Rough Rock Demonstration School, in 1966, and the first tribally controlled college, Navajo Community College, in 1968. President Johnson ushered in a policy for increased tribal voices in federal Indian school boards. The 1972 Indian Education Act, the 1975 Indian Self-determination and Education Assistance Act, and the education amendments of 1978 permitted further tribal control over American Indian schools (Tippeconnic III, 1999). Tribally controlled schools have been and continue to be sites for innovative multicultural and culturally responsive education (Pewewardy, 1999, 1994).

Multiculturalism has advanced theoretically since the early days of add-on curriculum units celebrating diversity. Today multiculturalists wish to "Americanize" the curriculum and teaching practice so that education reflects the reality of American history and culture for a populace that is increasingly multicultural. The non-Anglo makeup of the U.S. is projected to be near 45% by

the year 2020, yet the bulk of the curriculum is still dedicated to the traditionalist's Western Tradition and the teaching practice primarily reflects the "culture free" pedagogy of the education "generalists" (Banks, 1993a; Banks, 1993b; Smith, 1998).

Since its beginnings, multiculturalism has expanded into a rich and complex theory. Banks (1993b; 1997) has described five dimensions of multiculturalism that highlight the development of multiculturalism over time:

1. *Content Integration*—the logical and non-contrived inclusion of knowledge, data, and information from a variety of cultures into the curriculum to reflect the diversity of American society.
2. *Knowledge Construction*—investigations that seek to understand how cultural assumptions, values, class, perspectives, and bias affect the creation of knowledge in the disciplines. Knowledge construction is also concerned with how children create their knowledge from prior knowledge and experiences and the ways teachers can guide and facilitate the process.
3. *Prejudice Reduction*—the examination of children's racial attitudes and the creation of strategies that help students develop positive racial and ethnic images and relationships.
4. *An Equity Pedagogy*—the development of teaching practice that facilitates academic success of students from diverse racial and ethnic groups.
5. *An Empowering School Culture*—the examination of the ways schools can be restructured to ensure educational equity and empowerment for all

students. It involves school-wide and systemic issues such as assessment, tracking, labeling, placement, and professional development.

Banks (1993a; 1993b; 1997) elaborated on the knowledge construction dimension of multiculturalism to help clarify the current state of school curriculum and to describe the directions education should be taking. He devised a topology of knowledge, which describes five overlapping and evolving knowledge types, 1) personal/cultural knowledge, 2) popular knowledge, 3) mainstream academic knowledge, 4) transformative academic knowledge, and 5) school knowledge. He argues that current school knowledge, which is the textbook, teacher's guides, and other official media sources designed for school use, is primarily influenced by mainstream academic knowledge and popular knowledge. Mainstream academic knowledge is comprised of the Western-centric concepts, theories, and information that are supported by mainstream professional associations. Such knowledge is often presented as unbiased and having universal validity. Popular knowledge is the lore and values institutionalized within the mass media.

Transformative academic knowledge is the emerging paradigm shift challenging mainstream academic knowledge. It promotes the idea that knowledge is not neutral nor universally true but reflects the power structure and social relationships within society. Transformative knowledge can play an important function in the classroom by helping students construct knowledge that will enable them to work toward a more equitable society.

Personal and cultural knowledge includes the "concepts, explanations, and interpretations that students derive from personal experience in their homes, families, and community cultures (Banks, 1993a, p. 6)." This knowledge includes cultural understandings about appropriate ways of interacting with others and proper social behavior in different contexts, which can interfere with the mainstream norms demanded by most school environments. School knowledge tends to be unresponsive to or conflict with the personal/cultural knowledge of subordinated minority children. Teachers can make use of personal/cultural knowledge in several ways: to contrast it with mainstream knowledge so that minority students can discover ways of crossing cultural boundaries, to use it as a vehicle for motivation, and to use it as a foundation for the construction of new knowledge (Banks, 1993a).

In a forward to a recent book, Banks gave a description of culturally responsive teaching. He said that it has grown out of scholars' concerns " . . . about the serious academic achievement problems among low-income students and students of color." The theory of culturally responsive pedagogy

> . . . gives hope and guidance to educators who are trying to improve the academic achievement of these students. This theory postulates that discontinuities between the school and low-income students and students of color is an important factor in their low achievement. The theory also postulates that the academic achievement of these students will increase if schools and teachers are changed so that they reflect and draw on their cultural and language strengths (Gay, 2000, p. ix).

This description of culturally responsive pedagogy from our foremost theorist in multiculturalism helps to make distinctions between the two fields. Insofar as culturally responsive pedagogy attempts to equalize academic

outcomes for culturally identified low-achieving students, it shares the goal of educational equity with multiculturalism. It is a bit more focused in its goals and will find some dimensions of multiculturalism more salient to its goals than others. For instance, knowledge construction, an equity pedagogy, and content integration have played more important roles in the historical developments of culturally responsive pedagogy than prejudice reduction and an empowering school culture, though all of these overlapping dimensions can play a role in the theory. The main distinction is the focus specifically on using culture as a positive consideration for classroom practice that improves learning for underachieving students.

DEVELOPMENTS IN CULTURALLY RESPONSIVE PEDAGOGY

BEGINNINGS IN CULTURAL CONGRUENCE RESEARCH

Ladson-Billings (1995) and Au and Kawakami (1994) traced the beginnings of what they label culturally responsive teaching to anthropological studies of Native American students in the 1970s and early 1980s. Cazden and Leggett (1981) and Erickson and Mohatt (1982), extending the findings of Philips (1972), first used the term culturally responsive teaching to describe teaching practices that incorporated language interaction patterns, or "participation structures," derived from the students' home life. These teaching practices depart from the Eurocentric teaching culture of tight teacher control and recitation, which Native American students resisted with silence. Making classroom discourse more compatible with the social patterns children had grown up

learning garnered more student interaction and consequently improved academic performance.

Other researchers have followed similar approaches to altering classroom practice so that it is "culturally congruent" or "culturally compatible" with the social and language interactions students have grown up with (Au & Jordan, 1981; Au & Kawakami, 1994; Dumont, 1972; Erickson & Mohatt, 1982; Heath, 1982; John, 1972; Mohatt & Erickson, 1981). These researchers maintained that many minority students encounter a discontinuity in the mainstream classroom. The mismatch or discontinuity between the students' home cultures and the dominant culture represented at school place minority students at a disadvantage with respect to effective academic performance (Au & Kawakami, 1994; Gay, 2000; King, 1994).

By changing classroom practice in ways that move toward a congruence to the cultural norms of the students, educators have been able to improve academic achievement. Perhaps the most thoroughly documented culturally congruent practice is the reading program at the Kamehameha Early Education Program (KEEP) in Hawaii (Au & Jordan, 1981; Au & Kawakami, 1994). In this program, teachers learned how to guide students in reading discussions that were closer to the students' interactions in "talk story," a shared collaborative discussion that permitted turn taking interruptions and oral prompting by other children, rather than the traditional teacher-led monitoring of comprehension. Student reading skills improved from below the 27th percentile before the program, to over the 50^{th} percentile after the program started (Erickson & Mohatt, 1982).

Researchers Erickson and Mohatt (1982; 1981) compared Native and Anglo teachers' approach to teaching Odawa students in Canada. The Native American teacher's practice involved a great deal less talk and much more small group work among the students. She also avoided "spotlighting" individual students by directing questions to them. Instead, she pulled students aside for private consulting and encouraged them to approach her when they had questions about class assignments. The Anglo teacher's style was much more traditional. To monitor student understanding, he asked frequent questions directed to individual students, questions that were commonly met with silence. Recitation and seatwork occupied the bulk of his instructional time. With help from the researchers, the Anglo teacher was able to improve student involvement by changing his teaching practice to being closer to the Native American educator's style.

Erickson and Mohatt (Erickson & Mohatt, 1982; Mohatt & Erickson, 1981) call the teaching approaches adapted for Odawa and Hawaiian students "mixed forms." They were not pure Native American interactional etiquette, but traditional classroom practice adapted to well-researched interactional forms found in the students' communities. The success of these interventions indicate that even minor adjustments in traditional classroom practice in culturally responsive directions can have significant effects.

LEARNING STYLES

In their article that first coined the term culturally responsive education, Cazden and Leggett (1981) identified two trends in research that held the potential

for improved teaching practice for minority students. One trend was the culturally congruent teaching approaches informed by anthropological and sociolinguistic research referred to above. The other was cognitive style, which included variables such as field independence vs. field dependence, reflectiveness vs. impulsivity, and analytic vs. holistic conceptualization. Their hope was that aptitude-treatment interactions related to cognitive styles might be discovered and lead to significantly improved learning for people by tailoring instruction to their different cognitive styles. Also, researchers sought for significant differences in cognitive styles among groups of people, such as minorities, hoping that such differences in central tendency would provide a key to improved minority education. That hope has largely been unfulfilled at this point, however (Gay, 2000; Wlodkowski & Ginsberg, 1995).

Since the 1970s, cognitive style has been combined with a number of other learner variables under a rather ill-defined concept called learning styles. Many current constructions of culturally responsive teaching include the importance of learning styles as a consideration for classroom teaching for minority students (Gay, 2000; Pewewardy, 1994; Smith, 1998; Swisher & Deyhle, 1989; Wlodkowski & Ginsberg, 1995). There are three general issues regarding learning styles that need to be considered when assessing their usefulness in classroom practice. First is the fact that the term learning styles has yet to be well defined. It has been used quite narrowly to mean a handful of cognitive traits that relate to how a person goes about learning. The term has also been used very broadly to include nearly any culturally affected attribute that has implications for

classroom practice. Second, the validity of some of the research on learning style has been questioned, leading to controversy about applying questionable research findings to classroom practice that may have little effect, or harmful effects upon classroom learning. Finally, given the possible existence of some of these learning styles, there is considerable controversy over what implications they have for classroom practice (Ryan, 1992).

Gay (2000) is particularly inclusive in what she means by learning style, considering nearly every cultural trait that might have implications on classroom practice. For her, learning styles are not only "categories for labeling students but also tools for improving the school achievement of Latino, Native, Asian, and African American students by creating more cultural congruity in teaching-learning processes (Gay, 2000, p. 147)." For her, learning styles take culturally responsive teaching to the heart of the process of instruction, focusing on the engagement, the interaction, and the dialectic discourse of students and teachers. Her categories for candidate learning styles is broad and exhaustive and includes procedural, communicative, substantive, environmental, organizational, perceptual, relational, and motivational attributes of the teaching-learning process. One example she gives of teaching practice that is informed by the learning styles of Latino, Native, African, and Asian American students is cooperative learning, which responds to the communicative, procedural, motivational, and relational dimensions of learning style. After citing one particularly effective cooperative learning program, she complained that "the findings in this study are not disaggregated by ethnic groups, so we do not know who is accounting for what

kind of performance (Gay, 2000, p. 159)." She did not mention the possibility that cooperative learning may be tapping into some universal learning attributes that hold for all cultures.

Compared with Gay, Wlodkowski and Ginsberg (1995) presented a much more focused view of learning styles. They borrowed a simple and direct definition of style from Hilliard (1989), "consistency in the behavior of a person or of a group that tends to be habitual—the manifestation of a predisposition to approach things in a characteristic way. (p. 67)." They then claimed that style is learned through culture and that "because different ethnic or other cultural groups have different histories, adaptive approaches to reality, and socialization practices, they are likely to differ in style in a least three dimensions: cognitive, learning, and behavioral (Wlodkowski & Ginsberg, 1995, p 144). For them, cognitive style referred to the preferential ways people process information, and have been associated with modal preferences (visual, verbal, kinesthetic, etc.) and dichotomies such as holistic vs. analytical processing of information. Studies of central tendencies for these variables have claimed that African Americans and Native Americans tend to be holistic-visual and White middle class Americans to be more analytical-verbal.

Learning style refers to how the learner relates to the learning situation and overlaps somewhat with behavior style, which refers to dialect, questioning and narrative style, and participant structures. These last two dimensions lead to approaches that recall culturally congruent teaching practice, which seeks to modify the classroom so that the mismatch of the way children speak and interact

in their home community and the expectations of student-teacher interactions in the classroom is minimized.

In his critical review of the learning style literature, Ryan (1992) divided learning styles into two categories: (1) a set of processes generating performance and (2) performance. The first category, processes generating performance, includes much of the cognitive learning styles identified by Wlodkowski and Ginsberg. These include not only the analytic/verbal vs. holistic/visual dichotomy, but also the notion of hemispheric brain dominance, learning preferences for different sensory channels (visual vs. verbal), field dependence/independence, and a smorgasbord of different "learning preferences." The performance category refers to ways in which learners and teachers interact in the teaching-learning process when it is considered as a social process. This is similar to the learning style plus behavior style categories that Wlodkowski and Ginsberg associated with the culturally congruent research. Ryan mentions that some researchers prefer not to include the performance category under the heading of learning styles, preferring to use the term learning style strictly for the more cognitive types of learning attributes.

Considerable controversy surrounds both the validity and the implications of some of the learning style research for teaching practice, especially for the cognitive category of learning style. Chrisjohn and Peters (1989) gave a scathing critique pf the claims of writers like Ross (1989) regarding right brain hemispheric dominance for Native Americans. They referred to the theory of brain hemispheric dominance as presented by Ross as "science fiction" and

warned that claims similar to this can lead to the stereotyping of American Indians and be twisted to provide evidence for the cognitive inferiority of certain groups as Gould (1981) has documented in his book, *The Mismeasure of Man*. They described inconsistent findings of the research on this learning style across several studies and pointed out the lack of double-blind research techniques on sensitive measures that are easily influenced by researcher bias. They also noted that, when using measures of verbal skill to determine hemispheric dominance, cross-cultural equivalence of the results will be confounded by the fact that many Native Americans come from families where English is not the primary language in the home.

Ryan reiterated some of these criticisms for other cognitive style measures, particularly the tendency toward holistic/visual over analytic/verbal cognition for indigenous peoples, which some researchers have correlated with brain hemispheric dominance. He reported that a number of reviewers have called such findings "dangerous" and even "racist." He also reported a number of studies that contradict the claim. Again, the issue of transitional language skills among Native populations confounds the comparability of scores on English language test instruments across different cultures. He also examined the claim that Native Americans display a tendency toward field dependence over field independence. Again, he noted the lack of consistency of findings across Native cultures. He also questioned the significance of the Embedded Figure Test scores, an objection that is similar to complaints about the use of English test instruments for analytical/verbal cognition. Native American test subjects, especially from

rural and wilderness home environments, may not be familiar with the types of figures in these tests, and may not understand the testing situation. He also stated that he had little confidence in the various learner preference surveys that he characterized as "thinly developed instruments . . . supported by fragmentary research." These self-report surveys make the assumption that students will learn best under the conditions that they claim to favor, an assumption for which there is no research evidence.

The third controversial issue surrounding learning styles concerns how they will be used to affect classroom practice. One issue is the danger of stereotyping a whole minority population based on a central tendency for a learning style. This can lead to unwarranted teacher expectations, which can have a powerful influence on student learning (Chrisjohn & Peters, 1989; Hilliard, 1989; Rosenthal & Jacobson, 1968; Ryan, 1992). Such teacher perceptions may cause teachers to underestimate the intellectual potential of students, who will then become educationally deprived as teachers "teach down" to the perceived aptitude of the students, simplifying, avoiding abstraction, fragmenting, and slowing the pace of instruction. Overreliance on teaching approaches that coddle to the perceived "strengths" of visual, holistic, and right brain learning styles can lead to teacher neglect of the high status knowledge areas that rely on analytical and verbal skills.

Critiques of the classroom application of learning styles tend to be less critical of the categories relating to "interactional styles," or culturally influenced ways of carrying out discourse and social interaction. These are styles that fall

under the "performance" category of Ryan (1992) and the learning style/behavior style categories of Wlodkowski and Ginsberg (1995), and they have been the focus of the culturally congruent research perspective (King, 1994). Unlike the case with the more cognitive learning styles, there are a number of successful educational programs that have been guided by this category of learning style research, most prominent being the KEEP program for Hawaiian students (Au & Jordan, 1981; Au & Kawakami, 1994; Cazden & Leggett, 1981; Gay, 2000; King, 1994; Ryan, 1992). Despite the success of such programs, Ogbu (1992) proposed that these behavioral styles are secondary cultural traits of involuntary minorities, cultural traits that developed after contact with the dominant cultural group in opposition to oppression and to maintain group identity. Therefore, classroom interactions that capitalize on interactional learning styles are not addressing the root of the problem, which is found in the historical relationship between involuntary minorities and the dominant culture represented in the school. Other culturally responsive theorists agree with Ogbu on that point to a degree but disagree with his remedies that rely on socializing students to the mainstream. They prefer to have students critically assess their situation in society at large and confront it with constructive political activity (Gay, 2000; King, 1994; Nieto, 1995; Villegas, 1988).

Despite the controversy over learning styles, especially the cognitive categories, many culturally responsive educators have acknowledged the danger they hold for misapplication but remain reluctant in dismissing them entirely (Gay, 2000; Hilliard, 1989; More, 1989; Pewewardy, 1994; Shade, 1994; Swisher

& Deyhle, 1989). In acknowledging the controversy, Pewewardy (1994) advised a practical approach:

> . . . one way to address these issues is to pose the question differently: Is the student presently learning successfully? For students who are not currently demonstrating successful achievement, . . . it might be reasonable to ask teachers to be as flexible and adaptable as possible in addressing student strengths. On the other hand, if students are being successful, then one might challenge students to develop non-preferred learning strategies (p. 86).

FURTHER DEVELOPMENTS FROM CRITICAL PEDAGOGY

Theories about the cultural mismatch between the home life of students and the mainstream culture represented by the school provide the first research base for culturally responsive pedagogy. The classroom interventions informed by these theories primarily have aimed to alter traditional classroom discourse so that it was closer to the discourse structures found in the students' homes and communities. As effective as this approach was, it was soon met with criticisms from new perspectives coming out of the rapidly developing area of critical pedagogy. Like multiculturalism, critical pedagogy itself is something of a metadiscipline that finds expression in numerous contemporary theoretical enterprises, including the liberation pedagogy inspired by Paolo Friere, postmodernism, feminist poststructualism, neo-Marxism, and border pedagogy (Sleeter & McLaren, 1995). Critical pedagogy is a "mirror image" of multiculturalism, but its agenda is much wider and more general than multiculturalism. It analyzes schools and schooling as part of a wider societal dynamic of social and cultural reproduction to maintain the powerful institutions of the dominant culture by perpetuating the existing class structure and the

inequalities that subjugate marginalized ethnic, social class, and cultural groups (Gay, 1995). For critical theorists, schools are political institutions and teaching is a political act. Their prescriptions for education have to do with challenging the power structure through pedagogies of empowerment, liberation, and transformation.

Villegas (1988; 1991) applied critical pedagogy to her critique of the cultural congruence approach to classroom practice, identifying a serious flaw in the approach:

> It is irresponsible to limit the analysis of minority children's widespread educational failure to the home-school connection and to isolate these two contexts from society at large, as much current sociolinguistic research has done. By ignoring the political nature of schooling and its relation to the dominant society, we help to perpetuate a system of inequality, thus reducing our chances of effecting the change we claim to seek (p. 258).

She spoke of two possible positions parents may take with respect to culturally responsive teaching. Though culturally responsive teaching affirms cultural diversity and the right for communities to be different, some parents might object if the teaching practice prevents students from learning the knowledge and "cultural capital" required to advance in mainstream society. Delpit (1995; 1988) made a similar argument, claiming that a "culture of power" is passed on disproportionately to White mainstream students because they come from homes where the codes and rules for participating in the culture of power is well known. These codes and rules need to be explicitly taught and critically examined by students from subordinated cultures and classes if they are going to participate in the culture of power and gain improved chances at social mobility.

A second position that parents of minority children take is the desire to gain the knowledge, skills, and cultural capital to advance socioeconomically but also to develop the ethnic pride and cultural identification that helps them maintain their vital and nurturing connections to their communities.

King (1994) reviewed these positions and developed the notion of different research perspectives or "knowledge bases" regarding educating African American and other non-mainstream students. For her, appropriate teaching practice for subordinated minority groups is transformative in the sense that it affirms the value of their cultures, challenges the status quo, and empowers them to think and act critically to support community and social transformation (Gay, 2000). She identified two knowledge bases that lead to transformative teaching practices that improve the academic performance of Black students and two knowledge bases that, though producing improved academic outcomes for Black students, fail to critique the wider social structures that subordinate poor and working class minorities.

One of the transformative knowledge bases is the *culture centered* knowledge base, which draws from studies of Black parenting relationships and Black family and community values, as well as the practices of effective Black teachers who use their knowledge of the Black community in their classroom practice. Teaching practices emerging from the culture centered knowledge base draw on family and community socialization practices to foster pride, responsibility, and perseverance in students' academic work. Culture centered teaching also fosters students' ability to understand, critique, and challenge the

societal forces that lead to the inequities they experience. King presented the culture centered perspective as an advance over the transformative knowledge base we have already examined, the *culture congruent* knowledge base. Like the other sociolinguistic approaches I have examined above, this knowledge base draws on well-researched African American cultural patterns and knowledge as a positive resource for classroom teaching. It makes use of the African American oral tradition, interactive performance styles, and creative and metaphorical use of language to teach academic skills in ways that motivate students and affirms their cultural identity (King, 1994).

King issued cautions about two knowledge bases for minority education. The first is the *culture difference* knowledge base. This knowledge base concerns research that examines the home environments and parenting styles of different cultures and seeks to understand these differences as positive resources for learning and survival. The cultural difference scholars stress the importance of minority children becoming bi-cultural, adapting to but not assimilating mainstream culture, in order to become academically successful and acquiring the cultural capital needed to succeed in mainstream society. They recommend teaching the "cultural codes" of the dominant society explicitly and using the students' cultural styles to compare and contrast with the dominant culture's "standard" ways of communicating and behaving (Delpit, 1988; Erickson, 1997; King, 1994). The culture difference knowledge base would be a favorable perspective for the first group of parents mentioned by Villegas (1988) who were

primarily concerned with their children gaining an education for socioeconomic advancement.

For King, the *cultural deficit* knowledge base is the least desirable of the research perspectives she reviewed, and it is one that many culturally responsive scholars decry (Bartolome, 1994; Estrada & Vasquez, 1981; McElroy & Hollins, 1999; Nieto, 1995). This knowledge base situates the academic difficulties of minority children in deficits of their language or socialization and seeks to remedy them by changing the home environment and through remediation.

Programs that have been informed by the deficit research prospective include Head Start and Comer's School Development Program (King, 1994; McElroy & Hollins, 1999). Multiculturalists find the implication within the deficit perspective that one's culture is dysfunctional to be reprehensible. They claim that the "psychological damage resulting from the covert or overt negative messages about the legitimacy of one's primary identity group is pervasive and insidious. Only through pride in origins, history and group identity, can the negative effects be modified (Estrada & Vasquez, 1981, p. 70)." A research perspective that contributes to these negative messages about subordinate cultures makes programs that are informed by it suspect in the eyes of many multicultural theorists. Regarding the culture difference and culture deficit perspectives, King and other scholars of the culturally responsive pedagogy camp agreed with the critical pedagogy theorists, who maintain that "multiculturalism without a transformative political agenda can just be another form of accommodation to the larger social order." (McLaren, 1995, p. 42).

CULTURE CENTERED TEACHING

King's (1994) description of culture centered teaching was an important contribution to culturally responsive pedagogy. She stressed several lessons derived from critical pedagogy as well as stressing the importance of including cultural knowledge and cultural competencies as positive bases for new learning and the importance of validating minority cultures by including their histories and perspectives in the curriculum. She described six areas for the content and process of education for African American students that can be applied equally well to other cultural groups as well:

1. Help children to recognize and affirm their collective identification with the people of their cultures.
2. Foster the sense of mutual responsibility for their learning and the learning of their peers. Encourage students to use their cultural knowledge for the benefit of their communities, and for society and the world.
3. Maintain a humanistic and personally meaningful focus in all areas of the curriculum. Make full use of traditional cultural knowledge, skills, values, wisdom, and creative forms of expression that students bring to the classroom.
4. Help students to recognize and maintain the world views, values, and cultural standards and practices that exist in their home communities.
5. "Enable children to discover, understand and use the strengths of their community's cultural patterns including peer group structures; relations with elders; interpersonal relatedness and authority relations; role

flexibility and self-determination in the processes of instruction. This may involve the indigenous wisdom and socialization practices of parents, surrogates, and community elders (p. 43)."

6. "Enable children to analyze and understand the strengths and weaknesses of their community's cultural patterns, inequities and opportunities in the society and global community in which we live. Instruction should also enable students to think critically about and act positively to support community and social transformation. (p. 43)."

JOHN U. OGBU'S RESEARCH ON MINORITY GROUP RESPONSES TO EDUCATION

Dividing multicultural research perspectives and their pedagogical implications into categories such as culture centered, culture congruent, culture difference, and culture deficit as King has done can provide a helpful guide for educators wishing to adopt culturally responsive teaching practice. However, some research findings can produce some contradictory responses. The research of John U. Ogbu (1991; 1992) that compares a number of minority group responses to educational systems in a number of countries is reviewed in both a positive and negative light by culturally responsive and critical pedagogy scholars (Au & Kawakami, 1994; Cummins, 1986; Eller-Powell, 1994; Gay, 2000; King, 1994; McElroy & Hollins, 1999; Nieto, 1995; Pewewardy, 1999). Ogbu's research has attempted to understand variations in minority academic performance by examining the wider historical and societal forces that may encourage or discourage minority students to succeed academically. His research also considered each minority group's collective orientation toward schooling, the

cultural ethic of striving for success, and each group's notion of the meaning and process of schooling (Ogbu, 1991). According to his analysis, there are two general types of minority groups that are distinguished by their response to education in a dominant society, voluntary minorities and involuntary minorities.

Voluntary minorities are recently arrived immigrants who have relocated to foreign lands to obtain better economic opportunities and greater political freedom. Examples of voluntary minorities in the U. S. include Hispanics from Central America, Koreans, and Punjabi Sikhs (Ogbu, 1991, 1992). Despite their language difficulties and the economic, political, and social barriers they experience, voluntary minority students tend to persevere in school to become academically successful. Several factors facilitate this positive response to education. Recently arrived immigrants tend to perceive the difficulties they experience in their host countries as temporary barriers that they will overcome in time. They realize that their difficulties with a second language and unfamiliarity with the new dominant culture can be reasons for the economic and social barriers they encounter, but they believe that with education they and their children can obtain the language skills, knowledge, and credentials to overcome those barriers. They also have a positive dual frame of reference, whereby they assess their status and opportunities in a favorable manner when compared to that of family and acquaintances in the "old country." They also maintain a positive identification with their home cultures, maintaining their language and culture at home and in their communities while accommodating to the mainstream culture at work and

school. This coping strategy Ogbu (1992) calls an "alternation strategy" which is, in essence, accommodation without assimilation.

Involuntary minorities are groups that became a subjugated part of U. S. society against their will through slavery, colonization, conquest, or forced labor. These groups include African Americans, Native Americans, early Mexican-Americans in the Southwest, and Appalachian poor (Eller-Powell, 1994; Ogbu, 1991, 1992). These minorities interpret social, economic, and political barriers differently than voluntary minorities. They do not compare their situations to people similar to them in foreign countries but instead employ a negative dual frame of reference, comparing their status to members of the dominant group. They do not see their subordinated status as a temporary situation that they can overcome but perceive the discrimination against them as permanent and institutionalized. Involuntary minorities will develop secondary cultural differences, which are cultural styles that develop in order to cope with their subordinated status in society and maintain their identities. Secondary cultural differences are reinterpretations of primary cultural differences, consisting either of cultural differences that existed before contact with the dominant culture or new types of cultural norms and behavior. Allied with secondary cultural differences is the coping strategy of cultural inversion, which is the tendency to regard certain behaviors, activities, and symbols as inappropriate for the group members because they are associated with membership in the dominate culture (Ogbu, 1991, 1992).

The attributes Ogbu identified for involuntary minorities have implications regarding the difficulty these groups have in attaining academic success in schools. Because these minorities perceive the barriers to social mobility to be institutionalized features of the dominant culture, they do not see education as the key to economic and social improvement as much as voluntary minorities do. Social cohesion within their own group is extremely important for the maintenance of identity and their struggle against oppression and discrimination. Schools are perceived as part of the oppressive White culture and to fit in, minority students must adopt White norms of behavior to succeed. Some students will adopt the strategy of "acting White" to succeed in school but only at the risk of isolation from their own group. Cultural inversion leads many students to avoid accommodating to the White American norms of most schools, resulting in academic difficulties (Ogbu, 1991, 1992).

Ogbu used his findings to make several recommendations for improving the academic achievement of involuntary minorities. For schools and school personnel, he stressed the importance of recognizing the differences between voluntary and involuntary minorities. To cope with their subordinate status to a dominant culture, which the school itself represents, involuntary minorities have developed "cultural and language frames of reference that are not only different from, but probably oppositional to those the mainstream." (Ogbu, 1992, p 12). School staff should study the histories of different cultural groups to understand cultural adaptations involuntary minorities have had to make in order to maintain their identities. This will help school staff to counsel students better so that they

can separate the appropriate attitudes and behaviors that foster academic success from those that lead to assimilation of White culture, so that they can pursue academic success without threatening their cultural identity and the security of being accepted in their own cultural group. The students should be guided to ways of behaving that lead to a strategy of accommodation without assimilation similar to the alternation strategy employed by voluntary minorities. Ogbu also noted that minority communities should come to similar understandings of their plight and recognize that the situation is not just a school issue but a community issue as well. The community should take similar steps that the school takes in convincing children that they can adopt behaviors for success in school without jeopardizing their cultural identity and community membership. He did mention in passing that society should change to eliminate the job ceiling against minorities and provide more equitable opportunities for advancement for them but the primary locus of action is still within the schools and minority communities. Also, he did not recommend that the school provide a different cultural environment more congruent to that of minority children.

As mentioned above, many multicultural theorists find Ogbu's research helpful, but some object to the implications he drew from it. King, for instance, placed Ogbu's research in the cultural difference perspective and implies that it may belong in the culture deficit category, as well. She cited the work of some critical pedagogy theorists to explain what she saw as the major flaw of his analysis:

> The alienating education process that African American students often experience is not a result of *their* faulty cultural frames of reference. On

> the contrary, as C.A. Bowers and David Flinders (1990) point out, the fault lies with the body of teachers' professional knowledge and its nearly "uniform silence on the importance of understanding cultural patterns that influence the manner in which the teacher and students think and communicate" (p. 14). For African American students the conceptually limited and faulty ways teachers think about culture and learning lead to lower expectations and erroneous conclusions about their ability based on prevailing assumptions about learning as an individualistic, culturally neutral process (King, 1994, p 41).

Nieto (1995) also presented some objections to the implications Ogbu draws from his research. She agreed that "accommodation without assimilation" is an appropriate goal for involuntary minority students but objected to Ogbu's focus on the student and minority community's responsibility for the accommodation. She stated that the recommendation was incomplete because it left out the responsibility that schools have in adjusting to the students. Schools need to also adopt a strategy of "accommodation without assimilation" as well. Otherwise, placing the onus of change strictly on the students and their communities may have the deleterious effect of the cultural deficit agenda.

These caveats surrounding Ogbu's research illuminates an aspect of culturally responsive pedagogy. Rather than questioning the culture of underserved minority students, culturally responsive pedagogy looks inward at the culture of teaching and questions the professional knowledge of teachers to find ways to change the cultural ecology of the classroom so that it is more equitable (Bowers & Flinders, 1990).

Culturally Relevant Pedagogy

Another source for culturally responsive teaching has been the ethnographic study of effective teachers of African American students by Gloria

Ladson-Billings (1994a; 1995). She calls the teaching approaches used by the teachers in her study culturally relevant pedagogy, but other theorists have adopted her findings under contemporary conceptualizations of culturally responsive pedagogy (Villegas & Lucas, 2002; Gay, 2000; Smith, 1998).

In order to derive an empirically grounded theory of culturally relevant pedagogy, Ladson-Billings studied the teaching practice of both Black and Anglo teachers of African American students who were nominated by both principals and parents as outstanding teachers. She found three common criteria among these teachers' classroom practices that describe the basic requirements for culturally relevant teaching. First, teachers must be able to help students develop academically. Second, teachers must be willing to nurture and support students' cultural competence. Third, teachers must help students develop a sociopolitical or critical consciousness (Ladson-Billings, 1995).

To foster student academic success, teachers maintained high expectations for students and created classroom environments where failure was not an option. The classes promoted an ethic of personal accountability, where teachers were willing to take risks, doing whatever they deemed necessary to see their students achieve academically.

As Ogbu (1992) has demonstrated, many minority students encounter the dilemma of pursuing academic success at the peril of cultural ostracism. Culturally relevant teachers helped students avoid this dilemma by assuring that academic success did not come at the expense of the cultural values and the psychosocial well-being of the students. Teachers helped students maintain

cultural competence and acceptance in their communities by challenging students to take leadership roles in the school and by including students' cultural knowledge as a basis for new learning. Students were allowed, even encouraged to be themselves in dress, language style, and interactional style as they learned the core curriculum in the classroom.

The teachers in Ladson-Billings' study also helped students to recognize and critique the social inequities they and their community members faced and to use the skills they learned in the classroom to address these issues. Students used mathematics, research skills, literacy, social, and political skills to discover, support, and promote important community issues in essays, reports, graphs, maps, oral presentations, and creative productions. In a couple of cases, students went on to fight city hall over issues that were important to their communities. Thus, classroom practice became a pedagogy of empowerment quite literally (Ladson-Billings, 1994a, 1995).

In addition to studying effective teaching practices, Ladson-Billings was also able to examine the personal qualities of these successful teachers of minority children. These teachers believed that all of their students were capable of academic success. They saw their classroom practice as an art that was continuously changing as they made new discoveries about their students and the students' communities and cultures. They saw themselves as members of the students' communities and saw teaching as a way of giving back to the community. They believed in the Freirean notion of "teaching as mining," or drawing out the knowledge of students for educational purposes (Freire, 1970).

They maintained a fluid give-and-take relationship with their students, something that required a sensitive connectedness to them. They sought to develop a community of learners where students learned collaboratively and took responsibility for the learning of their peers.

The teachers also had social constructivist conceptions of knowledge that guided their classroom practice. They believed that knowledge was shared in a community of learners, where it was socially constructed. They believed that knowledge should be examined critically. They demonstrated and modeled a passion for knowledge and learning for their students. The teachers helped scaffold students as they made new connections and constructed new learning. Teachers also incorporated alternative forms of assessment that allowed for multiple ways of demonstrating excellence (Ladson-Billings, 1994a, 1995).

Today's Synthesis

As described above, culturally responsive pedagogy has developed initially out of findings from school anthropology and sociolinguistics, which led to theories of cultural difference and the need for culturally congruent classroom practice. Scholars in the fields of multiculturalism and critical pedagogy have added the dimension of teaching practice that validates and preserves students' cultural identities and leads them to cultural competence and transformative knowledge that challenges the inequities of society. School ethnographers have further extended the field by seeking to understand the qualities of effective teachers of minority students. Today, culturally responsive theorists continue to develop the concept of culturally responsive pedagogy with new syntheses of the

scholarship that has gone before and by including findings from other important "knowledge bases" that contribute to the field.

G. Pritchy Smith (1998) presented one of the most wide-ranging formulations of culturally responsive pedagogy in a literature review/bibliography of thirteen "knowledge bases for diversity." For Smith, the key to implementing culturally responsive pedagogy lies in teacher education. He contrasts two camps of teacher educators, the "genericists" and the multiculturalists. The genericists believe that "good teaching is good teaching: and that traditional pedagogy that works so well with White middle class students should also work well for all students, regardless of race, culture, class, gender, or any other indicator of diversity. The genericist teacher educator curriculum is blind to cultural diversity and perpetuates a negative knowledge base for minority students. This knowledge base often focuses on a "literature of failure" for minority students which Smith calls "a literature of pathology in most generic teacher education programs [that] constitutes a 'knowledge base' that does more harm than good" (Smith, 1998, p. 18). He decried the lack of classes that address diversity in teacher education programs and the short shrift given multicultural research in much of the standard professional teacher education literature.

To counter the genericists, the multiculturalists believe that "culture deeply influences the way children perceive and go about school learning and that the more a teacher understands the cultures and other aspects of diversity of the students in a classroom, the more likely the teacher can provide a classroom context that will result in successful, high-quality education for culturally and

linguistically diverse students" (Smith, 1998, p. 18). For Smith, teacher beliefs about the nature of learning and teacher professional knowledge are the key to achieving the multiculturalist agenda. Hence, culturally responsive pedagogy must overcome the hegemony of traditional genericist pedagogy through teacher education programs that are *culturally responsible*:

> A *culturally responsible pedagogy* means that schools, colleges, and departments of education have a moral and ethical *responsibility* to prepare teachers to be culturally responsive, that is, to enable teachers to respond to the educational needs of their diverse student populations by planning and developing culturally rich curricula and by using instructional methodologies that are based upon knowledge about how culture influences cognitive learning styles. . . . A culturally responsible teacher education program graduates teachers who think and act multiculturally rather than monoculturally, who develop curricula that are multicultural rather than monocultural in content, who utilize methodologies that are congruent with cultural learning styles, who can reflect about relevance of knowledge bases in a variety of cultural contexts, and who understand that becoming a multicultural educator is a developmental process without a known point of completion. (Smith, 1998, pp. 20-21)

For Smith, becoming a culturally responsive teacher is an ongoing, career-long "noble quest" that embraces a "commitment to the common good" that will ultimately lead to "the reconstruction of society to be fair, just, and free of oppression (Smith, 1998, p. 21)." Given the immensity, complexity, and the controversial and evolving nature of research into culturally responsive pedagogy, beginning teachers may be able to gain an adequate understanding of only a few major cultures and gain enough familiarity with the literature to continue their pursuit of appropriate teaching practices for the cultures that are represented in their future classrooms. Smith acknowledged that there is currently no

comprehensive blueprint for all of the appropriate scholarship for culturally responsive teaching and proceeded to submit a review and bibliography of thirteen knowledge bases for diversity. These knowledge bases include:

1. Foundations of Multicultural Education
2. Sociocultural Contexts of Human Growth and Psychological Development in Marginalized Ethnic and Racial Cultures
3. Cultural and Cognitive Learning Style Theory and Research
4. Language, Communication, and Interactional Styles of Marginalized Cultures
5. Essential Elements of Cultures
6. Principles of Culturally Responsive Teaching and Culturally Responsive Curriculum Development
7. Effective Strategies for Teaching Minority Students
8. Foundations of Racism
9. Effects of Policy and Practice on Culture, Race, Gender, and Other Categories of Diversity
10. Culturally Responsive Diagnosis, Measurement, and Assessment
11. Sociocultural Influences on Subject-Specific Learning
12. Gender and Sexual Orientations
13. Experiential Knowledge

Smith included a small chapter on each of these knowledge bases that presents a few of the ideas that each covers, but he did little to synthesize a

coherent treatment of culturally responsive pedagogy from them. He mapped the terrain but gave no trails to follow through it. Continuing where Smith left off, recent book by Gay (Gay, 2000), *Culturally Responsive Teaching: Theory, Research, & Practice* is a well-organized treatment of the current state of the field.

Gay begins with five premises that guide her conceptualization of culturally responsive pedagogy:

Premise 1: *Culture Counts.* Culture is at the heart of everything we do in education—teaching, curriculum, assessment, administration, and reform. Culture may be defined as "a dynamic system of social values, cognitive codes, behavioral standards, worldviews, and beliefs used to give order and meaning to our own lives as well as to the lives of others (p. 8)." The cultures of schools are not always compatible with the cultures of minority students, interfering with their academic achievement. Teachers need to understand cultural incompatibilities and techniques that bridge the gap between school culture and the students' cultures.

Premise 2: Conventional Reform is Inadequate. There are a number of educational interventions that have proven effective for students of color that neglect to take cultural difference into account. Such approaches may inadvertently cause students to compromise their cultural identities for the sake of achievement. Educational programs need to provide cultural supports for students from subordinated groups.

Premise 3: Intention Without Action is Insufficient. Teachers' awareness of cultural differences and the inequities that exist in the social conditions faced by minority students is not enough. Teachers' good intentions need to be backed up with concerted efforts at developing cultural understanding and pedagogical skills and taking the courage to overturn the status quo.

Premise 4: There is Strength and Vitality in Cultural Diversity. Cultural diversity is a strength and an important cultural resource that students bring to school. Teaching that draws on students' lived experiences and invites participation from and utilizes the students' families and communities can have a powerful effect on student achievement.

Premise 5: Test Scores and Grades Are Symptoms, Not Causes of Achievement Problems. Rather than taking a cultural deficit perspective, teachers and scholars should seek out the underlying causes of minority student underachievement. By understanding the obstacles to student performance, teachers can take steps toward assuring high achievement.

Beginning with these premises, Gay sketched out her synthesis of culturally responsive pedagogy with *six descriptive characteristics*:

1. *Culturally responsive pedagogy is validating.* By using students' cultural knowledge, prior experiences, frames of references, and communication styles, teachers help to make them more effective learners, while validating and affirming their home cultures. "It teaches *to and through* the strengths of these students" (p. 29).

2. *Culturally responsive pedagogy is comprehensive.* Culturally responsive teachers teach much more than academic skills, they teach the whole child. They achieve this in a classroom that is a community of learners that reflects the relationships in the students' homes and fosters belongingness, dignity, and respect. In addition to academic success, excellence may be also measured in cultural competence, critical social consciousness, political activism, and responsible community membership.
3. *Culturally responsive pedagogy is multidimensional.* It attends to a much wider range of concerns than traditional classroom practice that relies implicitly on Western-centric cultural norms. Culturally responsive teachers must be sensitive to the cultural ecology of the classroom, taking into account curriculum content, learning context, classroom climate, student-teacher relationships, language use, instructional techniques, and performance assessments.
4. *Culturally responsive pedagogy is empowering.* "Empowerment translates into academic competence, personal courage, and the will to act" (p. 32). Empowered students are motivated students, as evidenced by their persistence in the face of challenging academic tasks. Culturally responsive teachers provide a social scaffolding for minority students that works to make school achievement compatible with diversity and cultural identity.

5. *Culturally responsive pedagogy is transformative.* Culturally responsive teachers show respect for minority cultures by including culture in their teaching and including the students' families and communities in their classroom practice. Students become social critics capable of making informed choices and decisions regarding their personal lives and the political, social, economic, and cultural well-being of their community and the nation at large.
6. *Culturally responsive pedagogy is emancipating.* It is a liberating educative practice that frees students from the Eurocentric hegemony of the dominant culture. Students learn how to contest "official knowledge" and learn how to construct their own knowledge that is true to their heritage and identities. They learn the importance of learning from multiple perspectives that contextualize the great issues of the day.

Gay then organized the research base for culturally responsive pedagogy under four foundational pillars: teacher attitudes and expectations, cultural communication in the classroom, culturally diverse content in the curriculum, and culturally congruent instructional strategies.

Under teacher attitudes and expectations, she reviewed the literature regarding teacher expectations for student achievement, and how it can have both positive and negative effects. The so-called "Pygmalion effect" has been well researched since the 1960s and is especially relevant to teacher interactions with students from different cultures who are disproportionately labeled "at risk" and assigned to remedial, vocational and low academic tracks. Students will rise to

the level of expectations, providing teachers communicate such expectations clearly and honestly, which requires an ethic of caring. Caring is communicated by a genuine passion for academic subjects, a personal connection to students' communities, and a belief in the intelligence and capability of all students. Caring teachers are lifetime learners with a personal commitment of continued professional growth, particularly in the complex and demanding discipline of culturally responsive pedagogy. Caring teachers make academic excellence a non-negotiable expectation for all students. They learn how to communicate effectively with students on their own terms.

Many teacher expectations stem from biases that have been indoctrinated into their belief systems both explicitly and implicitly over a lifetime. Teachers need to develop cultural self-awareness through a process of consciousness-raising that reveals their cultural biases, which would otherwise be invisible to them. Gay mentioned methods of "cultural therapy" whereby unexamined biases become revealed, analyzed, and deconstructed.

The second pillar, cultural communication in the classroom, examines how cultural patterns of both oral and written communication can affect classroom practice. Because teaching and learning is primarily accomplished through language, misinterpretations of language due to differences in cultural style can have detrimental effects on classroom learning. Students from different communities have different discourse styles, different traditions of story-telling, different uses of questioning, different communication etiquette, different

metaphorical expression, and different forms of creative expression. A teacher's awareness of these differences can lead to improved classroom practice.

The third pillar, curriculum content, is closely related to student empowerment. "To be effective, . . . knowledge must be accessible to students and connected to their lives and experiences outside of school. . . . Information and skills that are potentially powerful become so only through interaction with the interests, aspirations, desires, needs, and purposes of the students" (p. 111). Contemporary constructivist approaches to education stress the roles of students as active creators and producers of knowledge, rather than as merely consumers of knowledge. For ethnically diverse schools, this means that the cultural heritages and community experiences must become the source and center of educational programs. Unfortunately, the standard curriculum and most textbooks present primarily a "White studies" program that fails to make use of the rich cultural knowledge and experience that students bring to school (Churchill, 1996). Culturally responsive teachers must learn how to supplement or replace the standard curriculum with materials that reflect the true diversity of America. Gay reviewed several studies on the multicultural content of textbooks and concluded that there has been limited, uneven progress in inclusion.

Culturally responsive teachers also need to address the inherent bias and discriminatory practices of the mass media that tend to leave out the perspectives of minorities, resort to demeaning stereotypes and perpetuate popular myths. Children of all cultural groups pay a great deal of attention to the mass media, making it a powerful, unacknowledged component of their curriculum. Teachers

can guide students toward media of excellence that give a fair treatment of people from different positionalities. Teachers should also show students how to confront popular media critically.

Where schools have succeeded in implementing more culture centered curriculum, students have benefited according to several measures, including interest, enjoyment, positive attitudes toward reading, improved writing skills, improved vocabulary, self-confidence, self-esteem, and a greater appreciation of their own and other's cultures.

The final pillar, cultural congruity in teaching and learning, combines the prior three components into a classroom praxis, where an ethic of caring (pillar one) provides an ideological grounding, cultural communication provides the tool, and curriculum content provides the resource for culturally responsive teaching. "Instruction combines all the other components into coherent configurations and puts them into action to expedite learning. It is the *engagement*, the *interaction*, the *dialectic discourse* of students and teachers in the *processes* of teaching and learning. Interactional processes are absolutely imperative to the implementation of responsive teaching. They can nullify, enrich, counteract, or complement other components of teaching" (p. 148).

The recommendations for culturally responsive classroom praxis are drawn from the full history of research into culturally congruent teaching of culturally different students, the critical pedagogy tradition of empowering and liberating teaching practice for oppressed groups, and the recent insights into teacher beliefs and expectations that bring an ethic of caring to the heart of

classroom practice. Gay reviewed several examples of classroom praxis that draw from this knowledge base to illustrate how culturally responsive teaching looks in action.

In reviewing studies of culturally responsive teaching for this final pillar, Gay inadvertently revealed an approach for developing the field in the future: Look at any classroom practice that has significant effects upon cultural minority student achievement and examine the practice in light of its congruence to the students' cultural knowledge. Her treatment of cooperative learning was a case in point. In making a case for cooperative learning as a culturally responsive teaching practice, she pointed out that values of human connectedness and collaborative problem solving are part of the cultural legacy of African American, Latino, and Native American peoples. Also, cooperative learning is congruent to the learning styles of these groups, especially in the communicative, procedural, motivational, and relational dimensions.

CULTURALLY RESPONSIVE PEDAGOGY AND VIRTUAL MUSEUMS

Several aspects of virtual museum projects, especially the "Four Directions model" of virtual museum projects described above, recommend them as a culturally responsive teaching practice. In such projects, there is great potential for culturally congruent departures from traditional teacher-centered classroom practice, as noted by Sower (1987) and Bennett (1987) in their studies of computer classroom projects involving Logo and multimedia language dictionary projects. These classroom practices changed the role of the teacher from a provider of information to that of a co-learner and a guide or a coach to

students who were active in creating knowledge. This changed the discourse structure of the classroom, enabling students to engage in more frequent and more effective language interactions, as they shared knowledge and engaged in problem-solving with peers and solicited help from the teacher as needed—kinds of interactions that are more similar to their home and community life than that of the traditional teacher-centered classroom.

There is a strong transformative aspect to virtual museum projects, connecting them to aspects of culturally responsive pedagogy that have emerged out of the contributions from critical pedagogy. Students are engaging with materials directly related to their culture in a highly significant and meaningful manner, affirming the importance and relevance of their culture to their education, their communities and the world. The work they do on the virtual museum is authentic and important, as it directly addresses the urgent concerns that their communities hold for the preservation of Native cultures and the revitalization of Native languages. These issues can also lead students to opportunities to confront the wider social, political, and economic issues regarding the historical and contemporary status of the American Indian.

Virtual museum projects are culturally centered to the extent that they provide a venue for the involvement and direct participation of the students' families and communities in classroom practice.

Also, the projects give teachers the opportunity to engage in reflective, culturally relevant practice (Bennett, 1987; Ladson-Billings, 1994, 1995; Gay, 2000). Teachers have the opportunity to "give back" to the communities they

serve, to develop an ethic of caring, and to gain fresh insight on their students' home lives that may be used to improve their teaching practice.

Virtual museum projects, then, have the potential of providing a strategy for culturally responsive teaching in several different ways. The purpose of this study was to examine the various ways virtual museum projects that are collaborations between Native American schools, the school communities and museums express a culturally responsive pedagogy. This led to the original research question stated in Chapter 1: In what ways do virtual museum projects support a culturally responsive teaching practice for Native American students?

SUMMARY

As is the case for other minority groups in the United States, education has failed in achieving equity in academic achievement outcomes for Native American students. The Native American community has expressed great concerns about this inequity and has added an additional concern for American Indian education—to play a role in the perpetuation and preservation of Native American cultures and languages. Educational computing in American Indian education shows some promise in addressing both of these concerns, but left to itself, technology alone will not provide a solution. Indeed it may become part of the problem (Apple, 1991; Bowers, 1988; Cuban, 1993). Learning technologies need to be coupled with culturally responsive pedagogies if they are to respond positively to Native American concerns for education.

Virtual museum projects provide one technology-supported teaching strategy that shows great promise as a culturally responsive approach for Native

American students, but there is a paucity of research into this new, emerging practice, especially as it relates to the educational needs of Native American students and other minority groups. There are many aspects of virtual museum projects to suggest that they can be culturally responsive. Students get to use their cultural knowledge as they study subjects that are directly related to their cultural heritage. Members of the students' communities are active participants in the virtual museum activities. The activity of creating a virtual museum departs from traditional classroom practice in potentially culturally congruent ways.

Chapter 3: Research Design and Methodology

RESEARCH GOALS

The primary goal of conducting this research was to examine a new and emerging educational practice in order to gain a better understanding of culturally responsive teaching. The educational practice I was researching involved the collaboration between museums, schools, and the school communities they serve to create a virtual museum. The schools involved in the virtual museum projects were tribally controlled American Indian K-12 schools in the Bureau of Indian Affairs education system. This setting assured that all of the students in the projects shared a common Native American heritage. The museums in the project participated through their Native American collections, thereby creating have specific relevance for the participating students and their home communities.

Students took on important roles in the creation of the virtual museums, including digitally imaging cultural objects, creating the virtual museum media, researching the objects in the museum, and writing text essays that accompany the virtual exhibits. Museum staff provided access to museum collections, assured safe and appropriate handling of museum artifacts, and served as research resources for the students. School staff served as educational resources for the students, but also participated in the design and management the virtual museum learning project. Native community members participated as information resources for the students and to assure that the virtual museums made appropriate use of Native cultural property. Native community member participation was

important to my research focus because some theorists state that the students' communities should be respected in culturally responsive teaching practice (Cleary & Peacock, 1998; Gay, 2000; Hall, 1991; Ladson-Billings, 1995; Pease-Windy Boy, 1995; Pewewardy, 1999; Reyhner, 1992; Van Hamme, 1996).

In chapter 1, I examined some of the literature to make a tentative description of culturally responsive pedagogy. I have adopted the term "culturally responsive" to describe the intended approach of the virtual museum projects in this study. In the past, "culturally responsive" has been applied to quite narrow approaches to teaching practice (Au & Kawakami, 1994; Ladson-Billings, 1995). Following the lead of other researchers, I have chosen to apply the term in a more inclusive sense (Bowers & Flinders, 1990; Gay, 2000; Wlodkowski & Ginsberg, 1995; Villegas & Lucas, 2002). Also in Chapter 1, and then more thoroughly in Chapter 2, I presented other crucial aspects of my study—the current condition of Native American education and the ways educators have used educational technology to address the concerns of Native American communities have regarding education. These component areas of the literature have a bearing on my primary research question:

> **Research Question:** In what ways do virtual museum projects support a culturally responsive teaching practice for Native American students?

To help focus the research activity, I developed two research goals that I then addressed in the study:

> **Research Goal 1:** To give a description of an emerging strategy for culturally responsive teaching by comparing several virtual museum project case studies.

Research Goal 2: To determine how virtual museum projects might contribute to the understanding of culturally responsive pedagogy.

The first goal seeks to examine the virtual museum projects as an educational innovation in order to present a clear description of how they may be designed and carried out effectively. This goal benefited from a composite picture of virtual museum projects as an educational practice that emerged from the four case studies. The second goal concerned the evolving understanding of a culturally responsive pedagogy. A consensus of what culturally responsive pedagogy entails has yet to be formed. Current formulations of culturally responsive pedagogy are informed by a variety of theoretical and empirical sources. One of the goals of this study was to contribute to the empirically-based determination of what "culturally responsive" pedagogy might entail in the context of a the teaching strategy represented by virtual museum projects. On the surface, the virtual museum projects this study examined satisfy many criteria for a culturally responsive teaching practice. Through a careful, systematic examination of these projects, I sought a clearer understanding of culturally responsive teaching, based on the multiple case studies.

RESEARCH QUESTIONS

I made use of a preliminary set of research questions to guide data collection. One reason for using these questions was to focus the data collection process. In qualitative research data tends to proliferate, such that data reduction

quickly becomes a concern for the researcher. Focused questions are one way of reducing the proliferation of data before it is gathered (Miles & Huberman, 1984). So that valuable avenues of inquiry are not eliminated, however, it is important to regard these questions as tentative. Qualitative research is "emergent," so new questions may be added and current ones changed or eliminated at any time during the research process (Erlandson, Harris, Skipper, & Allen, 1993; Lincoln & Guba, 1985). As research continues, there is a process of "progressive focusing" whereby the research issues become clearer and the research questions become more refined (Stake, 1995).

I developed the initial set of questions for the four categories of participants in the virtual museum projects: the students, the teachers, Native community members (parents, elders, community opinion leaders), and museum staff. As my research proceeded, I recognized that my original four categories of participants did not accurately reflect the variety of participants in my study. For instance, several participants occupied dual roles such as community member/ teacher or community member/museum staff. The category of teacher was too undifferentiated. I found I needed to distinguish between regular classroom teachers, culture program teachers and coordinators, and technology coordinators. I developed my initial set of questions based on my interpretation of the culturally responsive teaching literature and how I thought it might apply in the virtual museum projects,

The following sets of questions were included in my original research proposal. They became a guide to help me conduct my semi-structured interviews as well as a starting point for my data analysis.

Questions about Students

Do students perceive the virtual museum project as important? In what ways and for whom?

Do students believe that they are using their knowledge and values as Native Americans to achieve the goals of the virtual museum? What knowledge and values?

Are students motivated to work hard on the project? Why or why not?

Do students believe they are gaining knowledge that is relevant to academic success? What knowledge and skills are they gaining?

What is their sense of the impact of their work (for the community, world, and other students)?

How do the students perceive the roles of the other participants in the project (teachers, community members, museum staff)?

Are the students working collaboratively on the project, or independently? How would they prefer to work?

Questions about Teachers

What role have the teachers played in designing the virtual museum project?

What guiding principles and values did they use in designing the project?

What learning outcomes do the teachers see, or hope to see, coming out of the virtual museum project?

Do teachers believe that the virtual museum project draws upon the cultural strengths of Native American students? How?

How do teachers perceive student motivation in relation to the virtual museum project?

How do teachers perceive the impact of the virtual museum project? How many students will benefit and in what ways? How does the school and world community benefit?

From the teachers' perspective, how well are the students working together?

How do the teachers characterize their roles in the project? How do they perceive the roles of the other participants?

Questions about School Community Members

What role did school community members play in the design of the virtual museum project?

What principles and values guided their input into the design of the virtual museum project?

Do community members believe that the virtual museum project is drawing upon the cultural strengths of the students? What cultural strengths do they perceive the students are utilizing in the project?

In what ways do they see the project benefiting the students (academically and otherwise)?

In what ways do they see the project benefiting the community?

What impact do they see the project having?

What concerns do community members have regarding the use of Native American culture in the virtual museum project? Are there any changes that they would make to the project so that is more acceptable?

How do the community members characterize their roles in the project? How do they perceive the roles of the other participants?

Questions about Museum Staff

What role did museum staff play in the design of the virtual museum project?

What principles and values guided their input into the design of the virtual museum project?

How well does the virtual museum match the mission and programs of the museum?

What has been the response of the museum directors and staff to the virtual museum project? What have been their primary concerns?

In what ways do they see the project benefiting the students (academically and otherwise)?

What impact do they see the project having (for the school community, the museum, the world)?

How do the museum staff characterize their roles in the project? How do they perceive the roles of the other participants?

RESEARCH DESIGN

Virtual museums have been used as an organizing concept for learning projects only recently. They have emerged with the advent of the Internet and other communications technologies and teaching practices that take advantage of them (Ivers & Barron, 1998; McKenzie, 1995; McKenzie, 1996; McKenzie, 1997). Typically, these virtual museums have been built as classroom projects and not in collaboration with public or private museums. Also recently, some museums have extended their educational missions to include collaborations with schools, but little research has been done on those initiatives (King, 1998). The teaching practice I examined was representative of culturally responsive pedagogy, which has recently been undergoing a reformulation (Au & Kawakami,

1994; Bowers & Flinders, 1990; Gay, 2000; King, 1998; Ladson-Billings, 1995; Pewewardy, 1999; Wlodkowski & Ginsberg, 1995). Cummins and Sayers (1997) did examine Internet classroom practices that had features of virtual museums and culturally responsive pedagogy, but they did not include school-museum collaboration. The only learning projects I have found in the literature that included the combination of a virtual museum project, school-museum collaboration, and culturally responsive pedagogy were those that were coming out of the Four Directions project (Allen et al., 1999; Resta et al., 2000; Roy & Christal, 2000b). As a partner in the Four Directions project, I have had the unique opportunity to study the projects as a *participant-observer* (Lincoln & Guba, 1985: LeCompte, 1993 #45; Merriam, 1998; Patton, 1990).

My research applied a multiple case study design. The unit of analysis for this study were individual virtual museum projects, thus exhibiting the specificity and "boundedness" that exemplifies a case (Stake, 1995). The boundaries of the cases, however, have proven to be not so distinct. The cases extend back through time through my previous relationship with the schools as participants in the Four Directions project. After the approval of my research study, I helped the schools to a varying extent with planning the projects. My main research effort occurred in the one to two weeks of intense activity when I trained the students in the virtual museum technologies and helped them image cultural objects at the museum sites. I continued to assist some of the schools on the technical issues of developing their virtual museum Web sites after the work in the museums was completed.

Because my research goal was to gain a deep understanding of an emerging teaching practice, I decided on a qualitative research strategy (Merriam, 1998; Patton, 1990). I initially sought out two or three cases in order to explore, analyze, and describe this new practice of school-museum collaborations for virtual museums and discover how this practice utilizes and informs a culturally responsive pedagogy. Because these practices are still emerging, there was no fixed recipe or guidelines indicating exactly how such a learning project should be designed and implemented. I expected that the projected outcomes and impact one may expect from this type of learning project would be uncertain and likely to vary from case to case. Rather than studying just one case, I decided that multiple cases would help me to come to broader understanding of the emerging practice by analyzing the similarities and differences among the cases.

CASE SELECTION

Often in case study research, the question of which cases to sample for a study does not come up. There is only one case, hence no choice (Merriam, 1998; Stake, 1995). This is very close to the situation in this study. Because I have been a partner in the Four Directions project, the case selection has been primarily through opportunistic sampling (Patton, 1990). In a sense, the cases selected themselves because I had been conducting similar projects with schools in Four Directions for a few years and had informally discussed pursuing such projects with several of the schools for some time.

Funded projects like Four Directions often struggle with the issue of scalability. Part of the scalability issue is the question of whether the schools

without outside funding and support be able to replicate the project's innovations. It was important for me that the schools use their own technology and provided their own resources to pursue the virtual museum projects as much as possible outside the financial support of Four Directions. The schools selected museums in their regions that they would be able to visit in a field trip that was not unlike other activities the school had pursued in the past. The only additional resource was the expertise I brought to the school as a participant-observer/technology consultant.

RESEARCH DATA

Qualitative data for the study came from four sources: participant interviews, videotaped activities, researcher observation, and documents and other products that come out of the virtual museum projects.

Participant Interviews

I relied primarily on the participant interviews in my analysis of the virtual museum projects for this study. I conducted the interviews at the latest possible time during my visits to the school and museum sites so that the participants would have had the most time to experience the project activities and formed their opinions about them. I audio taped the interviews and carefully transcribed them for data analysis. The interviews were conducted in an informal manner, with one or two participants at a time. I used my initial research questions as a guide to help me keep track of the topics that were addressed in the interview. As the study progressed, I developed a more focused questioning strategy. For instance, the issue of student choice emerged in the second case study, which I believed

might have important implications for culturally responsive teaching, so I tried to address it more directly in subsequent interviews. I tried to avoid leading the participants with my questions as much as possible. I also tried to encourage participant talk, especially when it was developing in the directions my research questions were pointing, but at the same time, I remained open to new avenues of relevant inquiry the discussion might follow. As the interviews wound down and I believed we had discussed the topics I needed to cover, I would ask a question that invited the participant's independent input into the research agenda that went something like, "Is there any thing that you have observed or thought about regarding the virtual museum project that I have not asked about that you think I should know?" Several times this question led to further productive discussion. Usually the respondents indicated that they believed we had covered the topic thoroughly. The length of the interviews with the adult participants was between 30 minutes and an hour.

I interviewed as many of the student participants as I could in the time available, but I was not able to question them all. I also had some difficulty gaining enough rapport with the children to conduct an effective interview. They tended to be very shy and answered my questions almost inaudibly, and they did not speak at any length to my queries. It was only in the last two cases that I was able to conduct satisfactory student interviews. I do not know if that was due to my own development as an interviewer or the nature of that particular student population in their responses to outsiders. To make the students more comfortable with the interview situation, I interviewed them in small groups of

two or three students, hoping they might talk about the questions among themselves. This approach worked to a limited extent. I found that my line of questioning with students needed to be a little more direct, leading the students to their responses a little more strongly than I would like. As a result, I found the student interviews to be less informative and reliable as the adult interviews, and I relied on them to a much lesser extent in my report. The student interviews were much shorter than the adult interviews, typically lasting between 15 and 30 minutes.

Videotape

Before my study began, Romo (personal communication) cautioned me that the research interview may not be culturally responsive for Native American children, and she suggested that I videotape virtual museum activities to document student responses to the innovation. This was a fortunate suggestion because it helped me to supplement student interviews and triangulate the adult interview statements and researcher observations about the student response to the project. The videotapes sampled parts of the virtual museum activities that took place in the museums as the students selected and imaged their virtual museum objects and interacted with their peers, community members, teachers, museum staff, and me. I set up the camera in a strategic position and left it running when I thought important activity would take place. I sketched a layout of the room where the activities took place, indicating the position of the camera and the angle of view it covered. Later I viewed the tapes and wrote down the types of activities that were taking place minute-by-minute as well as summarizing or

transcribing some of the audible talk on the tape. I recorded just over thirteen hours of videotape for the study.

Researcher Observations

During the intense period of virtual museum activities, it was too difficult to take detailed notes because I was so involved in my role of participant in the activities. I jotted down quick notes that I wrote up in more detail later in my researcher's notebook, which included not only my observations, but also my thoughts about the directions the research was taking, questions to ask participants, and avenues of inquiry to follow. Most of the observations that I included in my report have been triangulated with other data sources.

Documents and Other Data Sources

Among the remaining sources that I used in writing the study have been email messages, notes from phone calls, project planning documents, training materials, calendars, digital images and QTVR movies produced in the virtual museum project, and the completed virtual museum Web pages.

DATA ANALYSIS

I considered the participant interviews to be my most important source of data for this study, and most of my analysis efforts were directed at them. After carefully transcribing all of the tapes, I imported them into NUD*IST (1999), the qualitative data analysis computer program. Following the advice of Miles and Huberman (1984), I coded with an evolving list of codes. I devised an initial set of codes based on my research questions and observations I had recorded in the course of the studies. As coding proceeded through each interview, I found I

needed to devise new codes to fit the content of the subjects' statements. This meant I needed to review earlier transcripts as coding preceded to see if the newer codes applied to them, so the process of coding was somewhat iterative. I eventually ended up with 169 codes that specified the content of interviewee statements. I added four data codes to entire transcripts to identify each with one of the four case studies. To reduce the complexity of these numerous codes, I developed seven code categories related to participant statements about 1) the nature and conduct of the virtual museum projects, 2) the tribal community, 3) school and classroom issues, 4) students, 5) museums, 6) Native America and the nature of culture, and 7) technology (see Appendix 3).

The individual case studies were based mainly on the statements about the projects coded under the first category. I was able to pull out those statements for each study using the NUD*IST reporting feature. Analysis then proceeded for each individual case as I examined those coded statements in concert with the video logs, observations, and other printed and electronic documents from each case. It was at this point that I tried to identify the themes that became the organizing structure for each case. In Chapter 8, I applied the idea of a mega-matrix of findings (Miles & Huberman, 1984) for between site analysis that condensed the many themes from all of the cases under the coherent theme categories summarized in Table 7.

In Chapter 9, I examine the culturally responsive aspects of virtual museum projects, I made use of the remaining code categories and the statements they identified in all of the cases. This process tended to bring up a fresh set of

participant observations that had not been utilized in the case study descriptions that focused more on the procedural aspects of virtual museum projects.

VALIDITY, RELIABILITY AND GENERALIZABILITY

> The applied nature of educational inquiry . . . makes it imperative that researchers and other have confidence in the conduct of the investigation and in the results of any particular study. Assessing the validity and reliability of a qualitative study involves examining its component pars, as you might in other types of research (Merriam, 1998 p. 199).

Validity, reliability, and generalizability are requirements for research that are rooted in the quantitative paradigm. Some qualitative researchers reject the positivistic underpinnings of quantitative research and rely instead on constructivist, critical, or postmodern perspectives to judge the quality and usefulness of research (Denzin & Lincoln, 1993). I favor a pragmatism similar to Patton's (1990) that does not reject the value of the quantitative research paradigm but recognizes the value of the challenges and methods that contemporary qualitative research philosophies bring to scientific inquiry.

Validity

Due to fundamental differences between a qualitative case study and quantitative research, validity, reliability and generalizability, need to be reframed in a way that leads to specific methods in conducting qualitative inquiry. In quantitative research there is a focus on the validity and reliability of the research instrument. "In qualitative inquiry, the researcher is the instrument" (Patton, 1990, p. 14). Consequently, qualitative researchers have reframed the issues of internal validity as trustworthiness. To assure the trustworthiness of this study, I have tried to apply a number of methods that qualitative researchers have

developed, which have been described by many qualitative researchers (Erlandson et al., 1993; LeCompte & Preissle, 1993; Lincoln & Guba, 1985; Merriam, 1998; Patton, 1990; Stake, 1995).

One key feature of my study is the *triangulation* of information from multiple sources and data types that strengthen the different findings. All of the findings that have emerged from the study were based on the statements made by several participants and implicitly supported by my own observations and other study data sources. When I combined the findings from the *multiple cases* into my cross-case summary, those findings were further strengthened.

In my report I have used *thick description* of the major findings to provide the reader a sense of the rich context from which these interpretations have emerged. One feature of my reporting style is the frequent use of participant quotations in an attempt to let my data and my subjects speak for themselves so that the reader my be able to draw his or her own conclusions regarding the implications I have drawn from the data.

To help my readers judge the report, I have provided a "Researcher as Instrument" statement of my beliefs and experiences that relate to the study (see Appendix 2). This is intended to help my readers decide where my biases lie so they will have a basis for deciding whether they can agree with the various findings I present.

Throughout the research process, I maintained a *researcher journal* that documented my evolving thinking on my research subject. This gave me a sense of progress as I struggled with coming to a deeper understanding of the nature of

virtual museum projects and their implications for culturally responsive teaching, and documents the new learning I gained in conducting the research.

I have sent copies of my case study drafts to several key participants, asking them to see if my writing is factually accurate and to see if they agree with my interpretation of the events. This method of *member checking* has helped me to improve the accuracy of my writing in several incidences.

I have participated in a *peer review* group of fellow graduate students who are also working on dissertation studies in education. These periodic meetings have proven to be extremely valuable, as we share our thoughts on the research process and educational theory as it applies to our studies. My peers have reviewed my writing in progress and have been especially helpful to me in producing the final draft of my case studies.

Reliability

Reliability in research refers to the question of whether the findings of a study can be replicated. The concept comes out of the positivist paradigm that many qualitative researchers reject (Denzin & Lincoln, 1993). Also, the notion of replication works against case study methodology, which is designed to reach a deep, particularistic understanding of unique situations. Qualitative researchers find they must reframe the notion of reliability in terms of "consistency" or "dependability" (Erlandson et al., 1993; Lincoln & Guba, 1985; Merriam, 1998). Consistency asks whether the conclusions of the study are consistent with the data collected and the worldview and theoretical position of the researcher. One purpose of my "Researcher as Instrument" statement is to reveal my biases at the

beginning of the study. Triangulation and thick description help determine if the findings are consistent with the data.

Generalizability

External validity in research refers to the question of whether the findings within the study will hold in similar situations outside the study. This is the question of the generalizability of the study. Again, it is inherited from the quantitative, positivist paradigm, and qualitative researchers have found it necessary to reframe the attribute in terms more cogent to the nature of qualitative research. Establishing generalizability in quantitative research requires a sample of a specific population of subject large enough to achieve statistical results. In case study research, where the subject is unique and particular, the concept of generalizing to a population of cases is problematic at best. One way the concept has been reframed is in terms of the "working hypothesis." This is the notion that findings in a study may be applied to new situations, but only as a working hypothesis that is to be altered or discarded according to the requirements of the new setting (Merriam, 1998). Another reframing of generalization is in terms of "naturalistic generalization." Naturalistic generalization is the result of tacit or ineffable knowledge that comes from being intimately familiar with a situation (Merriam, 1998; Stake, 1995). Unlike quantitative generalizations, naturalistic generalizations are not in propositional form, but they work in much the same way to transfer findings of a study to a new context. Both the working hypothesis and naturalistic generalization reframing of generalization place responsibility upon the user or reader of the research to determine the extent of the

transferability of the findings in the new context (Merriam, 1998). There are a few things the researcher will do to assist the reader of his or her research in making the transfer of findings to new contexts. One way of providing readers a basis for making generalizations is by providing rich, thick description of the cases. I have attempted to do this sufficiently so that my readers will have enough detail of the cases to help them apply the findings to their unique situations. By giving some indication how typical or modal the case is, I aim at helping the reader determine how aspects of the case will apply in other situations. The use of a multi-site case study design will also help readers determine how typical different aspects of the cases are and how likely the findings might hold in new settings (Merriam, 1998). In my final chapter, I have tried to address the issue of generalizability by addressing the ways virtual museum projects may need to be altered to fit into situations outside of American Indian tribal schools and with different student populations.

LIMITATIONS OF CROSS-CULTURAL RESEARCH

I would like to conclude the description of my methodology with the statement of the limitations that are inherent in conducting research in Native America from the privileged position of a European-American male. Even though I carefully applied research methodologies that attempt to ameliorate the tendency, it is the nature of Western social science to imply that a researcher can succeed in representing accurately the statements of numerous participants from a number of different ethnic and cultural backgrounds. The postmodern "crisis in representation" has struggled with the realization that this cannot be done with

complete validity because there is no fabled Archimedean point from which a researcher can escape his or her enculturated worldview to make such unbiased claims without error. Rather than completely abandon the social science agenda, I prefer a prudent recommendation that all intelligent consumers of social science research read my study with a critical eye.

The history of Native American education should serve as a cautionary tale. The shameful purpose of forced assimilation of Native children into European-American culture was the result of the good intentions of government policy makers who saw it as the best alternative to racial annihilation in the face of the manifest destiny of Western expansion (Adams, 1995). The imperialist thinking behind this sentiment was well supported by the anthropology of the day (Adams, 1995; Fabian, 2000). Even today, Native American scholars complain that Western science continues to denigrate their worldviews and silence their voices (Sarris, 1993; Deloria, 1994, 1995). It is my hope that I have been critical enough in my approach so that I can succeed as an advocate for the self-determination and culturally responsive education of Native Americans.

Alcoff (1991) has written on the "problem of speaking for others." Some researchers have pointed out that resisting the need to speak out for others may work against their own political effectiveness. Yet speaking from a privileged position of power carries dangerous possibilities of harm to subordinated peoples, as history has shown. Another possibility is to try to speak to and with the people for whom one advocates. I hope my study may be taken in this regard. I am saying *to* Native America: here is another possible tool for self-determination, and

I have documented its use through the voices of Native and non-Native participants, although imperfectly. In the future, I would like to assist or work with Native researchers in furthering the research into this and other innovations for education. This follows the recommendations of Swisher (1996) who stated that it should be Native Americans who conduct research in American Indian education if that research is to have the perception of authenticity and legitimacy within Native communities. She asserted that non-Native researchers should take an active role in collaborating with and mentoring Native people in education research. This is a position I agree with and one that I would implement in the spirit of Alcoff's suggestion of speaking *with* the beneficiaries of cross-cultural research.

Chapter 4: Case 1

The Pacific Tribal School

INTRODUCTION: THE FOUR CASE STUDIES

This study is comprised of four cases, each examining Native American tribal school efforts to collaborate with one or more museums to conduct a student learning project. In each case the project activities involved Native American students creating virtual reality images of a variety of cultural items from the museums' American Indian collections. The students also researched the items using museum staff and community members as information resources and composed short essays about their objects. The projects culminated in the creation of an Internet-accessible virtual museum exhibition of Native American tribal artifacts accompanied by the student annotations. The four cases involved tribal schools that had participated in the Four Directions project. As a university participant in Four Directions, I had developed a professional relationship with many of the key participants over a number of years.

The first case involves the Pacific Tribal School virtual museum project, conducted in March of 2001 with the participation of two regional museums, the Lawrence Museum and the Broad County Museum. The second case involves a collaboration between two schools, the Northern Lakes Indian School and Great Bear Tribal School, at the Great Bear Tribal Museum in early April, 2001. The third case involves the Bountiful River Tribal School virtual museum project

conducted in May of 2001 with the participation of two regional museums, the Wabanaki Tribal Museum and the Seaside Museum. The fourth case involves the White Pine Tribal School virtual museum project conducted in May of 2001 with participation of the Provincial Archaeological Commission in Canada, the Seaside Museum, and the Northeast Museum.

Table 1. Study Sites

Case	Participating Schools and Museums	Tribal Affiliation	Region
1	Pacific Tribal School Laurence Museum Broad Museum	Pacific Northwest Coastal Tribes	Pacific Northwest
2	Northern Lakes Tribal School Great Bear Tribal School Great Bear Tribal Museum	Anishinabe	Great Lakes
3	Bountiful River Tribal School Wabanaki Tribal Museum Seaside Museum	Wabanaki	Northeast U.S.
4	White Pine Tribal School Northeast Museum Seaside Museum Provincial Archaeological Commission	Wabanaki	Northeast U.S. Southeast Canada

CONFIDENTIALITY OF THE PARTICIPANTS

In order to maintain the confidentiality of the case study participants, I have used aliases for the participant names and places. Because Native Americans like to stress the individual characteristics of the many different tribes, I have used tribal affiliations that refer to a wider group of related tribes, hoping to at least partially reflect their unique characteristics. These wider, related groups include Pacific Northwest coastal tribes, Anishinabe, and Wabanaki.

OPEN-ENDEDNESS OF THE CASES

It is customary to construct a case study of an individual subject bounded by specific constraints of time and place; however, most of the virtual museum projects that I have assisted in the past and in this study involved an inherent open-endedness. School communities tend to regard their virtual museum projects as ongoing activities that have a tendency to evolve in participation and purpose over years. Typically, virtual museum projects will take off with an intense, short term period of activity when students visit museums to do imaging of museum collections, conduct research, and then write up interpretive essays about their selected objects. Assembling the materials into a useful Web site, though, may require time and technical facility that is scarce at the school, so that months or semesters may pass before the project is complete enough to publish on the World Wide Web. For this reason, I have conceptualized these cases in terms of the *process* of conducting a virtual museum project, studying each project at the period of its most intense activity, and recording the reflections of the participants as they identify the project's successes and problems as well as anticipate the project's ongoing and future progress.

Researcher's Participant Role and the Four Directions Project

For three of the cases, my own role as a participant in the project was crucial. Northern Lakes Indian School, though, already had experience conducting several previous projects with my assistance. Through those experiences, Northern Lakes School had developed the resident knowledge and had acquired the technology to pursue a virtual museum project, probably without

additional help from me. I do not believe the other three schools would have ventured to design and implement a virtual museum project without the kind of outside assistance I was offering in terms of technical training and project management. As a result, there was a training aspect to these projects in which I played the role of the technical expert providing the training.

Due to the culture and technology issues surrounding the virtual museum learning projects, my position as a participant and researcher at times conflicted with my duties as a Four Directions project partner. The Four Directions project was based on the principle that tribally controlled schools would be able to develop their own culturally responsive curriculum materials using technology, and we had been developing a Four Directions model for virtual museum projects based on that principle (Resta, 1998, Christal, Roy, Kreipe de Montaño, Resta, & Cherian, 2001). The Four Directions project brought up a common controversy about "who gets to teach culture" in tribally controlled schools. The general consensus within the Native communities was that the culture classes, common in the tribal schools, should only be taught by Native teachers, but the inclusion of culture content in regular classes taught by non-Native teachers was a more controversial issue. Most of the Four Directions university partners and many of the participating teachers from the tribal schools were non-Native, so to validate the cultural content, curriculum materials and learning projects were designed to encourage tribal member participation, including Native teachers, teacher's aides, parents, respected community members, and students. However, the technology had a tendency to become a separate factor rather than an integrated component of

the Four Directions mission because the technically adept individuals tended to gain a driving or leadership position in some of the project's efforts. For the virtual museum projects, these culture and technology issues led to conflicts regarding ownership. Was a virtual museum project intended to further the culture curriculum, regular classroom instruction, or both? Was it a project supported by the technology coordinators who would put it all together on the World Wide Web to enhance the pride of the school and tribal community, or to benefit me—the researcher and Four Directions colleague—seeking a doctoral degree? Should the students take ownership of the project?

For my own part, I wanted the school community to take collective ownership of the project, which meant reducing my role as a project manager, a role that too often was expected of me, leading to my conflicted participant-researcher role. This issue of ownership played out differently in the four cases.

A NARRATIVE APPROACH TO THE FIRST CASE

This chapter will continue below with the first case study as a chronological account revealing the issues that have emerged from analyzing the case within a narrative format. My goal in this approach is to illustrate a typical sequence of events as a virtual museum project is planned and carried out and to give an account of some of the problems that arise that may impede the successful completion of a project. Because this chronological and detailed narrative approach would be needlessly repetitive if used for each case I use a more direct analytical approach for the subsequent three cases.

CASE 1: THE PACIFIC TRIBAL SCHOOL VIRTUAL MUSEUM PROJECT

Pacific Nation is a northwest American Indian reservation and shares many features with the other tribes of the region, where the rivers and coastal waters have provided a traditional livelihood of fishing and sealing. Wood carving, basket weaving, and canoe making have produced the bulk of the Native American collections in the regional museums. Pacific Tribal School and Pacific High School are housed in a complex of buildings that are adjacent to the early childhood center on one side and a tribal college on the other. Tall pine trees grace the school campus. Beautiful totems and signs with traditional Pacific Native designs add to the ambience of the school. A "welcome pole" stands next to the school cafeteria, a ten-foot figure with forearms extended palms up—a gesture of welcome and offering. The buildings in the tribal school complex are connected by covered walkways, important features in this rainy climate. Across a paved area there is a building for the middle school, an octagonal building for the culture program offices, and the high school building. At the time of the study, there was a huge cedar log with its top planed flat in front of the culture building. It was for the next major carving project for the school, an ocean-worthy canoe.

PACIFIC TRIBAL SCHOOL PARTICIPANTS

Anna is the culture program coordinator for the Pacific schools. She took on the leading role in planning and carrying out the virtual museum project. Anna was part of the Four Directions team at the school, and I had known her for almost five years from a succession of Four Directions summer institutes and site

visits. A resident on the reservation, Anna has deep connections with the Pacific community, so she played a dual role of teacher and community member in the project. Her brother runs the carving program for the school. Her sister Frances also participated in the virtual museum project.

Joan is the technology coordinator and reading specialist for the Pacific schools. She is non-Native, but a highly valued asset at the school. Joan had been the Four Directions facilitator for the Pacific Tribal School, which means she was the primary contact between the school and the Four Directions partners. She was also the initial person whom I contacted for the virtual museum project case study. Joan, used to being a key participant in school programs, was initially concerned about the project because she had to attend a mandatory Bureau of Indian Affairs meeting for several days out of the two weeks we had scheduled the virtual museum project. She would have preferred to be much more involved, but in retrospect, she was glad that Anna had taken the leadership, and told Anna and me, "…you know what? I am really proud of you, . . . that I wasn't involved at all to speak of, really makes me think it can go on."

The school librarian, Sharon, provided a small computer network in the library and her flexible time to the project. She was unable to attend the trips to the museums with the students but assisted by helping us train the students.

Martin, the new school superintendent, showed great interest in the project and provided his support to the effort. He is a Native American but from a different tribe in another region of the U. S.

Anna wanted the project to be school-wide, and she tried to get students from all the grades to participate. In all, fifteen students were able to go to the museums to select, digitize, and research the objects for the virtual museum—students from every class except the fifth grade. Many more students were able to use the images taken at the museum to learn how to use the software that creates QuickTime Virtual Reality media (QTVR).

COMMUNITY MEMBER PARTICIPANTS

Anna was able to arrange for the participation of three other community members in the project. Ruby is a community member, respected elder, and former school teacher who is related to several of the students in the project. She attended the first trip to the Lawrence Museum and followed the progress of the virtual museum project with great interest. John, also a tribal elder, is the traditional dance teacher at Pacific School, and he attended one of the trips to the Lawrence Museum as well.

Frances, mentioned above, is Anna's sister and a parent at Pacific Tribal School. She is also a member of the Pacific Tribal Museum Board, a group of tribal members who are planning their own tribal museum. She was intrigued by QuickTime VR when Anna showed her some of the work done by Four Directions students three years ago and had an intuitive grasp of the possibilities of a virtual museum, connecting it to the goals of the Pacific Tribal Museum Board, thinking of it as "an exciting jumpstart on what we want."

MUSEUM PROFESSIONAL PARTICIPANTS

Pacific Tribal School partnered with two area museums for this project, the Lawrence Museum and the Broad County Museum. The Lawrence is a small, non-profit museum in a rural town in an agricultural section of the state, a little over an hour's drive from the school. Charles, the museum director, took on the full responsibility of working with Pacific Tribal School at the museum. The Broad County Museum is a much larger public museum, located in downtown Waterton, a 20-minute drive from Pacific Tribal School. Robert, the education director, and Fran, one of the curators, were the most active participants in the virtual museum project.

Table 2: Pacific Project Participants

Participant Name	Position or Title	School Staff	Community Member	Museum Staff
Anna	Technology coordinator	•		
Joan	Culture program coordinator	•	•	
Sharon	Librarian	•		
Martin	Superintendent	•		
John	Culture teacher	•	•	
Ruby	Retired, school volunteer		•	
Frances	Tribal Museum Board member		•	
Charles	Laurence Museum director			•
Robert	Broad Museum education director			•
Fran	Broad Museum curator			•

PRIOR EXPERIENCE

QuickTime Virtual Reality and the Four Directions Project

Several experiences during the Four Directions project prepared Pacific School for a virtual museum project. In September 1996, I visited Pacific School for the first time on the initial site visit by Four Directions partners. There I photographed one of the earliest QuickTime Virtual Reality media done at a Four Directions schools, a 360º panorama in the school cafeteria with the Pacific school dancers surrounding me in their traditional regalia and striking their dance poses. This was done at a time before easy-to-use software for QTVR creation was available, and I was assembling the source pictures into the finished media as a service to the schools.

In March, 1998, I visited Pacific Tribal School with equipment I had been accumulating for a full QTVR imaging studio. We set up the equipment in an activity hall near the school and invited tribal members to bring items they would like to see imaged in QTVR. We got a good response to that request, especially from some of the Pacific carvers. By this time, easy-to-use software for QTVR creation had become available, and I gave Joan some training in its use. I left software and equipment with the school so people could experiment with the new media technology. During the 1998 Four Directions summer institute, Joan assembled the media created during my visit into a Pacific Virtual Museum that was published on the Four Directions web site. Comparing the current virtual museum project to the one done in 1998, Joan remarked, “When we did it the

very first time [1998], it was very adult-driven, and this time—we didn't have this space [high school computer lab] then—this time we definitely [decided] it would be run by the students."

Early in 2000, which was to be the last year of the Four Directions project, I issued a request-for-proposal to all the Four Directions schools, offering my assistance to schools wanting to carry out virtual museum projects in partnership with museums in their regions. At a Four Directions quarterly meeting, Anna told me she had been talking with the Broad County Museum about possibly engaging in a partnership for a virtual museum project, but the necessary commitments were not made in time to pursue it that semester. Later, we found out that the Four Directions project would be extended one more year, providing another year of opportunity for virtual museum projects.

That summer I took part in a presentation at an education conference that featured the virtual museum projects that some of the Four Directions schools had implemented. At the end of the presentation, Charles the director of the Lawrence Museum approached me to say he would like to do a similar project with Pacific Tribal School at his museum and asked me how he should contact them. This was a switch from the way contacts usually happened for the school-museum partnerships with which I was familiar. Usually, the school representatives would be the initiators of the virtual museum partnerships. I asked Charles how he came to be at an education conference. He told me he was tagging along with his father, a technology consultant for schools in the Pacific Northwest. For many years, he and his father had been discussing ways technology could improve the

museum's mission as well as education and how the two could be combined in school-museum partnerships. This led Charles to recognize the potential for a partnership with Pacific Tribal School:

> So we began to take those concerns, the concerns of museum use of technology—how can we better use technology to make our lives as museum professionals easier—and began to sort of ruminate on that project. The demonstrated QuickTime potential to me at the time opened up a lot of doors, as far as how researchers can be accessing the museum, how museum personnel can be accessing the collections, [and] how visitors to exhibits can be accessing the exhibits. However, it was missing two primary elements. One was the actual usable hardware at the time, and two, was the model on development. In a lot of cases the software was not quite readily available, or quite usable enough, and then, who would be the actual developers? Would it then be the up to the museums, the school districts, computer science people, who was going to actually image the collections? So it has been on the back burner for many years. And then I went to the NECC conference down in Atlanta last year. While I was there, I was looking at that, and you guys were actually the only ones that showed up on the entire schedule as the virtual museum, how schools and museums can work together to further the resources within a community, and I'm like, "Right up my alley. Hey, let's go." And so I headed in there, listened to the thing, and you guys flashed up on the screen the schools you had been working with around the United States, and I noticed up there in the northwest corner was Pacific Tribal School, which immediately hit a chord, so I think, "I need to contact you guys," after listening to your model because that really all fell into place.

NEGOTIATING THE PROJECT

After gaining permission from Pacific Tribal School to conduct the case study, I talked with Joan to find two weeks on the school calendar that would work best. Just about anytime in March seemed best because of the need to avoid two weeks of standardized testing in April and a plethora of end-of-semester activities in May. We finally settled on the first two weeks of March. In mid-January I began to assist project planning by contacting the museums from Austin

through email and telephone calls. My contacts for the museums were Charles at the Lawrence Museum and Robert at the Broad County Museum. I explained to them that a school team of teachers, students, and community members would like to visit each museum for two days to image and research the objects. Before the student visits, I would come to the museum with Pacific school staff to identify collection items for imaging and decide where to set up an imaging area for the project.

Small Museum Experiences with Schools

Arranging the project with the Lawrence Museum was fairly straightforward because the museum was small, and Charles was the decision-maker for the museum. Because he already had a desire to work with the Pacific school in just this type of project, the school and the museum were meeting each other midway. His earlier experiences in proposing projects with the local school district had not been successful:

> Museums' relationships to school districts are oftentimes very strained relationships. You'll find, at least in Washington State that many relationships that museums have with schools is one of aloofness. Museums are discovering that they would like to offer more to schools. Schools are curious, but concerned, about what that relationship is going to develop into. A lot of schools feel that museums are approaching them essentially for funding, as opposed to usage. That [happened] when we initially approached the Lawrence School District, here, with the concept of "How can we work more closely with you?" The first question they asked—rather, the first comment they had—was, "We don't have any money to give you."

To Charles's way of thinking, this issue has a bearing on which party should be the initiator in school-museum partnerships for projects like ours:

> Well, both parties have to be open to it, OK? It is a partnership. If one or the other does not feel comfortable with it—with a type of collaborative effort like this—then the program will collapse, regardless. So to accomplish that, it's going to take advocacy on both sides. Museum professionals represent to other museum professionals, "This is a good idea, and should be pursued." And then also, school districts relating to their teachers, "This is a good idea, and should be pursued." However, my own experience has been that teachers are probably more reluctant to embrace a concept like this than the museum professional, and so I would think that, initially, projects like this—to really start and take off—you'd have to have the school district being the ones that approach local museums.

Intellectual Property Rights and Student-Created Interpretations

Because museums hold the intellectual property rights to their collections, I explained to both Charles and Robert that the specific purpose of the virtual museum would be for the culture program at Pacific Tribal School and probably also as an educational web site that Pacific would maintain on the school's Web site, accessible everywhere on the World Wide Web. I also knew that Charles would be interested in the virtual reality images of the items and possibly the students' interpretive essays for his own use at the museum. Because there might be conflicting cultural property rights regarding some of the items, especially if an object had a sacred significance for the Pacific Northwest people, I told him that I could not speak for Pacific Tribal School on that matter. In the Four Directions project we left it to the Native American communities to decide what knowledge would be considered sharable with the outside world. There had been a few times in prior virtual museum projects when the sensitive cultural significance of an object led to the decision not to image it. In any case, I told Charles that I would

encourage Pacific Tribal School to share the materials produced in the project if it was deemed appropriate.

I asked Charles about how his museum's clientele would respond to images and interpretations of his museum's collection by Native children. He thought it depended on how much teachers took advantage of the opportunity to teach critical thinking skills and authentic research. Given that,

> for my clientele, you are talking about a businessman's dream, because you've got to ask about student-created things. For the most part, the general public is not a critical thinking group of people. They'll accept almost anything any organization acquainted with legitimacy in reporting will do . . . and they'll eat it up, just because it's made by kids. And very possibly it's made by their kids or grandkids or nieces and nephews, in which case it will be very well accepted. And, yes, I'm sure teachers will maintain some sort of historic integrity during the course of the research. It may not be as stringent as some people may like, but it will be enough to get across the broader concepts, and like I said, you can really bring up and teach broad concepts during the course of that research.

Project Approval at a Large Museum

The negotiations with the larger Broad County Museum were more complex. Robert, my contact at the Broad County Museum, was the museum's education director, one of many museum staffers who had a stake in the appropriate use of the collections. He told me how he went about getting the project approval at his institution:

> When you called me, the first thing I did was to try to explain in general what this was about by email to the museum director. I said, "this person has called, they're from Texas"—that was good because our director is from Texas—"and this is what they want to do. It sounds like it is something that's possible. Shall I continue with this project?" And I got a very enthusiastic response back, saying, "Yes, certainly, go ahead." I felt it was not just an enthusiastic response to go ahead, but that it was an assignment, "Do this. This is going to work. We want this done." . . . He

> was feeling a very positive response about working this way with the Native American community.

Next, Robert contacted the two curators who would be most actively involved in the project. "Actually my email was at this point not saying, 'Would you want to be involved?' but, 'I'm forwarding you the email that I have received from the director, and it says we are going to do this project.'" He had also mentioned to the director that the project would involve making images of museum collections that would probably end up on the Internet, which touched on the museum's intellectual property rights policy. The director had told him, "In this situation, I'm sure we could work it out." Robert passed this concern on to the museum's photo archivist who asked me about the resolution of the digital photographs we would be taking. He was satisfied that such photographs were at a low enough resolution that they would not be suitable for print publication, which addressed the museum's primary concern about images of the museum's collections.

Salient Features for Project Approval

Robert shared his analysis of the acceptability of our virtual museum projects from his museum education director's point of view. His analysis is relevant to the replication of this project model to non-Native school populations. First, he considered museum staffers' time invested vs. possible beneficial outcome for the project:

> From my point of view as an educator, I am also programmed [for] looking at the time component, and how much time it takes to do something like this. From a time component, as an educator, most of our regular institutionalized programs need to be some type of presentation

> where we can look and we can say, “We have so much time we can put into the development of this program and we are going to get so much pay-off at the other end,” and that pay-off usually comes by us knowing that there are X [number of] groups a year over X [number of] years that can use that presentation.

Second, and more importantly, as a museum representative, he considered whether this type of program would be making appropriate use of the museum’s collections:

> The other thing that has to be looked at from the collections point of view is, “How often do we feel it's appropriate to utilize objects, many of which are either potentially fragile to very fragile?” [So] we're looking at not only time, especially for a project like this that took some hours from several people over several days, but also just that idea, “Can this be done over and over?” And our answer would be, I think from both our points of view would be, “No,” that there would be a very limited number of times that we would become a part of this kind of program that [involved] taking artifacts out of exhibits and [being] handled. …Probably in this situation, if we had a high school teacher from some Waterton or Broad county school that came in and said, "I think my kids would get a lot out of this, if we could really handle the artifacts." What we would probably say is, “No, we don't have enough time to deal with it, and the priority is not to use our collection in that fashion for educational purposes.”

A third factor that made the virtual museum project with the Pacific schools acceptable to the museum was the connection it made to the Native American community:

> The difference, then, in this project is that we also have a priority with minority artifacts in our collection, to find ways for that minority culture to feel like they have ownership of these artifacts, even though they are being held by the museum. So, from that point of view, this seems [to be] an attractive program because of that minority use of minority artifacts. And so we found it a very attractive presentation, worth our time for that. However, we would still have to think very carefully about how many times we would allow Native American groups to continue to come in to do the same thing.

Virtual Museum Learning Projects—Process vs. Product

Robert's caution about repeating a virtual museum project with Native American schools stems from the nature of the project: Is it an educational *process* or *product*? In one sense the project leads to a *product*: the virtual museum of Pacific Northwest Indian culture, which is a reusable teaching resource. In another sense, the project is an educational *process* leading to other educational outcomes, such as the technical learning involved in students' use of the digital cameras and their use of various multimedia software programs, the research process, and the writing. I assured Robert that, from the Pacific Northwest tribal perspective, the goal was to produce a virtual museum product that could be used to teach about their people and also that it was considered an educational process but one that would not involve visiting the same museum or the same objects in a given museum repeatedly. In a sense, the school would be doing electronic collection for its own virtual museum so that an individual item needed to be handled for imaging only once.

Museum Accreditation

Robert also revealed that the importance of making connections to minority communities was crucial to the Broad County Museum for another reason—its standing as an accredited museum:

> There's another thing that I think is an important goal, and this reaches really beyond education on the part of our director, and that is that museums today are considered to have this obligation when they have minority collections—to reach out. On the national level, this is considered to be almost an obligation of the institution. Our museum is an accredited museum with the American Association of Museums. We've been accredited for twenty years or more . . . We will be going through

> reaccredidation within the next several years for our third time. We are working towards the third decade of accreditation. When you go through that process, candidly, one of the things that comes up there is: "What is your minority audience? How do you relate to your minority community? Do you utilize your objects in a way that is appropriate to make those connections to Native Americans, which is another minority?" So this is seen on the national scene as an obligation of museums, and literally, for accreditation, they—the national organization—want to see that these kinds of things are done. So, we wish to take advantage of these kinds of activities when we can, for one reason, because it shows that we are appropriately fulfilling those missions as a museum to minority audiences. From an even broader point of view, which is education, this is a part of our mission, and it's a part of our mission that is not only just seen as good, but is literally expected for accredited museums.

LAWRENCE MUSEUM ACTIVITY – PREPARATION

Pacific Administrative Approval

I flew to the Pacific Northwest on the Sunday before the project was to begin. Monday morning I met with Anna and the Pacific School superintendent, Martin Warrior, to brief the administrator on the project. Because superintendent Warrior was new to the Pacific Tribal School, he wanted to know the background on the project and its origins in the Four Directions project. On my laptop computer, I showed him some of the QTVR that had been done earlier at the Pacific School as well as QTVR media made by other Four Directions schools. I also showed him the completed virtual museums that Four Directions students had done with the National Museum of the American Indian in New York City and the Heard Museum in Phoenix, Arizona. Mr. Warrior was very impressed by the demonstration but was concerned about how the project would fit into the curriculum. Anna and I explained that the Pacific school virtual museum could be used to teach Pacific and Northwest Indian culture, not only to Pacific school

students, but, if it were published on the Internet, it could be used by all learners who were interested in American Indians. We said that the students actively working on the project would be gaining new skills in technology and doing research for the essays they would write for the items in the exhibit. Though only a few students would be involved in this particular project, it could be repeated in future semesters using different museums and different students. In this way, all Pacific students could have an opportunity to participate at some point in their schooling in a growing virtual museum. Mr. Warrior approved of this approach, noting several museums in the region that were good candidates for future virtual museum partnerships.

Visiting the Lawrence Museum

After lunch, Anna and I drove to the Lawrence Museum, about an hour's drive from the school. The museum was located near the center of town, and on entering it, a bell jingled on the door. It presented a small town main street USA ambience. Beyond the threshold was a small lobby/museum store, and beyond that were two parallel halls. The hall on the left contained a re-creation of early 20th century Lawrence, with two story models of homes, offices, businesses and storefronts, all densely furnished with items typical of the period. The right hall's exhibits mainly reflected the rural lifestyle of the same period. Immediately to the left of the entryway was a vault door that led to a smaller exhibit space of approximately 12 by 35 feet, which was where most of the American Indian collection was kept. Anna was impressed when Charles said the museum's most valuable items were displayed in the small room, specifically mentioning the

American Indian collection and old weapons. Charles described the 24-year-old museum as

> . . . representing primarily aspects of community and cultural history for the Broad county communities, ranging anywhere from prehistoric, early European settlements and then contact [between Native American and European peoples], all the up until about 1955. The collections here break down into [several] primary collections. One is our pioneer daily life collection; the other one is our agricultural collection. We then have our ethnographic collection, which includes our Native American collections and our prehistoric collections, also, our natural sciences collections. We have our transportation/automobile collection. And then finally we have our vintage photograph and archival collections. The exhibits we have here primarily try to reflect daily life, contextual exhibits for the culture and heritage of the communities of Broad county.

Three of the seven floor-to-ceiling display cases in the vault room contained American Indian items, most of which were of Pacific Northwest Indian origin. The largest case was mainly dedicated to a display of Native American baskets collected by a donor's mother. Charles mentioned that he had little information on the baskets, so there was some speculation about the age and source of each one. There were many other items, historic and prehistoric, including stone tools, fishhooks, fish clubs, a model canoe, masks, the prow of a canoe, and a cedar "rain hat." Charles could identify only a few items as being specifically from the Pacific Northwest tribe. He told us there was a dress in the collection, not on display, that was made by Pacific weavers in a business that was active on the reservation from the 1930s to the 1950s. Charles mentioned that the dress was for a very thin woman and that he would let one of the students model it for the virtual museum. A "shovel-nosed canoe" displayed in the right

exhibit hall, made for use in very shallow, marshy waters by a tribe in the Lawrence area, also interested Anna.

As Anna examined the items, she took notes and digital still images of likely candidates of items of interest for the virtual museum. I talked with Charles about setting up our digital imaging area. We needed a place where we could drape a cloth backdrop in front of a turntable where the items would be photographed for QTVR imaging. I would need enough space to set up photoflood lights as well. Charles suggested doing the project in the vault room, which he could close to the public for the two days of photographing. Charles could also provide two sturdy worktables for us to use during the project. I arranged to meet Charles at the museum the next morning at about 9:00, an hour before the students were to arrive, to set up the space and equipment for the project.

A Controversial Painting

On the way out of town, Anna stopped at the Lawrence post office to look at an old painting that had long been controversial for the Native communities in the area. The painting commemorated the arrival of the first European-American pioneers to the region, and it featured a nude American Indian maiden greeting the party of well-dressed pioneers. Anna took some pictures of the painting before we left. On the way back to the school, I took notes of the route so I would be able to drive to the museum by myself early the next morning.

Technology Use at the School

Back at the school we conferred with Joan about the project. We needed a place to put the digital picture files we would be creating so that they could be accessed both in the library and in the high school computer lab. Joan created a shared folder on the school's network server for that purpose. We also installed the software for QTVR media creation on several of the high school computer lab work stations.

Joan showed me some of the projects of her high school students. Their latest assignment was to re-create a modern commercial magazine cover, with replicated typeface, graphics, and teasers for feature articles. The designs were knockoffs of popular magazines like *Sports Illustrated*, *People*, and *Style*. Students featured pictures of themselves on the covers. They were using a PowerPoint presentation program for this purpose. I had seen similar projects before that used specialty software with clip art to achieve the same effects. Joan was "thinking outside the box," compared to the usual use of presentation software. For Joan's classes, PowerPoint was used for desktop publishing, multimedia applications, and digital photo databases. One semester-long project by her student Linda was a multimedia slide show dedicated to the memory of her grandfather, who had passed away six months previously. It was a healing activity that drew on the memories and resources of her extended family—a very personal project. Joan showed me several other innovative multimedia projects she and her students were working on, and all of them had a common thread:

connections to the students' lives and their culture. The virtual museum project fit in well with that approach.

Preparing the Students

I talked with Joan and Anna about how the students had been prepared for the project. They would need to know what they were aiming for when they arrived at the museum the next morning. I had sent Joan a CD with several of the early Four Directions projects on it and a list of other student-created virtual museum projects on the World Wide Web. Joan had shown these materials to the students who would be involved in the project and explained to them how the QTVR imaging was done. I also shared a research form with her that had been created for an earlier virtual museum project that I thought might be useful for the students. The research form (see Appendix 4) was a list of questions to help students collect important information about the items they had chosen for the virtual museum. The form asked questions like "How old is the object?," "What are the object's dimensions?," and "What tribe/culture is it from?" Joan made copies of the form for me to take to the Lawrence Museum with me.

Anna thought that they had done a good job of preparing the students mentally for the project.

> When a student feels that you're organizing [a project] to offer them something, they'll work to help what's going on to a certain extent, but if you drop them in front of the museum and say "See you at school," you know they'll probably go to the mall or something. [What makes a difference to them is] the sincereness of your concern of how we were going to do this and making sure we could have it done and show them that they needed to be proper in how they act at the museum. So anytime that we praise dance or something to the kids, I think that we tell …that this is important, . . . and they are going to play an important role in it.

> That kind of hypes them up, [to] say something in a way that they all feel sure that they can do it. And they want to do a good job, I think.

An Equipment-Laden Project

On the way back to town, Joan and I went to a fabric store to purchase some solid-colored cloth for the backdrop of our imaging area. We purchased black cloth against which we would be shooting most of our objects and a lighter colored cloth for a backdrop to contrast with darker-colored objects. We also went to an office supply store to purchase an ample supply of floppy disks to use with two of the digital still cameras we were using in the project.

I have called my job in the virtual museum projects as "equipment-laden," because I have to pack and travel with a variety of pieces of photography and computer equipment as well as custom hardware for photographing QTVR media. In addition, I usually need to make sure that everything is readily available and in good operating condition so that the few working hours we have at a museum are productive. The following list, based on my reminder notes, gives a general idea of the basic equipment one might use in a virtual museum project:

- Extension chords and power strips—for powering photo lights, computers
- Batteries (fully charged) for cameras and laptop computer, plus battery chargers
- Still and video cameras
- Tripods
- Storage media—videotapes, floppy disks, flash memory cards, etc.
- Cables—for connecting cameras to computer
- AC-DC converters for various equipment (cameras, computer, disk drives)

- Cloth backdrops in solid dark and light colors
- QTVR equipment—pan head, turntable, leveling bubbles, stands for holding objects securely on turntable
- Scissors, tape, push pins, tools (screw drivers and pliers)
- Audio tape recorder, microphone, microphone stand, and audiotape

Before retiring for the evening, I checked out all of the equipment and organized it for a quick departure the next morning.

LAWRENCE MUSEUM ACTIVITY – DAY 1

Setting Up

I arrived at the museum at 9:00 a.m. to set up the equipment for our first day of imaging. Charles helped me move two of the museum's sturdy folding tables to the vault room. At one end of the room, we used pushpins to hang the two colors of backdrops so that I could roll back the black cloth when the gray cloth behind it was required for dark-colored objects. I cut a corner from each cloth to drape over the turntable pedestal so that it would match the backdrop. One of the tables was pushed against the cloth backdrops, which were long enough to cover the tables as well, in case we were shooting objects that would not be imaged on the turntable. I set up the two photoflood lights to illuminate the objects we would be shooting. I arranged the electrical chords to the lights so that people would not be tripping over them. I set up a tripod for the digital still camera we would be using for the QTVR imaging. We put the second worktable at the other end of the room for the remaining equipment and to provide a working space for the students. I plugged in a power strip for the laptop and

battery chargers. Finally, I set up a tripod and a video camera for collecting research information near the worktable where the camera could be plugged into the power strip.

The Team Arrives

When I had finished setting up everything for the Pacific Tribal School team it was past time for their arrival. I toured the museum and chatted with Charles awhile, and then Anna, "Auntie" Ruby, and seven students showed up nearly an hour "late." Later, Anna made a reference to having run on "Indian Time" back at the school. In my experience, the term Indian Time is used to explain delays and lack of punctuality in Indian Country. It is a generations-old joke that Native Americans share about their cultural style that runs counter to the American mainstream fixation on time. In this case, Anna had to round up the students from all over the school and get them into the van. However, she had not had the experience with virtual museum projects that I had, so she had not developed a list of items required for this kind of equipment-laden project. Therefore, it was on the way to the museum that she remembered some items that would be needed:

> I know one of the things, when we were getting into the van to go, I looked at them and none of them had paper and pencil….So I had to stop at the local store. I wasn't about to run back and say, "I forgot the paper and pencils." Because I was going to get clipboards for them, you know, so they could feel like they were actually [going to do some work]. So there's the pencil, and of course the pencil needs to be sharpened, and I had to buy a pencil sharpener, and I gave Sam the job of sharpening. I said, "OK, Sam, your job is to sharpen the pencils so that everyone has one." And we'll get everyone notebooks so they can write up their notes in their notebook.

Sam was an eighth-grader who Anna and Joan both wanted to be involved in the whole virtual museum process and learn about it thoroughly enough so he could help the teachers with the continuing project.

Anna did not like the hurrying at the beginning of the project. Another culture teacher at the school referred to the importance of preparing the students before they engaged in spiritual activities, and the virtual museum project may be classified as spiritual in some respects. Anna told me that in that hurried start on the first day,

> Well, when we first went to the museum we rushed in there, 'cause I was so anxious, and I thought to myself, "My God, these are real things that real people owned—and—stop, I want to give thanks that we were able to capture the moment." And so I think that kind of feeling should go with the kids, too. You know, so you say, this was someone's at some time. Somebody actually made this, and a trace of the time is carried within them. I almost felt like crying . . .

After the project, Anna and Joan discussed the need to have an elder say a prayer over the project at the museum with the curator present. Such an activity would set a respectful tone for the activities and help to build a bridge between the museum and the Pacific community.

Project Activity

The students arrived with their newly sharpened pencils and notebooks, and Anna passed out copies of the research form I had copied for them. My first research videotape captured some of the activity early on that first day. They quickly set to work, looking into the cases, pointing out items they liked to each other. Anna and Ruby were drawn first to the display of baskets, and Anna recommended some for imaging to some students. The boys admired the halibut

hooks and the ancient mortar and pestle sets, which they called "rocks." Soon, some of the students sat on the floor or stood at the worktable with their research forms, taking notes on the items they had chosen for the virtual museum. Charles came in and talked with Ruby about items in the collection. Anna circulated among the students, helped them with their notes, and quietly answered their questions. A few minutes after the school group arrived, Anna's sister Frances showed up, and I gave her a briefing on the virtual museum project. At least in the first hour of the museum activity, as it is revealed on the videotape, all the students were engaged in serious work.

There was a striking difference in the conversational style between the adults and the children. The adults spoke in a normal conversational tone and at a volume that was picked up clearly by the video camera across the room, but the students spoke to each other and Anna in much quieter tones, moving into a familiar proximity to communicate, so that most of their remarks were inaudible on the videotape. By contrast, the students could easily monitor most of the adults' conversations.

About a half hour after the team arrived, I suggested that we should get the first item out of the case for imaging. Charles opened the display case and put on cotton gloves to remove a carved knife handle and took it over to the imaging area. I fished in my box of sundry stands and selected one on which to set the knife handle upright for imaging. Charles centered the object on the turntable, while I turned on the photoflood lights and began working with the student who had chosen the knife handle for imaging. Though the students had seen samples

from virtual museum projects that were done earlier, they had not received any training on the procedures for taking pictures for QTVR imaging.

Most of the students were familiar with point-and-shoot photography, but they did not have experience in using tripods and controlling exposure with a digital camera, so the virtual museum project became a training opportunity in these technical areas. I would typically show the student who was doing the imaging how to use the tilt and pan adjustments on the tripod, along with the zoom function on the camera so that they could frame their object in the viewfinder. I gave them pointers on framing the object in the viewfinder, suggesting that they use tight framing and center the object in the frame. If an object was tall, I suggested that they tilt the camera 90º to image it in "portrait orientation." Sometimes we needed to move the tripod closer to the object to get the tight framing we wanted.

When the student was satisfied with the way the object was framed, I might step her through the camera controls to set the exposure. I also gave some tips on how to take pictures without shaking the camera, which would result in a blurry shot. Typically, QTVR imaging requires 36 shots to capture a 360º rotation of an object. Often there are special details on the object that the student may want to feature in her digital exhibit as separate still images, like details of a pattern on a basket or the interior of a basket. The detail shots usually require moving the object off the turntable and moving and reframing the camera. Some flat objects would not benefit from 360º of rotation, so they would be shot flat against the cloth background.

The routine of shooting the 36 shots for rotation often involved teamwork between two students—one operating the camera, while the other turned the object on the turntable 10º at a time in a clockwise direction. Sometimes the students would trade roles in the middle of an imaging session. Other times one student would do both jobs.

In the case of our first object at the Lawrence, no detail shots were required, and the entire process of framing and taking the 36 shots took about nine minutes. It was fortunate that I had a stand available that allowed us to set the knife handle upright so that the finished QTVR image could be rotated to reveal the elaborate figure of a monster devouring a man that could be examined from all aspects and in a proper orientation. Several days later, the school's carving teacher told me that—because the rotating computer image let him see the handle in three dimensions—it would enable him to carve a copy of the handle without having to touch the actual item. Getting items like the knife handle to sit on the turntable in a proper upright orientation for imaging is often the most difficult problem posed for QTVR imaging. Over time I have collected a number of aids for this purpose—doll stands, various clear Plexiglas stands, clay, museum wax, paper clips, etc. Later in the day Charles made use of a small binder clip to get a spear point to stand upright for imaging. Virtual museum projects are full of such instances, requiring problem solving and inventiveness.

The students asked Charles why he wore cotton gloves to handle the objects, and he explained that the oil and perspiration on a person's hands can damage some objects, especially those made out of wood and bark. He said that a

person could actually etch fingerprints permanently on some objects. Charles got out some more gloves so that the students and I could help with the handling. Charles also provided the students with measuring tapes so they could measure the dimensions of the objects, one of the tasks listed on their research forms.

In the four hours we were at the museum, which included a break for lunch, we managed to image fourteen objects from the collection. Because it was my job to show the students how to use the equipment and monitor them to make sure they were successful, I was busy almost continuously. At times, I would have to do some technical chores, like download the pictures from the camera to the laptop computer when the camera's memory became full of image files, or change the batteries in the camera when they became depleted and put the depleted batteries in the charger. Anna was very busy as well, helping students decide which objects to adopt for their part of the virtual museum, helping them with their research notes, and taking them to lunch. She also took notes of her own on the objects and took digital still pictures of the day's activity and some of the objects in the cases.

Frances and Ruby had fewer specified duties and seem to enjoy the visit in a more informal way. They spoke quietly with the students and had discussions with the other adults about many of the objects. For instance, one object was a small stone "charm" with a face carved into it, tied to a four-inch piece of smooth deer antler by a leather thong. Charles only knew that it was something that was "very old" that "some collector brought in." Frances thought it was a decorative pin for a heavy wool blanket, used to secure it around one's shoulders. Ruby

speculated that it was a small tool for cracking nuts. The student Dora listened quietly to this conversation. This was one example of the role that Charles defined for himself in a virtual museum project:

> The actual primary role I see museum staff playing in this, which would probably be the most passive in the smallest role potentially playable in this model, is one of a facilitator more than anything else. Not always [do] the museum curators have an in-depth knowledge of their collection, especially in a small museum basis. Yeah, I know a lot about Lawrence and Broad county history, but there is a whole lot more I don't know. So I look at something like a project like this, where I have community contact, as both a learning opportunity for myself and then a means where I can facilitate—especially if there are seniors or elders present with the students—as an opportunity to facilitate that discussion. Because—whereas as a senior or an elder may be afraid to approach a student, or vice versa—as a facilitator, sort of neutral party there, the guy that owns the artifacts, so to speak, can begin asking questions: "What do you think this was? What do you think that was?" You can ask of the seniors, you can ask of the students. You can begin posing these questions, so that that contact is then made. And the next thing you know, they are talking to you and they are really getting into it. Then when you step out of the picture, they're talking [among] themselves and they never even notice that you switched gears on them.

There were several instances where I could see Charles performing this facilitating role in the two days of the project.

Accessing the Culture that is Behind the Glass

Frances recognized Charles's facilitating efforts as well in our discussion of the community member's role in the virtual museum project. She was alluding to incidents like the discussion of the purpose of the charm when she told me that at the museum, she and her aunt Ruby "talked a little bit about what we thought some of the pieces might be that were not identified, and we were able to come to a couple of conclusions that I think were pretty accurate." She saw this type of

input was one of the ways that community members could contribute to the virtual museum project. At a much deeper level, Frances appreciated how the students, the curator, and the community members worked together in the virtual museum project to foster a greater appreciation of her community and tribal culture, especially for the students:

> I think the thing I'm most excited about is that we're allowing the kids to have ownership of those objects. "These are yours, you tell us what they mean, you tell us what they were meant for, and you tell us what they mean to you as an individual." Being able to let the kids have that voice now is going to give them a sense of who they are, a deeper sense than if they were being just talked to by the curator about what those things are interpreted as. But being able to, as a tribal member, to sit and listen to my aunt talk about her experience in life, and being able to listen to her share with the curator, and for him to appreciate it and take her word and everybody comes away with a lot more insight and a lot more excitement about the pieces, that they're not just a part of someone else's history that's long gone. They're part of a history of a people that's still thriving. The people that used those still use them to this day, and I think that's what—it kind of pulls them into the here and now more than leaving them in the dust and the dark, behind the glass. . . . I don't want my culture to be viewed only from behind the glass.

Frances related a story to show that the students understood how special it was to have these items from their culture removed from the glass display cases for the virtual museum project:

> I know that one of the little boys that I talked to when you were putting one of the items back in the case, and they were all watching, and it was such a reverent moment, because he whispered to me, he says, "Just think, we'll never be this close and have this kind of access ever again." . . . He knew how special the moment and how special the privilege was to have access like that because all the time we've taken field trips to the museum, not once have the cases been opened.

Ruby also recognized that the virtual museum project offered experiences that helped students gain a connection to their culture. Ruby's granddaughter,

Linda, was the student who was doing the multimedia project in memory of her grandfather, Ruby's husband, who had passed away six months previously. She said the virtual museum project was similar to Linda's personal project because projects that touched on the students' genealogy, history, and language helped students understand "where they come from and who they are. . . . It's important for them to know." Ruby wanted the students to incorporate terms from the Pacific tribe's language into the virtual museum's text.

"Bumping your head against the glass"

In my interviews, several students recognized the unusual opportunity the virtual museum project gave them in gaining special access to the museums collections. Other people in the project brought up the metaphor of the museum case glass as a barrier to access. Several times throughout the project, Anna referred to "bumping your head against the glass" to get a better view of an item. The imaging of the objects the students were doing was one way to be liberated from the limitation posed by the museum glass. Anna told one student that with the virtual museum QTVR images, "You don't have to go bumping your head against the glass to get a closer look. I don't know how many times I've bumped my head on museum glass." Joan agreed, saying that if you tried to take pictures of items in a museum display "…you get glare. And you can really, from what I noticed when the students were first creating [QTVR] objects, the zoom is really compelling. You know, to get in close like that and see it is really almost better than seeing it behind glass."

Robert, the education director of the Broad County Museum, wanted to stress the primary importance of real museums that have real objects in their collections, but he could also see the value of the virtual museum imagery as well, especially if it enhanced the real exhibit behind the glass.

> I think that that [the] main advantage to this situation is that a museum needs to show real objects, or it's not really a museum. The idea of virtual museums on the Web, they are really a whole different cup of tea than seeing the real thing. They are an advantage and valuable when the real thing is not accessible. Here at the museum, where the real thing can and should be accessible, what the digital [image] can do is bring the person more in contact than the actual visual inspection can do. If they have the opportunity to have the real object—plus with some type of digital representation, be able to get closer to it, the digital image, move it around magically—in a way they cannot do to the glass, then we haven't taken the original object away, we've just enhanced it in a way that makes that look at the original object even more interesting.

Anna gathered the students into the van to leave the museum a little after three. I gathered up the digital camera and the laptop computer and drove back to the school, leaving the rest of the equipment for the next day. At the school, I downloaded the remaining pictures on the camera and organized them into folders, one folder for each object. Then Joan helped me transfer the files to the school network server. That evening I gave Joan a refresher session on how to use the QTVR software using the pictures the students had taken that day so she would be comfortable enough to help train the students in its use.

LAWRENCE MUSEUM ACTIVITY – DAY 2

On the second day I arrived at the Lawrence Museum about 9:30 a. m. There was very little set-up to do, so I took a couple of panoramas in the museum for possible inclusion in the virtual museum. One was of the shovel-nosed canoe,

which was too large to shoot on a turntable and too long to image well in a still photograph. The school team arrived a little after 10:00. With the first day behind us, the second day was more relaxed and confident. The group was smaller, too. Sam returned for his second day, along with four other students from grades 6, 8, 11, and 12—so the group was an older one as well. Student activity was much like the day before. They examined the objects, took research notes, and took pictures with the school's digital cameras. A tribal elder, John, who teaches traditional dance at the Pacific school, also came. The behavior of the students was very similar to the behavior shown by the younger students the day before. The students would speak quietly to each other and to Anna, but the adults' speaking levels were generally louder, so that everyone in the room could hear them.

Cultural Fish Stories

John was immediately drawn to the halibut hooks and fish clubs in the display case. The hooks were large devices, about ten inches long, carved from wood with steel barbs lashed to them. Some were plain and some had elaborate carvings on them. John said his father was a fisherman, and he could remember hooks, similar to the plain ones, lined up among his father's equipment. He said the carved figures on some of the hooks operated on the "spiritual side" to help the fishermen catch the halibut. There was a great deal of activity going on around John as he made these remarks. Charles, Anna, and I replied to him and asked further questions as we worked with the students. As Charles got a basket out of the display case, he asked John about the materials used in making some of

the baskets. Later, John returned to the topic of fishing. “Do you know how big a halibut has to be to get one of those hooks in his mouth? Four hundred pounds at least.” He mentioned that all of the big halibut had been fished out. I asked him how big they got nowadays. “Fourteen to 160 pounds.” The biggest halibut he had ever seen was 225 pounds, about six or seven feet long, that “would fill up the whole back end of your boat.” John said large halibut could be very dangerous if they flopped around in the back of your boat. I said that some of the students were asking about the purpose of the fish clubs the day before. John replied, “You have to kill them right away or they bust up your boat,” and he added that these days fishermen shoot them before bringing them on board.

Apparently, John’s interest in the fishing gear in the exhibit had an effect on the student choices that day. At one point, Anna asked, “Who is going to do a halibut hook?” Two students each selected a halibut hook and one selected a fish club for imaging. John’s role on this day reflects in several ways the remarks Frances made about her aunt’s role the day before as well as Charles’s remark about facilitating the connections between community members and students. In a way, the museum collection itself provided a forum for discussions on important aspects of Pacific Northwest culture, which placed John in a central role.

A Dress of Remembrance

Early in the day Charles brought in the Pacific Northwest weaver’s dress from out of storage, explaining that it was colored with natural dyes, which would fade from light exposure if it were placed on display for a long period. The dress was a part of Pacific history that was still within the living memory of the

community. The dress was the product of an economic project begun during the Depression, when about twenty looms were brought to the reservation. Pacific women made cotton cloth with Native American inspired designs, and Pacific seamstresses used the cloth to make "designer label" dresses and shawls, which Anna compared to "the Gloria Vanderbilt Collection." The business was eventually sold to the tribe, but it failed in the late 50s due to the lack of good product distribution.

Charles and Anna had decided it would be best if Lori, the most petite of the girls in the team, would model the dress for QTVR imaging. We decided to do the imaging while the others were gone to lunch because it would require Lori to maintain a serious focus on her expression and posture as we rotated her through 360º and having her classmates around watching might be too distracting. With everyone gone, Charles and I collaborated on doing the imaging. We moved the worktable out of the imaging area and placed the turntable on the floor. The backdrop cloth was long enough to serve as a background for Lori's full height. Lori stood on the turntable modeling the dress, as Charles rotated her by 10º increments as I operated the camera.

Like the fishing paraphernalia, the dress became a forum for an ongoing discussion of Pacific culture, which Charles thought was "neat" because

> . . . again you saw the generation gap was bridged because we had John, John was there and his sisters were part of that weaving experience from the late 30s into the late 50s there for the Pacific Nation. And so, you had in that case two generations actually bridged as he related his experiences to Anna who was the next generation, the teacher, and so she began to learn, which then of course encouraged students to learn. And I, you know, all that was from my role as a facilitator, asking a few leading questions: "What do you remember? When would it be, some of these

> times?" and the next thing you know, you then have this discourse going on with three different generations as the young lady, Lori, as Lori then questions Anna and John concerning the information about where to get information on that. And on top of that you watch as the three of them put together a number of resources in their community that related to that [artifact].

In the next few days, Anna was able to identify several Pacific women who had worked as weavers or seamstresses in the business. John also mentioned that some of the looms were still on the reservation, and Anna knew of a loom that had come from the university. Anna mentioned her own childhood memories of the pervasive sound of the looms operating throughout the day. "I can remember it when I was little. They would push, pull, and push the thing, and the seats would be moving, and swoosh, swoosh, you'd hear that noise all the time." She said she would love to rebuild some looms so that the children could experience that aspect of their history. Because of the number of resources available about the Pacific weavers' history, Anna and Joan began to outline a possible sub-project that would involve oral histories and archival photographs and documents that could be shared on the Web and perhaps a fashion show, if enough dresses from the business could be located.

For Charles, Anna's memory of the looms was remarkable because

> . . . to the project, someone had this capability of adding their memories, which is great because one thing I found out about memories is that memories are what validate a community's history. The memories are the personal aspect of community, and so when you have the ability to remember, you have managed to validate that experience, and that's what gives that experience and the history of that experience legitimacy. And so that's what she was immediately doing was she was legitimizing and validating her own experiences through her own memories and at the same time she was validating John's—and even though Lori was not physically a part of it, she could now become communally a part of it because she

> now had such a validated memory to base any of her further experiences on.

It was easy to see how proud Lori was to play her own part in this history. She incorporated one of the shots of her wearing the dress in her magazine cover project for Joan's class. The magazine was "Family Tree," and some of the teasers on the cover were "Find out about your great ancestors!," "The Good Old Days! A Look in the Past," and "Let's learn about our Family Tree!" She brought her mother and her father to the computer lab to show them the QTVR movie of her in the dress. Her mother told Anna that Lori was a fan of the model Tyra Banks and she wanted to be a model herself. Anna was pleased with the personal connections students like Lori were making to the virtual museum project and the kind of interest parents and community members gave to their work. "It really gives them a chance to feel good about what they've done."

Like the first day, the second day of virtual museum work was also very productive. The students were able to image and research another thirteen objects for the project. After they left for school, Charles helped me dismantle our imaging studio and participated in my research interview.

TECHNOLOGY TRAINING AT THE SCHOOL

The next day, Wednesday, was scheduled to be a training day for the students. Anna and I worked on getting the rest of the image files organized and uploaded to the virtual museum shared folder on the school network server. We installed the QTVR software on the library computers. Sharon, the librarian, would be learning the software along with the kids so she could help with the training.

During the day, several classes of students rotated through the library to learn how to use the QTVR software using the image files taken at the Lawrence Museum. The response from the students was generally good. Joan noted that

> . . . back when we had the whole fourth grade in there, everybody was able to do that. It's not at all just for a select few. I think that everybody will be able to do it. Some of them are more and less interested, but more so than not. There were just a few who were less interested, [but] most of them were quite interested, and all were able to do it and follow the process. I don't think there's anybody who didn't understand what we were doing.

Joan thought there were "a couple of kids whose feelings were hurt that they didn't get to go to the museum." She told of one student who was doing goal statements later that day who wrote that she wanted to go to the museum. Anna also felt that some students were jealous that they weren't selected for the museum trips. Anna and Joan thought that the issue of inclusion would need to be dealt with by making the virtual museum an ongoing project. Joan said, "I want to get the feeling out that this was something Pacific Tribal School does every year, maybe a couple of times a year, maybe something in the fall and then in the spring. So everybody gets a chance to be one of those people." This would be possible because there were "lots of museums" and "more objects at the museums than we can do."

During the training, I wanted to show the more advanced step of making a QTVR scene so that the students could add hot spots to their object that, when clicked on with the mouse, brought up the detail images. For instance, we had taken close-up shots of the design patterns on the Pacific weavers dress and blouse, and I showed Lori the extra steps required to add hot spots linked to the

details in her QTVR movie. This added a level of complexity to the task of creating a QTVR movie that is not required in most cases. Joan suggested that I initially confine the training to the relatively simple task of creating a plain QTVR object movie without hot spots and that I should save the hot spots for later lessons. I thought this was a sound suggestion, but I wanted to make sure that some people learned how to do the more advanced steps while I was there.

The virtual museum project was a training opportunity, and I wanted to leave the school with a body of knowledge that would enable them to continue with the project after I left. Where in the school community would that technical knowledge reside? Joan and Anna thought that the students could play a role in promoting the technical skills for virtual museum projects. Joan said:

> It's going to be the three of us [Joan, Anna, and Sharon] and the students who do it. Classroom teachers, [probably couldn't]—unless somebody really wants to take it upon themselves, but I wouldn't expect them to become the technicians on this—because their time has to be spent on reading, writing, arithmetic.

Anna noted that QTVR could be used for other purposes as well:

> So like if Liz [a teacher], for instance, took her kids down [to the beach], at least they could do a panorama of the beach. They go to the beach all the time, and they could come back and do their little essays, what they found on the beach, or if she wanted to get a clam [in QTVR]. She's forever looking for clams and oysters on the Internet.

Joan added,

> Don't you think it would be nice to have a core of students like Sam who, when teachers want to do a trip, and take along and do [QTVR] panos, you can send Sam with them or something, and he could do that?

Sam was the student who went to the museums every day of the imaging sessions for the project. Joan and Anna were cultivating him to be the resident

expert in QTVR and virtual museum projects. He was an eighth grader, so he would be at the school for some time. Joan was planning to depend on him to show her how to create scenes. Anna noticed how Sam expressed "heartfelt feelings" about the virtual museum work: "I was going to whisper that to him when we were at the museum, 'You could be a curator.'"

Having stated that they thought the technical skills were within the grasp of the students, I asked about the research skills students would need to write their interpretive essays for the virtual museum. Joan replied, "Everybody can do that, too. It's just a matter of requiring it." In fact, research was an important component of the state core academic standards. She mentioned other areas of the curriculum standards the virtual museum project would address—writing, communication, and the presentation of findings—and she thought it was important to stress the core academic components of the project.

> You better be careful not to let that part slide because that is the core of the academic part of it, and it's easy to get. And I think it's, as soon as you see the object, you really, you begin to realize you need that information, you need that essay because as soon as you see the object, you think, "Well how big is it? Where does it come from? Who owned [it], you know, the owner?" I mean all these questions come up immediately.

For Anna, the cultural content of the project was vital. She believed that the "cultural relevance" of the virtual museums would "spark their interest," so that the students would really want to write and view their work when the virtual museum was complete. However, this would require some cooperation from the classroom teachers at the school. Anna was concerned about "pulling in the teachers" on the project and mentioned that the teachers were having their parent conferences that week, so setting up a meeting with the teaching staff would have

to wait. Joan envisioned the teachers viewing the virtual museum materials with their students and thinking about how they would add to it, with new images and additional essays over the years.

Late in the morning, Anna received an urgent message from the Broad County Museum, wanting her to arrange our meeting with them the next day, a Friday.

BROAD COUNTY MUSEUM ACTIVITY – PREPARATION

Robert from the Broad County Museum had been trying to call Anna for several days to find out when we were going to visit them to set up our project activities. Because we had been so busy doing the Lawrence Museum visits, Anna did not get his messages until Thursday. Robert told me that he had arranged to meet with her the prior week, and the museum staff were very concerned that they would not be prepared when the school team showed up. The curator, Fran, who would be working with us most closely said,

> Friday was very much a relief for me, at least, and I'm sure for Robert, because we didn't want the kids to be coming in Monday without us knowing what was expected, what materials needed to be out, because we, it does take awhile to get the materials ready, and the information related [to the objects].

Anna and I drove to the Broad County Museum Friday morning,= and met with Robert and Fran. As the education director in the middle of a school semester, Robert was very busy and would not be able to be present for many of the virtual museum activities. The curator, Fran, would be able to work closely with us for the duration of the project.

The Broad County Museum of Art occupies a complex of four buildings in downtown Waterton, about a 20-minute drive from Pacific Tribal School. The original museum opened in 1941, but a fire in 1962 forced it to close until the late 1960s. It closed again for renovation in 1974. The American Indian exhibit was in a building that also housed an ornithological exhibit. Fran told us that there were about 500 pieces in the ethnology collection, pieces that were nearly all Native American, with a few Asian pieces. Because the primary donor, an anthropologist from the university, collected baskets, the majority of the collection, about 300 pieces, were baskets.

The largest American Indian display at the museum, about 20 feet long and five feet deep, contained a large variety of artifacts set in front of a photo montage of Northwest American Indian life, including baskets, fishing gear, weavings, boxes, rattles, masks, and clothing. With the help of a museum handout that listed details about all of the objects in the display, Anna began selecting items for the project. The display case could only be entered at one end, and Fran wondered if she would be able to get to some to the items that were deep in the display. Anna asked about the possibility of wearing a cedar dress for imaging, but Fran explained the dress was far too delicate to move. For the objects that Fran could not move, we would be able to photograph them in the display case, but we would not be able to rotate them. Another section of the American Indian exhibit had several display cases with baskets. Anna selected several of those for the project with the help of another museum handout.

There was a video monitor next to the main display case that presented a short documentary on Native American basket weaving by Anna Jefferson, a local Pacific elder. Robert explained that the Jefferson video was created in collaboration with the Native American community to add the minority voice to the exhibits:

> We have found that sometimes that can be done with video. And that a minority voice, and the feeling that the Native American person and their culture is a part of those artifacts, can sometimes be there by putting a face—and particularly, a contemporary face of the Native American community—onto the exhibition. We've had exhibits in the past where we have had two, three, even four videos throughout, where Native Americans are saying, "these are our objects, they are important to us because… and these are what we wish you, as non-Natives, to understand about our artifacts." So there was not a Native American tour guide there to deliver a tour on a daily basis, but through the video media the public, both Native American and a group of non-Native people, are hearing about that exhibition and Native objects from the Native voice. When we developed this video to put in our permanent exhibition, we were looking at the same thing. We wanted a contemporary Native person to say why these objects were valuable to them, and we wanted it to be done in such a fashion—so that person faced the audience. They saw, and in a sense, had an interaction with that person who was discussing with them, so to speak, why these objects were valuable, not as old things and stagnant things, but as part of a person's culture.

Following the same reasoning, Robert mentioned that if the partners in the virtual museum project felt that it was appropriate, the museum might make use of the students' QTVR "rotations" along with their interpretations for a museum kiosk exhibit.

After selecting the items for the project, Fran took us upstairs to examine the museum's photography room, where we would be setting up our own imaging area for the project. We identified the area where we could set up the turntable

and photoflood lights. Much of the equipment in the room would be stored away or moved to accommodate our project. We agreed to a time schedule for the project that was similar to the timetable used for our Lawrence Museum activities. I would arrive on Monday around 9:00 a.m. to set up, and Anna would arrive with her students about 10:00 a.m.

BROAD COUNTY MUSEUM ACTIVITY – DAY 1

I arrived Monday morning and began setting up the imaging area while Fran pulled out the items for that day's imaging from the museum's collection. The museum staffers had already cleared out a space for the activity in the photography room. Most of the large equipment was moved against the walls, and two large tables were pushed up against each other and covered with archival tissue for the objects. After laying out the objects on the table, Fran printed out the information for each item from the museum's catalogue database.

Anna arrived with Sam and three high school students, Toby, Alison, and Tori, and they got to work almost immediately. The students began selecting the objects that they wanted to shoot and filling out their research forms with the help of the catalogue printouts that Fran provided. She explained that the date on the printout referred to the date that an item was collected. Not all of the printouts indicated the actual age of an item so all she could say for certain was that it was at least as old as the collection date. Fran provided the students with a measuring tape so they could record the dimensions of their objects. Anna and the students also took flash pictures of the objects and of the activities throughout the day with the school's digital still cameras.

As she moved the first item for imaging to the turntable, Fran explained to the students that she was wearing cotton gloves so that the oils on her hands would not get on the objects and damage them. I added that Charles had told the students at the Lawrence Museum that they could leave their fingerprints on the items permanently if they did not wear gloves to handle them.

Adding the Sound of Spirit Rattles

One of the first items we shot was a bird-shaped "spirit rattle." After imaging it, I asked Fran if Anna could shake the rattle (wearing gloves, of course) so we could record its sound. The rattle's sound could then be added to the virtual museum. Fran assented so I brought out my tape recorder for the task. After recording the sound, Anna gave some explanation of why such rattles were called "spirit rattles." They were used during ceremonies to help guide a participant with its sound. She said her brother had used such a rattle to guide people's participation in ceremonies in Canada.

A little later the students imaged another rattle, one that was made from caribou hoofs and buckskin and was designed to be worn on the ankles. We did a sound recording of it, too. Fran said a Pacific man who had been on the museum staff in the 1960s made the rattle. He had written a grant proposal for a project where he would be a " living exhibit," a contemporary American Indian doing crafts in a display area that the public could visit. Fran remembered seeing the "living" exhibit when she was in high school and mentioned that the hoof rattle might have been made during that project.

Details of Cattail Mat Making

Robert was able to join us later in the morning when we were preparing to image a mat made of woven cattail stalks. He mentioned that he had done some workshops on making cattail mats and brought us some of the tools he had made for making the mats. Some features of the mats were creases at regular intervals across the mat. Cracks in the cattail stalks would stop when they encountered the creases, keeping the mat from splintering. To get the creases, a wooden rod would be inserted between the stalks across the mat and a creaser would be run across the stalks against the rod. The creaser was a piece of wood carved into a handle, with the bottom edge carved with a groove into which the rod and cattail stalks would fit. Throughout the morning, whenever they became idle, the students enjoyed running the creaser along the rod, as if they were creasing a mat.

"The Debris that It Left Behind"

Robert informed us that he would be leading a tour of the American Indian collection for the Kwanis Club late that afternoon and that Fran would begin returning the materials to the exhibition cases soon after lunch. Throughout the morning, we noticed that as Fran handled the baskets and other items, plant fibers were left behind. This was especially noticeable on the black background cloth of the imaging area. As Fran removed the items to put them back in their cases, the issue of the fragility of the objects became very apparent with the number of fibers left on the otherwise empty table that had held the artifacts at the beginning of the day. Anna pointed out, "You could see the debris that it left behind of the

baskets falling apart. You'd set them down and pick them up and you could see some on the black. You could see traces on the backdrop."

The flakes and fibers of the baskets that were lost in the virtual museum activity highlighted the fragility of many of the American Indian artifacts. The fragility of American Indian collections is an issue affecting the relationship of museums and Native American communities, and it touches upon the goals of virtual museum projects. I have already mentioned the Broad County Museum's concern that such virtual museum projects not become a process that led to handling fragile objects over and over again.

Light that Illuminates Also Hurts

In addition to the issue of handling delicate objects, museums are also concerned about exposing the objects to bright lights and flash photography. Previously, Charles had mentioned his concern about light fading the color of the Pacific weaver's dress. Robert was also concerned about the light required for our imaging of objects at the Broad County Museum.

> We had not only rather high-intensity lights on for the photography, but then for various documenting there were several digital cameras kind of going around flicking images here and there with a flash. Now, our first thought as that goes on, is "Egads!" Because, down here within the exhibits, the public is not allowed to have a flash anywhere near it, let alone the fact, currently, with our current regulations, the public isn't allowed to take pictures of anything. But specifically, even when they could, before those changes were made, certainly not with flash. So, once again, we're doing this for the short-term situation because we found a greater good beyond those tight policies.

Fran added that recent studies on the effects of flash photography indicated that it was not as harmful as previously thought. Despite that, the

museum recognized the virtual museum project was offering a "greater good" that mitigated their concern about damaging items in the collection. That greater good included giving the Native American community the feeling of ownership of the cultural materials in the museum's care and creating three-dimensional digital images that could substitute for physical examination of the fragile objects.

Repatriation

The fragility of preserved and collected objects is also an issue that comes up in discussion of the repatriation of Native American materials in museum collections. Repatriation became a legal issue with the Native American Graves Protection and Repatriation Act of 1990 (Pub. L. No 101-601, 104 Stat. 3048), also known as NAGPRA. The law provides for the return of human remains, funerary objects, sacred items, and "objects of cultural patrimony" to the tribes of their origin. Initially, the law alarmed many museum professionals who were afraid their Native American collections would be gutted, but this has not occurred. Since NAGRA became law, outside of a few controversial instances, museums have become very cooperative with Native communities in the repatriation process (Kinzer, 2000).

Even though she is not a member of the Pacific community, Joan had some strong feelings about how museums had obtained their American Indian collections, and she thought that the story could be incorporated into some classes at the school in conjunction with the virtual museum project:

> Well, for older students, there's a whole history of the relationship between Native people and museums. I mean that you could get into in high school and upper middle school classes how, well, objects were

> stolen. And there's a lot of bad feeling between communities and museums because of the way objects were collected in the past. I even get to the point where I don't—I almost feel like about museums the way I feel about zoos. You know, you want to see the animals, but you don't approve of the way they got them, so you don't like to really patronize them. Museums have a little bit of that feeling for me because I know that some of their holdings were gotten in an unethical way.

On the other hand, Joan recognizes the museum's role in preserving these same materials, and the level of expertise and facilities that are required to do it. She sees the virtual museum project as a way of achieving a kind of partial repatriation:

> It's a bittersweet kind of thing. You hear stories about how people were tricked out of their objects, and out of their heirlooms, and it's tough, you know. And it's something that people need to think about, but this is a way we can. If we can't repatriate some of these objects, and we can't very well, and we don't have a place to display them, even if we did repatriate them. This is the closest we can come. You're helping to repatriate these objects to the community this way.

Appreciating the Museum's Role in Preservation

Frances, who is on the Pacific Museum Board, appreciated the museum's relationship to the Native American community. Rather than a potential struggle over repatriation, she saw something special in the museum's role in the virtual museum project, in

> …the fact that they appreciate the tribes and the tribal school and the kids and the tribal members that have been involved—the openness and the recognition that they aren't trying to take those artifacts, that they are preserving those artifacts. And I know that I personally appreciate the fact that they value them, and that they care for them the way they do because if [these objects] were left in the elements or left in private, that they wouldn't, for one, they wouldn't be able to be preserved as long because they're mostly organic. And then, plus, that they wouldn't be used as an educational tool the way it has been used to help people, to kind of bridge

> a better understanding between the tribe and non-tribal members of Broad county.

Hers is possibly a minority position, though. When I asked her if she thought many in the Pacific tribal community shared her appreciation of the museums, she said, "No."

After lunch, the students and I moved the photoflood lights and the digital camera and tripod downstairs so we could shoot some items in the display cases. One item was a mountain goat and dog hair blanket draped over an old loom that was too large to shoot on our turntable. It was set outside the museum display case. We set up the lights to shoot it so that an old Native woman in the display's photomontage was directly behind it so it would look like she was operating the loom. Then we shot the cedar dress and hat that adorned a mannequin in the display. After returning our equipment to the photography room, we broke off for the day, having imaged ten objects.

BROAD COUNTY MUSEUM ACTIVITY – DAY 2

A Student Takes Off

Anna brought another four-student team on the second day. Alison had come on the first day of Broad County Museum activity, as well as Sam. High school student newcomers Brad and Linda completed the team. Again, Fran prepared for the activity by bringing out the items for imaging ahead of time, along with printouts from the museum catalogue to help the students with their research. The students selected their objects and started their research on them

right away. Fran told me later, though, that Alison had taken up her job with renewed earnest:

> And I want to say something too, in regards to Alison who made this comment about today, "Well, yesterday I felt like a ninth grader, and you know now I'm going to act like a twelfth grader." That was her own perception of herself. I didn't notice any change. I thought [she] was just as directed yesterday as she was today. But then when she followed it up with, "These are the three I would like to do, and I would like to do them in this fashion and I would like to not have any interruptions by any of the other students." It was like, "Wow, yeah, you're definitely taking charge of how you want your project to work."

Anna also noticed Alison's serious turn, and was impressed that she managed to do five objects very quickly on the second day. Fran said, "… she knuckled down, and [I] couldn't believe how efficient she was. . . . She told me which she wanted done, and when she wanted them done, and we were a partnership. She was clearly into what she was doing." Alison's serious approach was very apparent on the research videotape. She was very focused on selecting her objects, collecting her research on them, and photographing them. By her third object, she was operating independently, requiring no instruction or monitoring from me to set up the camera and tripod and do the imaging.

Anna Discovers a New Resource

In addition to the museum catalogue printouts, Fran had brought in some anthropology books from the museum library to help the students with their research on the items. Anna was very interested in one about Northwest Indian artifacts by Hilary Stewart. She owned one of the author's books on the use of cedar by Northwest tribes, but she was not familiar with the one on artifacts that Fran provided that had been published in 1976. Building up the school's culture

library was an ongoing project for Anna, so later she asked Joan and me where she might find the Hilary Stewart book for the school, and we suggested some places on the Internet where she might find it.

Fran noticed that after the students had done their initial research on the objects that there was a tendency for them to "play around" if they weren't ready to do the imaging on their object. She thought that if she had provided a large collection of books for them to look through that their time might be used more effectively.

A Gem Found in Family Participation

At about 11:20 a.m., Tommy, a precocious second-grade boy, and his mother arrived at the museum to participate in the project. Anna and Tommy's mother helped him do the research on his selected object, a canoe bailer. When we started helping him do the imaging of the object, it was apparent that he did not understand what we were shooting for. I guessed that he had not seen the QTVR objects that had been done earlier. He wanted to change the position of the camera after each shot, which I tried to tell him would produce some "very weird looking" results. With some difficulty, we did manage to get through the 36 shots required for the QTVR object. Later, Tommy's dad arrived, and he showed great interest in the virtual museum project. Along with Alison's performance, Fran thought that having Tommy and his family participating in the project was one of the special events that made the whole project worthwhile. Like Robert, she wanted the museum to make personal contact with the local Native American

community, so she was very pleased that Tommy and his mother came in and then,

> …his father came as well, and was profoundly interested in what was going on, and was extremely knowledgeable, but also wanted to know more in terms of what literature was out there. We started talking about how he was starting to take on some of the arts and become a carver, and make his own tools in the traditional fashion, and so on, and was actually quite knowledgeable about many of the resources, but at the same time wanted to see what we had, and was very inspired by this.

Tommy's dad also stated that he would like to participate in any future virtual museum partnerships that involved the Burke Museum. The Burke is a large museum in Seattle that was mentioned several times during the project as a possible site for future virtual museum activities.

Robert called the incidents with Tommy's family and with Alison's serious orientation to the project "little gems that worked" in the virtual museum project. He believed that one way the project could be evaluated would involve counting those little gems. He thought that more of these gems would have been occurred if there had been other families participating in the project.

With Alison's efficient work, we were able to image all of the items that Anna had selected for the project. By the end of the day we had imaged fifteen objects.

WORKING ON THE VIRTUAL MUSEUM

Working Around a School Schedule

In the last three days of the project, I needed to do all of my interviews with the school and community participants as well as to assist in the progress of the virtual museum project. Progress on both of these tasks was slow going

because of the constraints of the daily school routine. Anna and I organized the images and added them to the rest of the virtual museum files in their central location on the school server. I made sure that I had a complete set of files on my own laptop computer so I could burn a copy archive on CD-ROM to send back to the school. The final tally for the number of objects we had digitally collected from both museums was fifty.

When the opportunity presented itself, I gave the students additional instruction in how to create the QTVR images, but for the most part Sam was taking over the role of technology trainer. He showed several of his classmates how to use the software to assemble their images into QTVR objects.

Designing the Virtual Museum

At various times throughout the planning and conduct of the virtual museum project, I had discussed with Joan how the students might help to create the virtual museum Web site. She had only done a few Web page projects previously with her students, and the Web authoring tool she used was inadequate for the more ambitious project we were designing. I suggested that I could work with her students to create the basic layout for the virtual museum exhibits and then create an HTML template that would require only a few small changes to incorporate a student's unique content into each exhibit. Joan, Anna, and Henry (a student who was experienced in creating Web pages) worked with me on the basic design. It included several graphical elements that would appear on every page, such as still images of a couple of the school's totems flanking the main display area and a banner across the top with the name of the virtual museum

superimposed on a picture of the mountains overlooking the reservation. Henry suggested a blue-colored gradient for the background. Below the banner, the name of the object appeared in large text, and below that in smaller text, the name of the student appeared who imaged the object and wrote the essay on it. Below the totem graphic on the left side would be a number of graphical buttons for navigating the virtual museum Web site. The main exhibit area consisted of a cell for the text of the student's interpretive essay on the left and a cell for the QTVR image of the object on the right. Once the students had completed their essays and assembled their QTVR images, it would be a simple routine to create the fifty exhibits that would make up the virtual museum. Adding introductory matter and navigation would be something we could tackle when we got to that point.

Stymied Progress

As it turned out, further development of the virtual museum was stymied in the following weeks by the demands of the school calendar. The state required two weeks of standardized testing, a task that demanded the focus of the entire school community. After that, the end-of-year school routines predominated: the yearbook (a project that demanded Joan's time), finals, celebrations, and graduations. I called Joan occasionally to see how the virtual museum project fared and decided early the next semester to assemble the virtual museum for the school in its complete form minus the student essays, hoping it would be a stimulus toward the completion of the project. The essay writing was one component of the project that required bringing the classroom teachers on board. That semester, Joan tried to get the fifth grade teacher to commit her class to

writing all of the remaining essays required to finish the virtual museum, but that proved to be unsuccessful. Joan said she would try to get her summer computer class students to work on the essays. As of the time of this writing, the Pacific Tribal School virtual museum is not yet published on the World Wide Web, awaiting the final component of student-written essays for the virtual exhibits.

Another potential barrier to posting the virtual museum on the Web that Joan anticipated was the "politics" involved in getting it up on the tribe's Web server. She said:

> I think it's going to be really *really* important that we get it published out on the Web, and I talked to Martin [the superintendent] about making sure to get the politics of that done, because then that's pretty cool. . . . I think we will get it on a CD as a Web site, and we'll show it . . . to the tribal council once, and they'll say "yes." I think we'll bypass a few people.

REFLECTING ON THE VIRTUAL MUSEUM PROJECT

In Retrospect It Was Easy

The issues related to bringing teachers onboard for the essay writing and finding the human resources who could see through the Web authoring phase did not emerge fully as factors affecting completion of the Web site until after the intense four days of activity at the museums, which produced all the necessary source materials for the virtual museum. The momentum that was lost after that stage was hard to regain. Joan's and Anna's sense of the virtual museum project at the end of the museum activities was that it was a fairly easy project that was highly rewarding for the students. Anna said:

> It was a simple project. It was a simple project to do, you know, having the format all laid out for you. And the kids don't get enough time to go on

> field trips, to go get those special experiences, and like I say they always have to hit the roof a few times in their life. And this, I think this was a time when a whole lot of them really hit the roof, and they really just enjoyed it.

Joan felt confident that the school could continue with an ongoing virtual museum, even without my help:

> If we were going to do it again without you here, we'd pretty much replicate the same thing we did this time, right? Contact the museums and set up and go and select the objects and talk to the students about museums, and museums in general, some other museums. And now they have this year's work to look at, and they know what they're going to be doing. . . . I think you're going to have more confidence that it's going to work out well because we know now that the museum people are cooperative and eager even, and that the students can definitely handle the work, and that they enjoy the process—and really there's nothing about it that's too hard.

Expanding the Project: Community-Based Activities

The Pacific virtual museum project had been envisioned from the beginning as an ongoing project. One of the seeds of the project was my earlier visit, when we invited community members to bring their own materials for QTVR imaging. Joan and Anna discussed the success of that early experience and how the community might contribute their materials to the virtual museum project. Anna mentioned that when the tribe began its archives, many people in the community resisted donating their documents but in the case of the virtual museum, "then they can keep the object and we can just have the picture."

Joan noted that caring for delicate possessions could be difficult. "Well, you don't want to give up your family treasures. I mean, even though it is hard to keep them at home . . . it's hard to preserve them." To which Anna replied, "To

preserve them, yeah. I have a basket at home that's literally falling apart. You know, I spray it, I clean it, and like, 'Oh my God, more fell off.'" The virtual museum might be a compromise that would garner more community participation. As Joan put it,

> …when you see how careful the museums are just to keep it almost in no air, no light, no everything, and who can do that? So I think people really would be happy to have [their keepsakes] digitized so that they can share them without sharing them.

Charles saw a community-based virtual museum from a slightly different perspective. He imagined situations in which students would have to visit the community members' "private collections" at their homes to benefit from them and saw the benefits possible from imaging them for use at school and to share with others:

> …and now they have the capability of utilizing private collections. Because, of course you know, with a private collection you usually have to get the permission of the owner, but now you only need one kind of permission. Students don't have to continuously go back to someone's house and track mud across their carpet to be able to look at their private collection. That private collection can be brought to the school for a day of virtual imaging. And now the kids have a record of those collections that they can use in the future. Yeah, it tremendously opens up how you can use material history, material culture for curriculum for community contact with any museum. That's the important thing. It's overcoming the physical limitations initially imposed by material culture.

Frances also saw the community benefits of such a community based virtual museum:

> I think that a lot of community members might have objects themselves that they would like to preserve in a 3D setting, so that their kids—in case something should happen and someone doesn't value it as much as they do—that it would be on record somewhere. . . . Yeah, I think that's really

> important, and then the elders want a place to be able to put this information in writing or in record.

As a member of the Pacific Museum Board, Frances thought of the virtual museum project as a "jumpstart" on building a tribal museum. John also thought the virtual museum could work in that way:

> I feel really strongly that the tribe can really benefit from a museum if we could get our own museum started and build on that. Something like this will give the people and students some ideas about how to go about putting one together.

Community Relations

John compared the tribe's effort to create a museum to the successful effort of creating the tribal archives. He then went on to say how projects like the archives, the virtual museum, and a tribal museum would benefit not only Pacific Nation, but other people as well.

> Now we have an archive. It's similar in the sense of a museum, except it's all on paper. If they could get a museum where they have objects and relics and things to look at and read, it could be inspiring to the people, not only our people, but other people who come and read about us or want to learn about us.

The issue of educating the public at large with the virtual museum content is linked closely to improving the relationship between Native and non-Native peoples. Frances drew a connection between the educational content of the virtual museum and the fostering of an appreciation of the intelligence and ingenuity of American Indians. She also thought that the virtual museum approach could be effective for other groups of people as well.

> Probably a lot of people will start saying, "Why is there not more of this? When, where can we do this, because there's so many histories to be told?"

> Not only Native history, but histories of all the peoples in the United States, and we can share so much, and you can interact so much with the other cultures in these sorts of formats that it would be, the possibilities would be endless. Being able to have more understanding, more history, studying who people are and what their tools were in their culture, and how they interacted with the world that they existed in. Like the time for Native American people, they used so much of the cedar—being able to look at that in detail. . . . Then also, being able to help people really appreciate the engineering feats that Native American people had, the sophistication. Because people think, "Tools—they're so primitive," but a culture being able to take something as simple as a piece of wood and use it in so many variety of ways, shows true intelligence and true ingenuity then. People probably don't think twice about it unless they have a close-up look at those tools and pieces of them.

Part of the job of improving community relationships is correcting the misconceptions people have about Native Americans. Anna told a group of students that the virtual museum could help educate people who thought that all American Indians lived in tepees. One student, Portia, agreed, and told a story about a boy she met who was disappointed that there weren't any tepees on the reservation. Charles gave some historical context to the miseducation of the public that occurred during the "Collier years" and post-World War II. John Collier was the Commissioner of Indian Affairs in the 1930s and 40s whose efforts to eliminate the government's assimilationist policies and improve education and economic conditions for Native Americans came to be known as "the Indian New Deal" (Szasz, 1999). Charles believed it was during this time that a change in mainstream America's attitude toward its indigenous peoples led to some misguided efforts to bring the American Indian to the "forefront of the American mind." He maintained that often this effort

> so wholly misrepresented, it's no wonder that's a scaring issue, to have somebody walk in and say, "I want to represent you," and turn around and

> represent you as something totally different from what you are. There are pictures of many of the moots [meetings] and the exchanges and such out at Cherry Point, where photographers would show up and the Pacific and the Nooksack and the Frasier Indians and surrounding tribes would be dressed in their traditional costumes, carrying on a potlatch, and the photographer would say, "OK, great, I want to get a picture of all you guys, but you need come over here and stand by the tepee, and I want you to put these on and wear these long headdresses." And so the next thing you knew here's Northwest tribes being represented with Southwest and Midwestern tribal accoutrements because that's what people viewed the American Indian as.

Charles also recognized the friction between Native and non-Native communities that exists because of the long history of subjugation of Native Americans. During the project activities, he had a conversation with Frances about the years her father spent at one of the Northwest boarding schools, during a time when the deculturalization of the American Indian was still a lingering educational mission. He sensed “the anger and frustration build up in her the more she talked about it.” He realized that the virtual museum project, if expanded into “a multicultural, multi-community project that would allow communities to interact,” might be used as a forum for healing the divisions between the communities:

> I can tell you, most European[-American] communities don't like to have those issues addressed. They're opposed to it. Nobody likes to look at the mistakes that have been made in the past, but the one thing that I didn't say, but I was thinking, was that there are a tremendous number of Native Americans very mad and frustrated at the current treatment they receive and the historic treatment they received over the past 200 some-odd plus years. And that frustration develops and the anger, when unfortunately, more often than not, the anger develops into miscommunication or non-communication, when it shouldn't. A project like this—in the right hands, with a good facilitator, under a very structured environment—can very much be used as a means by which to begin facilitating communication, creating a forum, discussion, and potentially be a healing for some of these

> things. . . . So that the thoughts can be there, be expressed, given immediate legitimacy and validation, and then worked on, so that the anger that both sides and the frustration that both sides can feel about that could immediately be turned into constructive uses. So you now have both communities working toward creating this common goal of understanding, as opposed to drawing lines in the sand. So you have that potential as well, and so—regardless of schools—that would be a very interesting means by which to see the project take place. And again, museums would be a great forum to do that because our claimed neutrality on history is supposed to be that we report the good and the bad.

For Charles, the virtual reality imaging of museum objects became a metaphor for imagining the past, the present, and the future. "We, as a virtual museum, have created what has happened, but as a next step of that project, we are going to now virtually image the present, and possibly even virtually image the future." Virtual museum projects could lead to a plan of community action, as

> members of the community explore their own history through a project like this, working with the virtual imaging, imaging the artifacts, doing the research and writing it up, creating a product that says, "This is where we were, this is where we are, and this is where we are going to go." Because in creating that virtual exhibit, they also managed to create a plan of action.

Like Charles, Robert spoke from the perspective of the museum professional. Because the virtual museum project gave him an opportunity to interact casually with Native people, he was able to deepen his understanding of the lives and experiences of contemporary Native Americans. His interactions with students and adults as they worked with the museum items led to discussions about who they knew in the community who was a carver or weaver, what their interests were, how they spent their time, and many other things that helped him understand their experiences. This helped him "to work out where their pride is,

and how that's shown and how they're willing to exhibit that pride, where they feel a little more cautious about interacting."

Joan also saw how the virtual museum project improved community relations in a number of ways.

> Well, I think the tribe-community relations are important. I think we've left goodwill and received goodwill from both museums. The children need to have positive contact with Whites outside the community because they often don't have positive contact, and the idea that they can do something that's really of use [is good]. I still go back to the pride, that the museums can't do it on their own. That they need these students to do this for them, that we're providing a, we're doing something for them that they can't do for themselves, and I think it's all from the reverse—you know we depend on the White community to do something for the tribe that the tribe can't do for itself, and it's nice to see the tables turned.

Pride

The prospect of having the "tables turned" spoke to an element of pride that Joan and Anna had in the project. Anna added that the museums "wanted an Indian product," and were interested in the prospect of making use of some of the virtual museum material at their museums. Joan said she would love to see the virtual museum running on the museum kiosks.

There was also an element of inter-community competition in the project. Joan spoke of a virtual museum project that the Waterton School District tried to do with the help of a national technology expert. "It was one of the state technology grants, I think to do a virtual museum with the Waterton schools, and it never got off the ground. There's a few shots, there's a few stills in there, but compared to what this is already, it stinks, it's nothing." I asked her if she thought

Waterton might learn something from "little Pacific," and she exclaimed, "I want to be the only school!"

For Joan and Anna, the virtual museum was seen as something about which the school and the students could be proud. Joan recalled a time when the school was in a crisis and without a principal:

> Remember when David [a recruit for school principal] came here, and he was kind of interviewing the high school staff about whether he wanted to finish out the high school year. We were without a high school principal once again, and he was going to finish, do it for a while, and he said, "I've got to talk to you guys to see if I want to do it." Then he said, "Where is the pride in this school?" And even then people said it was basketball and technology, you know. But I think it's important to remember, you know, you go along day to day, but you need something special, something that's special about your school. Something you're really proud of. I think this could be the beginning of really something the students and the community can be proud of.

Anna compared the virtual museum project to the school's welcome pole that was carved with the participation of the whole school. It was an accomplishment that students left behind that was unique to the school.

MAJOR THEMES EMERGING OUT OF THE PACIFIC TRIBAL SCHOOL EXPERIENCE

Several important issues emerged from researcher observations, videotapes, and interviews in the Pacific case. The following themes emerged from my attempt to summarize these issues so that they can be compared to the issues that emerge from the other cases in the study. Themes represent larger concerns than topics or issues, and generally emerge from the statements of two or more participants. They are usually reinforced by researcher observations.

OWNERSHIP

The theme of ownership figured in several ways during the project. Joan discussed the importance of students taking ownership of the virtual museum project itself. A second notion of ownership was the feeling of ownership of the cultural objects themselves. Frances saw how the virtual museum project gave students a feeling of ownership about the cultural objects in the museums. Robert affirmed that from the perspective of the museum, it was important that the entire Native community came to feel they had ownership of the cultural items the museum held for them, and that the virtual museum project helped accomplish that goal.

PRIDE

Like the theme of ownership, the theme of pride unfolded in a number of ways. Joan mentioned the virtual museum as being a source of pride. Like the school's sports program and the school's carving project, it was viewed as something the students could leave behind that could benefit the school community. Joan displayed her own pride in the school's accomplishment when she compared the quality of the virtual museum Web site in its draft form to similar projects done by the local school district and the tribal college, indicating how much better it was. Joan also remarked on the pride that the students had in doing work for the museums because "museums can't do it on their own."

In another sense, the virtual museum project enhances the pride of being Native American. For Robert, the virtual museum project gave the museum staff an opportunity to see the areas of culture where Native people felt comfortable in

exhibiting their pride. The pride students had in the work they accomplished and in their culture was exhibited in their behavior. One instance was when Lori showed off her work to her parents and incorporated the digital image of herself in the Pacific weaver's dress in her school assignment.

UNDERSTANDING WHO YOU ARE

The theme of understanding who you are relates to the issue of the Native American identity and how it is formed. Frances thought the virtual museum project helped students gain a greater appreciation of their culture. Also, letting the students "have that voice" in the interpretation of the objects in the virtual museum, rather than have a curator tell them about the objects, gave them a deeper "sense of who they are." Ruby included the virtual museum project among a number of cultural projects at the school that helped students "understand where they come from and who they are."

The student Lori found connections to her life with the Pacific weaver's dress she modeled for the project. She used one of the frames from the QTVR image of her wearing the dress in her magazine cover assignment that reproduced the appearance of "Family Tree" magazine, including the text, "find out about your great ancestors." Others noted that her virtual museum experience connected with her personal ambition to become a professional model.

PREPARING STUDENTS FOR THE PROJECT MENTALLY AND SPIRITUALLY

Joan and Anna worked with students and teachers to prepare them for the virtual museum activities by studying other virtual museums and QTVR media.

Anna tried to "praise dance," or hype the project to the kids to make them feel they would be doing something important.

At most of the Four Directions functions, it had been customary for an elder or leader from one of the Native communities to say a prayer to bless our efforts. Usually the prayers were offered in a Native language and translated for the participants. I have always been impressed by the respectful tone the prayers set for our proceedings. Anna wished she had not been so rushed on the first day. She spoke of the feeling of respect she felt on entering the first museum, realizing that the virtual museum project would be capturing objects that had been made by her ancestors, and she wanted to capture the moment with respectful contemplation. Joan, Anna, and others at the Pacific Tribal school thought that project participants should be prepared spiritually before the project started by having an elder say a prayer. This did not take place because arrangements for a prayer at the beginning of the project had not been made.

BRINGING OBJECTS OUT FROM "BEHIND THE GLASS"

The glass of museum exhibit cases became a metaphor for the limits of access to the museum's Native American collections, and the culture the objects represented. As Frances expressed it, she did not want her culture left "in the dust and the dark, behind the glass."

The virtual museum project gave students and community members a rare opportunity to get close to these revered objects to examine them in detail. The significance of the opportunity was not lost on the students. Frances told about

one boy who told her, “We'll never be this close and have this kind of access ever again.”

There is a second sense to the theme of bringing objects out from “behind the glass” which relates to the qualities of the QTVR three-dimensional images. Anna mentioned the number of times she would “bump her head against the glass” to get a better view of a museum item. The project activities allowed her to get the closer look she wanted, but she also talked about the QTVR technology as superior in some ways to a museum exhibit because it allowed the viewer to rotate objects and examine them more closely in ample lighting. Joan agreed, saying, “to get in close like that and see it is really almost better than seeing it behind glass.” Robert maintained that a museum had to have real objects to be a real museum, but he conceded that the three-dimensional imaging could enhance the viewer’s experience of the actual object.

NATIVE COMMUNITY MEMBER PARTICIPATION

Several adult Pacific tribal members participated in the virtual museum project in varying capacities. Anna, the Pacific Tribal School culture program coordinator, shouldered most of the responsibility in the smooth running of the project activities, especially in helping the students select and research their virtual museum objects. Normally, Joan, the non-Native technology coordinator at the school, would take the lead in technology projects like the virtual museum, but she was occupied with other duties during the museum activities. Joan was proud of Anna’s ability to tackle a significant technology project, and it gave her confidence that the virtual museum could be ongoing.

John and Ruby were tribal elders who attended the virtual museum activities at the Laurence Museum as resources for the students and representatives of the Pacific tribal community. Frances, Anna's sister and a Pacific school parent, attended the Laurence Museum activities because of her position on the Pacific Tribal Museum Board, a planning group for a future tribal museum. During the second day of activities at the Broad Museum, a student's parents showed up to learn more about the project and lend their assistance.

The research videotapes revealed the informal interactions between the community members, museum staff, and students during the virtual museum activities. Students would work quietly and move close to each other or to the adults when they wanted to talk quietly about the cultural objects. The adults would talk more loudly with each other about the cultural items so everyone in the room could hear what was being said. It was fairly clear that the students were attending to this adult talk. Frances thought that the experience of hearing tribal elders talk about their life experiences with museum staff in the context of the virtual museum activities helped the students gain an appreciation of their own culture. Frances also thought that the tribal members could offer unique insights about the objects that non-Native museum staff could not make because they were not part of the culture represented by the objects.

Charles talked of the interactions between museum staff, tribal elders, and students as a means of "legitimizing . . . personal memories" and "validat[ing] a community's history." He talked about his role in the process as being that of a "facilitator," who helped to initiate a conversation about the cultural significance

of a museum object between students and tribal members, and then exited the discussion when the intergenerational contact had been made. He illustrated this role with two examples. One, when the student Dora discussed a "charm" with Ruby and Frances, and two, when the student Lori talked about the Pacific weaver's dress with John and Anna. In both cases, he facilitated a cultural discussion across three generations of Pacific tribal members. Frances cited her conversation with Ruby about the purpose of Dora's "charm" as an example. Similarly, Anna was able to talk about her childhood memories of the Pacific weavers' business at the Laurence Museum and the use of spirit rattles in ceremonies at the Broad Museum.

The virtual museum project provided a forum for the exercise of community memory, giving it a new legitimacy in the context of virtual museum building. This was especially apparent in the activity related to the Pacific weaver's dress incident, but it took place on a smaller scale almost continuously as students and community members shared their memories and what they knew about their culture as they discussed the objects they were examining at the museums.

IMPROVING RELATIONS WITH NON-NATIVE COMMUNITIES

Several participants commented on the different ways that the virtual museum project might improve the relationship between Native and non-Native people. John compared the virtual museum to the tribe's archives, which were used by both non-Native and Native people to learn more about the Pacific tribal history. He thought the virtual museum might serve a similar purpose.

Frances said that people would wonder why there were not more virtual museum projects because there were so many histories, both Native and non-Native, that could be told in this way. She thought that non-Native people would gain a new appreciation for the intelligence and ingenuity of Native Americans when they saw on the virtual museum Web site the "engineering feats" their ancestors were able to accomplish.

Anna and Charles commented on the many misconceptions that mainstream Americans have about Native Americans and how the virtual museum could help correct those misconceptions. Anna told some students they would be teaching people that not all American Indians lived in tepees. Charles indicated one source of such misconceptions was the misdirected popularization and commercialization of Native America during the "Collier years." As an example, he described how local tribal people were asked to pose for tourist photos beside tepees in Plains Indian garb.

Charles also proposed a different approach to a virtual museum project that would be a "multicultural, multi-community" project that encouraged a healing conversation between Native and non-Native communities as they virtually imaged the present and imagined a better future.

PROPER USE OF FRAGILE NATIVE AMERICAN COLLECTIONS

Robert made a distinction between the process and product aspects of the virtual museum project. As a process, he thought the virtual museum project should take place on a regular basis to give students the experience of working with cultural materials and gaining skills in technology, research, writing and

communication. Museums might find this activity objectionable if it meant repeated handling of fragile collections.

Joan, Anna, and others at the Pacific School wanted the virtual museum project to be ongoing, to allow more students exposure to the museum activities. From the museum's perspective, it was important to consider carefully the project's impact on the fragile items in the museum's collection. Robert stated that the virtual museum project was acceptable to the Broad County Museum only because it was a minority use of the minority collection. It was still important to stress that the virtual museum project would not be a process that would involve the repeated handling of the same items in the museum collection. On the other hand, the project was able to produce virtual reality images of museum objects that might serve as a proxy for physical examination of the objects in the future.

Several participants noted the project's negative impact on the collections. Anna noticed "the debris left behind," pointing out fibers that broke off onto the table after handling baskets at the Broad Museum. She commented that her own heritage basket collection was falling apart from handling.

Robert, Fran, and Charles talked about the deleterious effects of light on the natural colors in Native materials. Though the Broad Museum had a policy forbidding flash photography of items in the museum displays and the use for the project of strong photoflood lights was worrisome, Robert said the virtual museum project was an acceptable risk only because of the "greater good" in serving the Native community. Charles pointed out that the Pacific weaver's

dress was colored with natural dyes that would fade quickly in bright lighting conditions so that even displaying it could have damaging effects.

As a product, a finished virtual museum published on the World Wide Web could be used by Pacific students and interested people everywhere to learn more about Northwest Indian cultures, without the necessity of handling or physical risk to the actual object. These outcomes mitigated the museums' concern about the potential damage done to their collections in the course of the virtual museum project.

REPATRIATION AND THE MUSEUM'S ROLE IN CULTURAL PRESERVATION

Joan described the uneasy history of the relationship between the Native American community and museums because of the feeling on the part of many in the Native community that the museums have acquired some or all of their Native American collections unethically. She compared her feelings about museums to her misgivings about zoos, which she saw as ethically ambivalent in that they remove animals from their habitats yet educate the public and preserve species that would otherwise perish in the modern world.

Joan portrayed museums' dubious acquisition of Native cultural items as "a bittersweet kind of thing." She acknowledged there had been efforts of repatriation, and where those efforts had failed, the virtual museum project could succeed in digitally repatriating some of the museum collections, partially satisfying the Native community's grievances and improving museum-community relations. Joan's concerns related to Robert's claim that the museum's goal

involves giving the Native community a feeling of ownership of the museum's collection of their cultural artifacts.

Overlapping the issue of repatriation was the recognition, even an appreciation, on the part of some Native community members of the museum's role in preserving the fragile cultural items in their possession. Some Native community members realized that they lacked the knowledge and facilities to safely repatriate the delicate items in the museum's care. Both Anna and Joan understood the difficulty of preserving delicate Native American materials. Frances appreciated the fact that museums actually value Native American items, and took steps to preserve them, whereas many items held privately might not be appreciated and could suffer damage from poor care. She also acknowledged that her view was a minority view within the Native community.

THE NATURE OF THE SCHOOL-MUSEUM PARTNERSHIP

Several participants commented on how the school-museum relationship came about and how it came to benefit both parties. Charles talked about his plans to use new technologies to allow museum visitors enhanced digital access to the collections and how the "model" of the virtual museum project connected with his plans, which included QTVR imaging done by school children. He was very interested in the possibility of using the virtual images and interpretations of the museum objects because they would be very attractive to his clientele.

Charles talked about how hard it would be to launch a school-museum partnership that would serve his plans. Museums had long been aloof to the needs of schools, but that trend was changing. Because of concerns about funding and

past strained relationships with the Native community, he thought that schools would need to initiate a virtual museum project because schools would probably be leery of the motives of a museum that initiated a proposal to collaborate with the schools. The fact that it was the Pacific Tribal School that initiated the project proposal helped to smooth the way for negotiations.

Robert talked about how the project was important in terms of improving the relationship between the museum and the Native American community. The virtual museum project was acceptable precisely because it made use of the "minority collection" for the benefit of the minority community. He said that the project had fulfilled some of the requirements for museum accreditation that look at the institution's relationship to the minority community.

The Broad Museum was concerned about handling the fragile museum objects but recognized the "greater good" of serving its Native clientele. The museum also had concerns about the intellectual property rights of the images that would be published on the World Wide Web but were satisfied that the relatively low-resolution images would not pose a significant property rights threat.

The virtual museum project also helped the museum's effort to "put a Native face on the Native exhibition." For this reason, Robert said he might be interested in obtaining some of the QTVR "rotations" for use at the museum.

Robert also commented about gaining a better understanding of the Native American community when he participated in projects like the virtual museum project. Anna appreciated the fact that the Native community had, by doing something for the museums that they could not accomplish on their own, "turned

the tables", reversing the usual roles of innovator and instigator in intercommunity partnerships.

THE VIRTUAL MUSEUM AS AN ONGOING PROJECT

One of the drawbacks to the virtual museum project was the limited number of students who could participate in the imaging and research activities during the museum visits. Anna and I proposed to Superintendent Warrior that more students would be able to participate over time if the project was ongoing, allowing new groups of students to visit different museums every year.

Joan and Anna commented that several students exhibited some jealousy because they did not get to go to the museum. Joan thought that every student at the school should have that opportunity at some time in their school career, which would be possible if museum visits were planned for every semester or every year. Joan added that "there are lots of museums" and in many of the museums, "more objects than we can do." Both Joan and Anna thought the virtual museum project was "easy to do" and believed that they would be able to repeat the process in the future. However, as of one year after the efforts reported here they had not yet attempted to replicate the project.

Another source for objects for an ongoing virtual museum project is privately owned items in the community, discussed more fully in the following theme.

VIRTUAL MUSEUM COLLECTIONS WITHIN THE COMMUNITY

Pacific Tribal School had had an earlier experience using QTVR in which community members brought their own personal items to be imaged. Joan had

assembled the media produced in that project into a Pacific Virtual Museum at a Four Directions Summer Institute. Joan and Anna talked about an ongoing virtual museum project that could make use of community resources such as those in the earlier experience. Anna mentioned that the tribe had difficulty getting community members to donate their personal items to the tribal archive, but the advantage of the virtual museum would be that the families would only need to loan their treasures for imaging. Their fragile belongings would be preserved in a three-dimensional record for the benefit of both the Native and non-Native communities. Joan said it was a way of "sharing without sharing" privately owned cultural items.

Charles also talked about the advantages of doing digital collecting within the community. Students could examine privately owned items in Native households in the community without having to "track mud across their rug." The virtual collections could offer tremendous possibilities for curriculum and community contact.

Frances also saw the potential for putting community-owned items in a three-dimensional record because they were in danger of deteriorating or becoming neglected by people who might, over time, lose their appreciation of the items' cultural significance. She also characterized the virtual museum as an "exciting jumpstart" on the community's efforts to create a tribal museum.

DEVELOPING VIRTUAL MUSEUM SKILLS IN THE SCHOOL COMMUNITY

Virtual museum projects require a number of technical skills that are not commonly found in a school's educational computing repertoire. Particularly

scarce are the technical skills involving digital imaging, QTVR, and Web site development. Equally important are non-technical abilities such as planning and research skills related to carrying out virtual museum projects.

Joan and Anna both thought the project activities were "easy to do" and Joan believed she would be able to handle the planning involved in putting together another similar virtual museum project. Joan noted, however, that teachers could not be expected to become the "technicians" for the project. She identified three Pacific Tribal School staff who had received some training in the technology during the project, herself, Anna, and Sharon, the librarian. However, Joan, who had received the most training, thought she would need additional help. As for the more academic aspect of the virtual museum project, Joan thought that would be a natural outcome of the virtual museum activities, and it would be "just a matter of requiring it."

One student, Sam, was especially technically adept, and Joan and Anna made sure he attended all of the virtual museum activities so he could learn the details of QTVR production well enough to show his peers and teachers how to do it. Both Joan and Anna mentioned that they were depending on Sam to help them develop their technical skills. Sam was quickly able to show several of his fellow students how to use the QTVR software.

Joan and Anna talked about having a "core of students" who were adept in using the virtual museum technologies and who would be able to assist teachers desiring to use the technology in their classroom teaching.

THE NEED TO BRING THE TEACHERS ON BOARD

The virtual museum project began as a school-wide extracurricular activity that then floundered because the regular classroom teachers were not brought on board. The vital second stage of virtual museum activity involved students writing essays on the objects they had imaged and researched, an activity that required the participation of classroom teachers. Unfortunately, the teachers were not included in the initial planning of the virtual museum project. Gaining the teachers' much-needed cooperation at this later stage turned out to be problematic.

Anna talked about the need to "pull in the teachers" on the project, but at the time of the interview, they were involved in parent conferences, and they were thus hard to meet with as a group. Joan wanted to sit down with the teachers and show them what had been accomplished so they could talk about how they might add to the project over the years.

In this first case I have used a narrative format to provide a step-by-step picture of a virtual museum project. However, such a sequentially detailed approach would likely be unnecessarily repetitive for analysis of the remaining four cases. In the remaining cases, therefore, I will highlight only some of the distinguishing features relating to how they were conducted, and then make a more direct analysis of the themes that emerged from these other cases. At the end of the remaining individual case studies, I will make a comparison of the themes that have been developed up to that point. After I have presented the analysis of all the cases, I will present a cross-case comparison of all four to

provide a more complete overview of the issues surrounding virtual museum projects in American Indian schools.

Chapter 5: Case Two

Great Bear Tribal School and Northern Lakes Indian School

DISTINGUISHING FEATURES

The second case in this study is quite different from the Pacific Tribal School virtual museum project in that it involved collaboration between two schools. The Northern Lakes Indian School and the Great Bear Tribal School are both Anishinabe schools in the northern United States in the Great Lakes region. The Great Bear Tribal Museum and Culture Center, located less than a hundred yards from the Great Bear Tribal School, completed the partnership for the project. The tribal museum had been built the year previous to this project's inception and was only beginning to acquire a collection. It was not officially opened for business during the time of the project.

Another difference for this case was the shorter duration for the project. The project took place over a single week. The Northern Lakes team drove to the town adjacent to the Great Bear reservation and stayed at the casino and hotel operated by the Great Bear tribe.

A third difference relates to the prior experience Northern Lakes Indian School had in conducting virtual museum projects. My level of participation on the planning and organization was therefore much less because the experienced individuals at Northern Lakes Indian School took the lead in that area.

KEY PARTICIPANTS: NORTHERN LAKES INDIAN SCHOOL

Joanne, Northern Lakes Indian School's technology coordinator, was the prime mover in this virtual museum project. Joanne had acquired highly sophisticated technical skills in computer programming. In addition to managing the computer labs, dispersing information technology throughout the classrooms, and providing staff training, she maintained the school's web site, servers, and computer network. Since she had begun working with the school in 1995, Joanne had taken an active role in finding ways to use computer and information technology in the classroom. After implementing an oral history project involving students in actively interviewing community members, she won a major federal grant for the school to have students and teachers research and document the tribe's history and publish it on the World Wide Web. Joanne had worked as the school's facilitator to the Four Directions project and had participated in several virtual museum projects with the support of Four Directions.

Fred was a Northern Lakes tribal member and basket maker who had an enduring interest in the tribe's history. He had participated in previous Northern Lakes Indian School virtual museum projects and through those experiences, had developed some relevant technical skills such as how to use the school's scanner.

Four Northern Lakes students (fourth and fifth graders) participated in the project. Because they were visiting the Great Bear reservation, two parents from the school came along as chaperones.

KEY PARTICIPANTS: GREAT BEAR TRIBAL SCHOOL

Jack was a Great Bear community member who had a degree in computer programming. He described himself as the tribe's "all around computer guy," and he maintained several of the tribe's computer networks including ones for the school, the tribal casino, and the tribal government. About 90 percent of his time was spent working as the Great Bear Tribal School's technology coordinator. Jack was also the school's Four Directions facilitator and had previously rendered valuable technical assistance to Northern Lakes Indian School when it hosted a Four Directions summer institute, which also established a history of collaboration between Great Bear and Northern Lakes.

Rose was the teacher for gifted and talented program for the Great Bear Tribal School. She participated in the project primarily because of her interest and because she had a more flexible schedule than the regular classroom teachers. She was also a part of the Four Directions team at the school and had some previous experience using QuickTime Virtual Reality media with her students. Eight fourth and fifth grade Great Bear students participated in the project.

KEY PARTICIPANTS: GREAT BEAR TRIBAL MUSEUM AND CULTURAL CENTER

Catherine was the technical assistant for the Great Bear Museum and Cultural Center. She was the most active virtual museum participant from the Great Bear Museum. Nick, the museum director, also participated, but to a much lesser extent.

Table 3: Northern Lakes (N.L.) and Great Bear (G.B.) Project Participants

Participant Name	Position or Title	School Staff	Community Member	Museum Staff
Joanne	N.L. technology coordinator	•		
Fred	N.L. community member		•	
Jack	G.B. technology coordinator	•	•	
Rose	G.B. gifted and talented teacher	•		
Catherine	Great Bear Tribal Museum staff		•	•
Nick	Great Bear Tribal Museum director		•	•

A SHORT NARRATIVE OF THE CASE

ORIGINS OF THE PROJECT

As mentioned above, both schools had previous experience using the QTVR technology and both had a history of collaboration with each other in the Four Directions project. Northern Lakes had considerable experience with conducting virtual museum projects, both within the community and with museum partners, and had an award-winning Web site featuring material from the virtual museum activities conducted within the community and at regional museums.

I had contacted Joanne at Northern Lakes Indian School at the beginning of my study to see if the school wanted to participate, and she showed great interest in doing so. I met her at a Four Directions quarterly meeting in early March and asked her if she had made any progress on organizing another virtual museum activity, and she said she had not been successful. On the last day of the Four Directions meeting, Joanne and Jack approached me to talk about a

collaboration between their two schools on a virtual museum project involving the Great Bear Tribal Museum and Culture Center. We talked about some tentative dates when I would be available. Joanne and Jack then drafted a proposal to present to their tribal councils to gain permission and funding to carry out the collaborative effort. Their proposal stated:

> Students and staff from Great Bear and Northern Lakes schools would like to join forces to digitize and document artifacts at the Great Bear Museum for preservation and sharing cultures and histories. . . . This activity will provide students and staff members of both schools and the Reservation the opportunity to be active participants in the preservation and sharing of culture and knowledge.

The proposal went on to describe the duties of the two partners and a schedule of activities for the weeklong event. Northern Lakes would bring its equipment and expertise for the creation of QTVR media and virtual museums to share with the Great Bear community. Great Bear would host the project at its tribal museum, provide lodging at their casino resort, and garner community member participation. The Northern Lakes students would be teamed up with Great Bear students "in an effort to build lasting friendships that will encourage collaboration in other future projects that could involve both reservations/schools." The proposal stressed the centrality of student participation, stating "one of the most prevalent reasons for creating a Native American virtual museum is to allow our students to become active participants in educating others about our Native American history and culture."

Both Joanne and Jack had to wait for their tribal council meetings for the approval, which took nearly two weeks. The time we finally settled on for the

project, the first week of April, was only about a week and a half away when the approval came through, providing a very tight window for making the final project preparations.

THE FIRST DAYS: SETTING UP AND ASSESSING THE SITUATION

Both Joanne and I traveled to Great Bear Reservation on the last day of March, a Saturday. Joanne drove for a full day in her minivan crammed with all the equipment that Northern Lakes was providing for the project activities. The observation that I had made about virtual museum projects being equipment-laden was multiplied several fold for the Northern Lakes/Great Bear collaboration. Wanting to make virtual museum activities an ongoing program at Northern Lakes Indian School, Joanne had invested in a QTVR object rig, a large piece of equipment for photographing "full motion" virtual reality objects that could be rotated both vertically and horizontally. She also brought photoflood lights, a scanner for recording photographs and documents, several digital cameras, audio recording equipment and software for interviewing community members, and several computers. This equipment would be added to what I brought along and some equipment that Jack was able to supply.

The next day Jack joined us at the tribal museum to meet with the museum staff and to start setting up our equipment. The museum shares a parking lot with a complex of buildings that include the reservation library, government offices, and council chambers. The museum itself is a large log cabin that, except for bathrooms, a small office, and a supply closet, is one large hall with a loft running down the center. Jack commented that the building had a leaky roof, something

that Catherine, the technical assistant, also complained about because it made it difficult to assure the safety of the museum collections to potential donors.

At this point in its development, the museum's collection was rather sparse. There were only about fourteen display cases, some empty, and the others contained only a few objects. The available objects included a decorated drum, a mask and statuette by a local artist, a beaded belt and bag, a model birch bark wigwam, a cylindrical birch bark basket, two ricing baskets, jewelry, pipe bowls, arrowheads, a buckskin jacket, war medals, and some documents. There were photographs and a painting on the wall. Joanne was expecting much more material for the students to work with and was disappointed by the small number of items available. We discussed how we might get some more material to work with from people in the tribe.

Next, we discussed how to use the museum's available space for our project. Joanne and Jack had planned to have four computer work stations set up for different purposes such as QTVR imaging, scanning, Web page authoring, and sound recording. They planned to network the computers so that media on any one computer could be downloaded to the others for archiving and adding to the virtual museum Web pages as they were being developed. Because the museum was so open and had log walls, pine floors, and no ceiling below the pine beam roof, the acoustics were bad for decent recording, so the recording work station was set up next to the small office to serve as a recording booth. The scanner station and the Web page stations were set up on the opposite side of the museum to help keep sound away from the recording area. We decided to set up the

QTVR work station and imaging area at the end of the loft, which was nearly empty. Just bringing in the equipment took all morning. In the afternoon, I worked with Joanne and Jack on assembling the QTVR object rig. We were able to get all of the computer work stations assembled as well, but not networked.

On Monday, Joanne and I met with Jack at the Great Bear Tribal School and met with some of the teachers whose students would be working with us. We were hoping to meet with some elders as well because the proposal had planned a role for tribal elders, who would work with the students, helping them understand the cultural significance of the items they selected for the virtual museum. The students could also interview the elders about their experiences living on the reservation. However, the community member participation in the project was only partially achieved. Jack was depending on the reservation newspaper to inform the community and invite participation, but he did not have enough lead time to get the word out. He also tried to get the school principal to contact some of the tribal elders who regularly worked with students at the school to ask them if they would participate in the virtual museum project, but she had not had the chance because of the time constraints. Consequently, community member participation was sparse and sporadic. Throughout the project, community members came into the museum out of curiosity because it had not previously been open. A few parents came by to see what their children were involved in doing. One parent, who was taking courses at the tribal college to earn a teaching certificate, was very excited about our use of technology and had me come to the college to do a presentation on virtual museum projects to one of her classes. An

artist, who had done pieces displayed by the museum that were imaged by the students, came by and made herself available for student interviews. Several members of the tribal council also came by to get a tour of the project activities. However, the more persuasive presence of tribal elders envisioned as occurring throughout the project did not happen.

Preparations for the student activities continued all day Monday. Joanne and Jack worked together on wiring the four computers together and creating the computer network for the project. Software installations and technical troubleshooting took a large amount of our time as well. We went to the reservation library and checked out books that the students could use in their research. We also made inquiries at the tribal council chambers about gaining access to more items for the virtual museum project, but with no success. The proposed activities for that day included time for adults in the community to bring in items from their personal collections that we would image for the virtual museum project, but the word did not get out to the community about that opportunity, so no one came. Fred, the Northern Lakes community member who had volunteered for the project, arrived in the afternoon. The Northern Lakes students along with their parent-chaperones arrived in the evening, having made the long trip in a school van.

PROJECT ACTIVITIES

According to the plan, the next two and a half days were to be student activity days for the virtual museum project. Each of the four Northern Lakes students would be paired with a Great Bear student to form a team. In the

morning, two teams would work at the museum while the other two teams visited the school. As it worked out, there were transition times when all four teams, eight students in all, would be at the museum. In the morning, all the teams would convene at the museum to identify what they wanted to do that day. After lunch, all the teams would again be in the museum. The morning team would be still finishing up their work while the afternoon teams would proceed to make selections and do research. Several students would be off task at these times. Despite occasional problems with managing the students, the virtual museum activities took place successfully in terms of doing the imaging.

The idea that there would be stations through which the students would move through to accomplish various tasks for producing a virtual museum exhibit did not work as well as anticipated. The original plan was for one team of two students to be upstairs doing their QTVR imaging while the other team of two students would be downstairs, engaged in researching or writing their essays for the virtual museum, doing scanning of museum documents or photographs, recording interviews, or typing their information into Web page templates for the virtual exhibit. Fred, Catherine, Joanne, Jack and I shared the responsibility of manning these different stations. I remained in the QTVR imaging area, my area of expertise, so that Jack and Catherine could observe how that equipment was used. Fred dedicated himself to helping the students with the scanning. Joanne worked on creating virtual museum Web pages as the students created materials for them. Jack and Catherine could not be present the whole time because other duties would call them away. Nick, the museum director, was only able to be

present for a few hours during the project. Rose, the only teacher involved in the project, escorted students from the school to the museum and back and observed the project activities.

One problem we encountered was an uneven workflow. As a result, there were times when a team would be off task, without a clear notion of what they should be doing. Sometimes students would be crowded into one station, all doing scanning or QTVR imaging, overwhelming the person at that work station. The full-motion QTVR imaging rig took much longer to set up than a simple turntable, causing a bottleneck in the workflow. This resulted in times when the students were idle while I made adjustments to the equipment. The students were excited about the project and were particularly attracted to the equipment, and having times of idleness led to student misbehavior. Joanne had to call down students several times and threatened to ban them from the project.

Another problem was the lack of community members to play the role of cultural informants for the students. As previously mentioned, one artist visited the museum to talk about her art pieces. The students were able to interview her on tape about her sculptures, which were based on Great Bear tribal legends. The museum director was able to talk with the students about a family cradleboard. The plan that there would be several elder community members present to help students understand the significance of the cultural items they were studying did not materialize. There were too few classroom teachers in the project who could have helped to guide the students through their research and writing and to keep them on task.

On a positive note, the students from the two schools appeared to enjoy each other's company. On the second day, Rose brought over several American Indian dance costumes. Several students wore the costumes and stood on the turntable to be imaged in QTVR by the other students. In the afternoon, they recorded songs they had learned in each other's Native language.

On the third day, things were a little less hectic. The Northern Lakes students had to leave early because one student did not bring enough of his medication to last throughout the day. With fewer students, things were a little less hectic for everyone. Catherine and Jack both took some time to learn how to shoot QTVR objects using the full motion rig. I showed Jack how to set up and shoot panoramas as well, using the construction site of the new school as our subject.

By the end of the period of virtual museum activity, sixteen museum objects had been imaged in QTVR media, and the students working with Fred had scanned scores of photographs and documents. The students and adults also took still pictures of a painting, the museum building, and the Great Bear war memorial on the museum grounds to include in the virtual museum. With his skills as a computer programmer, Jack was able to assemble the virtual museum and post it on the World Wide Web by the next fall. Joanne posted a description of the project and included a link to the Great Bear virtual museum on her school's web site.

CASE ANALYSIS

This virtual museum project was put together rather hastily. Less than three and a half weeks passed between the time Jack and Joanne drew up the proposal and the day we convened to set up the equipment in the Great Bear Museum and Culture Center. Joanne's prior experience with virtual museum projects and the history of collaboration between the schools helped to make the project modestly successful, but more time for planning and communication would have been helpful. Most especially, additional time could have been used to invite the Great Bear community to participate in this unique venture. Added time could also have been used to better prepare the students for taking part in the project and better understanding of what they were expected to do at each stage. Extra time might have helped to solicit the active participation of classroom teachers, providing them with training and input into the project. There was also a shorter time frame for the project activities than for the other projects in this study. It was conducted over a single week whereas the other projects involved a week and a half or two weeks spent at the museums and at the school.

In the interviews the participants commented not only about the problems they encountered in carrying out the project but also gave some constructive advice about how to better conduct future virtual museum projects. They also found a number of positive outcomes of the project.

PROJECT MANAGEMENT ISSUES

Probably the most-repeated concern among the participants was the need for more adult supervision of the students involved in the project. The comments

were usually combined with suggestions for more specific ways the project could be better structured, such as making use of school and museum staff as well as community members to correct the problem.

Joanne was quick to point out the student management problems:

> One of the problems I think we had was that we had too many kids at one time, and not enough [adults]. If we had more adults, it would have been better, but we didn't have enough adults to cover the kids that we had. . . . I'm that type A personality. Once I have the ducks in a row, I try real hard to be flexible for these types of events. I think I like going with the idea [that] there are enough adults to supervise the students, preferably at least one adult with no more than two children, and I don't think that they should be the adults that are trying to do the work and teach the children. I think that we have to find a way to get more people involved so we can have community members supervising children because it's too hard for us to take care of the behavior if there's a behavior issue, or the noise control. We can't be working with two kids here trying to do a QTVR and then looking over our shoulders to see where the other four or five kids are. And I think that eight is too many. I think that when we're working, it should be no more than three.

Fred, who helped students with the scanning, had a different response to the number of students. He experienced times when things got very busy at his work station but found that he could get the students to work with each other.

> My role was to be there for the kids, and teaching them how to scan pictures. . . . I got too busy or there were too many kids there, you know. So many kids wanted to learn how to do it, I got kids to teach themselves how to do it, and I had three or four of them getting in line taking their turns and everything. It was really exciting to see, you know, the kids being interested in that.

Catherine also noted that more adult supervision was needed. When I asked her what could be done to improve the project, she stated:

> I think more adult supervision, not that the kids were terrible—they weren't—but there were times when they were rolling around on the floor,

> being kids, because their attention wasn't engaged at the time, and I think that, not that anybody has to be looking over their shoulder or saying, “no, don't do this,” and “do that,” but more as general supervision. For instance, it would have been helpful if the mothers were here, you know, the two chaperones that came along. That would have been a help to have them here.

Catherine wanted to be engaged better with all the children and felt that she would be able to hold the students’ attention if she were better versed in the technology as well. Her suggestion for improving the project addressed these two points:

> It would be a good idea to have…the adults switch with the kids, so you will get to have experiences with all the children. I certainly want to be more versed in [the technology], so that I can help the children and teach them. But I think that once you engage the kids' attention, then that of course is the whole point, but when you keep their attention focused….that would be better.

Jack was much less aware of the need for more staff for supervising the students. He recognized that there were rough spots during the project, saying, “the first day we fumbled,” but despite that, in terms of the adult participation, he thought things “went pretty well.” He did recognize the importance of more teacher involvement, though, and he thought that lengthening the project to two weeks would help. Allowing for teacher training in the virtual museum technologies might be one way of securing more teacher participation.

There was a great deal of variance in these four responses in regard to the need for more adult supervision. Fred and Jack appeared to be much less aware of the need than Joanne and Catherine. However, Joanne, as the Northern Lakes Indian School staff member responsible for the visiting students, and Catherine, the only museum staff member on site, were in a greater position of responsibility

for student behavior. Perhaps this could explain their being more sensitive to student behavior. Also, the physical environment of the museum served to amplify the disruptive effects caused by active children. The work stations were scattered over the whole building, making it impossible for a person to monitor all the activity going on. The hardwood floors and poor acoustics of the building made it hard for the children to move about quietly, which perturbed adults who were sensitive to noise. This was especially true for the activity in the loft, where the QTVR imaging station was set up, because the pine plank loft floor was also the ceiling for the museum area below, with no intervening insulation.

Two students, one from each school, were identified as being hyperactive (Attention Deficit Hyperactivity Disorder, or ADHD), which may have sensitized the adults' perception of student misbehavior. Several project participants expressed concern over the potential for difficulty from these two students, but later praised them for their interest and remaining on their best behavior. The Northern Lakes student did not come with enough his medication for controlling his hyperactivity, which led to the Northern Lakes group leaving the project a half day early.

Jack related a story of working with the Great Bear student, who was labeled as being hyperactive but who was clearly interested and worked hard, speculating that something about the nature of the virtual museum activities that held this student's attention:

> We had one of our Special Ed students over there. And what we did was we shot—did some flat shots—of some arrowheads. And this little guy just sparks right up, picked up a magnifying glass and looked at these arrowheads, asked me what they were made out of, how they were made,

> when they were made. So right away [Jack snaps his fingers], he caught it. I don't know if it's something that interested him, and I don't know why they label them Special Ed, but he seemed very interested and he learned the technology and caught on right away.

Most of the issues expressed in this theme recall the kinds of concerns that are addressed under the teacher education topic of "classroom management." This topic deals with how a teacher would structure her or his classroom to create an effective teaching and learning environment. This would include subtopics such as student discipline, the physical layout of the classroom, practices to keep students on task, monitoring student progress, and planning instruction.

THE NEED FOR MORE CHOICE FOR STUDENT VIRTUAL MUSEUM SELECTIONS

The need for more choice of materials among which students could make selections for their virtual museum items was a complaint that was mainly voiced by Joanne, but it was apparent from my observations as well. The tribal museum was just getting started, and the number of displayed objects was somewhat sparse. Catherine's statements gave some indications why the collection was so small. Both Catherine and Jack told me that the new log cabin still had a leaking roof. Catherine was anxious to proceed with assembling a collection for the museum, but she was hesitant to do so because she did not feel she could protect the collection as well as needed. She also wanted to get some training in museum conservation and asked me if I knew of any programs that would provide such training. I mentioned the internship program at the Smithsonian National Museum of the American Indian and gave her some contacts there.

For Joanne, this issue had an effect on the students' response to the project because

> they didn't have a real large selection of items for the kids, so that made it difficult, because they didn't get to pick what they were doing. . . . They have a little more ownership that way. [It] means more to them if they can pick up the item, and it's something that interests them.

She compared the Great Bear virtual museum project to another project Northern Lakes Indian School had previously done at a regional museum. In that case, she had visited the museum with the school librarian months before the project took place and photographed all the display cases with relevant materials. The students were able to review the photographs and make their selections before they went to the museum. The museum was also able to open the display cases before the students arrived so that the materials were immediately available when they were needed. Joanne thought a similar approach should have been used with the Great Bear Museum.

> You have to know what's available. That's another big mistake. If you're the one facilitating, and you're the one who has to decide what the numbers of items are going to be, you need to know what's available. [For] the kids, there has to be enough to choose from, and they have to be readily accessible. You have to know the day before what you're going to do the next day, you know. Or at least have, "these are the eight items that are available for tomorrow," so they're there and we don't have to wait for two hours for them to be taken out of the cabinets.

Fred did not disagree with Joanne's points regarding the need for more selections for the students, knowing what was available at the museum ahead of time, and the need for more adult supervision. However, he was much less critical of the project as a whole. For him, the difficulties that so vexed Joanne

represented opportunities to improve the approach to virtual museum projects that the Northern Lakes community had made:

> I think everything we're doing now is a learning experience for everybody, you know. And so each time we do something we're always learning something from it. That's a good point there, you know—for us to learn and to make things better for the kids.

RESTRUCTURING THE VIRTUAL MUSEUM PROJECT

Given the problems encountered in the one-week project, several participants, mainly Joanne and Jack, mentioned some ways to restructure the project to make it more effective. More adult participation, especially from classroom teachers and community members, was key to these suggestions, as previously mentioned. Also having better communication with the museum in terms of finding out what was available for the students well ahead of time was another good suggestion.

Joanne summarized her complaints about the Great Bear virtual museum project and proposed some remedies in this way:

> I think …the adult supervision has to be there, and there has to be enough for each student to do. And when it comes to the students doing the form and writing, I really think we need to have a teacher in that position to help kids with their writing, and maybe getting that form filled out and their essay done, has to be done before the QTVR. Use the cameras and that kind of stuff as the carrot. You know, "you've got to do your research and your writing before you do the QTVR, because it's not getting done otherwise." It's hard to do when you just have a handful of adults trying to do all of it.

When Joanne hit on the idea of "using the camera and stuff as the carrot," she was confirming the observation that students find using the computer and imaging technology motivating, so that could these be used as a reward for

accomplishing the tasks they are more likely to resist, like the writing assignments. Joanne also drew on her earlier experience with a virtual museum project involving the Fort de Lancie Museum, a private museum in the region. In that project, she was able to visit the museum a couple of times and photograph the exhibits so that the students and teachers would know what was available for the virtual museum ahead of time. These observations led her to reconceptualizing the way virtual museum projects should be structured, to take advantage of the motivating attribute of the technology to students, she stressed the need to prepare before the museum imaging activities commenced:

> So maybe the first day there would be no photography at all. It would be strictly learning about the artifact and doing research for one or two [hours], depending on the age of the student, you know. [For] the younger ones, probably a full day is too much for them. I think maybe three hours. The one thing at Fort de Lancie, it was rushed, but if they knew what they were going to do, if they came in the day before, maybe spent the day, you know they go in, they visit, and they see the thing up close and personal. They might have seen a photograph and, like I did at Fort de Lancie, I photographed everything, you know, they looked at the displays and they circled items that they were interested in. So we kind of had an idea of the items they wanted to do. Maybe if they could have come in to the museum, done the little tour of the museum to get the feel for it, see all of the equipment, look at all the things they were going to document, and then go to like a library or another room, someplace away from the museum: "OK, now you're going to have to do your documentation, your research and documentation. Then you can go back to the museum and do the rest of it." I think that's a real important concept, because if those kids can get away with not writing, they'll do it. And if you're trying to teach them how to do QTVR and scanning and Web pages, all of that other stuff, and they've got all that other stuff around them, that's just too much stuff around them for them to concentrate. So definitely the next off-site thing we're going to do is going to be done that way, even they have to get a hotel room to set up as a study.

In addition to getting the students to do their writing first, with the help of the classroom teachers, Jack suggested that students could type in their own work into Web page templates that could be rapidly integrated into the virtual museum Web site.

> Well, the research on the objects could be done during the photography stage, or pre-photography stage, which seemed to work pretty well. What I think we'd do different[ly] is having our students write it out, make a template on the computer so they could come in and key it in. A lot of our students have a hard time writing, or, for me, I can't read their writing. Most of them can keyboard already. They could key it in, and I could just build some templates for them.

In order to get the teachers more involved in the virtual museum project, Jack thought the project should be extended to two weeks, with a week dedicated to teacher training:

> Two weeks would have been nicer. I believe we would have gotten more in-depth [with students] if we had more staff members over there . . . maybe a week of staff and then the students. Then the teachers could be over there, involved with their students.

EXPANDING THE TRIBAL MUSEUM ROLE

In addition to suggestions for restructuring the virtual museum project, several people noted that the tribal museum could expand its role in the partnership in ways that would improve the projects. The Great Bear Tribal Museum was right next to the school on the reservation. The proximity and close political and cultural connection between the tribal school and the tribal museum suggested the possibility that this type of museum could take on more responsibility in a school-museum partnership than a non-tribal museum. However, an expanded role could be achieved by non-tribal museums as well,

such as providing more information resources about the museum collection for the students to use, interacting more with the students during virtual museum activities, and preparing objects for imaging ahead of time for the students (i.e., removing them from the cases more quickly, having them ready for students to work with, etc.). A tribal museum could be expected to have an ongoing relationship with the tribal school and prepare itself for doing frequent virtual museum activities as a part of its offerings.

Rose thought the museum could do a better job of providing information resources to students working on the project. This included providing opportunities for students to have better access to the museum personnel as well.

> It would probably be good for them to have the research material available for the students, any cataloging, to be available to answer the questions that the students have, you know, because they're a valuable resource as well [museum personnel]. I think the students learn a lot by interacting with museum personnel.

With the tribal museum in such close proximity to the school, Rose believed that the virtual museum activities could be formalized into an ongoing relationship:

> Let's say this museum…would make the partnership with the school…Let's say this became an ongoing thing where, as the collections grew, the students would continue to take each item as it came in and was cataloged, and then the students would add to that. So the virtual museum for this museum would grow, and so that would make a really good partnership. And that would be a certain grade's assignment, let's say fourth grade or fifth grade or whatever. They use that, as one of their class projects at a certain grade level …this is what they did, as the things came in and each student got a chance to do an item that year, or something. I mean that's how I see that partnership going.

Jack also noted that both Nick, the museum director, and his technical assistant Catherine were very excited about the virtual museum project, and indicated that he intended to continue the partnership. Jack described a digital darkroom that was planned for the new school that was currently under construction. He thought it would be a good place to house the imaging equipment for an ongoing virtual museum partnership with the tribal museum.

Northern Lakes did not have its own tribal museum. Joanne and Fred believed that the creation of a tribal museum was a natural extension of the virtual museum activities they had been pursuing for several years. The virtual museum projects gave them an opportunity to brainstorm ways to leverage a tribal museum. As Joanne described it, this was:

> the museum that we want to build as part of our school project. Our building and trades people put in a proposal to build a house this year, and the tribal council for funny reasons turned them down. Fred and I have been talking with other community members, and when we go back this time we got some ideas from the people at this museum on how to get some funding. We're going to try to write a grant that incorporates building trades to build the building, get the tribal members involved with employees, and incorporate our virtual museum as a school project, so that the museum itself will actually be a school project. The students and community members will run it, but it will be more like a school project, and classes can do different activities. Maybe the middle school might be studying the fur trade, and so maybe they might do a display on the fur trade and go to different places where we know there are artifacts and things and actually put together [a virtual reality] exhibit as part of an assignment at school.

Joanne believed that a Northern Lakes tribal museum would be able to take over much of the work she had to do in planning and conducting virtual museum projects, leaving her to play more of a facilitating role that would suit her better:

> I found that in our particular project, I kind of think of myself as the facilitator, trying to make things happen and trying to keep things organized and the master of the Web, so to speak. I like to see that get transferred over to somebody else, eventually. If we end up being able to do a museum ourselves and are able to get grants, I see our equipment and everything being moved over to the museum, and the person that's in charge of the museum, the people at the museum, taking over the Web site.

Such a tribal museum could take on more responsibility for the organization and promotion of the virtual museum project begun at the Northern Lakes Indian School. Having an official responsibility to the tribal community, the museum could promote more community participation in virtual museum projects. It could arrange for student interviews of museum donors and other community members and provide the technical and educational expertise to incorporate the students' work in an online virtual museum. The tribal museum could also be the institution that purchases and maintains the equipment for virtual museum projects. The tribal museum would then serve a special purpose for the Northern Lakes community, and its educational mission would call for special skills. According to Joanne

> They would have to be people who would be willing to work with students because it will be an educational facility as well as a culture center. They're going to have to be people who would be willing to work with children on projects. They should be people who are familiar with the community, and the ins and outs and the politics and the whys and wherefores, and willing to go to classes to get training.

The vision of an expanded role for tribal museums in virtual museum partnerships with tribal schools has a great deal to do with the special relationship a tribal museum has with the tribal community. Catherine used the word "personal" to describe that relationship several times in our interview. She

described her hope for development of the Great Bear Tribal Museum along those lines:

> As a person and a community member, the Great Bear museum itself holds, or will hold, a lot of our history. There are a lot of good sources out there, now, where people come in. Say somebody moves off reservation, like I did, and comes back and says, "Well, who am I really if I didn't grow up on the reservation? Where are my roots? I know these names and these names." They'll be able to come here and see their ancestors in pictures, or they'll come here and look at artifacts or objects that belonged to their family online. They will be able to do research about themselves and their families, through manuscripts and personal papers. They will be able to come here and experience, and have a meaningful experience, rather than just walking in and going, "Ooh! Ahh!" looking at beadwork. They'll know that their great grandma made this belt, or their great grandpa or their aunt or some distant cousin, because it's also a veteran's museum, that's them. So for me, this is going to be a place of community and familial pride. Eventually, that's what this place will be. The museum in itself I see as evolving. It's never going to be done, or finished, and because I have the opportunity to build it up from the ground up, and realize I had a lot of visions when I first came here, and there is no way one person is going to do it all. So my approach has been slow, steady, to get it done right, and because we don't have a whole lot of artifacts right now, I've been able to concentrate in other areas. But if it was me coming back, this would be one of the first places I'd stop.

Catherine saw the virtual museum project as an extension of what she was already doing in developing the Great Bear Tribal Museum, except that it was an activity that she would not have anticipated as happening so soon in the museum's development. In many ways, it caught her by surprise. As she explained:

> Well, you know, I only knew about it actually about a week or less, when Jack came by before. It actually got approved by the council, and I said, "Oh, that's interesting." So I myself did not know what to expect. But I expected with the museum, I need, I still need a lot of equipment. And so, I thought, "Well, we'll get in a basket maker, and we'll have demonstrations of this and that." I was thinking of having Great Bear

> Historical Society meetings, and I've had some small [activities], a photo party for instance, but I just wanted to see how that would go, you know what I mean. When you guys came, it was almost like, it was just this huge leap of what I would have thought we would be doing years from now, you know, as much as two years from now.

THE NEED FOR COMMUNITY MEMBER PARTICIPATION

For Catherine, the "personal" aspect of the tribal museum meant that she envisioned that there would be a great deal of community pride and participation in its development. She even hoped that there would be some healthy competitive spirit in the community in terms of participating in the museum's development:

> I hope there's kind of a rivalry that starts, you know, not a mean rivalry, but a rivalry that says, "Well we're, you know, we're the loon clan, we should have this. Well no, we're the bear clan, and we need to have this in here. The people in the museum should have our things here." So I hope there's a real healthy interest and rivalry to have the different families donate to the museum or participate in it on a personal level. Everything in here is very personal. It's about our history. It's about our community. It's about the present. It's who we are, where we've been, and who we've become.

Jack was hoping that a "healthy interest" would be shown by the community in the virtual museum project as well, but that did not develop as well as expected, probably due mainly to the short time interval for getting the word out. As it turned out, gaining community participation for the virtual museum was problematic. According to the proposal to the tribal councils prepared by Joanne and Jack, there was a specific role for tribal elders in the virtual museum project. The community participation ended up being fairly low, and there was no presence of elders fulfilling the roles described in the proposal. There was some community member participation in this project, but several participants

expressed a need for more. Jack claimed that there is considerable potential community member participation for future virtual museum activity:

> Now, next thing we need to do is secure some more equipment which—I don't think that should be too much of a problem—and then we can continue on doing the museum. We have a lot of other places on the reservation, such as the clinics that have tons of stuff that they want to share with the virtual museum, or with the museum. But they'd be willing to share with us through the virtual museum. So I just see it growing and growing. I'd like to get more community members involved. Get the elders involved, especially so they can come in and tell stories about a lot of the objects they know about. But it will always continue to grow, I hope.

Though there was little formal participation by community members in our weeklong project, several community members did come by for brief interactions with the students and the adult participants in the project. One parent who was taking education classes at the tribal community college was very interested in the virtual museum as a resource that she found useful as a community member as well as an important education project for Native American students. The students interviewed a sculptor who had donated several items to the museum. Several community members circulated through the museum and expressed curiosity about the virtual museum activities. Jack described the reactions of some tribal council members who came by to see what the virtual museum project was like: "We got [a] couple come into the museum, and they just go 'Wow! You can do this?'"

Fred had a dual role in the project, helping the students learn how to use the scanner and answering their questions about culture. He described his community member role as "being there for the kids." In past virtual museum

projects, he had played an important role in identifying sacred items that should not be included in a virtual museum. His role as a cultural advisor in this project was reduced because he was not a member of the specific tribe represented by the museum, though there is a great deal of affinity between the traditional cultures of the Great Bear and Northern Lakes communities.

Jack tried unsuccessfully to get a story about the project into the reservation newspaper, to spread the word that the project would be happening, but there was not enough lead time to get an article written and published. He wanted community members to come and interact with the students and to be interviewed by the students, and he was hoping to get some elders who had been working with the students in the past to come in for that purpose, but as he explained,

> I gave the principal of the high school the proposal we put together, which she didn't share with her staff. We have [a] bunch of seniors that come into the school to work with the students already, and they're all elders from the reservation. So there's a whole group of people with, probably combined, a couple [of] hundreds [of] years of knowledge together, which we could tap into.

Rose thought it would be good if the community member donors and artists could be present to talk to the students about the objects they had given to the museum. She had a specific artist donor, Chris, in mind who had done a painting reflecting tribal legends that was displayed prominently in the museum. She said,

> I think that, for instance, let's say Chris could have come in. . . . I mean it would be wonderful for the kids to meet with the people who donated the items, and to be able to include that. That would make a wonderful piece to do a video, or the kids to learn how to do the video and the audio

> interviews. . . . Because, you know, Chris would have been a good one because of his painting here, to talk to him. "OK, where did you get the idea?" Ta da ta da. And then include that as a [video/audio] clip with the [art] piece.

In Joanne and Fred's vision of the expanded role of the tribal museum in virtual museum projects as previously mentioned, the tribal museum would be a center of cultural sharing where community members could bring heirlooms to image and have their memories recorded by students. Joanne compared the current virtual museum project to an early oral history project she had done with students at Northern Lakes, which demonstrates the evolution, not only of her thinking about the community member role in virtual museum projects, but also her evaluation of the community's reaction to the prospect of putting their memory on record, especially if the memory has unpleasant or controversial aspects to it.

> We did an oral history project back in summer of '96. I think I had maybe a half a dozen kids, junior high school kids, and we got the camcorder from the school and microphone, tape recorders, and they were just cheap tape recorders, and you know, it was just thrown together in a couple of weeks. Somebody asked me to do something with them, and they wanted to do kind of a oral history kind of thing, you know. They wanted to go and interview their grandparents and stuff. Of course the elders were just like, "Ahhh!" [expressing worried concern], you know. We finally convinced Hope and, I can't remember who the other one was, two ladies, two elderly ladies that agreed to do it. One said, "You can't videotape me. You could audiotape me." The other said, "You can videotape." But anyway, these kids went in and worked just…they were real nervous at first because they were afraid that their history is so bad, and there're so many bad memories. They don't want to talk about that, especially to their grandchildren. But when they realized, I mean, we worked together and we came up with a list of questions, and when they realized we were asking things like, you know, "How did your dad react when electricity came to Northern Lakes?" you know. Then the stories would start flowing in. It was all good, you know, it wasn't a bad thing. And then some of the

> bad stuff came out, not in a way that was upsetting, really upsetting to anybody. It wasn't real derogatory, and it didn't upset the kids, but it freed them up a little bit. Once they realized the kids weren't going to come in and say, you know, "What was it like for you when you went to school in Pleasant Valley?" or you know, "When they took you away to school, how did you feel?" They didn't ask any questions like that, and that's what the elders [said] later. Sue Acorn was one that told me that, "We were afraid of the questions they were going to ask us."

Joanne's story is interesting because it illustrates that there can be barriers to overcome in order to gain the trust and participation of tribal community members in projects such as the virtual museum done within the community.

THE NEED TO BRING THE TEACHERS ON BOARD

As in the Pacific Virtual Museum project, classroom teachers were left out of the virtual museum activities. All of the planning and most of the work was done between Jack and Joanne, who were the schools' technology coordinators and had no specific classroom duties. The only classroom teacher actively involved in the project was Rose, the gifted and talented teacher. She was chosen because she had the most flexible schedule, and for the most part, her role did not involve her teaching skills. As she explained, "Due to my other obligations, my main role was kind of observing students when they were here and making arrangements for them to get here, to get back, to observe what they were doing."

Despite the lack of teacher involvement in the virtual museum project, Rose was able to appreciate it as a potential classroom activity. She thought it could be adapted as a classroom activity in a classroom with learning centers, where a few students could be working on one activity in one area of the classroom while the other students were working on other aspects of the project in

other areas. There would be “multiple simultaneous activities” going on. She thought there would need to be an extra staff member available to monitor students, while the teacher worked with students one-to-one or in small groups. In the context of teaching gifted and talented children, Rose also found the virtual museum project to be an exemplary approach to using museums as a learning resource:

> You know, I've read, you know, with GT [Gifted and Talented], how to take children to a museum and show them, and they kind of go "Yeah, huh, yeah, uh huh." And so I allow strategies for helping students focus on a museum experience, and this is probably one of the best ones. They actually, they know their object when they're done with this, so they have actually, I think the refection piece, where they do the write-up, they do the research, and then they do the actual examination. It causes them to really look and reflect on the object, so they definitely do more in-depth learning that way, this way.

The lack of time after the approval of the project may account for the lack of teacher participation, but statements by Joanne and Jack indicate that this is probably not altogether the only factor in the case. Joanne spoke of her earlier efforts to garner classroom teacher participation in the virtual museum project at Northern Lakes Indian School. As previously mentioned, she thought that greater teacher involvement was crucial for virtual museum activities. She thought that teachers should work closely with students in the research and writing portions of the virtual museum project, and that this would fill in many of the “big gaps” that she perceived. Among all the schools in the Four Directions project, Northern Lakes had the most experience in conducting virtual museum projects, both within the school and in partnerships with museums. However, Joanne still encountered problems in getting teachers to embrace the innovative practice.

Joanne expressed this concern when she described her frustration in trying to getting teachers to prepare their students for virtual museum projects:

> I think we're in a really early stage of it, and I think there are big gaps, huge gaps. If I was a teacher in a classroom doing this project, for example, there would be some things that I would be able to do with the kids as a group, but because of my many roles, I don't have time to do [that]. . . . I give all of this information on paper and it doesn't get to where you need to have it get, and I guess I'm just going to have to take some time… Sometimes you can't delegate and you can't rely on the information to get disseminated where it needs to be. And I know that the students were not as informed as well as they should have been, or educated about what it was, as they should have been about what it was, even though they were in the QTVR project [done earlier that semester] in the school. I was kind of disappointed that, the three classrooms that were involved….I don't feel like the teachers spent enough time talking with the kids about it before they wrote essays and that kind of stuff.

Despite her frustration, Joanne felt that over time the virtual museum technologies would become popular with teachers and students, and teacher participation would increase. To illustrate this prediction, she described a "phenomenal" change in the number of Science Fair projects, attributing the change to the new technologies the students were using:

> I think the tools themselves are being used in a lot more different ways besides the virtual museum, you know. And the QTVR isn't used as much as we'd like to see it, but I think it will in the future. I mean, it's been such a short time and it takes five, six years to get a classroom to work, you know, or a course to work. So it's got to take at least that long, what we're trying to do. But just since we've started using the technology, the last year or two, the difference between the Science Fair projects two years ago and the Science Fair projects this year are phenomenal. It's just totally, I mean *totally* different. They're neat. The kids are able to use the pictures. They have microscopes that connect to their computers. They are able to use that and print out things from that. And they use the software, and they word process, and they do their graphs on the computer and print them out in color, and you don't see a lot of handwritten

> anything. You know, it's all neat, and they even take time to cut out fancy backgrounds to paste their projects on so it looks like a real display. Two or three years ago, it was kind of like "Ahh, do we have to do this?" This year they really got into it.

Jack complained that the teachers were "reluctant" to use technology, and remarked about how difficult it was to train them how to use it in their classroom practice. He characterized the current use of technology in the classroom in this way:

> Well, basically they just use it to surf the Web—they don't do a whole lot of drill and practice. Basically that's what they use it for. They're not really developing anything, such as a thematic unit, involving technology. They're coming along.

Jack mentioned only one teacher other than Rose who was integrating the use of technology into the classroom—the middle school teacher who was involved with a university project using technology. It appeared that, for Jack, getting teacher participation in the virtual museum project was an extension of the Four Directions project goals of using technology for teaching in culturally relevant ways:

> From my point of view, it's preservation of the culture using technology. We want to preserve what we've got out here, is where we want to go with it. Like I say, as the technology expands, we'll keep expanding with it. Four Directions helped a lot with the training end of it, which really came in handy. What we need to do right now is move it from where Four Directions was, exactly into the classroom, getting people working on things. Other than the classroom, people like to see the reservation staff [as] a whole, learning in this whole process.

STUDENTS CAN BE TECHNOLOGY MENTORS

Like Joanne, as a technology coordinator, Jack expressed a good deal of frustration in teaching teachers how to use technology. He noted how this

contrasted dramatically with the students' ability to pick up new technology skills:

> With our staff, for instance, they're reluctant to use any technology. And as the kids use it, they seem to catch more on to it. I also find teaching a kid something is a lot easier than teaching an adult staff member something. I can show a kid how to do something once, [but] I have to show an adult staff member the same thing maybe three or four times and they'll catch it. So I see the role as the student helping the teacher out more—and they catch on a whole lot quicker.

In contrasting the teachers' difficulty in learning technology to the experience of students, who had little or no problems learning technology, Jack saw students as taking on "the role of the student helping the teacher out more." He also mentioned that there might be an "intimidation factor" in the teachers' resistance to technology because "the kids learn it instantly." In that case, Jack hoped that there would be a role reversal for students and teachers in terms of acquiring learning technology skills. "I see [the teachers] more as…a learner, and I see the students as teachers teaching the teachers."

During my student focus group interview, Jack proposed to the students the idea that they could train the teachers in the use of the virtual museum technologies. The students responded positively to this idea, and one said, "We could teach our teachers."

IMPROVING RELATIONS WITH NON-NATIVE COMMUNITIES

Several participants saw the virtual museum as an opportunity to improve relations between the Native and non-Native communities. Catherine was especially excited about the potential of improving community relations through the power of this type of project to "make real" the lives of modern Native

Americans to the non-Native community who still maintained conceptions based on the past and fiction:

> I see the phenomenal opportunity to defictionalize [or] ground people in who Native people really are. There are a lot of people around the whole world who still don't know who Native Americans, American Indians, who the Native people of this land really are. So the way I see the big picture, the larger picture, is that people will be able to go to the Web site, [and] see who we really are as a people, rather than what we are presented as in the media.

In addition to defictionalizing the Native American experience for non-Native people, Catherine hoped that the virtual museum would encourage Native and non-Native people to visit the reservation and the tribal museum:

> I believe that it will, again, make [it] real. I see the connection as those same people who do live off the reservation will have a connection to home, and those people who are not of the Great Bear enrollee heritage, or Anishinabe, will be able to observe and feel—I want them to feel welcomed. I see that this is a huge marketing [tool]. People will travel now to come see this. We're not exactly an isolated community, you know. We're close to a larger city, but it's also not one of the more well-known tourist attractions, so I believe the virtual museum will bring people here, and they'll be able to see the artifacts for themselves.

Catherine acknowledged that there was some friction between the Native and non-Native communities in the region, and hoped that the virtual museum might be able to help bridge that gap. She said:

> This whole project generated a lot more ideas for [ways] to expose the museum more to the community—and not just the Native community. It's not just for them, it's about them, but it's not just for them. I mean on a reservation, which is so close to the town line, there has been some friction, and it will probably be that way for a long time. Not that the residents have not intermarried or there aren't what we call Findians here, you know, Finnish-Indians. That's not it. But for them to be just as welcome to come by here and spend some time. I mean I really would like people to come and just take their time and contemplate, as well as being actively involved in [them], when I do have programs.

Rose claimed that she lived in a "dual community" and saw the virtual museum as a way of improving the image of the Native people in that community, and improving the communication between the communities:

> Yeah, I think it's always nice to get some good PR, you know. This museum is very small here, but it's possible that someone could check something on the Internet and say, "Oh yeah there's that there." And so, of course, our big agenda is breaking down those walls, those stereotypes. If that happens in some way that's definitely a benefit, to do that education piece because we're a dual community. So I guess I'm coming from, so it benefits this community in showing pride and showing what it's able to show of the culture, and then it can benefit the larger community by possibly increasing the communication there.

Fred believed that his culture had a lot to offer to the world at large and believed that the virtual museum was about sharing that knowledge with the world. It was also a way for a community to define itself to the world at large. His description of this sharing evokes an interesting combination of the reciprocity of sharing and the potential for developing self-knowledge as well as the knowledge of others:

> I think it helps the community to say who they are, and what they have to offer to the world. Helps us to clear up misconceptions about themselves, or ourselves here. And it gives us a chance to share to the world, but also to get other people in the world to share about themselves too, you know, because there are the Four Directions, what it covers, you know. Everybody needs to share.

Both Jack and Joanne saw a very practical purpose to the virtual museum. As the school technology coordinators who maintained the tribal schools' Web sites, they were in a position to receive email queries about their schools and their communities. Joanne said,

> I get a couple of email messages a week, I think. And it's either questions about culture, questions about language, and I just usually refer those to

> the culture department at the school, give them, you know, forward it to them. Then once or twice a month I get an email commenting on like, "Wow, we're really glad you're doing this Web site. It means so much to see something, you know, my mother came from Lower Michigan and she's Potawatomi, and we live out in California," you know that kind of stuff. I've gotten email from as far away as South Africa.

With the virtual museum posted on the Internet, she is now able to refer to it as an additional resource for people interested in Anishinabe culture. Jack's experience with email queries was very similar to Joanne's. He said that most of the queries were from "education people from the non-Native community." He sees the virtual museum as another resource he can point them to:

> Well, we have a lot of people write me, email me, and ask me [to help them] to do an Indian study of a certain tribe. I see that [the] virtual museum will have a point to place them. You can pull out and say, "Well, go here. We've got all kinds of information on it. If it's not here, we've got links to these other Web sites, other museums that might have what you're looking for."

Jack also had an interesting story about his experience with people visiting the reservation, expecting to see the American Indian from the past or from fiction. He also believed that the virtual museum would help in correcting people's misconceptions about Native Americans:

> It's going to open a lot of doors to the non-Native communities. For instance, we had some people come in from Germany last year, and I think what they're concept was with the Indian reservation was tepees and there's wild horses and Indians in feathers running around. And when they came in they were totally shocked because it wasn't that way at all. But they had this preconceived notion of what they were going to see, and it's not what they saw. So we want to change a lot of ideas around that way. "Actually, no that's not what we do anymore, that's what you write in history books. " So yeah, I see it changing everybody's views.

THE VIRTUAL MUSEUM MAKES THE MUSEUM COLLECTIONS MORE ACCESSIBLE

Closely connected to the improvement of community relations is the ability of the virtual museum to make the collections of the museum more accessible to the Native community and the non-Native community alike. This has been expressed in several ways already—in Fred's statements about the importance of sharing, in Fred and Joanne's hope for a Northern Lakes tribal museum that would encourage the community to share their personal treasures digitally with the rest of the community and the world, and in Rose's desire for a class to work with the tribal museum on an ongoing basis to digitally record its collection as it is acquired.

Rose also expanded on the statements that Fred and Joanne made about using the virtual museum for sharing important cultural items. This would not only help tribes to continue to share repatriated objects that the public once accessed at major museums, but it would also allow individuals or families to publicly share their private heirlooms. She illustrates this with a hypothetical description of the situation in her own family:

> I was thinking in the car…because of the repatriation, because so many of the artifacts hopefully will be leaving these big museums where they've been, and will be returning to their home reservations, that this tool could be used as a way for the public to still have exposure to these things, whereas these things are with their families where they belong. Now, in my kids' family, there are things in our family that I'm sure she'll want to bring to this museum, because they're family things, and so that's going be an issue. I'm not talking about sacred things; I'm talking about family things. But I'm thinking that it's possible, that let's say a grandchild can say, "Grandma, I know you're not going to put your things in a museum, but we have this other thing called a virtual museum, and you could bring grandpa's bandolier bag. You could talk about like how great grandma got

> the beads and how this whole thing, how you did it, . . . and you could tell me about it, and we could take pictures of it while you're there and then you could still have it at your house." And that way these very valuable things—this is all theoretical—but these beautiful things could be shared with the public in an appropriate way, and it could still be with their family.

In such a scenario, the virtual museum not only enhances the community's access to important cultural items, it also augments the actual museum's collections with digital items it does not keep on site. It is a new form of collection, the virtual collection.

For Catherine, the technology behind the virtual museum had a dual promise of not only making the museum's collections accessible to people who may not be able visit the museum, but also of helping to record and preserve the collection for future generations. The value of virtual museum was something she hoped would be generally recognized by other museums as well:

> I would like to encourage other museums to take on projects like this because artifacts get old, age and deteriorate—especially Indian things, because of the material—that if you can, the digital version, provided we have electricity, can be kept forever, or close to [forever], and be more accessible. I think the accessibility is really a huge part of it. That a lot more people, rather than traveling here, for instance, and coming into the museum and spending a little time here, most people can get access to a computer, and it will be even more so in the future. I think that the accessibility and the connection to, the accessibility for other people to learn more about Native people, in this instance Great Bear Native people and the community. Everything is so personal, all the items, like I said, and for Natives to have that connection and pride, for other people to have that accessibility and to [greater] understanding. And I think that's what the QTVR is going to do.

Catherine acknowledges the natural tendency for many Native American artifacts to deteriorate, which the museum professionals in the Pacific virtual

museum cited as a reason to restrict access in order to prolong preservation. Catherine sees in the QTVR technology a way of not only preserving a record of those delicate items, but of increasing the access to them as well. Hence, virtual museum projects are consistent with the mission of museums. This is one of the primary rationales for museums entering into virtual museum partnerships with schools.

A Comparison of Themes in the First Two Case Studies

As in the analysis of the Pacific virtual museum project, I have arranged the findings that have emerged from the data into coherent themes. Because each case is unique and different participants have unique perceptions of each project, there is a natural tendency for the cases to have their own unique set of themes. However, there is a thread of consistency in the vision of virtual museum projects across these cases, so there is a great deal of overlap in the themes. There are many themes in the Great Bear School and Northern Lakes Indian School case analysis that are similar to and reinforce the prior Pacific Tribal School case. There are also some themes in the current case that do not have any strong resemblance to the findings in the prior case. By examining the common and unique themes as I explore these and the following cases, a broader picture of the nature of these kinds of virtual museum projects should emerge.

Common Themes

The Virtual Museum Makes Collections More Accessible

Rose and Catherine remarked on ways in which the virtual museum technology made important cultural items more accessible to Native and non-

Native people. This access to material of their culture was especially important to Native people because it helped them to deepen their understanding of who they are, which strengthens the Pacific theme of "Understanding Who You Are." The virtual museum makes digital collections accessible, while preserving the delicate items from repeated physical handling that might damage them. Also, the digital collections may include privately owned objects not actually held by the museum.

There were similar aspects in some of the themes in the Pacific Tribal School case. The theme of "Bringing Objects out from 'Behind the Glass'" echoed Catherine's remark about the ability of QTVR to make museum items more accessible, in some ways superior to the accessibility possible through the museum exhibit. Rose's remark echoes in the Pacific Tribal School theme of "Repatriation and the Museum's Role in Cultural Preservation" by describing how objects that are successfully returned to the tribes might be shared with the public digitally. This differs from the Pacific theme of "Repatriation" because it refers to digitally repatriating objects in the opposite direction, from the tribe *to* the non-Native public that had access to them in public museums before actual repatriation. Rose's remark continues with a scenario of community sharing that reflects the Pacific case theme of "Virtual Museum Collections within the Community." Joan's phrase "sharing without sharing"—referring to sharing cultural artifacts digitally in a virtual museum being preferable to sharing artifacts physically in a museum—would perfectly describe the situation Rose proposed.

Improving Relations with Non-Native Communities

In both the Pacific and Great Bear/Northern Lakes cases several participants described ways that the virtual museum could improve the relationship between Native and non-Native communities. Mentioned most often was the ability of the online virtual museum to provide accurate information about Native Americans that would dispel stereotypes and misconceptions. This was described by Catherine, who saw the virtual museum as a way of "defictionalizing" Native people, and by Fred, who thought it was a way for the "community to say who they are." Rose thought it was good "PR" for the Native American community, that could break down the walls between Native and non-Native communities. As school technology coordinators who received frequent email requests for information on Anishinabe culture, Jack and Joanne both thought the virtual museum would be a good resource to which they could refer people.

In the Pacific case, Joan mentioned that their virtual museum project was a way of "turning the tables" in the context of inter-community service, which was too often conceived as the non-Native community helping the Native community. Charles, the Laurence Museum director, believed that the virtual museum would help clear up the misconceptions people had about specific Native American tribes. He also proposed a multiple-community virtual museum project as a good forum for addressing sensitive inter-community issues.

Expanding the Tribal Museum Role

In both the Great Bear/Northern Lakes and Pacific cases, the virtual museum project provided a forum for planning a tribal museum. Joanne and Fred were using the virtual museum projects to leverage a case for a tribal museum in the Northern Lakes community. They conceived of the tribal museum as primarily being a school project that could take over most of Joanne's virtual museum efforts and provide a place where students could work with community members to build digital collections (including items from private collections), research, and oral history projects.

The Great Bear Tribal School participants also wanted to expand on the relationship between the tribal museum and the school. Catherine was impressed by the advanced work the students were capable of doing. Jack was planning to equip the new school's digital darkroom for virtual museum capabilities, and Rose described an ongoing relationship with the tribal museum in which students documented the collections as they arrived for the museum's collection.

The desire for a closer working tribal museum/tribal school relationship described above by participants from both the Northern Lakes and Great Bear communities reinforces the Pacific Tribal School theme, "The Virtual Museum as an Ongoing Project."

Like the Northern Lakes community, the Pacific community did not have a tribal museum. Frances, who was on the tribal museum board, thought that the virtual museum activities provided a "jumpstart" on the tribal museum, which was in the planning stages.

Again, the theme of "Virtual Museum Collections within the Community" may be cited as a reinforcing theme. Though they did not make not specific connection to a tribal museum, Joan, Anna, and Charles in the Pacific case all mentioned the potential of community-based virtual museum projects, echoing the types of tribal museum activities described by Joanne and Fred in the Great Bear/Northern Lakes case.

The Need to Bring the Teachers On Board

For the most part, teachers were left out of the virtual museum activities in both the Pacific and Great Bear/Northern Lakes projects. In the Great Bear/Northern Lakes project, Joanne thought that the teachers could have done a better job in preparing students for the activities. She also wanted to have more participation from teachers during the project activities, to help students with the academic activities. Jack thought that teachers should be versed in the virtual museum technology as well, and wanted to include teacher training in future projects.

Teacher participation was considered very important to a successful project in both cases, especially in terms of their pedagogical knowledge, needed to guide students successfully though the research and writing components. Joan did not expect teachers to be "technicians" on the project because their focus was on "reading, writing, and arithmetic." Joan and Anna thought the virtual museum activities went smoothly, but the successful completion of the virtual museum Web site was sidetracked in the Pacific case by the requirements of end-of-

semester activities. Also, without the participation of classroom teachers in the project, the students did not write the virtual museum exhibit labels.

Students Can Be Technology Mentors

In the Great Bear/Northern Lakes case, Jack complained about teachers' reluctance about using technology in their classroom and wanted students to take on the role of "teachers of the teachers" for those skills.

In the Pacific virtual museum case, there was some discussion about how the technical skills needed for a virtual museum project could be promoted at the school so the project could be an ongoing activity. Joan and Anna recognized that the students could be an important reservoir of these technical skills that the teachers could draw on in the future whenever they are needed for virtual museums and other learning projects.

Other Commonalities with the Pacific Tribal School Case Study

I like to call the themes discussed in these case studies "emergent" because they do not come out of the interviews, observations, and other qualitative data as clearly defined or specified pieces. Often, eloquent remarks from one person would lead me to seek out similar remarks from others that might otherwise escape notice. In referring back to the themes in the Pacific case, I found some ideas with clear relevance to ideas arising from the Great Bear/Northern Lakes case, but that did not come to the fore in my initial notes on that case. For instance, the "Ownership" idea became an important theme in the Pacific case, due to some eloquent remarks made by Frances. Although this word is not used in the same forceful way in the Great Bear/Northern Lakes case, it is

mentioned by Joanne as something that might be inspired in students if they had more choice in their virtual museum selections. In this manner, the Great Bear/Northern Lakes case relates to the ownership theme identified in the Pacific case, but it was insufficient to warrant a separate thematic discussion.

The theme of "Pride" emerged in the Pacific Tribal School case from Joan's question of "Where is the pride in this school?" The theme of pride played out in various ways—pride in the virtual museum itself, pride in regard to the Native America culture, and pride in a student's personal accomplishment in the virtual museum activities. Some statements by Great Bear and Northern Lakes participants thus reinforce the pride theme. Catherine mentioned the "familial pride" she hoped the tribal museum would inspire and specifically connects that to the pride that she believed would be apparent in the virtual museum project. Rose also stated that the virtual museum would benefit the community by displaying the pride it had in its heritage.

Connected closely with pride is the theme of "Understanding Who You Are" or developing a distinct sense of identity. Tribal members Ruby and Frances in the Pacific case saw that the virtual museum project could help students develop their sense of identity though an examination of their culture. For Catherine, the tribal museum—and by extension the virtual museum—was very "personal" for Great Bear community members. Fred also saw the virtual museum as a way for Native people to "say who they are."

Some findings under the Pacific Tribal School theme of "The Nature of the School-Museum Partnership" related to the Great Bear/Northern Lakes case as

well. There was a mutual benefit perceived for both school and museum in the partnership. The project extended the existing connection between Great Bear Tribal School and the tribal museum. Catherine saw the project as one that accelerated the development of the museum, and Jack and Rose looked forward to continuing the relationship for the benefit of the students. Joanne and Fred spoke of founding a tribal museum at Northern Lakes that would actually be a school project.

UNIQUE OR DIVERGENT THEMES

Several themes emerged from the Great Bear/Northern Lakes case that did not occur in the Pacific Tribal School case. Just because these themes were not recognized in the Pacific case does not mean they did not occur to some extent. These ideas or experiences may have occurred, but not to an extent that warranted comment from the participants. Other themes may be truly divergent in the Great Bear/Northern Lakes case because the project took a different direction than the Pacific case.

Problems in Project Management

Several participants in the project, particularly Joanne and Catherine, mentioned that there were times of student misbehavior and how it would be preferable to have more adult supervision and/or fewer students in the project activities. This was not the case at all for the Pacific project, which had an equal number of students and adults involved. In fact, Joan and Anna thought the project was easy to do. I suggested that some of the reasons for the difficulty in the Great Bear/Northern Lakes project might be due to the large, spread-out space

allotted to the project stations, the acoustics of the hall, and the bottlenecks in the flow of the virtual museum production that let to off-task behavior among the students.

Another reason for the management problems might stem from the short time available for project preparation. Joanne mentioned that the students were not as well prepared as they should have been. Also, the participation of tribal elders in the project also did not occur as planned.

The nature of the project space and the presence of tribal members along with museum staff are elements that can combine to provide an atmosphere conducive to project activity. I had noticed in the Pacific project that the students tended to speak very quietly in the close space of the project activity, and that they were attentive to the conversations that took place between the adults, as tribal members exchanged project-relevant stories with the museum staff.

Also, there was a contrasting evaluation in the Pacific case as to the effort required to do the project. Anna and Joan agreed that the project "was easy to do."

Restructuring the Virtual Museum Project

Problems in the management and student choices naturally led to discussion about how the project could be restructured to improve the process. Aside from the need for more adult supervision, Joanne thought that the academic portion of the project—research and writing—should take place before the technical part because she recognized the students resisted the chore of writing and were motivated to use the technology. She hit on the idea of "using the

camera and stuff as the carrot." She also wanted teachers present to guide the students in the academic component of the project.

Jack also noted that students resisted doing the writing. He was interested, too, in getting teachers more involved, and thought that it would be better to have a two-week project that included a preliminary week of teacher training.

In contrast, there were a few remarks about how the Pacific Tribal School project could be improved. Only a few minor suggestions were made for improving the project. In fact, Joan mentioned that she would "pretty much replicate the same thing we did this time" for future virtual museum projects

The Need for More Choice for Student Virtual Museum Selections

It was mainly Joanne who complained about the lack of sufficient numbers of museum items for the students to choose from. This was apparent from my own observations, and the problem was discussed among several of the participants during the project. The items that were available were not always readily accessible, being closed up in their museum cases. Joanne compared the situation to the other virtual museum projects in which she had participated, where there were ample numbers of objects to choose from and arrangements were made ahead of time to make them readily accessible for virtual museum activities. She thought that a wide range of choices was important because it gave the students more of a feeling of ownership in the virtual museum project.

The issue of student choice did not arise in the Pacific case, probably because there were sufficient numbers of items to allow choices for the students each day, and they were readily accessible for imaging and research.

The Need for Community Member Participation

The Great Bear/Northern Lakes project was planned to include tribal elders as cultural advisors, but that did not occur as hoped due to the lack of preparation time. Aside from Fred, who took on a role of technical assistant as well, the community participation that did occur was primarily incidental. In the Pacific project, there were several comments about how the presence of community members, parents and elders, contributed to the respectful orientation the students took to the project.

The Pacific theme of "Native Community Member Participation" differed somewhat in the Great Bear/Northern Lakes project experience. During the Great Bear/Northern Lakes project, the lack of sufficient community involvement precluded confirmation of the Pacific case findings. However, in the second case, the incidental participation that did occur indicated that there was definite benefit to community member participation in virtual museum projects in Native American schools.

Differences in the Conduct of the Projects

Some of the differences in the themes across these first two cases appear to reside in differences in the way the two projects were conducted. Because much more time was spent in arranging the Pacific virtual museum project, my discussions with the school began over three months before the project and

contact with the museums began over six weeks before the project. In the Great Bear/Northern Lakes project, the planning between the schools began less than a month before the project began, and the permission to proceed was given only a week and a half before the project began. Also, the time for the virtual museum activities was only one week for the Great Bear/Northern Lakes project, whereas it was two weeks for the Pacific project. This shorter time for preparation and activities had a negative affect on the project.

Technically, the Great Bear/Northern Lakes project was much more ambitious than the Pacific project. The setup of a computer network with separate stations for different aspects of the project took over a day to set up. Setting up the imaging area in the Pacific project took only about an hour. The full-motion QTVR object rig used for many of the objects in the Great Bear/Northern Lakes project took over twice as long to set up and shoot a QTVR object, which led to occasional delays in the flow of the activities.

THEMES NOT SPECIFICALLY ADDRESSED IN THIS CASE

There were several themes in the Pacific Tribal School case that were addressed strongly in the Great Bear/Northern Lakes case. Other themes that emerged in a minor way, such as the "Ownership" theme, did not warrant thematic treatment.

Joanne did not think that the teachers at Northern Lakes Indian School prepared the students well enough for their participation in the project, which may be compared to the Pacific Tribal School experience under the theme of "Preparing Students for the Project Mentally and Spiritually." In the Pacific

School case, Joan and Frances promoted the project to the students, and this had a positive result in the way students comported themselves during virtual museum activities. They also felt that it would have been beneficial to involve a tribal elder who would offer a prayer at the beginning of the project to prepare the students spiritually for their participation.

The "Proper Use of Fragile Museum Collections" theme in the Pacific Tribal School case was not mentioned in the Great Bear/Northern Lakes case at all. This theme related to concerns about handling delicate Native American artifacts, and how that was balanced by considerations of the benefits of a virtual museum project. The relationship between the public museum and the tribal community swayed the museum in a direction that favored the virtual museum project.

By comparing the emerging themes across these first two cases, a broader picture of the nature of virtual museum projects began to develop. This cross-case analysis will continue in the following two case studies.

Chapter 6: Case Three

Bountiful River Tribal School

DISTINGUISHING FEATURES

The third case study involves Bountiful River Tribal School, a Wabanaki reservation school in the northeast United States; the Wabanaki Tribal Museum, which is a few blocks from the school; and the Seaside Museum, a public museum dedicated to the Native American cultures of the region, which is a ninety-minute drive from the school. The project shared some features with the first two. Like the Pacific Tribal School project, Bountiful River Tribal School partnered with a public museum for their project, but like the Great Bear Tribal School, Bountiful River also partnered with the reservation's tribal museum. The tribal museum curator brought a selection of items for imaging to the school, so that the first part of the project imaging activities took place at the school. This was the only time that virtual museum imaging activities took place *in* a school facility in these four case studies.

Another distinguishing feature of the project was the time allotted for project activities. I had traveled to the northeast to split a three-week visit with Bountiful River Tribal School and White Pine Tribal School, which was my fourth case study. I spent a full week working on the project at Bountiful River Tribal School, and then returned a week and a half later to finish up my work on the project and collect my interview data. Nearly all the virtual museum activity

was done in the first week, similar to the timetable of the Great Bear Tribal School project.

Unlike the Pacific Tribal School and Great Bear Tribal School projects, the Bountiful River Tribal School project included the participation of the students' classroom teachers. In the first two cases, the lack of classroom teacher involvement was cited as an area of possible improvement in subsequent virtual museum projects. However, in the Bountiful River case, the teachers were given very little time to prepare for the project and lacked the information and input they needed to participate effectively, leading to unique problems for this case, as will be depicted in the description an analysis of the project which follows.

KEY PARTICIPANTS: BOUNTIFUL RIVER TRIBAL SCHOOL

Marsha, Bountiful River Tribal School's principal, was my main contact for setting up the virtual museum project. The year before this project she had been the school's technology coordinator as well as the school's facilitator to the Four Directions project. She had taken a strong role in both the technology planning for her school and in the school's participation in the Four Directions project. The summer before this virtual museum project, under her leadership, Bountiful River Tribal School had hosted the first Four Directions Regional Summer Institute. Prior to that summer, the university partners in the project had organized the summer institutes. Beginning with the Bountiful River hosting of the first regional institute, subsequent regional institutes were organized by participating schools to promote the role of technology leadership that the Four Directions schools had accomplished at the end the project's five-year life.

Unfortunately for this project, Marsha's new role as school principal made it impossible for her to participate actively in the virtual museum project, other than to delegate the responsibility for its implementation to other Bountiful River staff. As Mat, the special education teacher who assisted us in the project said, "The reality is [that] she is a very busy woman. . . . and her responsibilities are immense."

Vince, a non-Native married to a tribal community member, was a Bountiful River Tribal School parent recently retired from the military, where he served as a reporter. Through his Army training, Vince had become technically adept at computer networking, audio recording, and digital photography. I first met Vince at the Bountiful River Regional Summer Institute, where he taught workshops in audio recording and digital audio. He had been recently employed half time by the school as a technical assistant. As he described it, "I am essentially the technology coordinator assistant, computer technician, helper, [and] assistant in the lab." However, at the time of the virtual museum project, Bountiful River Tribal School had no full-time technology coordinator. Because of his technology responsibilities, I ended up working more closely with Vince than the other participants in conducting the virtual museum project.

Roger was the fifth grade teacher at Bountiful River Tribal School. He had been on the Bountiful River team in the Four Directions project from its beginning, attending the project summer institutes. His entire fifth grade class of eight students participated in the virtual museum project. Two semesters earlier,

his class had participated in a "community based" virtual museum project with my assistance.

Laurie was the sixth grade teacher at the school. She also worked with seventh graders in social studies. It was in this capacity that she worked with the seventh grade class on the virtual museum project. Like Roger, Laurie had been on the school's Four Directions team and had attended most of the Four Directions summer institutes.

Mat was a special education teacher at Bountiful River Tribal School. In that capacity, his main assignment was conducting the school's Reading Recovery program, "a very intensive early intervention reading program for first graders." He also participates in Title I programs in Language Arts and mathematics. Mat was also a member of the school's Four Directions team. Because he has a "keen interest in the Internet and technology in general," he has volunteered his expertise in helping students and his fellow teachers use technology at the school. He explained that, because the school currently had no full-time technology coordinator, he, like Vince, had become the "default person" that people approached when they had questions about technology. Mat had some experience using FrontPage, a program for developing Web sites, and had become the primary person that maintained the schools Web site, so he was brought in to create the virtual museum Web site from the materials created during the project. Mat, Laurie, and Roger are non-Native.

The student participants included the eight students in Roger's fifth grade class and five students from Laurie's seventh grade social studies class.

KEY PARTICIPANTS: COMMUNITY MEMBERS AND MUSEUM STAFF

Two of the participants had somewhat dual roles in representing the Bountiful River community and the participating museums. Ernest described himself as the "the director, curator, janitor, and everything down there at the museum." Ernest was also on the school board and is a Bountiful River Tribal School parent. Several project participants noted that Ernest was well known and respected in the community.

Annie was a Wabanaki tribal member who served on the board of trustees of the Seaside Museum. She was the wife of Vince and a Bountiful River Tribal School parent. Annie was also an archaeologist, hoping to have the tribe hire her as a tribal archaeologist to negotiate with the state and museums with regard to issues of Wabanaki culture and history. Shirley, a non-Native, was a curator at the Seaside Museum. Shirley and Annie worked together with the students during the Seaside Museum project activities.

Table 4: Bountiful River Project Participants

Participant Name	Position or Title	School Staff	Community Member	Museum Staff
Marsha	Principal	•		
Vince	Part-time Technology Assistant	•		
Mat	Special Education Teacher	•		
Roger	5th Grade Teacher	•		
Laurie	7th Grade Social Studies Teacher	•		
Ernest	Wabanaki Tribal Museum Director		•	•
Shirley	Seaside Museum Curator			•
Annie	Seaside Museum Board Member		•	
Paula	Seaside Museum Staff		•	

A SHORT NARRATIVE OF THE CASE

ORIGINS OF THE PROJECT

Like the Northern Lakes Indian School in the previous case, Bountiful River Tribal School had some prior experience with virtual museum projects before the project in this case study. A year earlier, I had traveled to Bountiful River Tribal School with another University of Texas Four Directions partner to conduct a community-based virtual museum project in the school. Roger's fifth grade class participated in the imaging and write-up of the virtual museum items, which were contemporary items made by local Native artisans. Roger enjoyed the earlier project and the way it involved his students in the promotion of the tribe and its culture, and he hoped the current project would expand on that:

> I enjoyed doing the one we did last year because it was kind of community-based. It was, hopefully, to bring out some of the pride in the work that some of these people do and the tradition that [they] kept going. As I thought about this particular one with the museum, I thought it was kind of neat in that it was part of a bigger project, and [it] would certainly, if people who were looking for this kind of information, I thought it would be. Because a lot of time Wabanakis are, you know, it's not a big tribe. The tribe may not be very big as some of the ones out west, and a lot of times that's what people think of when they think of Indians. It's always Western Indians. So I thought it was good that they were going to be a part of this, I like that idea.

The year before the current study was to be the last year of the Four Directions project, and I was actively challenging the Four Directions schools to pursue virtual museum projects with regional museums, with my technical support. One of the suggestions I made to the schools was the possibility of two or more schools collaborating on a regional virtual museum that would reflect the Native cultures of the partner schools. I suggested this to Bountiful River Tribal School and White Pine Tribal School, two Wabanaki schools in the northeast. The year earlier, both Marsha, who was then the technology coordinator at Bountiful River Tribal School, and Theresa, the technology coordinator at White Pine Tribal School, had expressed interest in collaborating, and we discussed the museums in the region that might be brought into the partnership. However, we were unable to organize a project during that year. When it came time for me to invite schools to participate in my case study it also represented an opportunity to fulfill the prior virtual museum plans that had been made earlier with Bountiful River Tribal School and White Pine Tribal School.

I began calling and emailing both Marsha and Theresa in December about planning a collaborative virtual museum project and encouraged them to work

with each other. Marsha, however, had stepped into the position of principal at Bountiful River Tribal School, and the school had not hired a new technology coordinator to replace her. The new position of principal did not allow Marsha the time to work closely with Theresa on a collaborative project at this time. It was not until the Four Directions partner meeting in early March that I was able to sit with Marsha and Theresa to discuss specific planning for virtual museum projects. By then it seemed to be more feasible for the two schools to do their projects separately. Both schools had identified a number of museums that would work well for their purposes, but they had not yet begun negotiations with these museums for a project partnership. We were able to set up some dates in May for me to come and participate in virtual museum projects at both the schools and conduct my case studies.

In March and April, I continued my contacts with Marsha to keep informed about her progress and assist her with the project planning. She told me that the Bountiful River Tribal School would partner with the tribal museum and the Seaside Museum because the school already had a close relationship with the museums through Ernest and Annie. In mid-April she asked me to contact Paula, a publicist at the Seaside Museum, to answer questions about what was required from the museum in a virtual museum project. Marsha, Theresa, and I settled on three weeks in May for the timeframe in which to conduct the two schools' virtual museum projects. We negotiated the times I would work with each of them, deciding that in my three-week stay in the region I would work my first week with Bountiful River Tribal School, then work a week and a half with White Pine

Tribal School, and then return to Bountiful River Tribal School for the last few days to help them with the development of their virtual museum and conduct my study interviews.

SETTING UP FOR THE PROJECT ACTIVITIES

I arrived at the Bountiful River Tribal School during the first week of May. Monday was originally planned to be a training day, but we were unable to make arrangements for the school staff to attend a training session. I met with Vince, who worked with me into the afternoon preparing the school's home economics room for the virtual museum activities that would take place the next day. We set up the imaging area with the turntable, backdrop, and photoflood lights. Vince brought in a computer on a cart so students could transfer the images of their objects from the digital camera and build the QTVR media as they were photographed. After installing the software, I stepped Vince through the steps in shooting and creating a QTVR object so that he would be prepared to assist the students in the process.

In order to be able to plan for setting up an imaging area at the Seaside Museum, I had arranged a visit to the museum that afternoon. In the early afternoon I drove to Sunrise, the coastal town where the museum offices were located, to meet with Paula, with whom I had talked earlier about the kind of space and setup we would need to conduct the virtual museum project. The museum was in the process of constructing a new facility downtown, which was scheduled to open the next fall. Paula thus drove me to the old museum building—a small building nestled in the woods in a national park, just outside of

town. The museum, still closed for the winter season, was a complex of small, connected structures. The main room of the museum was a tall octagonal structure, about 35 feet in diameter, with a high ceiling and tall windows. Display cases were set up around about half of the perimeter, and one long, tall case dominated the center of the room. Behind the main room were a tiny museum shop and a larger library/storage area. Most of the museum collections were stored in the basement.

Looking over the rather tight confines of the museum, Paula and I decided that an imaging area could be set up against a display case at the back of the main hall, next to the door to the museum shop, and some worktables could be set up against the windows at the opposite end. Paula and I discussed the time that the museum project would begin, and she agreed to let me into the museum an hour early to set up. Toward the end of my visit, Shirley, the curator, came by and Paula introduced me to her. She showed me a database program on a laptop computer that she could use with the students to help them make their selections for the project.

WABANAKI TRIBAL MUSEUM ACTIVITIES AT THE SCHOOL

When I arrived at the school on Tuesday morning for the tribal museum activities, Ernest, the Wabanaki Tribal Museum curator, had already brought over five objects for imaging that morning. He also told me that there was a tribal headdress that he would bring over later in the day that was too delicate and valuable to be handled by students and teachers. He also said that he would not be able to participate in the museum activities until later in the day.

Four of Roger's students and Vince came to the home economics room at 9 a.m. Roger had already divided them into two-member teams to select their objects for research and imaging. The students began to fill in their research forms, which I had adapted for their project from the one developed for the Northern Lakes Indian School project. One of the research questions related to the size of the objects, so Roger retrieved some tape measures from his classroom for the students to use. Roger had to split his time between his classroom and our project area throughout the morning.

In two 45-minute class periods, the first of the two groups of fifth graders were in the room. Vince and I stepped the student teams through the process of collecting information on their chosen objects, setting up and shooting the images, and creating their QTVR media of the objects. The students collaborated closely while imaging the objects, with one student operating the camera while the second student rotated the turntable. The students switched roles when half the images were shot.

As in the Pacific case, the students spoke quietly to each other and the adults spoke at a louder volume, as much of the adult talk had instructive content for the students. This adult instructional talk continued through all the sessions and covered topics relating to mathematics, cameras, computers, QTVR, writing, history, and culture. Vince, Roger, and Mat (who came in toward the end of the two periods), also picked up what they could about the QTVR process, so the session provided a training opportunity for them as well. When one team was imaging, Vince and I would keep the other team involved by showing them the

Virtual Tour of the National Museum of the American Indian (NMAI) done by Four Directions students, so they could get a feel for the finished product and thus understand what was expected of them. Between researching, imaging, and working on the computer, the students remained on-task for the two periods. Each of the two teams imaged one object.

In the late morning, we conducted another ninety-minute session with Roger's remaining fifth graders. The session went much like the earlier one, with a combination of training, research, virtual museum imaging, and creating the QTVR object movies. One student team selected a rattle to image, and we decided to record the sound of the rattle in addition to imaging it. These two teams shot two more of the objects from the tribal museum.

In the afternoon, Laurie's seventh grade social studies students imaged their objects. Ernest, the tribal museum curator, arrived while the first two-student team was in the midst of imaging their chosen object, a pestle. Ernest immediately began to talk about the objects he had brought us, beginning with the pestle the students had just imaged. Being a respected tribal member with a deep knowledge of the museum collections and a love of the culture the collection represents, everyone in the room attended to Ernest's detailed descriptions of the objects. For instance, Ernest explained that he found the pestle at a site that was being excavated for building construction. He said it came from a layer that must have been from the original village. The pestle was shaped like a football. He demonstrated how the two small ends of the stone were held, like a rolling pin, and how one side was flat, for initially crushing corn, and the other end was

rounded, to roll over the crushed corn to produce a fine flour. While manipulating the pestle, he mentioned how comfortable the tool was to use, describing it as being "ergonomically correct."

While Vince and I helped the students with their imaging and creation of QTVR objects, Ernest continued to describe the objects he had brought. The second seventh grade student team came into the room while he was describing these items, and it is apparent from the research videotape that everyone was listening attentively to him. Students and adults both asked him questions during his talk.

The last team of three students photographed a headdress that Ernest brought over. He described the differences in headdress features among the different tribes and how Hollywood influenced contemporary headdress making to follow the Plains Indians design. He described the cultural and historical significance of the 120-year-old headdress he had brought over.

Vince and I recognized the importance of the information that Ernest had to offer, so we asked Ernest if he would repeat the stories he had been telling us on an audiotape so that the students could listen to his description when they continued their research on their objects. Judging from the student essays and remarks the students made in their interviews, this strategy worked well.

After school was out, Vince and I showed Ernest the work that the students had done, as well as the NMAI virtual tour. He was impressed by the QTVR object movies. We gave him some hands-on practice imaging and creating a QTVR object with one of the objects that the students had not done.

Ernest believed that the technology had great potential to promote the tribal museum, and he asked me about the equipment and software he would need to do it. He mentioned that he already had a digital still camera and a video camera, and he was interested in trying out the technologies for the tribal museum web site.

TRAINING DAY AT SCHOOL

The next day, Vince and I set up the school's computer lab so that the students could continue working on the virtual museum project. We installed the QTVR software on several computers, and Vince set up a tape player so that several students at a time could listen to Ernest's tape. In the morning, the fifth graders worked with Roger to do their "paragraphs," while Vince and I helped students add hot spot details to their QTVR movies. In the afternoon, the seventh graders came into the lab do similar work. Mat came into the lab when he had time to help the students and to ask me some questions about putting the media on the Web.

Vince, Mat, Roger, and I talked a little about the plan for the field trip to the Seaside Museum the next day. All thirteen students from the fifth and eighth grade would be attending. We were concerned about the logistics of the trip because the weather prediction for the following day suggested a chance for rain. The museum was small, and it would be very crowded with all the students and adults in the building at once. I proposed that we have no more than four students, in two teams, inside the museum at once. One team would be doing the imaging of their object, while the other team selected and researched their object.

We hoped the weather would turn out to be good because the small museum was located in the middle of a park with no other buildings nearby.

SEASIDE MUSEUM ACTIVITY

As it turned out, we had beautiful weather for the activities at the Seaside Museum. I met Shirley, the curator, at the museum an hour before the students were scheduled to show up so we could set up for the project. Shirley had a laptop computer that had a picture database of the museum collection, as well as printed lists of objects relating to the Bountiful River community. Soon after setting up the imaging area, the Bountiful River team showed up, and immediately the thirteen students and three teachers and Vince flooded into the small museum. I gathered the adults together and went over the plan we had discussed earlier and suggested that we have each student team image one object and then begin to cycle through the teams for imaging a second object, as time permitted.

Despite the relatively large number of students for a day of museum activities, it appeared to me to go fairly smoothly. After the first team made their object choice and the imaging process began, the students inside the museum remained on task. As one two-student team collaborated on the imaging, the second student team worked with Annie and Shirley to select and research their objects. In the back room of the museum was a small library of books relating to northeast American Indian cultures, and Shirley had selected a few of these for students to consult for their research. Vince encouraged the students to use the school's portable tape recorder to record the information that Shirley and Annie

could provide to them about each object. The students also had copies of the research form to help guide them during their research.

Inside the museum the workflow was fairly even. By the time one team was finished doing their imaging of their chosen object, the second team had made their object selection, had completed their research, and were ready to do their imaging. Annie and Laurie were able to guide the students through the selection process. They first asked the students what types of objects they wanted to select from, and then they showed the students several items from the museum collections database from that category or brought out several additional items the students could examine up close. For instance, one team of girls wanted to do some quill boxes. Shirley brought out several, commenting on their fragility and age. The girls selected one, stating that one of the reasons for their selection was because it came from their tribe.

Annie and Shirley handled most of the objects, but they allowed the students to handle some of the more durable objects, explaining the reason why they had to wear gloves to do so. As a curator, Shirley thought the project was "a little stressful" with thirteen "very high-energy kids" participating, but she thought that it was important that the students learn about museums, including, as part of that learning, how museum personnel handle precious objects:

> Well, it's a little tough when kids want to [touch things], and of course, the first reaction is they want to touch everything. They want to handle the objects, and it's important that they don't do that, but it's also important that they understand why because of the notion that we're in this for the long haul. When an object comes into the museum it's here forever, and it's our responsibility to take care of it. So that when kids understand that, as they learn that when you handle these objects, only someone who's got training does so, that person wears gloves, and everything is carefully

> supervised. That's an important piece of the educational part for them, I think.

Shirley also noted that the layout of the museum was awkward for the virtual museum activities. She said,

> It's a little tough because of the logistics here. I mean, the museum base is small, and the collections are fairly inaccessible because of the way we have to store things. It's a little tougher here. When we get our new, wonderful, bigger museum, where we'll have open storage ability, where we'll have everything databased, it will be much simpler, I think, for us to offer this kind of experience. Definitely.

One difference between the Seaside Museum activity and the Wabanaki Tribal Museum activity was that the students had a huge number of items to choose from at the Seaside Museum. From Annie's perspective, the element of student choice was an important aspect of the virtual museum activities:

> I think that made all the difference in the world. If you gave them an object and said, "This is your object, you're going to do this," I don't think they would have been as enthusiastic about it. I really think, to have the opportunity to look through the database, see pictures of stuff, you know, have Shirley bring stuff up for them to look at, I think that made all the difference in the world. It would have been nice to just be able to have everything there and open for them to look at and think about, but the museum wasn't set up to do that. I think it worked out well, how it went.

The students went about their activities inside the museum in a focused and competent manner. Because of their earlier experience with the Wabanaki Tribal Museum objects, they were able to do the imaging task with little assistance from me. Several of the objects did not lend themselves well to QTVR object imaging, so they were shot "flat." By the end of the visit the student teams were able to image over two objects each, so that they recorded a total of sixteen objects.

With only two of the six teams in the museum at one time, the remaining eight to nine students remained outside, supervised by the four adults—three teachers who came along and Vince. The few times I went outside during the activities, I saw that the teachers were sitting with some students helping them with their essays about their objects. Mat later described the Seaside Museum activities in our interview:

> When we went to the Seaside Museum, it was done in shifts, so some students were working on filming the objects while others were doing research. When some kids were done doing their research, they went outside and they weren't doing either. And that's the point where I took couple students and we wrote up their, we did their writing portion. It was nice because I could sit there and we could ask questions, and I could edit it, we could read it again and see if it sounded right, so they could edit their grammar or whatever. And that was kind of a nice thing to do. Plus, it was a beautiful day, which makes it that much more comfortable doing it. It wasn't threatening, it wasn't work, per se, it was kind of cool. So that was a good thing. My observation for when I went into the Seaside, sometimes there were kids in the library looking through books, trying to get the information about the objects that they were filming, and I thought that was really pretty neat. I'm sure the Seaside staff was helpful in that respect.

Laurie, who remained outside with the students most of the day, had a very different perspective on the Seaside Museum activities. She said,

> I think we brought too many kids to the museum. Because of too many kids there was too much down time. I think they wanted to do more filming and stuff, but there just wasn't enough to do for all the kids.

Though she helped the students with their write-ups, Laurie felt left out of the educational activities, saying, "Seems like at the Seaside Museum I baby-sat the kids." Roger's observations corroborated Laurie's perspective to some extent. When the students were not engaged in selecting, researching, and imaging their objects inside the museum, there was a tendency for them to get off-task. The

students also had a tendency to avoid the writing assignment, as well. As Roger described it:

> We're talking about a group of students that you really need to keep their attention focused on the task at hand. They are very quick to be distracted, to distract each other. But, breaking them up into teams and trying to find things for them when they weren't directly involved, I think that was a necessary part of it. I think when they were engaged, I thought they did a pretty good job. You know, taking the pictures, and then getting them to write about it. That was a little bit more difficult, but just to keep them on task was, it was a hard job. But I think for the most part they stuck with it pretty good.

FINISHING UP

The next day, a Friday, we again had some time to spend in the computer lab to help the students create their QTVR media and to write up their "paragraphs" for the virtual museum. Mat spent some time working on the virtual museum Web pages, working up a "down and dirty" version to show the teachers and me. Later, at a virtual museum celebration that evening, Marsha, the principal, asked him about his progress on the virtual museum, and he was able to say it was already going up on the Web, albeit as a draft version.

I returned to Bountiful River Tribal School a week and a half later to conduct my research interviews and assist in whatever way I could with completion of the virtual museum project. Mat asked me to write up a step-by-step instruction sheet on how we created the QTVR objects with detail hot spots, which I did. Mat was continuing his work on assembling the virtual museum materials into a Web site as he got them, and he showed me the results of his work. The following semester I was able to log onto the Bountiful River Tribal School Web site to enjoy more of the fruits of our labors.

CASE ANALYSIS

In many ways, the Bountiful River Tribal School virtual museum was a success. Students—and some adults—learned how to photograph objects on a turntable and use software to build QTVR object media from the digital pictures. The students researched and wrote their essays on the museum items that they selected. Mat built and posted a virtual museum of student-created materials on the school's Web site.

However, there were still expressions of frustration and disappointment about the project that surfaced in the interviews, especially from the teacher participants. Another hint that there were some problems with the project was in one of my interviews with the students when I asked, "Did you think you were working harder on this than other types of projects?" One student replied, "No. If I knew this was for a grade, I would probably, but it's not a grade. I know. If it was a school grade, I would have put in a lot more." This exchange struck me as an indication that this student's teacher did not know how the virtual museum project might fit into his/her academic program, and that some educational opportunities might have been missed.

In the first two case studies, classroom teacher participation was essentially missing from the virtual museum activities, and a theme surrounding the issue emerged, noted in the earlier cases as "The Need to Bring the Teachers On Board." The involvement of teachers in this third case, then, provides a new aspect of conducting a virtual museum project. It is an aspect that presents its own issues that bear close attention. The failures and successes of this current

case can be used to help identify considerations that may be important for future projects.

THE NEED FOR BETTER COMMUNICATION AND ORGANIZATION

As I mentioned earlier in the narrative of this project, my main contact for organizing the project at Bountiful River Tribal School was Marsha, who had been the school technology coordinator the year before, but who had just taken on the role of principal. The year prior, when Marsha was technology coordinator, we had tried to put together a collaborative virtual museum project in collaboration with White Pine Tribal School, but could not pull together a viable plan in time. The year extension on the Four Directions project gave us one last opportunity to pursue a virtual museum project. Also, I had worked with Roger on a small virtual museum project with community artists the year before, so the prospect of having a successful virtual museum project appeared to be good. However, when the project actually materialized Marsha's principal duties did not allow her to be active in the new project, which led to some lapses in communication. It was a problem that I did not foresee, so the lack of communication and planning was at least partly my fault. Roger described how the project came up at school for him, which gave some indication of the communication lapses that led to planning problems:

> Yeah, and part of that problem might have been the problem here at school, because I remember hearing about it, I think it was way back in, before December I think, and then it was like one of those things that was talked about, but then nothing was said again until we got some of your [research protocol and permission] papers. You know, she put them in, Marsha put them in our mail box. But then again, it wasn't. You know you get busy with all kinds of other stuff, and before you know it, Mark's

> coming next week. So that part of it was probably my fault with not getting the kids better prepared, but again it might have been a good idea for all of us to sit down and—not you because you're in Texas—but here in our school, and decide what we we're going to do and come up with a little bit better organized plan as how things were going to work.

Mat, who was involved in putting up the Web pages for the project Roger's class had done the year before, was, like Roger, a little better informed about the nature of virtual museum projects. However, he also recognized the problems encountered due to lack of planning for the project and was able to express the issue to me more explicitly:

> Your role [was] in introducing the project. I think it would have been important, and this is a failing of, what I'm recognizing is a failing in the project. Communication is key. I guess I'm kind of a nut with communication and organization, and there were times when the task may not have been as clear, or the organization of the task may not have been clear, which led to some confusion as to what the teachers should be doing when. And organizing. I know it's very difficult to do that around a school schedule, and so on. . . . I guess my main thing is organization and putting it all together so it flows, and then sometimes the teachers weren't sure what needed to be done and when it needed to be done. I think that's communication more than anything else. That's what I see in that.

Mat also recognized that the lack of a full time technology coordinator, especially one of Marsha's caliber, was a feature of the earlier virtual museum projects I had been involved with, and that role was essential in the successful conduct of those projects. Vince, who was substituting for that role in the Bountiful River Tribal School project, was a part-time employee who had technical, but not educational credentials, so he was recognized as someone to call on for solving technical problems, but not someone with educational leadership experience. This essentially meant that one key person, the communication link at the school responsible for negotiating the project with the teachers and other

participants, was missing. Mat described the situation and how it affected the current project in this way:

> And when it comes to having your plate full is having that one more thing that makes it really hard. I think that having at least a person, I mean, you've gone to other schools where you meet closely with the coordinator and you map out how it's going to work, and you have a schedule and so on. While I guess it would be an easier process, it may not be, but at least you have one person you have all the time around, and Vince I'm sure has been an unbelievable amount of help to you, and even so, even Vince at times had other duties maybe that he was responsible for, whatever, so it's hard. So that's the one failing that I see.

Laurie expressed the most frustration with the project. She had not been involved in the earlier project as Roger and Mat had been. Her sense was that she had no role in the project except to provide student participants from her class and supervise them. As she explained it:

> My role was pretty minimal. But Marsha asked me to become involved in it. She basically said she just needed me to have a group of students to work with you when you arrived, and didn't give us a lot of prior information, and [I] didn't really know what I was getting myself and the students into.

Even after the project was completed, Laurie still had some questions about the project:

> It did seem just thrown together. . . I still don't know what my role was, and I think that it wasn't clearly defined at the beginning. I never realized what my role was. I had a difficult time with that. And the students [didn't] really know what their role, didn't realize what they were getting into, either. We had so little information to begin with. . . . Seems like at the Seaside Museum I baby-sat the kids.

As Roger had indicated, part of the communication problem resided at the school. The teachers could have taken the initiative, could have met to negotiate the requirements of the project together, and figured out how to take the most

academic advantage of the experience, but because they had not had prior experience, they did not realize this was an option. They were just told to cooperate with me, the researcher on the project, which left the educational planning primarily in my hands, while I was counting on the school to take more ownership in the project.

THE NEED FOR A SUBSTANTIAL TEACHER ROLE

Teachers expect to have control over the educational program in their classes, a complex task with great responsibilities. In order to have their fullest collaboration in such an innovative and time-consuming project like the virtual museum, it is necessary for the teachers to have a substantial role in the planning and implementation on the project. They are professionals used to having decision-making roles, not to being babysitters or simply following orders.

Teachers may also have some professional goals that could be addressed in the context of an ambitious project. For instance, Laurie complained that, "I didn't work too much with the technology. I was disappointed on that. I wanted to get more involved in that." Indeed, teacher training in the virtual museum technologies was something I was prepared to do, and there was enough time to provide the training if someone had thought of scheduling it. As it was, Laurie felt she was cast more in the role of a "soldier" following orders that were given to her without explanation of the rationale behind them. As a teacher, this was a role she had little desire to pursue. When I asked Laurie if she would have preferred to have had more input into the planning of the project, she said,

> Yeah, because as the classroom teacher, once you leave, I don't think there is anything I can do to follow up with the students. And you know, the

> hardest part was knowing what was expected of us, where Mat was doing his Web page and Vince was doing whatever Vince did, and you did different things, and the kids weren't sure who to see to do different things or what the ultimate goal was.

The role and level of participation of the teacher may thus also have a direct effect upon how the students participate and benefit (or fail to benefit) from a project. Lack of teacher ownership can lead to lack of student ownership. Mat addressed this issue when he said,

> What I'm hearing from the students and from the teachers is that the students haven't truly bought into it as something exciting that they want to pursue. It's a chore at this point. They're learning the tasks, we're going to do the tasks, and then that's going to do it. Once again, that goes back to what I had said previously. The teacher is going to have to drive that, or the coordinator, whoever, is going to have to drive, to pursue it further. So the impact on the students right now is, I'm not quite sure, I'm not quite sure on that.

Because of his earlier experience with a virtual museum project, Roger had a better overall response to the project than Laurie, who had not seen how a project looked when carried out to completion, but he still felt left out of the planning process. When I asked him what role he played in the design of the project, he also indicated that it was quite minimal:

> I don't, no, I don't feel like I designed it. Pretty much this was, Marsha had asked about the possibility of us being part of the work that you were doing, and how, you know, how our class would fit into that. So as far as the planning of it, just the week that it started and the whole logistics as far as when and how. I mean that part of it, yeah.

Both Laurie and Roger felt that they had little or no substantial input into the design of the virtual museum project. This reduced their roles to "babysitting" or "logistics," failing to make use of their expertise as educators and the teacher-student relationship that they had developed with their classes. The lack of a

substantial teacher role also undermined possible benefits of collaboration and left the design and, possibly, the feelings of ownership of the project to other stakeholders.

THE VIRTUAL MUSEUM PROJECT WOULD NOT BE DONE WITHOUT OUTSIDE HELP

My own conflicted dual role of participant and observer placed me in the position of one of the "other stakeholders." I have attempted to define my role in the virtual museum projects, and my role in the Four Directions project in general, as that of a resource, consultant, and advocate for educators of American Indian children. I definitely did not want to participate in a virtual museum project solely for the purpose of conducting a study. I tried to express my position to Laurie, when I protested, "I didn't want it to be *my* project. . . . I didn't want it to be someone who's doing this and studying what *I'm* doing." To which Laurie replied, "That's kind of how it came across." I explained that I had been working with the Four Directions schools for five years, developing the concept of virtual museum projects, and I was hoping that the schools would take a leadership role in conducting them. Laurie replied, "Once you leave, if we wanted to continue doing this, we wouldn't have the expertise to do it."

In a similar fashion, Roger mentioned that he was participating at Marsha's request, and characterized that his participation as "being a part of the work that you're doing." I asked Roger to characterize my role and the role of the other participants in the project, and he said,

> Well, I guess the word [is] "vital". I can't imagine it being pulled off [otherwise], certainly by me. I didn't—though I probably should have

> from the experience I had last year, of doing some QTVR—I certainly wouldn't have been able to show the kids that, you know, so that your role was absolutely important. Vince—I think he caught onto things pretty well working with you, and Mat certainly. He has a pretty good handle on the Web part of it, and I think he catches onto these things pretty quickly. The people at the museum I thought were very good. I thought their patience was extraordinary, you know, their willingness. They seemed very willing to do whatever they could to make this easy. I mean certainly, just the space they gave us to work with, letting the kids—and I could see expressions on their faces, like oh, you know with the kids handling everything—but you know they never seemed to get rattled. So I was pretty impressed with the people, really. I thought the adults did everything that they had to do to make it a good experience for the kids. I thought that part was really good.

Roger acknowledged that the project was indeed a highly collaborative one that required the knowledge, skill, and efforts of all the participants. He stated that he could not accomplish a project like this one on his own, and he described vital roles played by the different participants in the project. Given the highly collaborative nature of the project, this might seem to be a tangential observation, but it raised the question as to why a teacher often does not feel empowered to initiate a proposal for such collaboration. Among the roles Roger mentioned specifically was my role in showing he students how to use the software. This seemed to connect with Laurie's statement that "we wouldn't have the expertise to do it." In these statements, both Laurie and Roger implicitly suggested that the ability to help students with the technical aspect of the project was an important role that they should have as classroom teachers, but it was something that was provided by me, as the outside researcher and technical helper. This teacher technology training issue was addressed explicitly by these

participants' comments and is definitely a major concern for similar technology-intensive collaborative projects.

TEACHERS NEED TRAINING IN THE TECHNOLOGY STUDENTS USE

As mentioned earlier, Laurie stated that she was disappointed that she was not given sufficient training in the technology. She mentioned this topic in our interview, making a case for the teacher acquiring the technical skills that the students use in their learning projects. First, she stressed that the teachers needed to be comfortable with the technologies that students are asked to use:

> I think that the teachers need to know how to do it before they can work with the students. To be comfortable and do it with a class, you know, you have be comfortable in doing it yourself, and I don't think that there's a teacher here who is comfortable doing it. I think if there was, then we'd bring the kids in to work with them.

Later, Laurie elaborated her concern about teachers knowing the technologies that students use, adding that they would need to know the technology well enough to help the students with it, which implies that the teachers would need to have the training prior to the students need to make use of it:

> The teachers should be trained themselves first, and then bring the kids in because the kids would ask questions, and we had no idea how to answer the questions.

The issue of providing training in technology for teachers was one with which I had been grappling in the Four Directions project for five years. I had learned how quickly the training faded from the memory of my teacher-trainees, particularly when not applied in the classroom in projects with the students. One of my strategies for promoting QTVR and other virtual museum technologies in

the classroom was to provide the training in conjunction with a learning project, such as the "community based" project that had been conducted at Bountiful River Tribal School the year prior and the virtual museum project during this case study. I hoped that by embedding the training within the context of a hands-on learning project, teachers might recognize its benefits and incorporate it more into their teaching practice. As it turned out, in the Bountiful River case, the teachers did not get any training apart from their casual observations of the student instruction given by Vince and me. With more substantial input into the design of the project, the teachers could have requested separate training, as Laurie suggested. I would have pressed harder for separate teacher training myself, but I found it hard to broach that issue in the middle of a semester when so many demands were already made on the teachers' time. In light of Laurie's remarks, I wish that I had arranged for separate teacher training.

Another issue relating to technology training for teachers is the time it takes most teachers to become comfortable with new technologies and innovations in general. The Four Directions project had afforded numerous opportunities over a six-year period for staff training, but according the Roger, the effects of this training were just beginning to show up in his classroom practice:

> Sometimes I get a little worried about, and that kind of goes back to me as a classroom teacher, we learn this and then we don't ever do it again, which is sometimes the case. And for me it's been, this whole technology thing has been a drawn out process because it takes me awhile before I feel comfortable with anything. Finally, you know, we're using HyperStudio, and that's something I learned a while back and now I'm finally, you know, to find ways to get it into different projects we do here, and I think the kids do like that. It's the same way with PowerPoint. It's a neat way to give a presentation that the kids enjoy, and now I'm starting to

> feel more comfortable with it. So maybe that's what it's going to be with this QTVR. Maybe it's just a slow process. For some people, I think it's quicker, because they're more geared to it, and they really enjoy that sort of thing.

Mat reinforced Roger's remark by explaining how students' learning skills need much more than a single exposure to sink in, adding that this is true for teachers as well:

> Too often, and once again, I don't want to speak just to this school, I'm saying [this] to the general public because it happens to my kids and they're not in a Native school: They're shown something, and then that's it. And even as teachers sometimes, we're shown things and we don't get the opportunity, or the opportunity doesn't present itself, to use that technology or that learning skill that we were shown at an in-service or something like that, in the real time in the classroom, and that's one thing that sometimes we miss.

Mat's remark brings up another issue that may relate to the way the teachers responded to the project. If the teachers did not believe that they could reproduce or continue virtual museum activities without outside help, and they did not foresee the continued support from the researcher or the Four Directions project to develop their technical skills, then they felt that the virtual museum project would likely become a "one-time thing."

THE VIRTUAL MUSEUM PROJECT IS A "ONE-TIME THING"

Mat's remark about students and teachers being "shown something, and then that's it," points to the practical issue of cost vs. benefit. Is it worth it to invest the time and effort learning an innovative teaching strategy or a new technology if it is not incorporated into classroom use? Perhaps the investment is worthwhile, if teachers are able to see good student outcomes, and if they are able to comfortably adapt it into their classroom practice. However, it is only through

repeated classroom use that the innovation is refined and becomes a comfortable part of a teacher's teaching practice or a student's learning repertoire. It would be hard to argue for the expenditure of effort on an innovation that has no chance of affecting teaching practice in a lasting manner. Laurie addressed this issue when I asked her if she thought the virtual museum project was culturally responsive. She answered:

> I think it could, but this being a one-time project, something they do for only one week, do they really benefit or get anything culturally relevant out of it? I don't know. But I could see how if it were an ongoing project, which means each year they added different things to their virtual museum, that it would become more relevant.

Laurie made it clear that she did not believe that the virtual museum project would be ongoing when she concluded,

> Well, I think it was a good experience for the students. Otherwise, I hate to say it, it's just a one-time thing, where they did it, and they'll never ever do it again.

Roger also spoke of the "one-time" aspect of the virtual museum project, in much the same manner as Laurie:

> You know, if I could convince myself a hundred percent that this is really a good thing to do and a good thing for the kids to get involved with, it would make me feel a lot better, but I just worry sometimes that when we do projects like this that it's a, and again a part of it is something that I have to deal with as an educator, it's a one-time deal. Then Mark's going to be gone, and we're never going to do this again. That's what I worry about. But then again, that's, to me, is my problem.

Here Roger revealed some of the thinking process classroom teachers go through when they are considering educational innovations in the classroom. Both Roger and Laurie were concerned with the longer-term outcomes of the

project for their students and appeared to be at a loss or skeptical that the outcomes could be significant without some kind of program follow-up. Roger and Laurie's responses regarding the "one-time" nature of the project also reinforced the theme, in the earlier cases, of "The Need for a Substantial Teacher Role." If the teachers had been able to collaborate on the nature and requirements of the project well before the museum visits, perhaps they would have been able to extend the project activities beyond the researcher's visit. Roger's remark that nothing more would happen once "Mark's going to be gone," reinforced the earlier theme in this case, "The Virtual Museum Project Would Not Be Done Without Outside (Researcher) Help."

THE VIRTUAL MUSEUM IS A TIME-CONSUMING PROJECT

The theme "The Virtual Museum Project Is a 'One-time Thing'" deals primarily with the benefit side of the teachers' pragmatic cost vs. benefit analysis of the virtual museum project, albeit a reduced benefit due to its lack of continuity. They also expressed concerns about the cost side of the equation, in terms of the time invested in conducting the project. On the cost side of the equation, Mat spoke of the teacher's time investment in the virtual museum project as a factor that dissuaded teachers from buying into it:

> The key, Mark, as you well know, is the teachers have to buy into it, find time for it, because it is time. It just sucks up time. You can use that time wisely to make that work, but you can't just, we've seen it before, you can't just show something and that's it. If nothing happens between the time that person has come the first time and the time that person comes back maybe a year later, something's missing. It has to have, there has to be continuity within that.

Here Mat talked about a virtual museum project innovation as being one that not only "just sucks up time" to implement, but requires an ongoing engagement and commitment to make sense in the classroom setting. Teachers must invest their time in at least two different ways: one, professional development time to learn the innovation and the associated technologies and to figure out how to adapt it to their classroom practice; and two, the time it takes to carry out the project in the classroom, time that could be used for other more tried-and-true methods they are familiar with. Both of these categories of teacher time are scare resources, especially when only a few days of teacher in-service training are available each school year. The Four Directions project bought more professional development time for the participating schools, but as Mat explained, the yearly summer institutes and site visits did not provide the "continuity" required for teachers to learn and adapt to more ambitious innovations like virtual museum projects.

The second category of time, classroom time, tends to be filled with the day-to-day requirements of the curriculum. Roger referred to this time more directly when he tried to justify the time spent on the virtual museum project in his class:

> But my problem is that I always find it really time-consuming. You have so many other things to get in during the course of the year, and your project, whatever it is, you need to try to integrate a lot of things into it if you're going to make it . . . worthwhile, so that you can get, maybe it's science and social studies and math, all of that, try to get it involved in the project at once. . . . For me, it's a weak area, trying to come up with "how I can integrate math" or "does this relate to science," How does it relate to justify that whole of block of time that you're using up?

From the beginning, virtual museum projects have been conceived of as learning projects with a great potential for integrating a wide range of curriculum requirements into a culturally responsive approach to student teaching. Roger's comment, however, revealed that the integration aspect was not all that easy for him to figure out, and that he saw it as a professional development issue. At the same time, he stressed that the integration of a number of curriculum topics would need to be required if he wanted to justify the class time he spent on the project.

THE NEED FOR MORE TIME AND OPPORTUNITY FOR STUDENT RESEARCH

Roger did have some good recommendations about how the research aspect of the virtual museum project might be improved. He thought the day at the museum went "really fast," and wondered what the students may have gotten out of the visit. I asked him how he thought the research phase of the project went, and whether the research guide the students used helped them. He answered,

> Yeah, and that definitely helped. I think that definitely helped them formulate, or at least give them some guidelines to go by, and then get the information from that to put into a paragraph. Yeah, I don't know. I think it would have been a lot harder without that, much harder for the kids to come up with a decent description of their object. But again, maybe with some brainstorming ahead of time maybe they could have come up with some of their own questions too.

Roger's idea that he could have brainstormed research questions with the students before the project began provides insight into ways that teachers, if given an opportunity, can adapt their teaching skills to accommodate an innovative project. Roger also suggested that the students might have been better prepared

for the project if they had more time to consider the objects they selected and about which they conducted their research:

> I think maybe the one thing that I might do, what I might suggest, is that the kids have a little bit more time to pick their object, and to maybe think about why they picked it. And maybe be able to do, and I'm not sure if more research would help, but maybe find a little bit more about that object and come to grips a little bit more. . . . just ahead of time. A lot of their information was gathered from just talking with whoever knew anything about it. I think it might be a good idea if they picked something a month ahead of time or a couple of weeks ahead of time, and then actually used different resources. You know, talk with Ernest or whoever, but then find some books or talk with other people. But to just to be able to gather a little bit more, and then kind of sift through that and decide what they want to use, and what they think is the most important. So I think just maybe more time.

Of course, implementing Roger's idea would require considerable amounts of advance planning for the project by the teachers and other project partners. It would have meant meeting with the museums in advance to find ways to present the potential choices of objects to the students. It would mean identifying community members who would be willing to act as resources for student investigation. This amount of advance planning and collaboration with the project partners would open up new possibilities for student research and reflection as a way of improving the educational outcome of the project.

Annie, the tribal member on the Seaside Museum board, also recognized the need to go beyond the quick research the students did at the museum, based on the questions on the research guide. Though she said, "The questions were done really well [on the research guide sheet]," she added that "What I did notice was that nobody went beyond the questions." She also suggested, "I think it would

have been better to have more people to interview." She went on to indicate how students may have benefited from more time to investigate their objects:

> Yeah, and I don't know how you would do it another way so that, I mean maybe you could give them an object and give them some time and send them on their way and say, "Find out what you can about this from some people." But that's [in] an ideal world, you know.

Shirley, them Seaside Museum curator, also recognized that trying to do all of the research at the museum was a shortcoming of the project as it was implemented:

> I think it went OK. I think that they, what I'd like to see them do is to go back into the community and do community-based research. I think that's a piece that they can't do here.

Like Roger, Shirley made some remarks that indicated how the project might have proceeded if prior planning and collaboration had taken place. Shirley did not know if any detailed planning had been done regarding the design of the final virtual museum product. In fact, outside of the decision to let the students select the objects they wanted to image, there was no prior design plan. If she had had the opportunity to work with the teachers to plan ahead, Shirley would have been able to contribute her knowledge about how actual museum exhibits are designed. In our interview, she indicated the kind of contribution she could have made:

> When we do exhibits, you take an idea or you take a theme. It's much more of a content-driven interpretation. With this one, I'm not sure if it's object-driven, you know, they're selecting objects and they're going to put those up [online], but what is the interpretation of the framework of that going to be? I think that with an exhibit, we start in the other direction. We come up with, "What are we going to say? What are we going to do with this exhibit? What is this exhibit about?" And then select the objects based on an interpretive theme...

What Roger, Annie, and Shirley's recommendations have in common is their recognition that students would benefit from more research opportunities and more time to reflect on and "come to grips" with their virtual museum selections. Implementing their recommendations would require prior collaborative planning among the teachers and museum staff. Shirley's second recommendation would have students playing the role of museum professionals in developing a virtual museum exhibition around an interpretive framework. In a similar way, Roger's idea of having students brainstorm their research questions would involve students in high-level planning of the virtual museum's goals. Roger, Annie, and Shirley all indicated that students would benefit from more opportunities to talk to community members about their selections.

Whereas Roger, Annie, and Shirley thought of the educational opportunities missed because of the lack of advanced planning, other participants focused on the educational effects they recognized in the project as it occurred. For instance, Vince remarked on the kinds of connections they were making in the limited research they were able to accomplish during the project:

> Well, they had their stock questions to ask, and a lot of the students really expanded upon those, and the curators were very good about answering all the questions that the kids had. Their research was really confined to just their questions and whatever else they were able to draw from the curator, but the kids were very inquisitive as well because they were in an area where there were so many other things. And so they were able to correlate things [related to] the stone tool as well as the baskets and wood objects. They were able to correlate information that was relative to different objects. They were not just studying tomahawks, or they weren't getting just questions answered on tomahawks, they were getting questions answered also on the strap used to attach the tomahawk head to the wooden handle, and the wooden handle was made of this type of wood because that was the type of wood that was available, and it was also the

> type of wood they may have used for baskets, and so on. Their information was just being compounded upon, and they were learning so much more than what was just item-specific. Their research, although limited, was very detailed and very expansive.

Mat also described the students' investigations, characterizing their research efforts in a positive way:

> Well, not just the writing portion, but also the investigating. I mean they had to learn about their object, which was they either had to listen to the tape of Ernest, the curator, or they had to do some research at the Seaside Museum about that object, or whatever else they had to be researching. So, for just the writing portion, they had to get that information first before they could write, so the writing could be accurate. So when the visitor came to the site to look at that object, the information would be accurate.

A theme that emerged in this case analysis and was discussed previously explored "The Need for Better Communication and Organization." This theme addressed what might have resulted from a project that had better communication and organization. Though Mat and Vince were able to see important student outcomes in the project as it was implemented, Roger, Annie and Shirley pointed out the missed educational opportunities that might have been addressed by more thorough prior planning to give students better research opportunities and a better framework to reflect on the virtual museum content and how it related to their lives.

THE VIRTUAL MUSEUM NEEDS PROMOTION

As mentioned in the narrative portion of this case, Mat posted a draft version of the virtual museum on the Internet that students, teachers, and community members could view. However, I did not get any remarks from the interviews about the Web site. When I asked participants what kind of impact the

Web site might have, I did get several remarks that indicated there might be a lack of community interest and that active promotion of the virtual museum might be required. Mat made the remark that the students and teachers hadn't "bought into it as something exciting that they want to pursue." He believed that, to have an impact in the community, the virtual museum would need to be actively promoted:

> I know how Web sites work. Anyone put can up a Web site—anyone—but if you don't publicize the web site, if you don't promote the Web site, if you don't keep it fresh, no one's going to come. So, I think, no one knows that it's up there, first of all. That's a process that I think a school or a business or whatever has to learn. If you have something that you want to share with the world or your community or whatever, depending upon the location of your site, you have to promote it. You have to tell people where it is. You have to tell people how to find it. You have to tell people what they might find there and give them a reason to go there, and then you have to keep it fresh. So I can't, I don't think we're to that point yet. I think we're still working so much on the site that we haven't done the promotion, and I think that's key.

Mat saw in Ernest, the tribal museum curator, a key figure in promoting the virtual museum in the community. He also thought that Ernest might promote the virtual museum as an ongoing project to the teachers and students:

> I'm sure once we get him [Ernest] in the loop, and he sees the finished product, then it'll be a naturally occurring thing that he would want to promote that, OK, and hopefully he would be able, he would encourage students and staff to continue the process.

Vince also remarked on the need for promotion of the virtual museum Web site, and connected the promotion of the virtual museum with the promotion of the tribal museum because it featured items from the Wabanaki tribe. He also believed that the museum curator might promote the virtual museum within the community, and at the same time, promote the tribal museum:

> Yes, our curator of the local museum played a very big role in this in that he's a member of the community. He's also the curator of the museum, and he brought over a collection of fine items for our local museum's inclusion into the project. And he also, being that he lives in the community, being able to go back and share that with other people that he knows, and you know, he knows everybody in the community, and so certainly, you know, he goes back and tells everybody, "You've got to check this out once it's online," and everything. . . . A lot of the people in the community never go to the museum for whatever reason, they never cross that threshold there in the doorway and look at any of the items, and they may never go there and visit him, but because he tells them, "Well it's right there online, and you can look at it in the comfort of your own home." That changes things greatly for some people, and maybe they will grace his doorstep and look inside the museum a little bit more.

Roger participated in the "community based" virtual museum project of the year earlier, and based on that experience, he had serious doubts about the impact the virtual museum might have on the community. When I asked him if he thought that community members would use the virtual museum as an information resource on Wabanaki culture, the said,

> I don't see that community-wise. And the only reason—and maybe I'm just thinking of it from my own perspective because I'm not a big user of the Internet in a big [way], and I don't know how many people are. I think there are some people that use it, but I don't know if it is community-wide, if it's that big a deal to them, to use it and to see it up there. I mean when we did this project last year, I thought it was a really great project. I thought, you know, even the people involved would really like it, but I haven't gotten any . . . feedback at all from anybody, even from the kids that did it. You know, "Oh, I went to the Web site, the school web site and it looks really cool." And there's nothing like that, and nothing has come back from the community, even from the artists. So I don't even know if they've gone to see the site. So I don't know. Maybe there's just not a lot of Web browsers out there, I don't know.

I asked Roger if he thought that actively promoting the web site would bring more visitors, and he replied, "I don't know, put it in the flyer and say, 'Check out the Web site,' or you know—I don't know how important it is."

Vince, the school's technical assistant, had some insight into the way students at the school responded to technology. He believed that they displayed a lack of enthusiasm that was paradoxically connected to the school's abundance of technology. As he explained it,

> I don't think that we're at the level of enthusiasm with technology that we could be, and that other schools are, and I think part of that has to do with the fact that because we're a government funded school, we've actually gotten an abundance of technology. We've got almost a hundred computers in the school, and 114 students. So, realistically, we're not hurting for technology. And we have a lot of very current technology. . . . And while the kids don't focus on the technology in terms of how fast it will actually run a game or something like that, I think the kids have been growing up with technology, and so they don't know what it's like to be in a school where they don't have technology, or they have very limited [equipment]. If we had five computers in the school, just five computers, the kids would be fighting, and lining up, and doing whatever they had to do, being on their best behavior so they could use that computer. And actually, I think it kind of hurts. It bites us a little bit on the backside because they've got all this technology, and they've got all this technology, and it's there. They've kind of gotten a *laissez faire* attitude that, "So it's a computer. Big deal." And you show them something new on the computer, like the QTVR, and they do that, and, "That's cool!" and, "That's neat!" and, "I can do that!" and so forth and so on, but they tend to be, I think, of the mindset, "That's a computer, of course it can do that." But you take some of these kids that may be in a school where they've got less technology available to them, and I think their whole take on being able to do it would be on a far grander scale.

Vince did not make any statements about the use of computers in the students' homes, but Roger's remark indicated that a lack of enthusiasm might extend to the parents as well. The difficulty of promoting the Web site to the community may be connected with the fact that it is implemented on the Internet and requires a computer with a Web connection to view it, along with the technical facility to use the web browser, and so on. Roger did not believe very

many community members were "Web browsers." Because of this lack of in-home technical capacity, it is difficult to see how one might promote the virtual museum to the community, though the kinds of promotional ideas that Mat proposed would possibly help increase recognition in the wider, world-wide community. A few years back, the school received recognition for some claymation movies done by students and an artist-in-residence. The films were well promoted and were renowned throughout the state. News spots and a feature on PBS served to promote the films widely. Roger attributed the recognition partly to the nature of the technology involved:

> Certainly it was a great project, but I think there was some, and I don't know if any money was made on it, but I mean that, videos are a great media. I mean . . . all you've got to do is plop it in, and you can show the kids. And, like you say, everybody knows how to operate a VCR and a tape, so it's very accessible, and it's easy to show, and you can show a large group of people in a one-time deal.

The accessibility, ease-of-use, and universality of videotape helped to make the promotion of the claymation project much easier. Roger admitted that he did not personally use the Internet very much, and indicated that he did not think Internet browsing was widely adopted in the community. In that case, the need to promote the virtual museum Web site would probably be compounded with the need to promote Internet use in the community as well.

THE NEED FOR MORE COMMUNITY MEMBER PARTICIPATION

As I have in all of the virtual museum projects, I encouraged Bountiful River Tribal School to try to get community member participation. Unfortunately, that occurred only at a minimal level. Ernest, the tribal museum

curator and Bountiful River Tribal School parent, was able to be present only during the activities of the last of the student teams. Fortunately, Vince and I were able to audiotape his comments about the virtual museum objects for the students who were not present. Mat recognized that Ernest was a very important asset in the virtual museum project because of his intimate knowledge of the tribal museum collection. He said,

> I think it was really good getting the curator to really give some background information because that's his job. He probably has a lot of knowledge about those artifacts, and the history, and he kind of put all that together, which probably isn't written any place. More often than not a lot of the extra information may not be written, you know, with the history and so on.

Vince also recognized Ernest's importance, not only as a community member, but as a "subject matter expert" in Wabanaki culture and history. Having heard Ernest talk about the virtual museum objects he brought to the school for the project, I would agree with Mat's and Vince's assessment. It would have been very difficult to locate the detailed information Ernest had about the objects, and some of the information was fairly recent tribal history that may not be available on record. It was clear that Ernest enjoyed that aspect of the virtual museum project as well, and believed that it would not have been as effective without his participation. Regarding this aspect of his participation, Ernest told me,

> I think that worked very well. I mean, especially if the kids became excited, you know, and they became interested because those objects could have just been objects to them. They could have taken pictures of them, written down length and width, you know, diameter and things like that, and that's all they would have known. But with me talking about it and giving a history, and telling the workings of the corn grinder, you

> know, and the story behind the headdress, and the story behind the bracelet, they got excited because they were learning about their culture, you know. And they probably felt a little bit more pride in who they were as a people.

Ernest pointed out that the students became excited about the project when the objects became more than just objects for them through listening about the culture and history behind the artifacts that he was able to provide them. This information provided a connection to the theme of "who they were as a people," a connection imbued with pride, which occurred in the two preceding cases as well.

Annie, a tribal enrollee and Bountiful River Tribal School parent, was present for the trip to the Seaside museum. As relatively young parents, neither Ernest nor Annie would be considered tribal elders, but their knowledge of Wabanaki culture was considerable. Annie had not grown up on the reservation, unlike Ernest, and had moved there with her husband Vince as a young adult. Annie recognized the need to have tribal members other than herself present at the virtual museum activities at the Seaside Museum. In commenting about the students' research efforts, she said,

> I think the interviewing process went very well. I wish there were more people available for them to interview about the objects, rather than just myself and the curator. That would have been nice to have more community members there to talk about different aspects of what they were looking at. I think they gained a sense of their history, but they also gained a sense of the diversity of that history. I mean, we had objects from stone tools all the way through to beadwork. I don't think they're really aware that it is all connected through time, and I think that was probably the most important aspect, is that, things, stuff changes through time, and that doesn't make it less important or less valuable. But you know it does give them a sense of themselves, how they've changed as well.

Like Ernest, Annie recognized the power of the virtual museum objects to make a connection to the students' past as a people, contributing to "a sense of themselves" and how that identity as a people had developed over time. She wished, though, that there were more community members present to help the students make those connections. In the earlier theme on the "Need for More Time and Opportunity for Student Research," Shirley made a related statement about students conducting "community-based research."

Roger also recognized the importance of community member participation in projects like the virtual museum because of the cultural connection. As a Franco-American teacher, however, he described himself as feeling awkward and unprepared when it came to incorporating cultural material in his classroom practice. This awkwardness was very apparent when he talked about his past efforts to incorporate Native American culture in his teaching:

> I've been here a long time, and it's something that, I mean when I first taught here, I used to teach Indian culture. Well how, you know, me as a Franco-American, I'm teaching them beading, and I'm teaching them things that, you know, [relate to their culture] and to me there was something wrong with that, and I'd draw a picture that was an Indian scene, and the kids would say, "Well, how could you draw that?" And they didn't say that in a mean way, but it was like, "You're not supposed to be able to do these things." I said, "People learn things. They learn it. You know, somebody's taught me, and I'm teaching you."

I recognized how Roger might feel uncomfortable as a non-Native teacher in trying to include American Indian cultural elements in his teaching, and I asked him if more community participation in the virtual museum project would have helped him with that. He though it might, but that it would "have to be something that starts a lot sooner than we did." He went on to say,

> And to find those members that, I mean certainly I think there are community members that are very in tune with their culture and why it's important to them. . . I would want that imparted to the children. It's the kids [whom] you want to have that feeling. Maybe if the kids worked closely with a community member, maybe some of that would rub off, and maybe that's one way of doing it. Maybe, rather than working with the classroom teacher, maybe working with our Native culture teacher, that might have been, he may have had more resources, and he may have known more people to talk with who might be willing to give that sense of importance to it. That would be a good way to go. . . . When it's coming from them, it might have more power with the students, too.

Mat, Vince, and Ernest himself recognized the importance of Ernest's dual role of community member and tribal museum curator in providing students the important cultural connection to the virtual museum objects. Annie also expressed a need for increased community member participation to provide their personal knowledge of the history and culture for the student researchers. Roger, having had past concerns about incorporating Wabanaki and Native American culture in his teaching practice, indicated he would welcome community member participation, but he also recognized that he did not know who should fill that role and stated that there would need to be more prior planning to garner that support. He believed that the school's culture teacher would be better equipped to locate and enlist greater community member participation.

In the Pacific Tribal School project, the culture teachers did take a lead in conducting the virtual museum project and the community member participation was adequate, but there was a recognized need to "get the teachers on board." In the Northern Lakes/Great Bear project the technology coordinators took the lead, and there was a recognized need for more community member participation and classroom teacher participation. The Bountiful River Tribal School project did

include teacher participation, but revealed several issues that needed to be addressed to make that participation more effective. One of those issues was the inclusion of more community participants, something that would require more advanced planning and possibly the collaboration with the school's culture teachers, who were thought to have better community contacts.

EXPANDING THE TRIBAL MUSEUM

Like the two preceding cases, the Bountiful River Tribal School virtual museum project became a forum for the development or expansion of a tribal museum. Vince, for instance, noted that the virtual museum project could be a tool to promote the tribal museum. Ernest, the tribal museum curator, also recognized this potential:

> Well, that'll [the virtual museum] probably sort of whet their [virtual museum Web site visitors'] appetite because it's just a few items from our museum, and hopefully it'll create a desire in them to come in and investigate us further, and come to the museum so that I can talk with them and so that they can help, help in the dream that I have in making a newer and larger museum come true. Because the items, where they're stored now, is in a concrete building, block building, and we keep getting new items in, and there's no new place to put them, to show them, because our museum is all filled up. And so, it's been my dream, since the first time I got there, to build a larger museum that is more up to the standards of any high tech museum, I guess, with the air quality control, with the air-tight glass cases to preserve our items more, and you know, fire protection, more of a video area where we can show more videos and maybe more like a virtual item list that they can see when they come to visit the new museum. And hopefully this will open up new avenues in one way or another, and if not, it'll instill ideas inside myself to try to get something going like that for the museum's Web site.

Ernest saw the virtual museum project as a way of promoting the tribal museum to the community, to get them, as Vince said, to "grace his doorstep and

look inside the museum a little bit more." Then Ernest would be able to promote his dream of expanding the tribal museum to community members. Ernest also showed great interest in the virtual museum project as something he might try implementing on his own, for the development of the tribal museum's web site. Vince and I had given him some hands-on training in creating QTVR movies, which helped him to generate some ideas of his own about promoting the tribal museum through a Web site, as he explained,

> I mean I've seen how it's done. I have videotape equipment. Maybe not as technical as the school's, but it's something I could probably talk [about] to the principal and the other people who worked on the project and see if we can get some of these items put up for the museum's Web site. Because it seems pretty simple. I've seen the [turntable] platform you put [items] on. I've seen how the pictures have been taken off. I have a digital camera; I have a video camera; and with the museum's budget we have now, it's possible to get a highly sophisticated digital camera, video camera, to do such a project for the museum.

Repatriation

Going beyond the virtual museum as a tool to promote tribal museum expansion, Ernest anticipated a time when he could pursue the repatriation of tribal artifacts back to the community, something that would require the new museum of his dreams. He explained,

> If we do get a new museum, there are items in other museums that belong to us, I myself feel they belong to us, and that we will be able to get them back because they belong to us. It should be there for our people and our children to see.

I knew there were limits to the types of items that could be repatriated under NAGPRA, and that Ernest might not be able to repatriate all of the items he would like. I asked him if making digital copies of unrecoverable items using

such virtual museum technologies as QTVR would be acceptable to him. He replied,

> That would do OK, but you know, the main object in my mind is to bring them back, the actual object, back to the museum. Because you know, objects like that were bought up, taken, and I believe that they should be returned to the rightful owners.

Ernest did see some great potential in the virtual museum technologies for doing digital collection of items that community members might have in their homes and would want to share with the rest of the community in a virtual tribal museum. He talked of this possibility in the context of an ongoing virtual museum project at the school:

> Possibly there are people with objects in their own homes that most people haven't seen, and if they're able to bring them into the school, if it's an ongoing project, that other people can see these objects that no one has seen before except the person who owns the object at that house, and maybe they'll be willing to loan it to the school until they take the 360 [degree QTVR] picture of it, and so they can take it back home, so that they can have a photo image of it anyway, and so other people can see it also. . . .Because I have baskets back home, and artifacts back home that haven't been shown in a museum, and I haven't seen other places. I know there are a lot of people around here who have their own stone artifact collection that they have gathered around this area, and there're many different objects, and it would be good to be able to click on something and see these collections, instead of staying at home, put away somewhere gathering dust.

IMPROVING RELATIONS WITH NON-NATIVE COMMUNITIES

In addition to promoting the tribal museum and expanding its collection electronically, several participants recognized the potential for improving community relations to the wider world. For Annie and Shirley, the virtual museum project could easily be connected with the Seaside Museum's mission

for educating the people about the Native Americans of the region, and through that education, foster better inter-community relations. Annie spoke of the Seaside Museum's education mission in this way:

> The Seaside Museum is the only museum in the state that is dedicated to the [state's] tribes, and part of their mission is to serve the non-Native community in educating the people about the people, the Native people in [the state]. However, I think that some of the education needs to come to the communities because a lot of people in the communities don't know a lot about history before European contact, and you know, I've met people who don't know that Native people in [this state] made pottery, you know, right here within the community. In accomplishing their mission, in trying to accomplish their mission of education, they need to devote an equal amount of time to the Native communities, as they do to the non-Native communities. This project serves that purpose really well, I think, because it introduces the students to things they may not have known about their past and the heritage of the Native people of [the state].

Though Annie here was talking about how the virtual museum could be seen as helping to fulfill the Seaside Museum's mission with respect to the Native communities of the region, she went on to talk about how the project could help to dispel misconceptions and improve community relations if it were done in the right way:

> The culture of the Plains and the Southwest gets imposed on us, and it's our, the culture of this area is really not well known and not associated with what's traditionally Indian. . . . I think that any kind of education, public education about Indian people serves to get rid of some of the stereotypes that are out there. The flip side of that is you put an axe up there, you know, a stone axe, and of course what are people going to say, people are automatically going to go back to the stereotypes that already exist. So I think in this type of project you really have to have a balance of contemporary materials as well as past materials.

The "flip side" of presenting Native American cultures to the public on the Web is that the presentation might serve to support some stereotypes. Annie, as a

tribal member, was very sensitive to that issue, so she was concerned that the virtual museum should provide a "balance" that would counteract stereotypes and misconceptions. She also believes that the virtual museum project would help to put her community "on the map," which alone would be an important step in a region were so many people are not even aware of the Native American communities in their midst:

> It puts us on the map, first of all, and people can say, "Oh, yes, there are Native people in the northeast," which is something. Many people in the state, they don't know. So I think it does help to give us a presence, not only in the state, but nation-wide, and also, again, with the stereotype issues. It does help to dispel some of those.

Shirley, the Seaside Museum curator, also recognized that the virtual museum project could make an important contribution to the museum's educational mission, and she stressed the importance of building community relations for the children:

> I think that there's a great interest out there about Indian communities. I think that the average school, I'll say the average school child in the state has few opportunities to interact with children from Indian communities, and that's part of the problem with stereotyping—misunderstanding. I think I see these kinds of projects as a real opportunity for others to see that, given there's a history and a culture that sets Native people apart, but on the other hand, these children are just like the children everywhere. And so that any time there's an opportunity to see that people are people, even though we might speak a different language, we may have a different cultural heritage; I think that's extremely important.

Vince also recognized the potential for education about Wabanaki culture for both Native and non-Native communities. He also thought the virtual museum could dispel the stereotyping of Native Americans fostered by the movie industry. Also, like Annie's statement about putting the community on the map,

Vince thought the virtual museum project might stimulate some tourism to the community as well. He commented,

> It fosters, certainly, good relations, but it also provides some education. You've got a spirit club there on the virtual museum, and until the Native children learned more about it, it was a war club, and until you can get some of that detailed information on something, that old root over there with some carving on it is just a big old club for pounding the heck out of something, but it has so much meaning. So that impact is carried out far greater than in just the local area. It's just like the old Western movies. For the longest time, all the information that the majority of the public had on the Indians was what they saw in the movies. And you know, gosh darn it, if you saw it in the movies, than that must be the way it's done, why would they, yeah, why would they make that up? Well, you know, they didn't always do it that way and what have you, and Indians in the East didn't live in tepees, they had wigwams and so forth and so on. There's a lot of stereotypical information out there that the virtual museum, by virtue of the fact that it's on the World Wide Web and going beyond our front door and being accessible to the world. There are a lot of people who can learn from that, and there's the ability to contact and pay [the museum's entrance fee]. Maybe they want to come and visit. Maybe they want to see it some more.

Annie, Shirley, and Vince spoke of many different ways the virtual museum could improve community relations—by putting their community "on the map," by educating people about the Native Americans of the region, by dispelling stereotypes, by connecting people with the children of the community, by generating enough interest to bring visitors to the reservation. Ernest spoke of how the virtual museum might "whet their appetite" and bring people to the museum where he could passionately promote the museum and Wabanaki culture to visitors face to face. Once there, in a personal encounter, the serious business of fostering community relationships could begin. To illustrate how this might take place, Ernest told me what he often tells visitors to the tribal museum:

> I tell a lot of people when they come in to the museum that it doesn't matter what the people are at this present moment, at one time in their life they were a tribal people, and they had an earthly connection, and they saw the same designs, their people saw the same designs as our people. From the spiral being the universe, to a sun symbol, you know, to a plant design, we've all seen it no matter where we are on this planet. You know, we're all connected in that same way, so we were all at one time tribal people. No matter how far advanced, if you want to say they're advanced, just because they have a technology, but they have forgotten about their roots, you know. But I can't say that's advanced—only in the sense that scientifically or materialistically, they're advanced—but as for being a people they've sort of stepped backwards, regressed.

Ernest values the person-to-person connection he enjoys with museum visitors. In these encounters, he feels that he is able to engage in some important intercultural education that takes place across the cultural borders when people of different cultures communicate. The virtual museum provides a similar opportunity for this kind of communication, when American Indian students describe aspects of their culture on the Web. However, as it is constructed in this case, such communication is only one way. Another potential for intercommunity relationships may develop if members of the non-Native community could have their appetite for knowledge whetted by the virtual museum and they would actually visit the reservation.

COMPARISON OF THE THEMES OF THE FIRST THREE CASE STUDIES

As in the prior case with the Northern Lakes and Great Bear schools, I will summarize the themes that emerged from the current case analysis in light of the themes that emerged from the prior cases. Again, I would note that the themes that develop from the case analyses tend to overlap each other and some of the earlier case themes, reinforcing or diverging from the earlier themes to a varying

degree. Common themes will have their differences, and divergent themes may have a touch of commonality. After I have analyzed the last case and compared it with the others, I will be able to paint a more complete picture of virtual museum projects in American Indian Schools.

COMMON THEMES

The Need for More Native Community Participation

In some ways this theme is ambiguous as it applies to the current case. The community member involvement in the Bountiful River Tribal School case was fairly minimal. The main cultural representative in the project was Ernest, the Wabanaki Tribal Museum curator, who was only able to be present for part of the day of virtual museum activity. However, he was able to maximize his participation by allowing Vince to record his comments about the virtual museum objects for the students. Vince, Richard, and Roger stressed the importance of Ernest' role in sharing his knowledge of the museum objects and Wabanaki culture and the position of respect he held with the tribal community. Several students commented on what they learned about their culture from Ernest.

The limited amount of time for participation that Ernest was able to contribute to the project reinforces the theme that first emerged in the Pacific Tribal School, "Native Community Member Participation" to some extent. Ernest served as a cultural expert for the virtual museum project, but was involved primarily as the curator of the tribal museum, not as a tribal visitor to a non-tribal museum, as in the Pacific School case.

Several participants in the current case noted the need for more community member participation in the project. Annie wished there were tribal members present at the Seaside Museum to act as information resources for the virtual museum activities, and Shirley made a similar statement regarding the need for "community-based research." Roger would have liked for the students to know what they would be researching ahead of time and that they would have had an opportunity to learn about the objects from community members. He also thought that the schools' culture teachers should have been included in the project. These comments relate to the Northern Lakes/Great Bear theme, "The Need for Community Member Participation," which also referred to a lack of community member participation. Because of the limited amount of community member participation in the Bountiful River Tribal School, the need for more community participation was also strongly felt. What these three themes have in common is that they illustrate a range of amounts of community member participation.

Expanding Tribal Museum

As the curator of the Wabanaki Tribal Museum, Ernest was interested in the various ways the tribal museum might be expanded, including those in which the virtual museum project might play a role. He thought that the virtual museum would "whet the appetite" of virtual museum visitors, and encourage more real-world visitation to the tribal museum. Ernest talked about the limitations of the tribal museum facilities, and talked about the many plans he had for improving them. He was excited about the virtual museum technologies used in the

Bountiful River Tribal School project, and wanted to apply them to a tribal museum Web site as well.

Ernest was also interested in expanding the tribal museum collection. Repatriation of Wabanaki cultural items from other museums and collectors was part of that plan. In the case of items that could not be repatriated, he thought that digital reproductions might be "OK," but could not replace actual repatriation. However, he thought that doing digital collection of items in the community would be a great way for community members to share their heirlooms and privately held treasures.

This theme reinforces the theme of "Expanding the Tribal Museum Role" that emerged in the Northern Lakes/Great Bear case. Unlike the Great Bear and Bountiful River reservations, the Northern Lakes reservation did not have a tribal museum. Floyd and Brenda planned to use the virtual museum project as a way to influence the Northern Lakes Community to build a tribal museum for the tribe, one that would have a close working relationship to the school. The Northern Lakes Tribal Museum that they envisioned would use students, on an ongoing basis, to do digital collections for the tribal museum. In a similar way, Christine, Mat, and Laurel thought that Great Bear students could continue adding to the Great Bear virtual museum by imaging objects as they were collected by the tribal museum.

Like Northern Lakes, the Pacific community also lacked a tribal museum. Frances, who was on the Pacific Tribal Museum board, thought the virtual museum project would "jumpstart" the tribal museum by encouraging and

arousing interest among community members. The theme of "Virtual Museum Collections within the Community" that appeared in the Pacific Tribal School case strongly reinforces the digital collection within the community idea mentioned by participants from both communities in the Northern Lakes/Great Bear case, as well as Ernest's remarks on the subject in the Bountiful River case. Ernest's desire to repatriate Wabanaki cultural materials from other museums also addressed the repatriation aspect of the Pacific School theme of "Repatriation and the Museum's Role in Cultural Preservation."

Improving Relations with Non-Native Communities

As in the two prior cases, several participants in the Bountiful River Tribal School case made comments on ways the virtual museum project might improve the relationship between Native and non-Native communities. Shirley, the curator at the Seaside Museum, spoke of the rare opportunities that school children had to communicate with Native children and learn about the Native Americans of their region. The virtual museum could offer that opportunity. Annie and Vince both recognized that the virtual museum project could correct stereotypes and misinformation the non-Native community had about the region's Native Americans. Annie was pleased that the virtual museum project gave a more balanced view of the Wabanaki people, showing items from their long history that demonstrated how their way of life had adapted to historical conditions. It was Ernest's hope that the virtual museum would help bring non-Native visitors to the reservation and to the tribal museum, where personal contact with Native people would serve to improve community relations.

This theme strongly reinforces the theme of "Improving Relations with Non-Native Communities" that arose in the Pacific School and Northern Lakes/Great Bear cases. Many participants in the two prior cases expressed ways in which the virtual museum project helped to correct stereotypes and misconceptions about Native peoples. The virtual museum was seen as one way that Native people could express who they really are to the rest of the world. Some participants mentioned that non-Native schools could use the virtual museum as an information resource. Also, queries about Native Americans that educators ask tribal schools may be answered by referring them to the virtual museum. The virtual museum might act as good "PR" and encourage Web site visitors to come to the reservation. The virtual museum was also seen as providing a service to the non-Native community, which "turned the tables" in terms of the direction humanitarian service usually flowed between the two communities.

Other Commonalities with the Prior Two Cases

As explained in the prior case, the nature of the emerging themes in the case analyses make it difficult to create themes that do not overlap each other in some respects. Also, some topics that become themes in one case may be addressed or reinforced by comments in other cases, but not to the extent that they warrant a separate thematic treatment in the analysis. In looking over the themes of the prior cases, I can see some that were touched on or were addressed to some lesser degree in the Bountiful River Tribal School case.

In the themes of "Project Management Issues" and "Restructuring the Virtual Museum Project" that arose in the Northern Lakes/Great Bear case, several participants expressed concerns about how the virtual museum project was planned and structured and different ways that such a project might be designed and organized in future projects. In the Bountiful River Tribal School case, a number of issues that were raised concerning problems with the planning and implementation of the project became a number of themes in their own right and related to some of the same concerns expressed in the themes in the Northern Lakes/Great Bear projects. Among these were the themes "The Need for Better Communication and Organization," "The Need for a Substantial Teacher Role," and "The Need for More time and Opportunity for Student Research." These themes emerged as classroom teacher concerns, and as such they will be addressed as unique or divergent themes below. However, these themes could possibly be combined to elaborate a broader theme about how virtual museum projects might best be conducted.

Similarly, a theme that arose in the Bountiful River Tribal School case, "Teachers Need Training in the Technology Students Use," will be included in the following section on unique or divergent themes, but it does resonate with some of the concerns that were expressed in the Northern Lakes/Great Bear case theme, such as "Students Can be Technology Mentors" and the theme that emerged from the Pacific School case, "Developing Virtual Museum Skills in the School Community." These themes all deal with how best to propagate or carry on virtual museum skills in the school. The main difference in the Bountiful

River case is the importance placed on technology training for the teachers. In the prior two cases, several participants thought that the students would primarily take the lead roles in spreading the technology skills because teachers would be too involved in teaching the core curriculum.

The Pacific School case theme "Pride" was addressed in the Bountiful River Tribal School case, but to a lesser extent. Ernest noted that the students were excited to learn about the cultural objects he brought them, and thought they thus showed "pride in who they were as a people." Roger also said that he hoped that the virtual museum project "would bring out some of the pride" in the craftsmanship displayed in some of the objects and the traditions they represented.

UNIQUE OR DIVERGENT THEMES

Several themes emerged from the Bountiful River Tribal School virtual museum case that did not occur in the prior two cases. As mentioned above, some of these "unique or divergent themes" did share some aspects with some of the themes that appeared in the prior two cases.

As noted at the beginning of this case study, one of the distinguishing features of the Bountiful River project that contrasts it with the prior projects was the presence of classroom teacher participants. This was discussed under the theme, "The Need to Bring the Teachers On Board" in both the Pacific and Northern Lakes/Great Bear cases. With the inclusion of classroom teachers in the Bountiful River project, a number of concerns relevant to classroom teachers became apparent. These concerns were expressed under the themes, "The Need for a Substantial Teacher Role," "Teachers Need Training in the Technology

Students Use," "The Virtual Museum Project Is a 'One-time Thing,'" "The Virtual Museum is a Time-consuming Project," and "The Need for More Time and Opportunity for Student Research," which together might be categorized under a larger theme called "Classroom Teacher Concerns." These themes grew out of an exploration of what might be called shortcomings or failures of the Bountiful River virtual museum project. Though the lived experience that provided these themes was rather vexing, as a researcher, I must rejoice at the valuable implications that ensued. I will be exploring the implications of these teacher classroom concerns in more detail in Chapter 8. If we had not experienced these problems, some important findings would have been missed.

The Need for a Substantial Teacher Role

Both Roger and Laurie were concerned about not having substantial input into the design of the virtual museum project and the minimal role they played in its implementation. Laurie described her role as "babysitting," and Roger identified his role as primarily "logistics." Though Roger said that the teachers knew the project was coming up for months, they did not actively pursue a more active role, saying they participated primarily because the principal asked them to. Mat pointed out that the teachers did not "buy into" the project, and the students followed that lead by also not buying into the project. Mat's observation diverges from the theme of "Ownership" that arose in the Pacific School project.

Teachers Need Training in the Technology Students Use

Part of the reason Laurie may have felt uncomfortable with the project was that she was not trained in the virtual museum technologies before the students

were, which detracted from her ability to participate fully as a teacher in the project. Both Roger and Mat commented that the virtual museum technology training that was provided in the Four Directions project was not reinforced often or strongly enough for the teachers to learn it well or figure out how to use it in their everyday classroom practice.

The Virtual Museum Project Is a One-time Thing

Part of the teachers' reluctance to take the leading role or participate in the project more fully was their belief that "they'll never ever do it again." A brief one-time exposure to the technology would not be enough to help them connect it to their classroom practice. Laurie commented that if the project were ongoing, it might benefit the students more, but that part of the problem in being able to continue or do additional independent projects was the lack of confidence among the teachers that they could successfully plan and implement a virtual museum project on their own. This theme differed from the theme that arose in the Pacific School project, "The Virtual Museum as an Ongoing Project."

The Virtual Museum is a Time-consuming Project

Both Mat and Roger pointed out that the virtual museum project was a time-intensive project, and would need to be justified in terms of educational outcomes to be something they would consider in their classroom practice. Mat thought that a virtual museum project "just sucks up time," not only to implement, but also in terms of the time investment teachers must make to master the technology and do the planning. Roger felt that, because the project used a large

block of classroom time, it should be justified in terms of the core curriculum goals that the activity addressed.

The Virtual Museum Project Would Not Be Done Without Outside Help

In light of the cluster of separate themes that could be combined as "Classroom Teacher Concerns" described above, the emergence of this theme is not surprising. Laurie, Roger, and Mat participated in the project primarily because the principal asked them to. Laurie said she would not know how to continue work on the project after I left, saying the project appeared to be primarily my research project rather than the school's learning project. Roger said my role was "vital" to the success of the project and hinted that the project was "the work that you're doing." They both noted that the role I played in training the students to use the virtual museum technologies was something they could not do themselves.

The Need for Better Communication and Organization

Part of the problem that aroused so many teacher concerns was the lack of planning and coordination of the project and its goals. In the prior cases, project planning was shared between myself and the schools' technology coordinators and culture teachers. In the Bountiful River case, Marsha, who had been the technology coordinator, had just taken over the immensely complex role of principal, which demanded all of her attention. Because I did not realize the need to provide the kind of coordination that she had previously been able to provide, there was a lack of organization and communication on the project. Mat said I should have communicated the goals of the project and the roles of the

participants more clearly. Laurie commented that she did not know what her role was on the project, nor did her students.

The Virtual Museum Needs Promotion

Mat, who had taken on the role of the school's Webmaster, stressed the importance of promoting the virtual museum if it was going to have an impact in the community and on the World Wide Web. He thought that Ernest would be able to promote the Web site within the community if he were kept "in the loop" regarding its development. Vince also thought that Ernest could tell community members about the virtual museum, especially if it would bring more people to the tribal museum. Roger was skeptical about community members visiting the Web site because he had received no indication that similar work posted a year earlier had received any community attention.

Vince pointed out that the wealth of technology at the school had a paradoxically retarding effect on attitudes of the students who took computers for granted, reducing their enthusiasm for innovative technology projects like the virtual museum. Roger did not think that there were many "Web browsers" in the community. Vince's and Roger's observations support the beliefs that the virtual museum would probably need to be actively promoted within the community in order to receive community attention.

THEMES NOT SPECIFICALLY ADDRESSED IN THIS CASE

There are several themes from the prior two cases that were not directly addressed in relation to the Bountiful River. The museum issues addressed in the Pacific School case under the theme of "Proper Use of Fragile Native American

Collections" did not arise in the Bountiful River case at all. Student-related themes from the Pacific School case, "Understanding Who You Are" and "Preparing Students for the Project Mentally and Spiritually" also did not come up as topics in the current case. "Bringing Objects Out from 'Behind the Glass'" was not addressed to a noticeable extent as a specific concern, either.

Two themes from the Northern Lakes/Great Bear case, "The Need for More Choice for Student Virtual Museum Selections," and "The Virtual Museum Makes Museum Collections More Accessible" were not addressed to a significant degree in the Bountiful River case.

This summary analysis will continue at the end of the next and final case study. A summary of all the cases will then be presented in the chapter on across-case analysis to give a more complete picture of the nature of virtual museum projects in Native American schools.

Chapter 7: Case Four

White Pine Tribal School

DISTINGUISHING FEATURES

The fourth and final case of this study involves White Pine Tribal School, another Wabanaki tribal school in the northeastern United States; the Provincial Archaeological Commission, a provincial office that promotes Canadian heritage and regulates the archaeological sites throughout the province bordering the state; the Seaside Museum; and the Northeast Museum. I was unable to secure permission to conduct my study with the Northeast Museum, so it will not be included in this report except to note that it was one of the museums that participated in the White Pine project. The Provincial Archaeological Commission, a governmental organization, was a unique participant among these cases in that it represents the only international collaboration as well as a non-museum provider of cultural material.

Like the Bountiful River Tribal School project, the White Pine Tribal School virtual museum project included the participation of a classroom teacher. The entire fifth grade class, consisting of twelve students, participated in the project. The school's technology coordinator participated fully in the planning and implementation of the project, including doing the Web scripting for the final virtual museum Web site. Several teachers in the school's culture department

also collaborated on the project. The virtual museum activities took place over a week and a half.

One aspect of this case that distinguishes it from the three previous cases is a balance in the participation of the different categories of participation. For the purposes of project design and data analysis, I had identified three classes of participants for virtual museum projects in Native American schools: school staff and students, museum professionals, and tribal community members. In the first two cases, several participants noted the need to "bring the teachers on board," indicating participants' concern about the lack of classroom teacher involvement. In case two and case three, several participants felt the need for more community member contribution. In the White Pine Tribal School project these kinds of concerns were not voiced, indicating that the participants may have felt that there was a better balance of input among the three classes of participants.

I have found the need to distinguish between technology coordinators, regular classroom teachers, and culture program teachers. In the previous case with the Bountiful River Tribal School project, the lack of a full time technology coordinator caused problems that participants cited as diminishing the project's success. Even though there was more classroom teacher participation, the need for technical support and project coordination remained. Also, the Bountiful River Tribal School's culture teachers were not involved. In this fourth project, with the White Pine Tribal School, the classroom teacher received ample support from both the school's full-time technology coordinator and from teachers in the school's culture program. This support made a difference.

KEY PARTICIPANTS: WHITE PINE TRIBAL SCHOOL

Theresa, Bountiful River Tribal School's technology coordinator and Four Directions facilitator, was my main contact for setting up the virtual museum project. She also regularly applies for the school's federal grants and files the reports such grants require. On the technology end, she maintained the school's computer network and makes technology purchases. She scheduled the school's labs and works closely with the teachers, helping them with special projects and technology training. She also enjoyed working with students in technology projects. Theresa also maintained the school's Web site. She created the virtual museum Web site from the materials the students produced in the project. As a Catholic nun who served the Wabanaki community, Theresa had a long-term, close association with the tribal community.

Ronald was the fifth grade teacher for White Pine Tribal School. His class of twelve students created the materials that comprised the virtual museum. He saw the project as an opportunity to integrate technology with science and history in his classroom practice. In characterizing his role in the project, he said he operated "like a facilitator."

Martha was the school librarian. She facilitated the project by driving the student teams in the school bus to two of the three museum sites. She also videotaped the students as they worked on the project at the museums. She explained the dual purpose of the videotaping in this way:

> My role . . .was to accompany the kids and use the digital video camera to record the kids as they were taking pictures for the virtual museum—document what they were doing. That way it [videotaping the project] was actually a two-part piece. One, that if they needed any reference that they

> had missed, they could go back to that video camera and hear the discussion about the piece that they were taking pictures of, and two, just for, to show what the kids are learning, what the kids are doing with the virtual reality.

Will was the culture program director for the school. He had been one of the most active Four Directions participants since the beginning of that program four years earlier. Will saw himself as an information resource for the virtual museum project, and he was instrumental in selecting the museum partners for the project.

Betty was a culture and language teacher for the school. Like Will, she has been an active participant in the Four Directions project and viewed herself as a resource for the virtual museum project.

Sandra was also a culture and language teacher for the school. She became active in the Four Directions project as well, but only in the last two years of the project. Unfortunately, she was not available for an interview for this study.

Because Martha, Will, Betty, and Sandra were all tribal members, they served a dual role as community members as well as school staff in the context of the study. Theresa and Ronald are non-Native.

KEY PARTICIPANTS: THE PROVINCIAL ARCHAEOLOGICAL COMMISSION AND THE SEASIDE MUSEUM

Wendy was my primary contact for setting up the virtual museum project with the Provincial Archaeological Commission. She was a Wabanaki First Nations Native, but of a different Wabanaki tribe than the White Pine Tribal School participants. ("First Nations" is a term Canadians use to describe their

indigenous peoples.) She explained her role at the Provincial Archaeological Commission as fostering "intercultural education and acting as a liaison between the First Nations communities and the Provincial Archaeological Commission for the province" (neighboring the state of the White Pine Tribal School). Wendy made the arrangements for the project activities, and she gathered pamphlets and archaeological articles related to the objects the students would photograph.

Donald is an anthropologist and professor at the major Canadian university that is located in the same city as the Provincial Archaeological Commission office. He selected objects from the university and the Provincial Archaeological Commission collections for the students to photograph and research. Many of the artifacts he provided came from archaeological digs on which he had worked. Some of the artifacts were his personal favorites from the digs. He shared his professional knowledge with the students during the virtual museum project.

Jim, as the director of the Provincial Archaeological Commission, was responsible for the Archaeological matters of the province. He stated that his role in the project activities was "strictly managerial," but he also had great interest in the virtual museum project activities because it made a rare connection to indigenous people across the international boundary and provided a unique way of putting cultural materials into circulation.

Sally was a graduate student in anthropology at the Canadian university. She helped to interpret the artifacts for the students during the project activities.

Shirley, curator at the Seaside Museum, had assisted in the Bountiful River project activities that took place the week before the White Pine project began.

Table 5: White Pine Project Participants

Participant Name	Position or Title	School Staff	Community Member	Museum Staff
Theresa	Technology coordinator	•		
Ronald	Fifth grade teacher	•		
Martha	School librarian	•	•	
Will	Cultural program director	•	•	
Betty	Cultural program teacher	•	•	
Sandra	Cultural program teacher	•	•	
Donald*	Canadian anthropologist			•
Sally*	Graduate anthropology student			•
Jim	Provincial Archaeological Commission director			•
Wendy†	Provincial Archaeological Commission staff			•
Shirley	Seaside Museum curator			•

*Not museum staff, but work closely with the Provincial Archaeological Commission.
†Wendy is a tribal member of a related but separate tribe in Canada.

A SHORT NARRATIVE OF THE CASE

ORIGINS OF THE PROJECT

White Pine Tribal School had been showing interest in QuickTime Virtual Reality and virtual museum projects for several years prior to the project described in this study. Three years before this study, I had made a Four Directions site visit to the school for the purpose of training some students and teachers in digital video and QTVR. At the time of that training, I had noticed a display case of cultural artifacts in the cafeteria, and I learned that the school had

received the objects on loan from the Northeast Museum, so I knew that the school already had some experience working collaboratively with museums to further their culture program.

As I mentioned in the Bountiful River Tribal School case, both Linda at Bountiful River Tribal School and Theresa at White Pine Tribal School had been communicating with me for a year about doing a collaborative virtual museum project for the region. In March, at a Four Directions meeting, we were able to revisit the idea of doing virtual museum projects, and we decided that each school would do its own project during a three-week visit I would make in May.

In March and April, Theresa and I communicated via email and phone calls to collaborate on the virtual museum project planning. I volunteered to help her by making the contacts with the museums that she provided me. At this point in the planning, Will, the director of the school's culture program, was very influential. He had developed a thorough knowledge of the museums and institutions in the region and already knew those that would be the best candidates for his vision of the virtual museum, which was that of a "living museum." As Will explained his vision,

> I have a personal commitment, and that's to make a living museum. Museums all too often in the past have been a place to put . . . has-been or dead objects, and my own philosophy is that museums should be safe places to keep your living history. . . . The virtual museum project is neat because it gives yet another dimension for manipulating these products for contemporary use and understanding.

Will wanted a variety of objects in the virtual museum that would show a continuity of Native life from prehistoric times to the present. He helped select

the museum sites to visit based on the variety of items in their collections and other criteria that made them promising partners. He explained:

> The Provincial Archaeological Commission one and the Seaside and Northeast museums—those are primary sources for us. There are other places, but those seemed to be the most workable because they were, first of all, [within] driving distance to, to having our students work on. And some of it is past relationships. The one at the Provincial Archaeological Commission was really kind of neat because they had, actually had Native people in a lot of the organization, which is unusual, but hopefully…in the future, there'll be more Native people at the heads of these organizations.

Theresa provided me with contact numbers and email addresses for the people at the three sites, and over several weeks, we collectively developed plans and times for the virtual museum activities at the three sites. Wendy, at the Provincial Archaeological Commission, put me in contact with Donald, the anthropologist who had worked on several digs in the region. Bone and stone tools from prehistoric Natives of the region would be the main contribution from their organization. The Northeast Museum would provide both prehistoric items and historical items for the virtual museum project. Finally, the Seaside Museum would provide historical items as well as contemporary objects made by tribal members.

FIRST TRAINING DAY AT THE SCHOOL

I arrived at the school on the Monday after my first week at Bountiful River Tribal School. It was the second week of May. Theresa had set up a computer in the fifth grade classroom and introduced me to Ronald, the fifth grade teacher. She recapped the virtual museum plan with me. The virtual museum would be a fifth grade project. Ronald had twelve students, and a team

of four students would go to each museum site to do the research and imaging for the virtual museum. Ronald was very excited about the project and had been preparing the students by brainstorming research questions with them. One of the classroom blackboards was filled with the final questions the students had developed.

Theresa and Ronald planned to have me work with students during the day to show them how to use the camera and create QTVR media. Theresa and I set up a QuickTime VR imaging area in the corner of the classroom. I thought it would be possible to work with three students at a time, so four groups were formed and I began working with them, one group at a time. The students chose cultural objects from the library or the culture classrooms to image. They chose a moose call, a rattle, a sweetgrass braid, and a pair of beaded baby moccasins. The moccasins were a personal choice by one of the students, who said she had made them herself.

I showed the students some sample QTVR from earlier projects, explaining how the objects were imaged. Then I began working with each group in turn. The students took turns taking the required pictures of the object on the turntable. Then I showed them how to take detail close-ups of features that they thought were important. Immediately after imaging an object, I would step the students in that group through the process of making the basic QTVR object. After going through the basic instruction with all of the student teams, I used the remaining time to show them how to add hot spots on their QTVR media to bring up their detail shots. For instance, on the moccasins, a hot spot was added so that

when clicked with the mouse it would bring up a detail of the beadwork on the top of the moccasins.

The students especially enjoyed using the camera. At the end of the day, they wanted to take pictures of each other, Ronald, and me. It was hard to get them to put the camera down, even after class was over. Theresa called Wendy in Canada to settle the last details of the visit scheduled for the next day. Wendy told her that the Provincial Archaeological Commission had a database of historical photographs they were willing to share with the school. Theresa made a copy of a Four Directions sampler CD that contained several virtual museum projects to share with the Provincial Archaeological Commission.

VIRTUAL MUSEUM ACTIVITIES AT THE PROVINCIAL ARCHAEOLOGICAL COMMISSION

I was excited about the prospect of the first international virtual museum collaboration in my experience. After the two and a half hour drive, I arrived at the Provincial Archaeological Commission building about an hour before the students were scheduled to arrive. The offices were in a historic building, which was in the process of being renovated near the city center. Wendy met me at the door, and helped me carry the equipment up to a second floor office where the objects to be used for the project had been laid out. The selections were stone and bone artifacts from Archaeological sites along the river bordering the two countries and shell middens that had been found along the Canadian Atlantic coast. Wendy provided several copies of pamphlets published by the Provincial Archaeological Commission and several archaeological reports regarding the items we would be imaging. She said the school would be able to keep these

publications to assist the student research and the virtual museum development. I set up an imaging area against some bookcases on one side of the room.

Wendy introduced me to Sally, the anthropology graduate student who would be helping us with the project. Will and Theresa arrived about a half hour after me. About twenty minutes later, Martha and Ronald arrived with the four fifth grade students—all of the boys in Ronald's class, who preferred to work with each other. The director, Jim, came in to welcome us. Theresa and I demonstrated the National Museum of the American Indian tour done by Four Directions students to show the Canadians what we were trying to accomplish. Showing the museum staffers what we were trying to accomplish helped to promote confidence in the project among all of the project participants. As Theresa explained:

> I marveled at their sense of awe that they had over the project by looking at what we, for instance, brought along to share. At the Archaeological Commission, the CD [of the NMAI Virtual Tour], and at the Northeast Museum, they got to see what a virtual museum is, via the laptop. And I don't really think they fully understood . . . the scope of what we were attempting to do, until they actually saw the types of things the students would be involved in. And I really, I think they learned, took their hats off to students, when, you know, "This is just wonderful—the students are doing this? Why aren't we doing this for our own museum? They're ahead of us; we'd better get going here." I mean, these are people with PhDs. So, I think it was good. I think the students sensed that.

Soon our project activities began in earnest. Ronald divided the boys into two teams of two, so that one team could be selecting and researching their objects while the other two did the imaging for one of their objects. Wendy and Sally provided the students with gloves so they could safely handle the objects. The boys who did the imaging were very confident in their work, requiring little

instruction from me. I monitored the students' imaging activities closely enough to be confident that they were being successful. The school's digital camera saved the images on floppy disks, and it took one or two disks to contain all of the images from a given object. With Ronald's help, I made sure each disk was labeled and safely stored after each object was imaged.

The students who were selecting and researching their objects were very engaged in their task. Sally gave them very detailed information about the objects, answering questions from the boys, Theresa, and Will. The boys wore gloves the entire time, so that they could handle the objects in a professional manner, an opportunity they apparently enjoyed. Occasionally, a student would point out a specific feature of an object to one of his peers, or walk up to one of the adults to ask a question about it.

Martha was busy videotaping the activities and Will was recording the exchanges with an audio tape recorder. Along with the students, both Ronald and Theresa were engaged in taking notes on the objects the students were examining. Occasionally, Will, Ronald, or I would repeat a point made by Sally, Wendy, or Donald to check if the students were attending to the information they were offering, and the students would voice their understanding of the information they were hearing. For instance, at one point, Donald explained that the bone objects of that age would normally deteriorate in the acidic soil of the region in a few decades, but they were preserved in the shell middens because the calcium carbonate in the shells neutralized the acid in the soils. I commented that this was "basic chemistry," and asked the boys if they understood what Donald was

saying. They said they understood the concept, and one of the boys included the explanation in the essays that appeared in the final version of the virtual museum.

These focused activities continued as the teams swapped their roles of imaging and researching throughout the day. Will made a comment that the behavior of the boys was an indication of their motivation for the learning activities of the project, as follows:

> One of the gauges [of student motivation] I always use is how much discipline do you have to put into it? If you are usually doing something that's fun with the kids, very seldom do you have behavioral or discipline issues. This fits into that category because, at least the times I was there and present, I don't know if anybody was ever corrected for anything. You know, it seems like it was a different relationship with the kids. That's the kind of relationship I like to see. . . Even having lunch that day in Rivertown [Canada] was a good experience. And the students were very responsible. We didn't have to chase them down or anything, you know, they were right there with us, and so to me that is an affirmative response. We have seen the kids when they don't like something. It can be, ah, it can be challenging when they're not with it. And so this doesn't seem to be that category, or I didn't hear any complaining.

Throughout the day, the adults exchanged a great deal of information. Will and Theresa especially had exchanges with Wendy, Sally, and Donald about anthropology, Archaeological sites, and the First Nations communities on the Canadian side of the border as well as their relationship to the American Indian communities on the United States side. Wendy was able to burn a CD-ROM of historical photographs of Native Americans that the Provincial Archaeological Commission had collected for a traveling exhibit and Internet site. Among the photographs were pictures of some of Will's ancestors.

In the afternoon, Donald, the archaeologist who had worked on several of the digs that produced many of the objects the students were imaging, came by to assist with the project. For a while, the students stopped imaging and listened carefully to Donald as he gave comments about each object in turn. The students made use of the list of research questions that they had developed in their brainstorming session with Ronald the week before to interview Donald. Martha videotaped the exchange. By the end of the day, the students had imaged ten objects for the virtual museum.

VIRTUAL MUSEUM ACTIVITIES AT THE SCHOOL

Back at the school on Wednesday and Thursday, I helped the students work on their virtual museum project as time allowed. Ronald was out on Wednesday, so I was only able to work with the boys for a small amount of time. After transferring the image files to the classroom computer workstation and organizing them into folders for each object, I supervised the boys as they assembled the QTVR object movies from their images. I helped three of the boys add their hot spot details to the basic object, a task that they seemed to find tedious. I also encouraged them to listen to the audiotape recording of Sally talking about the virtual museum objects that Will had made, but the students seemed to have a difficult time figuring out which object she was talking about at any given time. I spent a good amount of time on Wednesday helping Theresa figure out how to view the pictures she had acquired from the Provincial Archaeological Commission, a problem that occurred because the software was

not available that would allow her to access the kind of database in which the pictures were embedded.

Thursday, Ronald was back at school. There were many activities going on at the school besides the virtual museum project, so only a portion of the day was dedicated to that purpose. As time allowed, I continued to help the boys create their QTVR media for the virtual museum. Ronald suggested that the students could get the information for their object essay by watching the videotape shot by Martha. When Ronald took the rest of the class to the computer lab, I helped the boys review the videotape. This worked well. I went through the tape as the boys watched, taking notes. We rewound the tape at several points to review the most important information being presented by Sally or Donald. Occasionally, I would pause the tape to explain some of the terms and concepts the anthropologists used. After we had reviewed the tape, I read through some of the anthropology handouts about the objects that Wendy had provided to the school. I translated the technical terms in the reports into common language that the students could understand. For instance, in an article that discussed an extinct sea mink found in one of the shell middens, I explained that a *metacarpal* was a bone in the animal's paw, a *phalange* was a toe bone, and a *mandible* was a jaw bone. The student used the common terms in his final essay on the bones.

On Friday, the second virtual museum team, consisting of four girls, went to the Northeast Museum with Martha, Theresa, and Sandra. Unfortunately, I was unable to secure written permission to conduct my research at that site, and therefore was unable to conduct research interviews with any of the museum staff,

so other than indicating that there was a third museum partner for the White Pine virtual museum project, I will offer no other discussion regarding that site in this report.

VIRTUAL MUSEUM ACTIVITIES AT THE SEASIDE MUSEUM

On Monday the following week, I drove to the Seaside Museum. Travel time from the school was about three and a half hours, and I left early enough to arrive about a half hour before the White Pine group. Shirley, the museum curator, met me and helped me set up. Shirley was the same museum staff person who had assisted with the Bountiful River virtual museum activities ten days earlier. Will had made a special request that the Seaside Museum provide historic and contemporary items from the White Pine community for the virtual museum. Shirley had identified several possible items for the students to consider.

Ronald and Betty arrived with the four girls. Will was sick that day and did not come. Shirley showed the students the items that fit the criteria that Will had suggested, and the girls selected the ones they wished to research and image. Several of the items had been acquired by the museum fairly recently and had been made by relatives of the students. Shirley also helped the students browse through the museum database to make additional selections, some of which were from other Wabanaki tribes in the region.

Because Martha, the school librarian, did not come to the Seaside Museum, Ronald took over the job of documenting the project on videotape. He also assisted the girls with their research. Betty made herself available to the students as an additional information resource. Because many of the objects were

made by members of the White Pine community and other nearby Wabanaki communities, many of whom Betty knew personally, she was able to help the students recognize the family connections they had with the objects they were imaging. Betty was also able to describe the materials and craftsmanship that went into making the objects the girls selected. Betty's personal knowledge of the Wabanaki communities complemented the information Shirley had of the donors and the museum collections. The students appreciated the Betty's contribution to the day's activities, as June, one of the students, explained:

> I thought Betty was there to, that she's like real old, that since she was little like back in the past, I think she knew a lot more about our ancestors, who we're related to and like she learned about all kinds of things. Like I needed help with the kind of wood that the walking stick was made of and she thought, she kind of knew, since she was real little, that it was a cherry stick she used, and I thought that it was really cool the way she was there helping us.

The girls used the questions that had been developed by the class and improved through the earlier virtual museum activities to guide their research. Ronald facilitated their research by helping them measure the dimensions of the objects and contributing his knowledge of the regional history.

Again, Ronald had divided the students into two teams of two, so that one team could image an object while the other team selected and researched their objects. As the boys had done, the girls performed the technical aspects of imaging the objects with very little help from me. The girls remained very focused on their tasks throughout the visit, and they were able to image and research ten objects that day.

VIRTUAL MUSEUM ACTIVITIES AT THE SCHOOL

In the last two days of my visit, I continued to assist the students with their work on the virtual museum. On Tuesday, I helped the students transfer image files from the disks and place them in folders for each separate object. I worked with the girls, helping them create their QTVR object movies. Ronald helped the students write the essays that went along with each object. By the end of my visit, he was happy to say that the students had completed most of their virtual museum essays.

Theresa wanted to assemble and post the virtual museum as soon as possible because there was a great deal of anticipation from the parents and other community members. She had some experience creating the school Web site during the Four Directions project, but she did not feel confident enough to put together a whole virtual museum site on her own. In the last two days, as time allowed, I worked with her to develop a basic structure for the school's virtual museum. This basic structure included graphical elements such as navigation buttons and the background pattern for each of the pages, as well as the basic interface and layout of the virtual museum. With that basic structure completed and with some additional training I was able to provide, Theresa thought she would be able to complete the project. I told her I would make myself available via phone and email to help her along if she got stuck.

In addition to the virtual museum activities, I was able to conduct research interviews with the students and most of the adult participants at the school. I arranged to interview the last adult over the phone after my return to Austin.

COMPLETING THE VIRTUAL MUSEUM WEB SITE

I stayed in contact with Theresa after my return to Austin via phone and email. A week after my visit, she told me about a tragedy in the community. A tribal member had died in an auto accident, and he was the brother of one of the culture teachers involved in the virtual museum project. Also, he had made a quill box that was featured in the Seaside Museum section of the virtual museum. The school and community were in a state of mourning. Theresa and I realized that great sensitivity would need to be used in considering how to proceed with the project. Later, relatives of the deceased indicated that it would be appropriate to continue with the virtual museum project with the inclusion of their loved one's contribution.

I continued to help Theresa with the virtual museum development as needed. Very little assistance was required from me, though. When she completed the project as best she could, she mailed the whole project to me on CD-ROMs so I could correct any minor problems that eluded her. I fixed the few errors and quickly made some other minor improvements to the Web site, and—after she approved of the final version—I helped her post the virtual museum to the Four Directions Web site.

CASE ANALYSIS

From my observations as the researcher, I considered the White Pine virtual museum project to be the most successful of these four cases. The project went very smoothly, despite a tragic death in the community near the end of the project. The scope of the project was very fitting and appropriate to the project

goals and to the time and resources available. It consisted of a single class, which included all the fifth grade students in this small rural school. The availability of three museum partners allowed the division of the project into separate parts, three teams of four students for each visit, a number that has worked out well for most of the projects in my experience. The single classroom teacher was able to structure the project to fit his curriculum needs, and the culture teachers at the school provided the support and guidance that is crucial for this kind of cultural project. The technical, planning, and communication skills of the technology coordinator were very nearly equal to the task of seeing the project through to completion, with only a moderate amount of assistance and training from me.

The students were very capable technologically, and they picked up the skills for producing the virtual museum media quickly, so that they were able to carry out their tasks at the museum sites capably and with confidence. They showed great interest in carrying out the project, as indicated by their exemplary behavior at the museums and in their willingness to research and write up the text labels for the virtual museum Web site. As I will be discussing, the teachers came up with some innovations that facilitated the students in their research, simplifying the task of writing their essays.

In the three prior cases, there were a number of problems that interfered with the satisfying completion of the virtual museum projects. These problems included not completing the virtual museum Web site, not getting the teachers on board, not having enough adult supervision, lack of community member participation, lack of planning and communication, and not providing teachers

with project information or technical training they needed to participate effectively in the project. Because none of these kinds of problems occurred, it was my judgment that the current case was the most successful of the four. This is not to say that the White Pine Tribal School project is the epitome of successful virtual museum projects. Each of the virtual museum cases in this study displayed their own unique strengths and characteristics that may be added to a more complete description of an ideal virtual museum project. Because critical discussion of project problems represented a good portion of the other case analyses, the lack of similar problems in the White Pine Tribal School project also led to a fewer number of themes that emerged out of the case data.

THE VIRTUAL MUSEUM IS A CROSS-CURRICULUM PROJECT

One theme that was common to the first two cases was "Bringing The Teachers On Board." In the third case, classroom teachers were central to the project activities, but they felt that they were not given the opportunity to participate in the planning of the project and did not receive sufficient information and training that would help them take better advantage of the project's educational potential.

The situation was different for the White Pine Tribal School project. Ronald, the fifth grade teacher, was given ample opportunity to participate in the planning of the project, in terms of how it would fit into his classroom practice. His conceptualization of the project was fairly straightforward: "It's a cross-curriculum project." From that formulation, he elaborated his goal as

> incorporating this project into my science and history units, based on Wabanaki history, and some of the artifacts we found have come from the

> years in Wabanaki history and civilization. I was cued into this project via Sister Theresa, who came to me and suggested this might be a really be an interesting project for the students to work on, [to] gain knowledge from.

Ronald indicated that he was given advanced notice of the nature of the project, "cued in…via Sister Theresa," as he put it. This gave him some time to consider how the project would work with his teaching style and classroom responsibilities, allowing him to anticipate the opportunity to use it to teach aspects of the science and history units, as well as connecting the science and history to Wabanaki culture. He added:

> Well, I think the students are gaining vast knowledge of their own culture, about the past, their own culture, back thousands, you know, hundreds of years, as well as the technology part of it. They've learned incredible amounts of technology.

Theresa also recognized the integrated curriculum aspect of the virtual museum project, although she tempered her praise on that topic by noting that the timing of the project—that is, at the end of the spring semester—could have been better. As she explained,

> I think it's a wonderful cross-curriculum experience, and I just feel it's too bad that this can't be carried on. This, again, what they're doing can be used as learning units even in the school as we go on. We can build a thematic unit on it, and do cross-curriculum type of activities. Very definitely ongoing. But, alone, I mean right now they have not had a, and probably won't—because we're at the end of the year—get into the science aspect of it. They did some math doing this: the measurements, the metrics, the standards. Definitely they're doing some work in language arts by writing up their reports. The historical/social studies aspect is really finding the truth about the object, what it was actually used for.

When Theresa surveyed the outcomes of the virtual museum project, she saw some potential educational opportunities that were missed due to the ending

of the semester. Like many participants in the earlier cases noted, virtual museum projects need to be ongoing if it they are to live up to their potential. For Theresa, the project's potential could be realized in part by developing a "thematic unit" or "cross-curriculum types of activities."

THE VIRTUAL MUSEUM AS AN ONGOING PROJECT

Theresa's remark relates to another theme, that of the virtual museum as an ongoing project. For Theresa, continuing the project would afford opportunities to develop a more elaborated virtual museum curriculum.

Will, the culture program director, also hoped that the virtual museum would grow over the years. He said,

> I was hoping that this type of project would be something that builds on itself.. Students are doing this photography and this research and then putting it on the web site. Hopefully this Web site will grow, that you will have other students visiting different places or the same places and getting different objects every year so that this one site will be . . . ongoing.

Will saw another aspect of a virtual museum that "takes on a life of its own" once it is posted on the Web. Will pointed out that several students who went on the Seaside museum visit "recognized that such and such an object was made by their great aunt." He believed the virtual museum could be animated in the minds of the students in much the same way, that such a familial connection might function in a similar manner for a virtual museum built over time by different student cohorts. Will proposed

> And the Web site, these kids are going to know, "This was placed here by my big brother, they helped to put this Web site together." That is the same situation as if you saw a museum object. It's a different technology and everything, but the same principle, and that I think is one of the things, "You know my older brother did this, and then I've got to add on to

> it." And so I think that that's how you spread the whole business of expanding it down the road, so that it takes on a life of its own. Not because we are, adults are, actively promoting it. I think there's always a place for that, and that will always be necessary as our functions as teachers, but I think that the other part is it'll take on a life of its own because it is yours [the students'] already.

Will could see how a virtual museum might grow over time and become a part of the yearly school activities, allowing different students the opportunity to make the museum visits and contribute their own virtual museum exhibits over time.

As Theresa explained earlier, the school's Web site garnered a good number of requests for information about the school and Wabanaki culture, and she referred most of the cultural queries to Will. Like Theresa, Will saw the potential of the virtual museum as an information resource that he could refer people to, but he thought it would need to be developed over time. He looked forward to the posting of the first version of the White Pine Tribal School virtual museum because it would provide an "infrastructure" to build upon. He told me:

> I'm usually the one who ends up with them [requests for cultural information]. I have some prepackaged stuff that I mail out, but I think that if they can have a better view, especially, you know, something that they can just look at themselves and ask specific questions about. You know, "What does a birch bark wigwam look like?" We can very well add that to the [virtual museum] collection. Or "Show us, send us a picture of a canoe." We have one at our other reservation, a birch bark canoe, and there's no reason we couldn't figure out a way to photograph that and add it on. So the potential of adding on stuff is infinite. That's the beauty of it. It think that the initial phase of this project to lay what I call the infrastructure, hopefully we are doing that, and then it's up to us to pick it up and make it work.

Martha, the school librarian, saw another reason for an ongoing virtual museum project that was similar to Theresa's wish for more curriculum

development. As she stated it, both she and Theresa thought an ongoing project was important in terms of promoting the educational benefits of virtual museums throughout the school:

> I talked with Sister somewhat about it, and we're interested in carrying it on further into the fall, beginning the new school year, with the same kids, hopefully working with a grade younger. Next year they're going to be sixth graders. Bringing those kids down and letting them work with fifth graders and showing them what they know. That way it'll help those guys, help those kids retain what they've learned and pass it on.

Outside of learning the technology used in the virtual museum project, Martha did not specify precisely what she envisioned that the students would be teaching their peers. Possibilities include how to work with museums and handle artifacts, how to research the cultural items, and the cultural, historical, and scientific information they learned while doing the project. As she pointed out, there is an added benefit in peer teaching situations, in that it helps the student retain what he or she has learned. In addition to supporting the "Virtual Museum as an Ongoing Project" theme, Martha's statement connects to the next theme, related to developing the skills for conducting virtual museum projects within the school community.

DEVELOPING VIRTUAL MUSEUM SKILLS IN THE SCHOOL COMMUNITY

Theresa had mentioned to me that, as the school technology coordinator, she was disappointed at the low level of technology use by many teachers at the school. Martha explained how an ongoing virtual museum project that incorporates peer teaching could overcome teacher reluctance toward technology. She told me:

> It keeps them [students] using it so that even if they hit a teacher who—how should I say it—is not as advanced in the technology aspect as the virtual reality, they're still using it to be able to show another child and therefore still learning themselves. So, that will be the biggest thing, but there are plans for the fall. It does make a difference for the kids on who shows them, you know. They really like learning from each other.

Ronald, especially, appreciated the peer teaching aspect of promoting the virtual museum skills within the school. He said,

> What I'd like to see, though, is—these kids are grade five, OK, when they get to junior high next year—is to do some peer teaching as far as this technology goes and show some of the seventh graders or the eighth graders some of the things they have learned, have that time set aside to bring small groups maybe up to the lab, sit down and show them some of the things they've learned. Kids learn by teaching kids. I mean, that's great! Peer teaching is just fabulous!

For Theresa, the peer teaching approach to spreading the technical skills required by virtual museum projects benefited not only the students, but the teachers as well, because it freed up their time and attention so that they could focus on their other formidable teaching responsibilities:

> I see the kids as key with helping the teachers. A lot of the teachers have been hesitant to get involved with [technology]. And I can understand why something very detailed [could be daunting], because of their responsibilities. But all it takes is a few kids to really know what's going on, and they help one another out.

Martha acknowledged that the students "had already had experience with the camera," but she indicated that the virtual museum project was their "first big undertaking" using digital photography. She also stressed how important it was that the students did the work on the project. "I can take the pictures and put it out there, but it's not the same as when the kids are actually showing another child."

Both Theresa and Ronald were proponents of technology integration in the curriculum as a vital lifelong skill. For both of them, the goal of developing virtual museum skills in the school community represents an important curriculum goal in itself. Theresa linked the virtual museum skills to her wider goal of exposing students to various technologies over the course of their school experience. As she explained, in addition to being "fun" for the students, the technological skill they gained through experiences like the virtual museum project "touches all areas," and enhanced the students' prospects in the job market:

> The other thing is, I think the skill, the technological skill that they've learned or are learning now is ultimately to be definitely carried on through the rest of their schooling. Some may even find that they have a career. You know, it touches all areas.

Ronald's remarks echo Theresa's in several ways. As he explained, he personally found the virtual museum technologies to be interesting, and he thought that it would be something that would affect the students' lifelong learning:

> Well, for me the technology aspect of this whole project is just fascinating. It's something that I'm sure these children here will take with them throughout the rest of their lives, that lots of kids their age don't get an opportunity to work on. Lots of computer knowledge gained by all of the students as well as the teachers and everyone else who has worked on this project. Very, very valuable.

I would add that during the project activities, Ronald was too busy managing his classroom to participate in the technology training in the virtual museum technologies I was giving mainly to the students. Unlike the teachers at Bountiful River Tribal School, he was not concerned about the lack of technology

training for himself, but rather seemed to be comfortable with the students and Theresa assuming the leading technical roles in the project, while he performed his enabling "facilitator" role.

Will also appreciated the importance of students learning the technical virtual museum skills, but he identified a different aspect of it, related to the care of the equipment. He noted that earlier, the school staff were hesitant to put expensive equipment in the hands of young students, but the virtual museum project helped to alleviate those concerns and gave students the opportunity to demonstrate their ability to use the equipment responsibly:

> I think that, if it can be a pleasant experience, which I think from my observations this was, then it will feed itself into other stuff. The mystery of all of this machinery is now minimized and gone. It used to be when you saw something, the old way of teaching, it was sort of never let the students touch it, "We'll show you, but don't you ever touch it." . . . And this is a whole new ball game. They're handling the equipment, and when they're handling the equipment, we're teaching them hopefully how to be responsible for it. How to clean it, how to maintain it, and those in themselves are part of the learning that I see as real valuable because they're going to have to learn that down the road anyway.

As Martha suggested, "virtual museum skills" imply much more than the technical aspects of digital photography and virtual reality imaging. For Will, these virtual museum skills were important in terms of helping foster an appreciation for and ensuring preservation of Wabanaki culture. In this respect, he saw in the efforts of the students a continuity with efforts by museums and professional academics:

> The other part is, they learn to appreciate, and I think this is something that didn't exist for us for a while, to archive materials, to prepare them so that the next generation can have access to them. And I think that lots of times, you know, like when stuff of ours got lost, thank god for the

> museums, at least there's something. But think of the stuff that got lost and nobody paid attention to it, you know. Thank god some of those guys came and recorded our language way back when. You know that helps us an awful lot. Or even those pictures and stuff. We knew how people dressed and how they sang, and so the place of technology and the students' knowledge of it is so vital.

Developing knowledge of the cultural, historical, and scientific implications of the virtual museum objects required research skills. Virtual museum projects require an approach to research skills that departs from the typical kind of library and Internet research of ordinary classroom research projects. Much of the virtual museum research involves obtaining information from anthropologists, museum professionals, and community members, which implies the use of oral history techniques. White Pine Tribal School was particularly innovative in their approach to these virtual museum research skills, making use of research questions brainstormed by the students ahead of time and videotaped interviews with informants. This innovative approach to classroom research warrants a special theme of its own.

INNOVATIVE RESEARCH TECHNIQUES

Student Research Questions

To help with student research, I had provided all of the schools in this multiple case study a list of research questions that were originally developed by Joanne at Northern Lakes Indian School (see Appendix 4). Many participants in the previous projects commented on how useful they thought the questions were for the students. In the Bountiful River Tribal School project, Ronald had enough advance notice to work with the students to come up with their own research

questions. On the first day of my visit, when I did the initial technology training sessions with the students, I saw the questions that were still on the blackboard from the week before when Ronald helped the students develop them. He explained:

> We did some brainstorming with students on questions that the students could ask the curators at the museums dealing with the items and the objects that we may be dealing with when we got to the museums. We had to do this without knowing what the objects would be, so we had to come up with more or less generic type questions that would fit whatever the object would be. We finally came up with 27 questions, but we narrowed it down to, I think, 12 that we took with us to the museums, along with some other questions that Mark gave to the students. So all and all it was very good, very successful when they asked the curators at the museums these particular questions about the objects.

On the first virtual museum field trip for this project, Wendy, who was our host at the Provincial Archaeological Commission, noticed how the students made effective use of their questions. She contrasted the students' questioning with the anthropology articles she had collected for the students. When I asked her for her observations on the students' research activities, she told me:

> OK, well, first of all the reports, I mean the reports are a little too technical for them, but I didn't realize that at the time, like how old they [the students] were. I thought they would be older high school children. So, when Sally and Donald came and explained what the artifacts are, I think they understood it more. I know they wrote down the information and everything so I think they were pretty interested in that aspect, and based on the questions, I mean they had questions all written down to ask Donald, so that means, while he was talking, all these questions are going through in their heads. So, there was an interest, a great interest there. And again, I feel it's because of the energies, you know like the energies from the artifacts, from the items, you know.

Wendy realized that the technical reports she provided the students might not be age appropriate, and appreciated Donald and Sally's role in providing

information more appropriate to the students' grade level. She was impressed by the student questioning of Donald and Sally regarding the objects and gave an effective description of how the written questions were "going through their heads" as the anthropologists described their knowledge in the presence of the objects. The objects themselves contributed to the research process, adding their "energies" to the interview milieu. I will investigate the significance of the presence of the cultural objects in more detail in discussion of the next theme.

Will also appreciated the questions that the students prepared for the project, noting that "beautiful questions" are hard to ignore by an educator. He thought that the success of such an approach was largely dependent on the orientation of the people who were being questioned. In regard to using student research questions, he explained,

> It works well if you have the right individuals. If they haven't been tuned in, it doesn't work well, if, whoever has the direct answer to the question just doesn't see beyond it, but if you have a situation where the person being asked the question, the adult researcher who's also a teacher-oriented type person, then it has a natural way of working. It all depends on the individual.

Will recognized that student research questions may result in cursory information if the interviewee gives answers that do not extend the answer beyond the minimum requirement. "Teacher-oriented types" recognize the importance of more elaborate responses that connect the information to wider issues. Student research questions are what teachers call "teachable moments" that those Will called "teacher-oriented types" can take advantage of.

Donald, the anthropologist at the Provincial Archaeological Commission, certainly fit that profile. As Wendy noticed, student questioning worked very

well when Donald, who had worked on the archaeology sites from which many of the artifacts had come, was able to answer questions from students in the presence of the actual objects. The students were able to hold up the artifacts to examine them more closely as they interviewed Donald. The questions they asked from their master list may seem naive at first, but Donald took them seriously and gave elaborated answers that were rich in information. For instance, when asked about one artifact, "What tribe did it come from?" he had to consider the question for a while because the object came from a time before the contemporary tribes were established. He answered,

> Oh, boy. Well, an archaeologist would say it dates to the Middle Woodland Period, which is from about, oh, say, twenty-two hundred to about fourteen hundred years ago. The people living in this part of Canada and the Northeastern United States then were almost certainly the direct ancestors of Wabanaki people.

The repeated question, "How old is it?" led to another question about "How do you know how old it is?" which led to an explanation of layering in archaeological sites and carbon-dating techniques. The students wanted to know not only "Where was it found?" but also "What kind of country [environment] did you find it in?" These questions elicited from Donald a detailed description of the coastal island where the dig was located and the kinds of resources in the area that made the site attractive to Native people. In answering the question, Donald also explained that the sea level had risen since Native people had lived at the dig site, and the site would have been connected to the mainland at the time of use. By asking, "Is it fragile?" the students were able to learn about the typical condition

in which many objects were initially found and the steps that museums take to prevent objects from deteriorating.

The question "How much is it worth?" brought up an important controversial issue with which museums and anthropologists must deal. Again with careful consideration, Donald answered,

> Boy, that's a difficult question, too. It's priceless. You know that museums are hesitant about even insuring artifacts because by insuring them you put a monetary value on them, and therefore people will steal them, or sell them, and things like that.

To which explanation, Ronald then added, "It's very, very valuable in terms of knowledge."

Martha was present at the visit to the Provincial Archaeological Commission and noticed how well student questioning worked for the research phase of the virtual museum project. She also noticed that the questions the students had developed evolved as the virtual museum project continued at the other museum sites. She explained:

> The research phase went really well. They asked the questions that they had written, but they had also, as they were asking the question, had more questions, so they were learning that even though it was just what was written, [it] wasn't all that they needed to know. And I saw it as the next group went, that they had borrowed quite a few questions from the first group that wasn't even on the question sheet, so they were sharing that information, that they realized that not all they needed to know, that there was more that they needed and wanted to know about those, about the artifacts they were taking pictures of.

Videotaping the Project

In addition to helping the students develop good research questions to guide their research, Martha also videotaped the students as they worked on the

project and conducted their interviews of museum staff. Initially, the purpose of the videotape was to document the project for the school, but soon it became clear that the videotape was an important research document that the students could use. Martha explained her videotaping role as follows:

> My role . . . was to accompany the kids and use the digital video camera to record the kids as they were taking pictures for the virtual museum—document what they were doing. That way, it was actually a two-part piece. One, that if they needed any reference that they had missed, they could go back to that video camera and hear the discussion about the piece that they were taking pictures of, and to show what the kids are learning, what the kids are doing with the virtual reality. . . .

As described above in the project narrative, the value of the videotapes as an information resource was appreciated once the first group of students returned from the Provincial Archaeological Commission visit. Initially, we tried to get the students to find information on their objects from the audiotape that Will had done of the student questioning, but the students had a hard time figuring out which object Donald or Sally was discussing at any given instant. However, videotape instantly revealed what the archaeologists were referring to as they picked up the different items and pointed out the features on them. There was a social aspect to watching the videotape as a group in the classroom. The students could point out things they noticed to each other and the teacher could rewind the tape at places where an important point had been made to reinforce it through "instant replay."

After that initial success of using the video as a research tool, the videotaping of project activities for the purpose of gathering research information for the students became more conscious. Martha was unable to attend third

museum trip to the Seaside museum, so Ronald took over the role of videotaping the activities. I asked him about his use of video to capture information at the museum for student use, and he replied,

> I tried to use that as a supplement. I know the kids have taken notes on the questions that they had, but I wanted to have different resources, so when we got back to the classroom to do our little write-ups on each object, that they'd have, you know, they could go to the videotape, they could go to the tape recorder, they could go to their notes, and all the different resources to put their little writings together.

Several students agreed that they found the videotape useful for their research. June, who had gone on the Seaside Museum visit, said,

> I thought it was kind of cool where we got to videotape things and like, like when we watched it, we got more information when we really didn't realize we were getting that much information, and we'd write it down.

I called Martha a week after the project to conduct my interview with her, and she told me that the students were in the process of checking the accuracy of their object essays by reviewing the videotapes one more time and having the culture teachers examine their writing.

The use of student-created questions and videotape were innovative research techniques that worked well for the virtual museum project. These techniques are also common to oral history projects, and the connection would appear to be that the nature of both oral history and virtual museum projects are authentic learning activities and they both involve students interacting with people who have knowledge relevant to their learning goals. There is another aspect of the virtual museum project that affected the quality of student learning, but in a different way than the techniques of questioning and video recording, and that is the close proximity students had with the objects of study. In most cases the

students were able to handle the objects they worked with. As Wendy mentioned, "there was an interest, a great interest there . . . because of the energies . . . the energies from the artifacts." This has been noted in different ways in the earlier cases, and relates to the next theme that arose for the White Pine Tribal School case.

BRINGING OBJECTS OUT FROM "BEHIND THE GLASS"

In earlier cases, some participants made a reference to the glass of museum cases to symbolize the physical remoteness from important cultural objects that exists in museum collections, and the desire, especially of Native people, to get a closer look or have more intimate contact with the objects. I mentioned in the case narrative above that the research videotapes showed how the students were clearly excited about the opportunity to examine the objects so closely and how they understood the museum protocol of wearing gloves to do so. Proximity to the objects had a similar effect on the adult participants as well. Martha recognized the effect of being so close to the objects on the students and herself and commented on it in this way:

> I saw a lot of the kids recognized some of the names of the pieces that they were taking pictures of, when it came to the baskets, the moccasins, and they also had a chance to look, to look at pieces really up close that they may never get a chance to. In a museum it would be behind glass. The recognition of just what the people could do, of the past accomplishments of their basketry and beadwork. And for the Provincial Archaeological Commission one, I found a lot of interest in the kids when they were looking at the different spearheads and different tools that were used. So it kind of drew them back even further as to what our people were doing back then, what they were using these tools for. So I thought it really, I thought it was really informative for the kids as for myself. You know, I saw some pieces that I many never see up close like that again.

I commented to Martha that many of the objects we saw may never be on display, especially at the Provincial Archaeological Commission, which had no museum space to display objects to the public. Martha agreed with my observation, and then went on to explain further how she thought the physical closeness to the objects affected the students:

> Yeah, or if they had them displayed you are looking at the piece of glass. We really got to look at these. And I think having it up close like that, to me I saw the kids a little more interested in it. They had a little more fascination, a little more ownership of it, than some display sitting somewhere with this little note attached to it.

Donald, the anthropologist who worked with the students at the Provincial Archaeological Commission, thought that being able to handle the physical objects was especially effective in connecting the children to their ancestry and the past. He contrasted this effect with academic knowledge, and revealed some his own enthusiasm for working with material objects as a virtue of archaeology when he said,

> I think kids at a certain age relate better to material objects than they do to sort of abstract concepts and sort of dried academic information, and to me one of the powers of archaeology is being able to put in people's hands something—not that it is just connected to them personally through their ancestry and things like that, but an object that's really, really old, like that 6,000 year old gouge, and to say, I mean people have to be pretty numb not to have, not to feel something, when they're able to handle an object like that, and I think particularly with children, material objects like that really speak to them in a way that abstract knowledge doesn't, through abstract knowledge either written or oral.

In some ways this is an unusual statement to come from a scientist, who—one would think—would champion the more quantifiable aspects of experience, yet he did describe this effect as something akin to what Wendy described as the

mysterious “energies from the artifacts” that stimulate the curiosity, motivation, and enthusiasm of the students who handle them. It is something ineffable, that we may be able to refer to indirectly when we see its effects, but not name. When I asked some students how this project differed from getting the same information out of books, Luke’s answer revealed how the children recognized that the “energies of the artifacts” worked on them, but also how difficult is was to express this idea:

> It's not like you just have to stand back and not touch anything and just look, but don't touch. Like you can go up to it and feel it and when you're touching it, it's like the real thing, not like you … have to read about it. When you can look at it, you can touch it and take pictures of it and feel it and stuff. It's different from the book because you can see it and touch it and stuff.

Examining some of the reasons these particular objects resonated so well with the virtual museum participants, particularly the students and Native adults, will take us to another theme that deals with the cultural connections that these participants have with the objects, which cover thousands of years of their tribal history. It deals with the difficult issue of identity.

UNDERSTANDING WHO YOU ARE

I find that the theme that appeared of “Understanding Who You Are” is a difficult theme for me to address, especially because it was elusive even when it occurred to the project participants, much less to me, a person from a different cultural background. For example, Wendy, as a Wabanaki, shared cultural affiliations with the students. She pointed out the importance of realizing one’s historical and ancestral connections in a fairly direct manner when she told me:

> Well, I think they, well, first of all they learn this technical part of the project, and the other thing too is they learn about themselves, you know. And like these artifacts here and the ones that Donald has, they're connected to them. You know what I mean, they can, though they belonged to Indians a long time ago, sure they did, but they are also a part of it because they are the descendents of the Wabanaki people. You know, and there a connection has been made. So I'm hoping they see it, I mean I saw it happening, but I don't know if they do, you know, that it was happening, and I'm just hoping that they'll take an interest, a further interest in like who they are. Because you have to look at the past before you can say who you are today. You know what I mean? And I feel that connection was made.

In earlier virtual museum projects and in my Four Directions work, Native elders have told me how important is was for the children to "understand who they are." I asked Wendy if she could help me understand more precisely what the phrase meant, if it referred to their history, or who their ancestors were, or something else. She said,

> Yeah, it's this whole idea, you know. Some people will say, "Yeah, oh yeah, well we're just re-learning our culture." But I don't call it re-learning. What it is, like it was interrupted, like in my lifetime it was interrupted, and then now it's re-awa[kening], it's waking up now. It was asleep but it's waking up now, again, you know. And you don't re-learn it, it was there all the time. It just slipped. I don't know any other way I could put it.

I do not feel fully capable of interpreting Wendy's distinction between "re-learning our culture" and having the culture "re-awakening" within her. I would venture to guess that she was rejecting the notion that she had somehow "lost" her cultural identity, leaving her without one. Instead, she spoke of her cultural identity being "interrupted," without going into detail as to the nature of the interruption, though the idea would appear to be related to maintaining her First Nations identity in contemporary Canadian society. There is some aspect of

the Native American identity that is reawakened and reconnected when Native students and adults encounter the "energies from the artifacts."

Wendy referred to the long struggle in which Native Americans have been engaged to maintain their cultural identities. There must be something very enduring in the core of the Native American identity that has kept their cultures going. Wendy expressed it in terms of adaptation:

> And it's, like the other thing is too, like I saw, is how we've managed for thousands and thousands of years, and still today, we've managed to adapt to whatever changes [that] come along, but are still able to hold on to who we are. I see myself, well all of us, as being chameleons. We just adapt so very well to new processes or new legislation. You know, whatever is put on us, we can live with it. You know what I mean?

Part of the struggle for Native identity takes place in the schools, which have historically served governmental policies of deculturalization and assimilation. Since their emergence in the late 1960s, tribal schools have become institutions that have worked to reverse the deculturalization of Native Americans. Will referred to his own efforts to make culture a "centerpiece" of the tribal school mission. He told me:

> I've personally fought all my life to have my, our culture as the centerpiece of all the curriculum here. And we're at last barking somewhere around that neighborhood. We're not there yet, I don't think, but we're in the neighborhood, and that makes me feel a lot better because when we went to this school there was nothing. There was no mention of the fact that there were Native people, yet when we went home we saw it all, and maybe that wasn't that much of a frustration because school was one thing and what you saw in the community was [another], and they were always separate, then as one became infringed upon, though, it became important for the school to try to supplement that. I guess that's the model we're trying to do now.

Will went on to tell me that growing up, in spite of the frustration of having his culture ignored at school, it was not necessary to have it taught at school because the culture was seen in the community. Both Will and Betty talked about their school as a place where you learned to read and write in order to adapt to the mainstream culture. At school, Betty would be punished for speaking the Wabanaki language, but her family elders would look on her with disapproval for speaking English at home. Will spoke of how the sheltered tribal community of his youth became increasingly "infringed upon." Will acknowledged the importance of the tribal school's current cultural program in supplementing the cultural experiences students get at home. In this regard, he was very enthusiastic about the virtual museum project. He said:

> Our students are not just studying rocks of way back or moccasins of way back, they're actually, actually getting closer to the human beings that maybe chiseled the tools or made a certain pair of moccasins, you know, the children, the students of the school, as well as myself and Betty are descendants of these people. So they have a real, vital connection. Some of them are our physical descendants, direct line descendants, and so it's pretty important we keep these objects alive, and remind ourselves of our role in the world around us.

I mentioned to Will that the students who went to the Seaside Museum could identify family members and community members who had made many of the items in the museum collection. He said, "That's what I mean by that living connection." Then he elaborated,

> And see, if you take that foundation, that's the foundation block for expanding it into a maybe wider study when they get older. So, and it just builds upon itself, and they too will have children and grandchildren some day, and that's the connection you must maintain. Now we obviously can't maintain a direct connection for the people who came twenty-five hundred years ago, but there's still a connection there, and sometimes the

> archaeology, and the knowledge of the archaeology, and knowledge of the oral tradition, combining two to maintain that connection.

Here Will painted a broad picture of how one could maintain a cultural identity, through the "living connection" to the familial past and the familial future, and the past and future connections to the community. The connection then could be extended into the ancestral past through the knowledge of the oral tradition and back even further with the knowledge of the archaeology. In some respects the virtual museum project touched all of these connections, even the future connections through the ongoing nature of the virtual museum Web site.

In explaining this theme, I've tried to indicate how the virtual museum project might work to help Native American students strengthen their sense of cultural identity, which is a difficult case to make from the standpoint of a cultural outsider. The following theme overlaps this one in some respects, but deals with the more objective and particular issue of making the museum collections more accessible to Native people.

PUTTING MUSEUM COLLECTIONS INTO CIRCULATION

As the director of the Provincial Archaeological Commission, Jim was particularly sensitive to the importance of making his collections available to the public, especially to the Native Americans of the region. In describing his role in the project, he made that concern very apparent. He said,

> I asked Wendy and Pat to pull the collections out that we have. But I'm very interested in it from the point of view of working with First Nations, of trying to find ways to get this heritage stuff back into circulation. That's a big problem from our point of view, is just in breaking the barriers between Native history and archaeological history and working together, because they really do, they're basically the same thing.

Jim made it very clear that he has worked hard to make his collections available to First Nations peoples for the purpose of cultural preservation. He has been working under some constraints, however, which are apparent in the following comment:

> I'm really interested in getting all the information out and available. . . . It's the accessibility that's really being put on the table here. This is a longtime frustration because of, you can see most of the Native perspective in terms of materials in museums and storage rooms and those kinds of things and stuff that you can't get. You might know, but for the most part you don't even know it's there. But it's a question of, if you can put it back into circulation, the objects won't take the wear, you know, show 4,000 people the same bone harpoon, it just won't work, and if you want to do that for a hundred years, it just won't work. But if you do it digitally, the way you're doing it [in the virtual museum project], with being able to almost touch these objects on the computer, rotate it and look at it, those kinds of things—it's access. People can now have access. The Wabanaki . . . culture [gets] back where it's accessible to everyone who wants to get it. And I think that's what the promise of Web sites really is. Putting the stuff back into circulation, as opposed to kind of sitting there.

As the official government caretaker of the archaeological wealth of the region, Jim had experienced the "longtime frustration" of the conflicts inherent in the contradictory goals of preservation and access to fragile materials and in serving the First Nations communities, who have a vital interest in accessibility but a long-standing distrust of government and anthropologists. He sees the virtual museum project and the virtual reality technologies as a partial solution to these issues. The virtual museum allows for digital access to important cultural materials that for the most part replaces the need to handle the physical objects and avoids further deterioration of fragile material that physical handling promotes. Also, by collaborating with a tribal school and the Native American community it servers, the project helps to build a better relationship between the

government and academic communities and the First Nations and American Indian communities.

To illustrate the problems of cultural preservation, Jim told the story of a rare 100-year-old Wabanaki birch bark canoe that was currently in a museum in Sidney, Australia. It had been swapped for some Australian aboriginal artifacts by a Canadian Museum. The exchange expanded the Canadian Museum's collection in some respects, but it deprived the regional Canadian Wabanakis of a rare cultural item. Jim went on to say:

> We can bring that canoe back, and the issue, you know we get into a whole lot of repatriation issues. I don't think the issue really is repatriation, per se. I think it's access and use and putting this stuff back to work. Put the thing back to work digitally. We don't have to spend all that energy, and I guess that's my problem. Obviously I'm coming from the kind of large scale anthropological point of view because we've been through the ringer with the Native community, and I think we've come to a very comfortable, a heck of a lot more comfortable place now than we've ever been in the past. Both communities. And the point of the energy shouldn't be going into that kind of struggle. The issue on the table is heritage preservation, both archaeologically and oral histories and Wabanaki culture and language. Those are the issues that should be dealt with. A hundred years winning that fight with archaeologists is not the issue, but it is whether that site survives with the information it has, or whether its the Wabanaki language survives. That's the only thing that really matters.

For Jim, the goal of cultural preservation was more central than the issue of repatriation because he was working from the "large scale anthropological point of view" that represents his responsibility over all the existing and future archaeological finds in the province. In this view, the energy expended in battles over repatriating one item and historical fiction between communities detracted from the goal of cultural preservation. The virtual museum approach of putting

the cultural materials "back to work digitally" was seen as compatible with his large-scale perspective. Jim also saw that similar approaches could be used to preserve non-anthropological cultural items as well, such as Native language and the living memory of Native elders through oral history.

As a Native American who has sought access to the cultural materials in various museums, Will provided a perspective from the other side of the cultural border that reinforced some of Jim's comments and illustrated some of the tensions that still exist between Native people and the non-Native stewards of cultural materials. When I asked him what he thought the role of museums should be with regard to Native communities, he referred to earlier experiences he had had with museums, as well as the recent experience with the virtual museum project when he said:

> Continue to make stuff as accessible as they have for this particular thing on a long-range basis. Making sure they relate to us and other schools. Who does what in terms of, who's the person to talk to, for example, in the museum if you set up an exhibit? Who's the person to talk to if you want to specifically deal with archaeology, or just the different phases of the operation? Making those things known is really helpful. It's like a directory of resources, and I think that museums have responsibility to let us know that, because it's sometimes, when there hasn't been any dialogue between the communities and the museums, it was because nobody knew what the rules were. Museums in the past have had this very, very possessive attitude, where if you bring a child, their first instinct is to maybe pick up an object, and whereas if possible you want that interaction, you know, or if you can't because that object is too fragile, you at least learn or teach through a learning experience, why you wouldn't be able to pick that up.

Will would like the White Pine Tribal School virtual museum project to be ongoing, but he would also like to see similar projects with different Native communities and schools to develop as well. He recognized that this would

require a better relationship with museums and institutions like the Provincial Archaeological Commission, and he expected a more helpful response from the museums to facilitate collaborative efforts. Will was very impressed by the anthropologists at the Provincial Archaeological Commission, who instructed the students how to handle with care the objects they were imaging. This ran counter to the "possessive attitude" museums had formerly shown toward their collections that he was used to, as he explained:

> I think it's their responsibility to make that a good, humane experience for all of us. I think sometimes museums don't do it that well. You know, I've seen museums where they just, they're so restrictive, and so no learning takes place because you're all, we're all worried about breaking the object and stuff like that. So, [they can help by] making that information known and showing us how to utilize their resources.

Both Will and Jim believed it to be important to utilize the museum resources, put them into service, in ways that would preserve Native American heritage. They both referred to some earlier friction between the Native communities and the museum and anthropology communities that had worked against collaborative efforts to put the cultural materials to work in this way. By contrast, the virtual museum project offered them both some ways to see around the barriers that led to that friction. For Jim, the project showed how museums could work with schools to make the materials accessible on the World Wide Web, while educating Native children about their cultures and making congenial contacts with the Native community. For Will, it was learning that museums could have an amiable and humane relationship with the Native community and finding that, in some circumstances, the children could have intimate contact with

the museum pieces (which connects with the theme, "Bringing Objects Out from 'Behind the Glass'").

Both Will and Jim alluded to continued and improved communication between their communities on these issues. Will was really asking for a better understanding of what the museums have, how they operate, and how to interact with the institutions appropriately to improve the Native communities' access to their materials. He desired an improved protocol for negotiating with museums. He recognized the need for more knowledge in museum science and administration. He also expressed some frustration that the museums had not worked harder to make this come about.

Jim focused on the benefits of putting the cultural materials up on the World Wide Web because the digital access to the materials would reduce the wear on them and prevent deterioration. Will thought it was important for students to have the opportunity to actually handle the objects in a professional manner in the course of the virtual museum activities. There might seem to be some conflict in these two viewpoints, but not necessarily. If we take Jim's "large-scale anthropological point of view" there would be plenty of materials to digitize in an ongoing virtual museum effort that would involve many students handling many objects a minimum number of times to produce the digital versions that would be accessible to anyone on the Internet.

Of course, once on the Internet, these materials would be accessible to both Native and non-Native peoples alike. From the standpoint of the Native community, it was seen as important that Native children had done this work

because it gave an authentic voice to the materials that were being presented, and offered the potential of fostering better understanding of Wabanaki people by the larger community, leading to better Native and non-Native relations.

IMPROVING RELATIONS WITH NON-NATIVE COMMUNITIES

As in the other three cases, a major theme emerged from the White Pine Tribal School case through comments by participants who believed that the virtual museum could improve the relationship Native and non-Native communities in a number of ways. I have already mentioned that Shirley, the curator at the Seaside Museum worked with both Bountiful River Tribal School and White Pine Tribal School in two consecutive weeks. Her remark was that "the average school child in [the state] has few opportunities to interact with children from Indian communities," and she expressed her concern in connection with the potential for misunderstanding and misconceptions about Native Americans that was aggravated by that lack of communication. This theme arose in the White Pine case as well. Shirley thought that intercultural communication was crucial for the improvement of community relationships. I asked if she thought the virtual museum Web site would work in that way, and she responded cautiously:

> I don't know. That's a really good question. Maybe a really important opportunity for them to interact with school children or other interested people from outside the community that, by mounting this cultural history of their people on the Web, there may be more opportunity for them to interact with others who are interested. That's a good, very good question, and I'll be interested to see what happens with that because I don't know.

Shirley's cautious hope was that the Bountiful River Tribal School and White Pine Tribal School projects would "help bridge the gap between the Native and non-Native" communities. On the Canadian side of the border, Jim, the director of the Provincial Archaeological Commission, and Donald, the university anthropologist who assisted with the project, both saw in the virtual museum project a potential for intercultural education that was missing in the Canadian school system. Part of the problem was the fact that anthropology is not a subject that is taught in the public high schools, a situation that is true for the United States as well. From Donald's vantage in higher education, that leads to a "disincentive" for incoming students in education to take anthropology courses, leading to an education faculty that is ill-prepared to address intercultural education in the public schools. He put it this way:

> In fact, anthropology is not a teachable subject, so there's no incentive for people going into education to take anthropology courses. In fact it's a disincentive. . . . So we get students who come in from the education system, they don't take anthropology courses, because they don't know what it is because nobody's ever mentioned the word to them when they're in public school and high school. And . . . I think that's part of the problem. I mean, and certainly anthropology is not your only way into Native culture, anything like that, for Native students or anybody else, the fact is it is not on anybody's horizon in the education system, and I find that really ironic considering the way our faculty of education is constructed.

I asked if anthropology was addressed in any way in the general social science courses, and Donald thought that might be the case, but he did not know. Jim, who had experience in trying to get Canadian First Nations educational materials produced by the Provincial Archaeological Commission into the public schools, had a different perspective on the issue. He explained:

> There is a fundamental problem with that [anthropology in general science classes]. And we worked with education before on a couple of projects, some of which are more successful than others. But the point is, we keep on trying until we find something that works, and the latest one was this exhibition, has worked for the community. We weren't successful with that one, with the traveling exhibit yet, to get it into the school system, and to get this stuff, this educational material, like the catalogue and the posters, get it back into the educational system. There seems to be, there's some sort of barrier. I don't know what it is, but it hasn't gone much. The districts now in Canada have funding for Native studies, but not one of them has expressed an interest in getting copies of this, of what we're giving, we're even giving them away. But the problem is, they will use materials, but they will use West Coast materials, or they will use American Southwest materials. They haven't yet focused on the fact that there's true, exceedingly interesting, sophisticated, viable Native cultures right here in the province. And it's kind of, almost like a visibility problem.

What is enlightening about Donald and Jim's remarks is that they indicate a systemic flaw that interferes with intercultural education in the schools. It leads to a lack of education about the Native peoples of a given region, replacing it with a picture of a romanticized American Indian that always lives in tepees and wears feathered war bonnets. It is similar to the effect of old Hollywood movies that cast Navajos as Plains Indians that perpetually attacked wagon trains until the cavalry showed up in the nick of time. As we have seen in so many comments made in the earlier cases, because the virtual museum projects are authentic presentations of regional tribal people presented by contemporary Native children, they work to correct the misrepresentations of Native life that have afflicted the majority population.

The corrective effect of virtual museum projects was noted in previous cases and was pointed out in the current case as well. Several project participants at White Pine Tribal School were excited about the prospect that their Wabanaki

virtual museum that would have some effect on intercultural education. Theresa, the technology coordinator said:

> The technology interested me very much, however I think over and above was the cultural integration of something that's very important to the people. Giving the world, as well as the people here, the Native people, the opportunity to view what has been so important in the lives of the Wabanaki people throughout the centuries, and thousands of years, and to have the children exposed to that knowledge, and to be involved in the publication of the knowledge, our communicating the knowledge to others, I think that this is most exciting. . . I think, I see this whole project as another means of communication. . . . Students are excited about this type of project, that other kids on the other side of the world will get to see things that are special to them that will help to eradicate some stereotypes, that all Native people are the same, that it will give specific, the due that is specific to Wabanaki people.

Ronald indicated that the students and the rest of the school were well aware of the global reach of the World Wide Web, and were excited about the worldwide reach of their project:

> We were very excited to find out that it would be worldwide. Students like over in China or Japan could, if they want[ed] to, go over to the Web page and see what the culture of these students was all about. So that, we found that to be very exciting.

As Native Wabanaki people, Betty and Will made remarks about the intercultural education potential of the web site, and how that might improve the community relationship they had grown up with. In response to my question about the kind of impact the virtual museum might have when it went up on the Web, Betty told me,

> Well, some of it is going to be that some of the White community are going to be astonished as to what we are, not what they thought we were, because they've been misled, quite a few of them. And it's almost like, when I went to school I had to, like, they expected me to measure up to the White students there, made me feel like I was that kind, and I wouldn't

> accept that, and I told them, "I'm not that, I'm me. Accept me for what I am: Wabanaki Indian and that's it." I said, "I might not be bright and stuff, but I make my way up there." Because that's all I wanted to do is be accepted, and don't mock me for what's your curse.

Will made some remarks that were similar to Betty's in that he had to battle against the misconceptions of non-Natives, even if some of those misconceptions were flattering in some respect. He said,

> Part of why we're doing this I think is to educate the outside community among us, because I think there is, there is, unfortunately we're, what do you call that? Our reputation precedes us that was not of our making, and I think that's changing, thank god, but it's very time consuming. The Web makes it so much faster. Because even in the, like I was over in the, across the ocean, even there they worship the ground we walk on, especially like in Germany and stuff. What they're worshiping is something we're not either. They have this picture of us, "The Noble People of the Woods," that, you know, they don't equate us with having everyday problems, struggling in the world just like they are, and what affects them affects us. They just have this image of us as, we've got it all figured out, and that's not necessarily true. We struggle with balance today. And we struggle to do the right thing, so we can all coexist in future times. And that's not so easy today because there's so many things we participate in, in terms of economy or even the technology that helps, in fact, sometimes to contribute to the pollution. We participate in that too, and we have to be careful not to let anybody set us off to one side as beautiful little children that never do it. Because that's not real either.

The virtual museum project would not be the first effort by the White Pine Tribal School to present Wabanaki information on the World Wide Web. As part of their Four Directions Project involvement, the school had posted some cultural materials on the school Web site and had received feedback and requests from other schools about Wabanaki culture. School staff and community members who were participants in the Four Directions project produced this first Web site. Theresa told me:

> I'm the one who gets a lot of mail because it says, 'contact so-and-so' on the Web site, and then the cultural team. I know that Will has [received] a few, but I don't get as many. We did when we first put up streaming video [and] sound on there, when we had the Wabanaki people. As a matter of fact, we were bookmarked on the Netscape site for being like a star site, the first year our Web site did go up. But, we have had a few requests, but it's been not so much class contacts, "Would you please send us more information about…" And frequently, if it's something that's reasonable, I'll ask Martha, or I'll send it to Will, if it's cultural.

I asked Theresa if she thought that the virtual museum Web site would serve as a source for educators wishing to put together a unit on regional Native peoples, and she replied, "I hope it would be."

The White Pine virtual museum would be different from the staff-created Web site because it would be student-produced. Because of the response to the earlier Web site, Will thought that the virtual museum Web site would stimulate more requests for information and interaction. He speculated:

> I can't really predict right now, but I noticed that the Web site that we have up right now, that we get inquiries. One thing that we have to start preparing for is how to respond to those inquires. Either back through the Web site or other ways because if you're going to put something out there people are going to have some questions, and we need to prepare ourselves further. Students as well as adults have to respond to those, you know, to make it really meaningful to, you know in terms of the purpose of it.

Will went on to explain how the "kid-to-kid" communication offered though the virtual museum Web site and the responses to the queries it garnered could be successful in educating the public where other efforts failed. He said:

> There's a lot of people that know what they know about us is not true... If we can present ourselves in a way that we want to, and we have control over that, it makes it so much easier and less tense because lots of times we are misrepresented. I mean, even in school, where you have mascots that depict us in a not very complementary way. This is another way for

> our own students to talk to those students: "This is not the way we really are, this is what we really are, and this is who we want to be depicted as," you know. And I think at that point, more serious intercultural learning takes place. Sometimes when it's at the political level it doesn't, not much learning takes place there, but mostly negotiating, but at the kid-to-kid level, there are some genuine exchanges there. It works better than most people give it credit for.

Several of the students liked the idea that they would be teaching people about their culture. I asked them what they thought about having their work posted on the World Wide Web, and who they thought would be interested in it. Brandi thought that they would include

> people that, actually like, want to know about Wabanaki people or like things that have to do with a long time ago, somebody who likes history or something.

June added that, "It's not going to be only like a fun Web site, but an educational Web site." June was also curious about the prospect that there might be other Web sites similar to her school's virtual museum where she could learn about other students' cultures. I asked her if she liked learning from other kids, and she said,

> I like [learning from other kids], 'cause, if there's a kid that knows about, like their ancestors and stuff. Say a kid put on a Web site, or like Sister Theresa or somebody, put on a Web site, and they really know about the ancestors, if it's true, I'd really like to know about that. I think it's cool.

Having Wabanaki cultural items on the Internet with the accompanying interpretation written by Native children is an attractive model for intercultural education recognized by adults and children alike, and as June has pointed out, a form of intercultural education that can work as a two-way exchange.

MAJOR THEMES OF THE WHITE PINE VIRTUAL MUSEUM PROJECT WITH COMPARISONS TO THE PRIOR THREE CASES

I will conclude the current case study as I have done in the three prior cases, by summarizing these case themes in light of what has emerged from the earlier case themes, indicating how they reinforce or diverge from the earlier findings or indicating how they are unique among the other case study themes.

COMMON THEMES

As mentioned at the beginning of the case study, in comparison to the other cases, there were relatively few logistical or procedural problems with the White Pine Tribal School virtual museum project, which led me to claim that the White Pine Tribal School project was the most successful of the four projects. I also maintained that, because many of the themes that emerged in the prior cases dealt with the project problems identified by the participants, the lack of those problems on this project led to fewer themes surfacing in the White Pine Tribal School case. As I will show in the discussion that follows, most of the themes that did appear have strong commonalities with themes expressed in the first three cases.

The Virtual Museum as an Ongoing Project

Theresa lodged one of the few recommendations for improvement about the White Pine project when she said she wished it had started earlier in the semester, so that there would have been more time to develop curriculum connections to go along with the virtual museum Web site. Martha and Theresa both talked about continuing the virtual museum project so that the students

involved in the project could teach their peers how to use the virtual museum skills they had learned in future projects.

Will and Theresa both talked about the virtual museum Web site as an information resource they could refer to when they received queries about Wabanaki culture. Will saw the first version of the White Pine virtual museum as creating an "infrastructure" for an ongoing virtual museum that would grow into a more comprehensive information resource over the years.

Will thought that an ongoing virtual museum project would take on "a life of its own" as students saw what their older brothers, sisters, and cousins had done and as they looked forward to making their own contributions.

The theme of "The Virtual Museum as an Ongoing Project" also arose in the Pacific Tribal School case. Both Joan and Anna thought that virtual museum projects should take place every year, so that all the students in the school would have an opportunity to participate during their education at the school. Charles, the director of the Lawrence Museum, also thought the school should continue the project with regional museums. Several participants were able to identify other museums in the region that were prime candidates for virtual museum collaborations. Also, under the theme, "Virtual Museum Collections within the Community," Joan, Anna, and Frances talked about how students could continue their virtual museum work by doing digital collecting within the tribal community.

In the Great Bear/Northern Lakes case, the theme "Expanding the Tribal Museum" touched on some of the same topics. Northern Lakes Indian School

had, in fact, already participated in several virtual museum projects, so that their approach was already one that was ongoing. Joanne and Fred spoke of encouraging the development of a tribal museum for the Northern Lakes community that would work closely with the school to continue the digital collecting by students that had already begun within the community and with regional museums. Catherine, Rose, and Jack thought that the Great Bear school could continue to digitize the tribal museum collection as new donations arrived at the museum.

In the Bountiful River Tribal School case, a divergent theme developed, "The Virtual Museum Project Is a 'One-time Thing,'" in which several teachers wondered if they would have the ability to carry on a virtual museum project on their own. On the other hand, Ernest, the tribal museum curator, thought it would be important to digitize items for the tribal museum that could not be repatriated and doing digital collecting within the community, though he did not talk about doing this in the context of a school virtual museum project.

Developing Virtual Museum Skills in the School Community

Theresa, Ronald, and Martha all talked about the idea that students in the virtual museum project could teach their peers how to use the technology in future semesters. Theresa and Martha both indicated that the teachers at the school had been reluctant to learn and use technology in the classroom, and saw the student peer-teaching approach to spreading the technology skills within the school as a way to increase the use of technology in the classroom. They all expressed enthusiasm for peer teaching in this context.

Will saw an improvement from the approach to technology teaching in the past, when students were not allowed to touch expensive equipment. He thought the virtual museum project changed that attitude by helping students learn how to take more responsibility for handling and using the equipment.

In the Pacific Tribal School case, the theme "Developing Virtual Museum Skills in the School Community," arose as part of the discussion of many of the same ideas as the White Pine theme. Though Joan, the technology coordinator, had picked up the virtual museum technology skills, she stated that she would rely on certain students to help her reinforce those skills. She and Anna both said they would look to the students to share their knowledge of the technologies with their peers and with teachers. In the Great Bear/Northern Lakes case, under the theme "Students Can Be Technology Mentors," Jack talked about teachers who were reluctant to use technology and expressed his hope that the students could help the teachers learn how to use it in the classroom.

In the Bountiful River case, a similar theme emerged, "Teachers Need Training in the Technology Students Use." Teachers involved in the project thought that they should be trained in the virtual museum technologies so that they could incorporate them into their classroom practice. This theme is similar to the others in its focus on developing the skills within the school community, but differs in the ideas about the primary recipients of the training and who would spread the skills within the school community.

Bringing Objects Out from "Behind the Glass"

This theme relates to the effect of working directly with the cultural artifacts during the project activities, as opposed to experiencing them "behind the glass" in a museum display or through books. Wendy, at the Provincial Archaeological Commission, noted that the "energies from the artifacts" helped to motivate the students in their participation in the project. Martha also appreciated the opportunity to be so close to the cultural items during the project activities because normally they would be behind glass if they were on display in a museum. She also realized that many objects used in the project might never be placed on display at all.

Donald, the anthropologist at the Provincial Archaeological Commission, thought that the students related strongly to the physical cultural objects better than they did to abstract academic knowledge, noting that the objects "really spoke to them." Luke, one of the students, thought that being able to touch and feel the objects was better than learning about them from a book.

The Pacific Tribal School theme of the same name expressed these concepts as well. Both Anna and Frances talked about how students in the project realized how extraordinary it was to have such intimate access to museum objects. Anna mentioned how one would be constantly "bumping your head against the glass" to get a better view of cultural items in a museum display. The Pacific Tribal School theme, however, took on an additional meaning when it referred to the ability of QTVR technology to remove the museum glass and allow a person

to handle an object virtually, as well as providing better lighting on some objects that must have low lighting in the museum to prevent fading.

Understanding Who You Are

Several participants talked about how the project experience connected students to their cultural past, strengthening their sense of who they are. Wendy noted how the students recognized their connections to the people who made artifacts thousands of years old. She said, "you have to look at the past before you can say who you are today." She talked about the "re-awakening" of her culture in her own experience, saying that the Native people of her region had adapted to tremendous changes over the years.

Will and Betty talked about how their culture was ignored or forbidden within the schools they attended growing up, and how their cultural identity was promoted by the Native community. Will then talked about his efforts to create a cultural program at White Pine Tribal School that would supplement the community's role of Wabanaki enculturation. He saw the virtual museum project as following that model. Will went on to speak about the ways the virtual museum project could foster a "living connection" to the students' cultural heritage.

In the Pacific Tribal School case the theme "Understanding Who You Are" also referred to the ways the virtual museum project fostered a sense of cultural identity in the students. Ruby and Frances both thought the virtual museum project helped students appreciate their culture and strengthened their identities as Native people.

Putting Museum Collections into Circulation

Jim, the director of the Provincial Archaeological Commission, was excited about the virtual museum project because it demonstrated a way of both preserving cultural items by providing a digital proxy for study and putting the items to work in the sense of cultural preservation. Native people in the region could have ready access to important cultural items on the Web, items that they may not know existed otherwise. Jim was also excited about the project because it involved a congenial collaboration with Native Americans, counterbalancing a history of contentious relationships between Native people and the museum and academic communities. The virtual museum project was also conducive to a "large-scale anthropological point of view" in that it demonstrated a way of improving the accessibility to a large number of cultural objects, putting materials "back to work digitally," which otherwise would languish in storage.

Will addressed the relationship between Native people and museums from the Native point of view. He thought museums should make their policies, protocols, and professional practice more transparent to the Native communities, and reduce their "possessive attitude" toward their collections so that initiatives such as the virtual museum project might be undertaken more easily.

This theme, initially expressed from the point of view of a government official in charge of all the Native archaeological finds in a province, shares some overlap with the Great Bear/Northern Lakes theme, "The Virtual Museum makes the Museum Collections More Accessible." In that case, Catherine stated that she wished more museums would undertake virtual museum projects so that their

Native American cultural items, which have the natural tendency to deteriorate, might be made more accessible for the benefit of Native as well as non-Native communities.

Fred and Joanne also spoke about the importance of sharing cultural items, and Rose extended the discussion to the idea that people in the Native community could share their cultural items with others in a virtual museum. In this way this theme extends into the same territory as the Pacific Tribal School theme, "Virtual Museum Collections within the Community" and the "Expanding the Tribal Museum" theme in both the Great Bear/Northern Lakes and Bountiful River cases, which both discussed the desirability of digital collecting in the tribal community.

Improving Relations with Non-Native Communities

This is the only theme that emerged from all four of the case studies. Shirley, the curator at the Seaside Museum, commented about the potential for intercultural communication in regard to both the Bountiful River and the White Pine projects. She thought it was important for Native and non-Native children to interact with each other, and she hoped the virtual museum projects would raise the awareness about Wabanaki culture in the non-Native community.

At the Provincial Archaeological Commission, Donald and Jim discussed the failing of the Canadian education system in raising the general public's awareness of the region's First Nations peoples. Theresa thought the virtual museum project would help to inform the world by providing specific information about thousands of years of Wabanaki culture. Ronald said that many people in

the White Pine community were excited about the global reach of the virtual museum and that children overseas would be able to learn about their culture. Betty thought the non-Native community would be "astonished as to what we are." Will talked about the importance of correcting even the flattering misconceptions he had encountered in Europe that portrayed American Indians in an excessively noble fashion.

Will and Theresa both spoke of the virtual museum as a resource for educators who requested information on Wabanaki culture. Will spoke of the virtual museum as a form of "kid-to-kid" communication in intercultural education.

Students Brandi and June recognized the educational value the virtual museum held for non-Natives wanting to learn about their culture. June wished that children of other cultures would create virtual museums so she could learn about them, too.

The theme is strongly reinforced by the statements of many participants in the other three cases, making "Improving Relations with Non-Native Communities" one of the most important rationales for pursuing virtual museum projects. The participants spoke of many ways a virtual museum could work toward the goal of improving inter-community relationships. It was perceived as a Native-approved, authentic information resource for the non-Native community that helped to correct misconceptions about Native peoples and worked to overcome stereotypes about Native Americans. It was seen as "good PR" for the tribes, which might also bring visitors to the reservations. In addition, it was

viewed as an educational resource to educators in the public schools seeking supplementary materials for their units on American Indians. It was moreover interpreted as a possible channel for intercultural education on a worldwide basis. It was valued as allowing Native people to say who they are to the world.

In nearly all cases, participants spoke of this effect of the virtual museum project in anticipation of the publication of the Web site. For the most part, it does not reflect a past experience of virtual museum, but an anticipation of its future impact.

Other Commonalities with the Prior Three Cases

There were several other themes that arose in the prior cases that were supported in a minor way by the White Pine Tribal School case. The Pacific Tribal School case theme "Ownership" was addressed by Martha when she mentioned that students had a little more ownership of their cultural objects because of the opportunity to touch or handle them.

The "Native Community Member Participation" theme expressed in the Pacific case was certainly observable in the White Pine case, but none of the participants spoke about it directly. The White Pine cultural department certainly had a strong presence in the project. Will also mentioned that he was impressed by Wendy's presence at the Provincial Archaeological Commission, and added that he thought more Native people should have positions at museums.

Both Ronald, the fifth grade teacher, and Theresa, the technology coordinator, made remarks that contributed to the theme, "The Virtual Museum Is a Cross-Curriculum Project." They both recognized that the project touched on

social studies, science, and mathematics. Ronald wove those topics into the project activities. Theresa looked forward to the possibility of creating thematic units using the finished virtual museum. This claim was supported by remarks by Joanne in the Pacific Tribal School case when she said that the project met a number of state curriculum standards. Roger at Bountiful River Tribal School spoke about the need to integrate a number of topics into the virtual museum project to make it worth the time and effort he put into it. Roger's remark may be taken as disconfirming the claim that the virtual museum project is cross-curricular, but it may also indicate that the project could be if it were designed that to be.

UNIQUE OR DIVERGENT THEMES

Only one unique theme remains from the White Pine Tribal School case. It was a direct result of successfully bringing a classroom teacher on board in the project. Classroom teacher participation was missing from the first two projects, and full, active participation by the classroom teachers did not occur in the Bountiful River Tribal School case. Not surprisingly, the theme relates directly to teacher's classroom practice: "Innovative Research Techniques."

Innovative Research Techniques

Two innovative student research techniques emerged from the project. Because Ronald was given sufficient time to plan for the project, he spent some time brainstorming research questions with the students, which they then used to gather information during the museum visits. Both Martha and Wendy spoke of the effectiveness of the questions, and the research videotapes showed how well

the questions worked at the Provincial Archaeological Services. Will thought the questions worked well because Donald and Sally were "teacher-oriented types of people" who gave responses that went beyond the minimal requirements of the questions.

The second innovation was the use of audiotape and videotape to record the information-gathering activities of the students. Martha said she videotaped in order to document the project for the school, but it also turned out to be a good research tool for the students. The audiotape was not very effective for information retrieval because the students could not see what objects the informants were talking about. With the videotape, however, it was easy to see what objects the people were talking about, and students could view the tape with a teacher as a group, adding a social dimension to the learning activity. After writing their essays on their objects, some students reviewed the videotape again to check their accuracy of information from the experts they interviewed.

Themes Not Specifically Addressed In This Case

A number of themes in the prior cases were not addressed to a significant extent in the White Pine case. Because the White Pine project was relatively problem-free compared to the first three projects, a whole host of themes that addressed project problems were not addressed in the White Pine case, or addressed in a negative fashion. I already mentioned the theme "The Need to Bring the Teacher On Board" as something that was not expressed as a need during the White Pine Tribal School project, as well as a host of issues that arose in the Bountiful River case from classroom teacher concerns when the teachers

were not able to have a substantial role in the project. Issues related to problems in the Bountiful River case that fell outside the group of teacher concern themes include "The Need for Better Communication and Organization" and "The Virtual Museum Needs Promotion."

Other problems that came up for the Great Bear/Northern Lakes project gave rise to the themes "Project Management Issues," "The Need for More Choice for Student Virtual Museum Selections," "Restructuring the Virtual Museum Project," and "The Need for Community Member Participation." These themes were not addressed during the fourth project.

Some themes in the prior cases that were not about problems also did not garner significant discussion in this current case. The Pacific Tribal School case themes of "Preparing Students for the Project Mentally and Spiritually" and "The Nature of the School-Museum Relationship" were generally not a topic of discussion in this case.

In the next chapter, I will conduct a synthesis of all the themes across all of the cases in order to a give a more complete account of what virtual museum projects in Native American schools might look like. I will then look at data from all of the cases to address the potential for cultural responsive teaching with virtual museum projects.

Chapter 8: A Composite Picture of the Virtual Museum Projects

In the prior four cases, I have analyzed the data from four virtual museum projects in Native American schools. In analyzing each case, a number of themes have emerged, based on the coded interview data, observations, research videotapes, and documents collected in the course of the cases. Although each case study examined a common educational innovation—virtual museum projects—each project unfolded in its own way, so that each case study represented was unique. Some themes that emerged in each analysis were also unique, but many themes were similar in ways that might reflect some essential aspects of virtual museum projects in American Indian schools. I will now examine all of the themes across all of the cases to present more of a composite picture of virtual museum projects that are conducted in a similar manner.

I wrote up the case studies in the order that they occurred, and at the end of each study, I prepared a summary of the themes of each case with comparisons to the themes of the cases that went before, in a cumulative fashion. The following meta-analysis across these cases addresses my first research goal: to give a description of an emerging strategy for culturally responsive teaching by comparing several virtual museum case studies. Of course, the culturally responsive teaching strategy being described is the virtual museum project. I will use these four case studies to give a more complete description of the nature of the virtual museum projects in American Indian schools.

After I have given this composite description of virtual museum projects in American Indian schools, I will return to the research data across all the cases to address my second research goal: to determine how virtual museum projects might contribute to the definition of cultural responsive pedagogy in the next chapter.

Grouping the Case Study Themes into Larger Categories

In conducting the analysis of each case, I tried to identify themes that organized the multiple data sources and multiple perspectives of my study participants and told the unique story of the case. To explicate further the multiple case studies into a composite picture of all the cases, I organized all of the themes under categories that reveal a higher-order structure to the virtual museum project, one that will hopefully provide some guidance to those wishing to design similar educational activities or culturally responsive teaching practices.

The thirty-three themes can be grouped into nine broader categories that may be useful in terms of providing a composite description of virtual museum projects in American Indian schools based on the four case studies (see Table 6). The nine issue categories are:

- *Virtual Museum Project Management.* These are themes that deal with the planning, organization, and implementation of the virtual museum from the perspective of a project manager.
- *Classroom Teacher Issues.* These themes relate to virtual museum projects from the perspective of classroom teachers.

- *Technology Training.* Themes in this group relate to training project participants in the necessary virtual museum skills, and how those skills might be spread and preserved in the school community.
- *Virtual Museum Project Activities.* These themes relate to the unique aspect of virtual museum projects involving students working with cultural objects in the museums.
- *Tribal Museums.* This category involves themes that relate to tribal museums.
- *Community-Museum Relationship.* Themes that deal with the relationship between museums and Native people or tribal communities.
- *Native Community Participation.* Themes grouped here relate to the participation of tribal community members in the virtual museum projects.
- *Community Relations.* There is only one theme in this category, which deals with the prospect that virtual museum projects hold to improve the relationship between Native and non-Native communities.
- *Values.* Themes in this group relate to some of the ways the participants valued the virtual museum project.

Table 6: Emergent case themes summarized under categories

Emergent Themes	Cases			
	1	2	3	4
Virtual Museum Project Management				
Project Management Issues		•	+	
The Need for More Choice for Student Virtual Museum Selections		•		
Restructuring the Virtual Museum Project		•	+	
The Need for Better Communication and Organization		+	•	
The Virtual Museum Needs Promotion			•	
Classroom Teacher Issues				
The Need to Bring the Teachers On Board	•	•		
The Need for a Substantial Teacher Role			•	
The Virtual Museum Project Would Not Be Done without Outside Help			•	
The Virtual Museum Project Is a "One-time Thing"			•	
The Virtual Museum Is a Time-Consuming Project			•	
The Need for More Time and Opportunity for Student Research		+	•	
The Virtual Museum Is a Cross-Curriculum Project	+		+	•
Innovative Research Techniques				•
Technology Training				
Developing Virtual Museum Skills in the School Community	•	+	+	•
Students Can Be Technology Mentors	+	•		+
Teachers Need Training in the Technology Students Use		+	•	
Virtual Museum Project Activities				
The Virtual Museum as an Ongoing Project	•	+		•
Bringing Objects Out from "Behind the Glass"	•	+		•
Proper Use of Fragile Native American Collections	•			
Tribal Museums				
Virtual Museum Collections within the Community	•	+	+	+
Expanding the Tribal Museum Role	+	•	+	+
Expanding the Tribal Museum	+	+	•	+
Community-Museum Relationship				
Repatriation and the Museum's Role in Cultural Preservation	•	+	+	+
The Nature of the School-Museum Relationship	•			
The Virtual Museum Makes the Museum Collections More Accessible	+	•		+
Putting Museum Collections Into Circulation		+	+	•
Native Community Participation				
Native Community Member Participation	•			+
The Need for More Native Community Participation		•	•	
Community Relations				
Improving Relations with Non-Native Communities	•	•	•	•
Values				
Ownership of the Virtual Museum Project	•	+		+
The Virtual Museum Project Promotes Native Community Pride	•	+	+	+
Understanding Who You Are	•	+		•
Preparing Students for the Project Mentally and Spiritually	•			

• Theme occurs in the Case + Related theme or the theme is supported in the case

Table 6 identifies the cases in which each of the thirty-three themes appeared. Some of the themes appeared in two different cases; one appeared in all four. Sometimes the data in a case appeared related to or reinforced a theme that was prominent in a different case. This reinforcement is indicated by a plus sign (+) in the case column of the table. If no symbol at all appears under the Cases columns of Table 6, this indicates that the theme was not substantially addressed or not mentioned in a manner that would constitute reinforcement in that case.

In the following sections I will provide a detailed description of each of the categories including the rationale as to how the themes were grouped together, a recapitulation of the themes clustered in the category, and the implications of the theme category for virtual museum projects.

VIRTUAL MUSEUM PROJECT MANAGEMENT

Rationale for the Category

By "virtual museum project management," I mean the concerns and activities that would comprise the duties of a project manager in a multimedia project such as the virtual museum projects. The project manager is the keeper of the overall vision of the project and the person who keeps that vision in mind as the project is planned, goals are set, agreements are made, tasks and schedules are assigned, and the required equipment is identified and acquired. Because project management deals with the details of how a project is organized and carried out, I would include the case narratives at the beginning of each case study as contributing to the category as well.

As it turned out, no one person in any of these cases was identified as *the* project manager. As I mentioned at the beginning of the first case study, my role of the participant-observer researcher was conflicted because it was important to me that the schools should take ownership of the projects. I was, however, the person with the most experience in doing these kinds of projects, so I took on much of the project management role. I successfully shared that role with school staff members in two of the cases. The five themes under this category come particularly from two cases where a lapse occurred in the project management process. These themes grew out of participant statements that identified some problems they encountered and other concerns that had implications about how the projects could be improved through better project management.

Recapitulation of the Category Themes

In the "Project Management Issues" theme, the term "project management" is used much like the term "classroom management" is used in education literature. This topic includes issues related to making the classroom an effective learning environment, such as how to keep students disciplined and on task, how to best arrange the classroom physically, and how to schedule classroom activities.

The most common problem addressed under this theme indicated the need for more adult supervision and the fact that the students were not always on task. This also relates to the need for more of community member participation that appears in a later category because the presence of more community members would have increased the adult/student ratio, and community member interaction

with the students would help to keep the students on task. Also, there is a limit to the practical number of students who can work productively at a museum site. Across all cases, four students in a team for museum activities was the most common arrangement, and that number worked out well in most instances.

The problem of keeping students on task was mentioned in three of the four cases. Among the suggestions for keeping them on task were to provide more research resources, include more community members for the students to interview, and have more digital imaging stations.

The nature of the working environment is also important. Typically, students will need at least two work areas during museum activities, one where they conduct their research and one where the do virtual reality imaging. More work areas may be useful, depending on the particular museum facility and what the project participants wish to accomplish at the museum, for instance, an area where the candidate objects have been laid out for inspection and selection, or an area to conduct audiotape or videotape interviews with community members, museum staff, or other subject matter experts (e.g., anthropologists). The acoustics of the workspace may also be a factor if quiet conditions are required for productive work.

The theme, "The Need for More Choice for Student Virtual Museum Selections," refers primarily to the need for an adequate number of museum artifacts for student selections. When students have a choice in what cultural objects they image and research, they tend to invest more ownership in the project. It is also beneficial to know well in advance what items are available so

that students can make their selections before coming to the museum to do their imaging activities. The museum should have the items out of storage or display cases ready for imaging when the students are ready for them.

"Restructuring the Virtual Museum Project," further refines the design of the virtual museum project based on the experiences of the participants. Because students tended to resist doing writing assignments but generally enjoyed using cameras and computers, students should be required to do their research and essays on their objects before imaging their objects, using "the cameras and that kind of stuff as the carrot." The use of Web page templates that enable students to type in their virtual museum essays and link to the QTVR media of their objects in their virtual exhibits can streamline the production of the virtual museum. Some participating teachers believed it is important that they be well versed in the virtual museum technologies so that they would feel comfortable assisting students in the technical aspects of the project.

"The Need for Better Communication and Organization" emerged from the many suggestions for needed improvements from project participants. Teachers and students did not have a clear idea of what they were supposed to be doing or the final goal of the project. The teachers sensed that their role in the project was minimal and it seemed like the project was just "thrown together." The situation arose out of the lack of strong and timely project management. A virtual museum project is an ambitious undertaking requiring the collaboration of many key players who should have vital contributions to the planning and implementation of the project. The teachers should have the opportunity to

contribute their professional expertise at the planning stage. Part of project management is providing a forum for negotiations and planning among all of the partners.

"The Virtual Museum Needs Promotion" refers to the need to promote the virtual museum Web site to the community and to the world at large. Though this job might seem to be a "post-production" task it is something that can be anticipated and planned for well in advance.

Implications of the Category

The themes under this category indicate how virtual museum projects suffer when there is a lapse in project management. The obverse of the themes implies that virtual museum projects would benefit from effective project management. Participants in two of the case studies identified problems with their virtual museum projects that might be rectified through effective project management. These participant-identified problems implied specific remedies that may lead to improved management. When combined with the narratives of the four cases, these themes constitute a fair start on a "how-to" description of the critical elements of virtual museum project management.

CLASSROOM TEACHER ISSUES

Rationale for the Category

Reading the four case studies in sequence, one would be struck by the evolving role of the classroom teacher in these virtual museum projects. In the first two projects classroom teachers were conspicuous by their absence, prompting the theme, "The Need to Bring the Teachers On Board," in both cases.

In the third case study, classroom teachers were given the responsibility to participate in the project, but were not given the opportunity to help plan the project or to indicate how they felt about participating in the project. A number of teacher concerns arose during the project that might have been anticipated if the teachers were given more opportunity to participate in the planning stages. In case four, we encountered a teacher who was properly "cued in" on the project. He could see clearly how the project fit into his classroom practice and was able to participate effectively, leading to themes that identified some of the ways classroom teachers might contribute to the virtual museum activity if given the opportunity to do so. Taken as a whole, this evolution of the teacher role in virtual museum projects provides the rationale for the category.

Recapitulation of the Category Themes

"The Need to Bring the Teachers On Board" was a theme in the first two case studies because classroom teachers did not participate substantially in the virtual museum project activities. In both cases, students successfully imaged and researched their virtual museum objects, but without classroom teacher participation. In both cases, there was no one making sure that the students successfully composed their essays about the objects. The participants noted that students tended to resist writing and that teachers would be the most logical choice to work with students to overcome their writing difficulties. In the last two cases, where classroom teachers were key participants in the virtual museum projects, the students did manage to do their required write-ups for their virtual museum exhibits.

The third case was the first one to incorporate classroom teachers in the virtual museum project. However, these teachers and their students were essentially drafted into the project by their principal. A cluster of themes I called "classroom teachers concerns" emerged from the case study. The first of these, "The Need for a Substantial Teacher Role," reflects the fact that the teachers had little or no input into the project planning. This reinforces the point made in the "Virtual Museum Project Management" category regarding the collaborative negotiation of roles among project partners. The teachers stated that they had no role in the design of the virtual museum project. They felt their role was reduced to handling babysitting or logistical chores. As a result, the teachers had difficulty understanding or buying into the project.

The theme "The Virtual Museum Project Would Not Be Done Without Outside Help," further explores the consequences of the minimal teacher role. The teachers felt they could not carry out, continue, or replicate the virtual museum project without outside assistance. They seemed to invest little ownership into the project for themselves, implying that it was the researcher's project in which they were participating.

"The Virtual Museum Project Is a 'One-time Thing'" theme indicated how the complexity of the project led the teachers to believe that they could not continue it on their own. The innovation was compared to other instances of staff and student training where teachers were "shown something, and then that's it." Without more training and assistance, the teachers felt they would not be able to

master the innovation to a stage where they could see how to integrate it into their classroom practice.

The theme "The Virtual Museum is a Time-consuming Project" dealt with teachers' criticisms regarding the substantial time commitment the virtual museum project required. There are two aspects of the time commitment: one, the time required for the teacher and students to master the practice; and two, the amount of class time invested in the project activities. A substantial time investment would require a substantial payoff in terms of student learning.

Under the theme "The Need for More Time and Opportunity for Student Research" teachers and other participants indicated that students would need more time than the virtual museum project was allowing them in order to do a good job researching their objects and writing their essays. They also felt that more resources, especially community members' knowledge of the culture, were needed for student research.

The experience of the classroom teacher in the fourth case study contrasts with the teachers' experiences in the third case. This teacher was able to integrate the project into his classroom practice with ease. He was comfortable with a facilitator teacher role, and he was a proponent of peer teaching. Both of these teaching orientations integrated well into the virtual museum project. The last two themes of this category came out of participant observations regarding this teacher's response to the virtual museum project.

The "Virtual Museum is a Cross-curriculum Project" addressed the importance of the curriculum connections that a teacher can make to a virtual

museum project, so that it addresses the core academic standards, as well as important cultural content and technology skills. The theme "Innovative Research Techniques" looked into the kinds of creative teaching approaches that a teacher might employ to make the virtual museum project more effective. In the fourth project, students brainstormed their own general research questions, which were used to interview anthropologists and museum staff about their object selections. These interviews were videotaped, and the tapes themselves became important information resources when they worked on their essays back at school.

Implications of the Category

Part of the argument for doing virtual museum projects is that students will gain valuable core academic skills and knowledge through researching and writing the essays that accompany their virtual exhibits. These academic concerns fall under the purview of the classroom teacher. Getting good academic performance from the students is the province of the teacher, and ideally the students should get class credit for their work. In this study however, the virtual museum projects tended to be initially championed by the technology coordinators and culture program staff at the schools. "Bringing the Teachers On Board" proved to be a challenge in itself for the first two cases.

In the third case, teachers were brought into the project, but they did not have a substantial role in the project planning. They voiced several concerns about the project that could have been addressed well in advance.

Much of the teacher criticisms echo points made in the school change literature, which examines the conditions that support or impede the successful

adoption of innovative classroom practices. For instance, Doyle and Ponder (1977-78) propose a "practicality ethic," which describes three criteria that teachers tend to use to judge the practicality of an innovation: instrumentality, congruence, and cost. Instrumentality deals with the procedural details of the innovation—whether the innovation is communicated clearly enough so that the teacher knows what to do under changing contingencies of the classroom. Statements by teachers in the third case indicated that this criterion was not met for them.

The second criterion of the teacher practicality ethic is congruence. It asks how well the innovation fits the teacher's existing classroom practice. When teachers were left out of the virtual museum project negotiations and did not have an opportunity to gauge the innovation for congruence, the project failed for them in that respect as well. The classroom teacher in the four case study thought the innovation fit his classroom practice well and was quite comfortable with the project.

Finally, the cost criterion refers to teachers' cost-benefit analysis of an innovation to gauge whether it is worth their time and effort. For the teachers in the third case study the answer was no, the results did not warrant the effort. They did have some constructive criticism on this point. If the students had better opportunities to research their selected objects and if the teachers had been able to figure out how to integrate the required core curriculum into the project, their evaluation of the project's worth would probably have fared better.

Fullen (1993) has noted that when teachers feel they have been coerced into adopting an innovation, they will tend to resist it. He advocates the position that teachers should be change agents in their schools, having a substantial role in the planning and implementation of innovative strategies. Fullan's observation and remedy would seem to apply to an innovation such as the virtual museum project, which requires willing collaboration and curriculum integration from all teacher participants. The contrasting third and four case studies appear to support Fullen's premise in both the negative and positive sense. Across all the cases, the importance of bringing the teachers on board in a virtual museum project in a timely and substantial fashion is illustrated in a variety of ways.

TECHNOLOGY TRAINING

Rationale for the Category

The virtual museum projects were technology-intensive projects, making use of digital cameras, virtual reality imaging software, and Web authoring software. The final products were published on the World Wide Web. In the last case, video was also used, as a research tool. Many of the participants were unfamiliar with these technologies at the beginning of the project, so I had to fold technology training into the project activities. Most of my training efforts focused on the students. I was able to do training with only a few of the adult participants. This prompted some discussions about technology training among the participants, particularly about who should get the training and how those skills should be maintained in the school community for use in future projects and classroom learning activities.

Recapitulation of the Category Themes

"Developing Virtual Museum Skills in the School Community" emerged as a theme in two of the cases, and it was supported by remarks made in the remaining cases, suggesting that it is a strong element in virtual museum projects. Under this theme participants indicated that the students should be the foremost benefactors of the training and that the students would be able to share their learning with their peers and teachers for future projects. Some participants felt that teachers should not be expected to be the technology experts in a virtual museum project because their primary responsibilities lay in integrating the required curriculum.

In the third case study, the theme "Students Can Be Technology Mentors" expressed a very similar sentiment to the first theme of this category. One technology coordinator expressed frustration in his perception that teachers were resistant new technologies. He said that he had to show teachers how to do a computer task several times, whereas students would catch on immediately. His hope was that the students could mentor the teachers in technology skills.

Teachers in the third case study countered the notion that teachers did not need to be trained in the virtual museum technologies in the "Teachers Need Training in the Technology Students Use" theme. They believed that teachers should be comfortable with the technologies used in their classrooms, so that they can assist students when they need help. Acquiring a level of comfort with learning technologies, however, might take years of use to attain.

Implications of the Category

One of the biggest challenges of the virtual museum projects was the need to include technology training in the midst of all of the other challenging activities of the projects. It would have been much easier if the students and teachers had already possessed the technical skills required by the project, but virtual reality imaging is far from being the kind of routine educational computing application that word processing, database, and spreadsheet applications have become. In the first few years of the Four Directions project, I gave training in QuickTime Virtual Reality, but most of the teachers did not attain the comfort level they needed to use it in their classroom practice, and the effects of the training quickly faded. I realized that it made little sense for teachers to learn QTVR software in isolation, without having an educational context to use it in. Without a virtual museum project, QTVR would fail the congruence criterion of Doyle and Ponder's practicality ethic. English teachers use word processors, just as social studies teachers use databases, just as mathematics teachers use spreadsheets—because the teachers find uses of these technologies that are congruent with their classroom practice. This results in something like a chicken-or-the-egg dilemma. For teachers to adopt QTVR (or other appropriate imaging technology), something like a virtual museum project needs to become part of their classroom practice. For the virtual museum project to become a classroom practice, QTVR needs to become part of the technological skill set within the school community. The teacher does not necessarily have to be the technology expert on the project, but someone does. Initially the virtual museum project and the technologies it

uses need to be introduced as one package, which therefore increases the initial complexity and challenge of the innovation.

Again, the school change literature may offer some insight. In the late 1980s and early 1990s, Apple Classrooms of Tomorrow (ACOT) researches adapted the Concerns Based Adoption Model (CBAM) from the school change literature (Hord, Rutherford, Huling-Austin, & Hall, 1987) to a stage model of teacher concerns during technology adoption (Sandholtz, Ringstaff, & Dwyer, 1990, 1991). The earliest stage of the model, called the Entry stage, was characterized by teacher anxiety about their competence in the classroom. It was only until a relatively advanced stage, Adaptation, that teachers would begin to adopt technology uses involving collaboration and project learning. Many teachers never reach the Adaptation stage of adoption, and the ones that do may take years to reach that point. One teacher in the third case study told me that after over five years of Four Directions project training with HyperStudio—a multimedia software application designed for classroom use—he was only beginning to get comfortable using it with his students.

Some of the comments made by the teachers in the third case sound like Entry stage teacher concerns from the ACOT model. Yet the innovation they were asked to adopt implied that teachers would be at the Adaptation stage. This adoption-stage mismatch may explain some of the teachers' concerns and reluctance to adopt the innovations of the virtual museum project. Given the central role classroom teachers should play in virtual museum projects, it may be important to assess their readiness to participate before embarking on a virtual

museum project and to take appropriate steps to address their concerns, such as providing additional technology training.

The classroom teacher in the fourth case demonstrated that teachers do not have to be the technology experts in the virtual museum project. They do not even have to be the technology trainers, if the students are to be teachers of their peers and technology assistants for teachers. This relates to a nationally recognized education project, Generation www.Y, which advocates the use of student mentors to help teachers integrate technology into their classroom practice (Harper, D., Conor, J., & Course, A., 1999). There appears to be more than one route to effective educational computing. The classroom teacher in the fourth project assumed a facilitator teaching role and his reliance on student peer teaching and the collaborative support from the technology coordinator led to a satisfying virtual museum project. Perhaps teachers' recognition of the curriculum value of such a project can alleviate teachers' concerns that they have not mastered the technology as well as the students.

VIRTUAL MUSEUM PROJECT ACTIVITIES

Rationale for the Category

The innovative premise of the virtual museum project is that students can work with objects related to their culture, collecting them digitally for the school and community from museums and members of the community. The themes grouped into this category examine specific aspects of project activities at the museum sites.

Recapitulation of the Category Themes

"The Virtual Museum as an Ongoing Project" appeared as a theme in the first and last cases. The theme came up initially as a response to the low impact the project seemed to have in terms of student participation. Only a few students could participate in the museum activities on any given visit. One suggested remedy to the student impact problem was to make the virtual museum an ongoing project that involved different students each semester, so that all the students at the school would eventually have the opportunity to participate in activities at the museum.

Some project participants in the fourth project expressed the hope that the virtual museum would take on a life of its own. Student contributions to the virtual museum were similar to the tribal community member contributions to the public museums that collected contemporary American Indian arts. A similar familial pride might inspire students who saw their siblings' and cousins' work in the virtual museum and motivate them to make their own contributions. Also, once implemented, the virtual museum project would provide an infrastructure for ongoing activity aimed at building an important information resource on Native American culture.

In the theme, "Bringing Objects Out from 'Behind the Glass,'" the glass of museum exhibit cases became a metaphor for the limited access contemporary Native people have to museums' Native American collections. Participants noticed how the students reacted with excitement and awe when they were able to be in such close contact and even handle the same objects their ancestors made

and used. It was a cultural connection that was palpable to observers, even to a non-Native observer (like me).

In another sense, the virtual reality images of the objects can provide an important supplemental experience of museum objects on exhibit. They allow a person to rotate and zoom in on the virtual object that is often seen more fully (i.e., more details visible on all sides) and under better illumination than the actual object on exhibit. As the culture coordinator in the first case study put it, "You don't have to go bumping your head against the glass to get a better look."

From the museum's point of view, there was concern expressed regarding the "Proper Use of Fragile Museum Collections." Many of the objects were so delicate that they would deteriorate from even the most careful handling, and some were in danger of fading under bright lighting conditions. The virtual museum project was acceptable to the museum primarily because it made use of the Native American collection for the benefit of the museum's Native American constituents. Also, the one-occasion handling of the object during the project would have minimal impact on it, as weighed against the possible benefit of producing a virtual reality record that could be accessed in the future in lieu of further physical handling.

Implications of the Category

The themes grouped under this category highlight the very special nature of the activities within the museum. Museum activities are resource intensive, so that only a few students can participate in the activities at any given time. By

having a virtual museum project that is ongoing, many more students would be able to participate over several museum visits, perhaps over a number of years.

Both students and adult participants recognized how unusual it was to see the objects up close out of storage or out of the museum cases, and in some instances have the special opportunity to handle them. The impact of this experience reveals the essence of "culturally responsive." "Spiritual" would be a better description because, as several participants noted, the objects clearly speak to the students with the voices of their ancestors.

Virtual museum projects are unusual and special because museum professionals feel strongly their responsibility to safeguard the collections for future generations. Virtual museum projects cannot be routine because repeated handling of fragile objects runs counter to the museum's mission of preservation. Bringing the Native Community into collaboration with the museums can lead to a better appreciation of the museum's efforts in conserving these cultural treasures.

TRIBAL MUSEUMS

Rationale for the Category

The three themes of this category reflect remarks participants made about the relationship of the school virtual museum projects and the existing or proposed tribal museums on their reservations. Two of the museums in the study were tribal museums. Participants remarked on the implications the virtual museum projects held for their tribal museums. Participants from two of the five communities that did not currently have tribal museums made remarks indicating

how the virtual museum project could promote a tribal museum for their community in a number of ways.

Recapitulation of the Category Themes

"Virtual Museum Collections within the Community" refers to the idea that community members could bring their personal and family items to the school for virtual reality imaging by the students. For the case study sites that did not currently have a tribal museum, the virtual museum project suggested a way to "jumpstart" a tribal museum by having students at the school do virtual reality imaging of heirlooms, Native art, and cultural items belonging to community members. In this way, donating virtual reality images while keeping their family collections, Native community members could "share without sharing" their valuable treasures. Similar initiatives for doing virtual collections throughout the community were made in the other three cases as well, strongly reinforcing the theme.

The "Expanding the Tribal Museum Role" theme expressed the ways that a tribal museum could collaborate with the tribal school on an ongoing basis. Students could do virtual reality imaging of tribal museum objects as they were acquired. A tribal museum might be implemented as a school project, becoming a site that simultaneously supported virtual museum and oral history projects and provided a community-approved facility where tribal members could bring their cultural items for virtual reality imaging.

The "Expanding the Tribal Museum" theme referred to the ways a virtual museum project might be used as a promotional tool for the tribal museum,

garnering support for museum expansion and marketing the tribal museum inside and outside the Native community.

Implications of the Category

The themes grouped in this category demonstrated ways in which the virtual museum projects inspired new ideas about doing digital collections within the tribal community, stimulating community interest in starting a tribal museum, enlarging and enriching the relationship between the tribal school and tribal museum, and promoting the tribal museum to the public. Students at the school were envisioned as benefiting from participation in all of these initiatives.

This category is a particularly strong one, with themes that show up in three of the four cases and reinforcing remarks for all of the themes made in the remaining cases. This across-case reiteration also demonstrates the importance of the tribal museum to Native American communities, even for the communities that have not yet successfully established a tribal museum.

COMMUNITY-MUSEUM RELATIONSHIP

Rationale for the Category

Due to the types of cultural objects museums acquire and the ways in which they have acquired them, there has been a long-time conflicted relationship between Native people and museums. Some Native people take the position that museums have acquired all of their Native American collections unethically. Others are thankful that museums have sought to preserve what is left of traditional Native culture for the benefit of all. Repatriation is a difficult issue for both sides of the controversy. The virtual museum project offers an alternative

form of digital repatriation. The themes under this category explore some of these issues related to the community-museum relationship.

Recapitulation of the Category Themes

In the theme "Repatriation and the Museum's Role in Cultural Preservation," one participant in the first case study described the uneasy relationship between museums and the Native communities as "a bittersweet thing," because so many people lost their most treasured items to museum collections. She thought the issue could be a topic of study for the older students in conjunction with the virtual museum project. Several participants across the cases indicated that the digital repatriation effort exemplified by the virtual museum project might supplement the repatriation efforts of the tribes.

Several participants in the first case recognized how hard it is to properly maintain a collection of fragile objects and appreciated the museums' efforts in that respect. Several museum professionals in the study indicated that museums wanted the Native community to have a sense of ownership of the Native American objects in their collections, and they approved of the virtual museum project as one way of improving the museum's relationship to the Native community. Several Native participants in the study expressed gratitude that museums valued Native American culture and appreciated their conservation efforts.

Participants also talked about the ways the museum and the school community benefited mutually from the virtual museum project, as represented by the theme, "The Nature of the School-Museum Partnership." The project allowed

museums to explore some technological innovations. Museums desire to put American Indian collections to use in ways that benefit of the Native communities in order to improve community relationships and qualify for museum accreditation. Museums also sought to "put a Native face on the Native exhibition" through projects like the virtual museum partnership with a tribal school. Because the museums in the non-Native community benefit in several ways the virtual museum project is a way of "turning the tables" in terms of community service by having Native people doing something for the museums that the museums could not accomplish on their own.

The theme of "The Virtual Museum makes the Museum Collections More Accessible" relates to some of the implications of the accessibility of museum collections through virtual museums for Native and non-Native people alike. Tribal museums might want to put some items that have been repatriated from the big urban museums on their Web sites so the general public can still have access to them. Family items may be added to the offerings on the Web as well. A tribal museum staff member in the second case stressed the importance of virtual accessibility because it gives more people access and, unlike the delicate museum items, the electronic versions do not deteriorate with time.

Under the theme "Putting Museum Collections Into Circulation," the director of the Provincial Archaeological Commission spoke about his frustration in coping with the historical legacy of distrust between First Nations peoples and anthropologists or museums. He was well aware of the cultural erosion taking place in the Native communities and was anxious to make the cultural material in

his keeping available to them. From the other side of the cultural divide, the school's cultural program director in the fourth case spoke of his frustrations with museums because he felt that they do not communicate their policies to Native people clearly and seem to have a "possessive attitude" toward their Native American collections. He wanted Native people, especially children, to have a "good humane experience" with museums.

Implications of the Category

The themes grouped under this category reveal that historical tensions between Native people and anthropologists and museums still remain. The virtual museum projects help to bridge some of these troubling issues that divide the communities and may even provide a forum for healing old wounds and seeking new solutions to ownership, preservation, repatriation, interpretation, and accessibility issues. Still, virtual museum projects should be embraced with a bit of caution.

When the Four Directions project began its first virtual museum projects, we coined the term "digital repatriation" to describe the rationale behind having students doing virtual reality imaging of artifacts from their culture. I have been a little wary about using this term because I was well aware of the controversial relationship between Native people and museums. Digital repatriation might be seen by Native people as a ploy to forestall actual repatriation of valuable cultural objects. I have received a few hints that this concern might be a consideration in some cases. This issue cannot be lightly dismissed, however. It is understandable

that Native peoples would sometimes be concerned that non-Natives attempt to trick them out of their due, since this had often occurred previously.

Beyond the thorny issue of repatriation is the very positive consequence of dramatically increasing the accessibility of the virtual museum objects for Native and non-Native people alike, while avoiding damaging exposure to the actual objects. This benefit holds equally true for tribal museums, public museums, archaeological collections, and private collections. It provides a way to put objects of cultural heritage to work for the important goal of cultural preservation.

NATIVE COMMUNITY PARTICIPATION

Rationale for the Category

Part of the original design of the virtual museum project included the participation of Native community members who would have the role of helping the students learn about the cultural significance of their selected objects. Some of the schools were unable to include significant community participation in their projects. The themes in this category examined the data regarding Native community participation or the need for it where it was lacking.

RECAPITULATION OF THE CATEGORY THEMES

In the first case study the theme, "Native Community Member Participation," the research videotape revealed differences in the styles of interaction used by the adults and the students in during museum activities, and how adult community members causally managed to ensure that their statements could be heard by all of the students who wanted to listen. One museum participant described his "facilitator" role of broaching a cultural topic with an

adult community member and a student and then pulling away when the cultural discussion was well underway. He spoke of the virtual museum project providing a forum for "exercising community memory." Several examples of casual cultural teaching could be observed in the research videotapes. One Native community member noted that seeing community members talk about their life experiences with interested museum staff helped the students gain more appreciation for their culture.

The theme of "The Need for Community Member Participation" emerged in both the second and third case studies. In the second case study project planners formally requested community member participation in their virtual museum proposal, but the word did not get out to the community in time. There were only a few good interactions between students and community members, and the adult participants wished there had been more. The Northern Lakes Tribal School technology coordinator told about her experiences with a student oral history project that indicated possible reasons that some community members might be hesitant in participating in projects related to tribal history. Some community members were concerned that such projects would focus on the bad experiences of Native people in the past. The technology coordinator was pleased that she was able to dispel those concerns in that previous project.

Participants in the third case study desired more community member participation as well. Several participants stated how valuable the tribal museum curator's participation was, in terms of his personal cultural knowledge and his status the tribal community. Other participants wished there were more

community members present at the museum to assist student research. Some participants thought that students should conduct "community-based research." One classroom teacher wondered why the school's culture teachers were not involved in the project because they were better positioned to recruit more community member participation.

IMPLICATIONS OF THE CATEGORY

The participants who contributed comments related to this category made it very clear that community participation in virtual museum projects is highly valued when it is present and missed when it is lacking. It enhances students' appreciation of their culture and community when they witness interactions of community members as culture bearers and museum staffers as high status non-Natives who value Native American history and culture. The casual talk among community members, students, teachers, and museum staffers about personal experiences, history, and heritage in the presence of cultural objects that have been taken out from "behind the glass" can frequently turn into a forum for community memory and cultural validation.

Garnering such community support may not easy, though. It may be important to consider who solicits the community support. A project would need to gain legitimacy from the standpoint of the community members. Project promoters may need to negotiate some guidelines regarding topics sensitive to the community. Tribal schools have a built-in agency for brokering these issues—the school's cultural program. Tribal museum staffers may also play the role of organizers and recruiters in gaining community member participation.

Though it was not discussed in this study, another consideration may be ways of recognizing and honoring community member contributions. In tribal communities it is customary to bring an elder a small gift when one visits to seek advice or hear a story. A stipend or honorarium for their service in a virtual museum project might serve a similar purpose.

COMMUNITY RELATIONS

Rationale for the Category

The "Improving Relations with Non-Native Communities" theme is the only theme that emerged in all four cases. The prevalence of emphasis on this theme suggests that it is a very strong feature of virtual museum projects in American Indian schools. The remarks made by participants under this theme have a surprising consistency throughout the study, revealing that many participants were motivated by the desire to improve the relationship between Native and non-Native people, and valued the virtual museum because of the ways in which it might accomplish this goal. This theme stands as a category by itself in this cross-case analysis.

Recapitulation of the Category Theme

Everyone in this study—not only the Native participants, but also the non-Native participants, because of their close connection and familiarity with their Native neighbors—recognized the many misconceptions and stereotyped ideas that most non-Native people had about Native Americans and their cultures. The misguided depiction of American Indian culture in the popular media and mainstream American mythology tends to portray all Indians as possessing a

mishmash of Plains and Southwest Indian lifestyles—living in tepees, wearing feathered headdresses, and riding wild ponies. This kind of misinformation is perpetuated because the average non-Native citizen has rarely had opportunities to interact with contemporary Native people. Many participants in this study talked about the virtual museum as a way of correcting these pervasive misconceptions and clearing up the stereotypes about Native people. The virtual museum was seen as representing an educational resource in this regard.

Several participants in the schools have had the opportunity to interact with educators and interested individuals who have sent them queries via the Internet or by mail about their tribal communities, history, and culture. These queries have come from locations all over the world. Teachers who wanted to obtain specific and accurate information about regional Native people for their lessons and teaching units sent most of these questions. The participants spoke of the virtual museum as an educational resource to which they could refer these questioners. They speculated that the virtual museum would stimulate interest in the tribal community.

Participants thought it was important that it was Native children who were providing the information about their communities in the virtual museum. Most non-Native children rarely had the opportunity to interact with Native students. The participants thought that the kid-to-kid communication that the Web site would provide to school students studying their region in their social studies classes would be particularly effective.

The Native participants of the study were particularly interested in portraying contemporary Native America. They wanted to "defictionalize" Native people in the minds of non-Native people. They saw the virtual museum as a way for Native people to "say who they are" to the world. It was perceived as an important form of intercultural communication. They also saw the virtual museum as "good PR" or as a marketing device that would put the community "on the map" and bring non-Native people to the reservation so that intercultural communication might take place on a face-to-face basis.

Finally, many participants mentioned the frictions that have existed between the Native communities and their non-Native neighbors. They talked about the virtual museum as helping to build a bridge between the communities to promote understanding and improve their relationships.

Implications of the Category

When judging the efficacy of an educational innovation, we usually focus on the innovation's measurable effect upon student learning. We generally do not consider the effect of the innovation on the local community or the wider public. Participants in this study were well aware of a "wider agenda" to the virtual museum project, one that at times seemed as valuable or even more valuable than the educational effect on the student participants.

In this age of educational efficiency, accountability, and standardized testing the virtual museum project would likely fail a strict assessment of educational worth. However, when judging the value of the virtual museum

project, the service it provides the museums, the community, and the world at large should be folded into the calculation.

VALUES

Rationale for the Category

The themes grouped under this category relate to the signs that indicate how participants—particularly the students—valued the virtual museum projects. Sometimes participants' comments that are reflected in these themes suggested how Native American values were expressed with respect to the virtual museum projects.

Recapitulation of the Themes

The first case study theme, "Ownership of the Virtual Museum Cultural Objects" explored the community's sense of ownership in a number of ways. Participants thought it was important that the students felt they had ownership of the project as a whole. Participants also recognized that the students gained a feeling of ownership of the cultural objects they selected and imaged. From the perspective of some museum professionals, it was important for the Native community to feel they had ownership of the museum's Native collection, and they perceived that the virtual museum project helped to achieve that goal.

The theme of ownership was extended and reinforced by participants' remarks in two other cases. Participants said that students felt they had ownership of their cultural selections because they were given the opportunity to choose which objects they would image and research for their virtual exhibits. Some

participants thought the students felt ownership of the cultural objects when they were allowed to handle them.

The first case study theme, "The Virtual Museum Promotes Native Community Pride," examines the different ways that pride of culture and community was fostered by the project. The technology coordinator compared the virtual museum project to other school projects that exhibited pride in the school, such as the sports program and the traditional carving projects. Like these aspects of school life, students would be able to identify with the virtual museum project for years to come.

There was also a pride of accomplishment—being able to help the non-Native museums do what they could not do on their own and conducting an impressive education project.

Participants in all of the cases used the words "pride" and "proud" to refer to the pride that Native Americans possess for their heritage. The virtual museum project tapped into and expressed Native American pride in a number of ways.

"Understanding Who You Are" was theme that emerged in the first and fourth case studies. It referred to comments on ways that the virtual museum project strengthened students' sense of identity as Native Americans by providing them with an opportunity to work with materials made and used by their ancestors and recent relatives.

Relating to the theme, "Preparing Students for the Project Mentally and Spiritually," participants in the first project talked about the ways Native students should be prepared before engaging in a project that touches the spiritual

underpinnings of their community. The culture coordinator had talked extensively about the project with the students to get them excited about it, and she and the technology coordinator regretted that they did not have an elder say a prayer to bless the project at the beginning.

Implications of the Category

The themes grouped under the *Values* category all emerged initially in the first case study partly because of the very different approach to detailing events of that case. It was a strong narrative approach, and themes that resulted from it grew mainly out of this detailed narrative. In the other cases I developed the themes primarily through a direct examination of the study data as it was filtered through codings related to the conduct of virtual museum project. Because values tend to have such strong cultural sources, some of these topics will re-emerge later when I discuss the ways in which the virtual museum project supports culturally responsive teaching.

Like the prior category, *Community Relations*, the outcomes related to *Values* tend to get short shrift in the current approach to education in the United States, especially when those values are not mainstream values. In the politicized process of developing textbooks and testable standards acceptable to all, specific cultural values tend to be washed out. It is hard to see how a Native student would claim ownership and pride in such "official knowledge" (Apple, 1993). "Understanding who you are" as a Native American might dredge up a mass of conflicted feelings with respect to State-approved history textbooks. The idea of offering a prayer to the Creator before a school project might perturb both school

prayer and first amendment advocates. Clearly, because of the cultural context of these virtual museum projects, this type of project needs to be judged by a different value system.

In this case study, the Native participants clearly valued having an opportunity to explore and express their particular cultural values. This relates to the discussion of culturally responsive teaching in the next chapter.

SUMMARY OF THE IMPLICATIONS

Table 7 below collects the implications that have been discussed in this chapter to give a condensed account of the considerations educators may wish to make when planning similar virtual museum projects.

Table 7: Implications for Virtual Museum Projects

Implications for Virtual Museum Projects
Virtual Museum Project Management
• Virtual museum projects will benefit from timely and effective project management
Classroom Teacher Issues
• Virtual museum projects require classroom teacher participation to ensure good student academic outcomes • Students should receive academic credit for their virtual museum efforts • Classroom teachers should have significant input into virtual museum project planning • Teachers should not be coerced into participating, but have the opportunity to embrace the project on their own terms as change agents in their schools
Technology Training
• Initially, virtual museum projects may have to be introduced as a package that includes technology training • Teachers do not have to be the technology experts in a virtual museum project, but somebody in the school community does • Teacher readiness for virtual museum participation should be assessed before the project begins so their concerns may be address (e.g. through additional technology training for teachers) • Students may act as technology mentors to their peers and teachers
Virtual Museum Project Activities
• Virtual museum projects will have more student impact if they are ongoing • The museum activities offer special opportunities for students to make intimate connections to their culture and heritage • Virtual museum projects offer a special way for museums to achieve important aspects of their mission • Virtual museum projects cannot be routine due to the potential damage to delicate museum objects • Virtual museum projects may lead Native people to appreciate museum efforts to conserve cultural materials
Tribal Museums
• Students may benefit from doing digital virtual museum collections within their communities • Students may benefit from a close working relationship between the tribal museum and the tribal school • Virtual museum projects may mobilize community interest in starting a tribal museum
Community-Museum Relationship
• Virtual museum projects can provide a forum for addressing historical tensions between Native people and museums and anthropologists • Virtual museums offer a way for museums to offer Native people better access to cultural materials to help them in their efforts at cultural preservation
Native Community Participation
• As culture bearers, Native community members are important resources for virtual museum projects • Interactions between students, community members and non-Native professionals in the presence of cultural objects can enhance students' appreciation of their cultures • The tribal schools culture program staff members may promote the virtual museum project to the community and recruit community participation • Native Elders' participation should be recognized through a gift, honorarium, or stipend
Community Relations
• Virtual museums have the potential of improving the relationship between Native and non-Native communities
Values
• The value the Native community places on the virtual museum should be considered as a factor when judging the educational worth of virtual museum projects • Consider having an Elder bless the virtual museum project when it begins

Chapter 9: Virtual Museum Projects and Culturally Responsive Teaching

In the previous chapter, I began addressing my research question, "In what ways do virtual museum projects support a culturally responsive teaching practice for Native American students?" In that chapter I collapsed all the themes from the four case studies into a composite description of the virtual museum project as an emerging strategy for culturally responsive teaching. In this chapter I will address my research question further through my second component research goal, which is to determine how virtual museum projects might contribute to a definition of culturally responsive pedagogy.

TOWARD A DEFINITION OF CULTURALLY RESPONSIVE TEACHING

In Chapter One I ventured a tentative description of culturally responsive teaching, which I repeat here as a baseline for the ensuing discussion. Culturally responsive education

1. is a strategic approach to classroom practice that takes advantage of the cultural knowledge a student brings to the classroom to provide a challenging education capable of sustaining long-term academic success.
2. is a multicultural approach that seeks to improve education for minority students who have historically fallen below the norm of academic achievement.
3. means abandoning the deficit view of the minority child, and taking strategic advantage of the child's culture, language, social, and political

situation, and community relations as a positive base for classroom instruction.

4. addresses issues that are important to the students' wider communities, such as social and political problems and the preservation of endangered language and cultural heritage.
5. provides students with the knowledge, codes, and cultural capital needed to be successful in mainstream society, but does so while valuing and affirming the students' own culture.

In Chapter Two I outlined three decades of historical development of the concept of culturally responsive pedagogy in a range of disciplines including multiculturalism, socio-linguistics, critical education theory, and school ethnography. I maintained that culturally responsive pedagogy has recently been undergoing a reconceptualization or reformulation that synthesizes the scholarship from the full range of this historical development. I also explored several areas of controversy that have grown out of this theoretical development. One of the controversies involved the appropriateness and validity of the range of practices called learning styles (Ryan, 1992; Chrisjohn & Peters, 1989; Gay, 2000; Wlodkowski & Ginsberg, 1995). Another major controversy acknowledges a possible conflict in educating students to gain the knowledge, codes, and cultural capital for social mobility: should students and communities adapt their cultures to accommodate to the demands of a dominant society, or should education challenge the inequities and advocate social change (Delpit, 1995; King, 1994; Nieto, 1995; Villegas, A. M., 1991; McLaren, 1995)? Because of the difficulty of

bringing a coherent formulation to such an immense body of theory and research, and because the still-simmering controversy surrounding some areas of the supporting scholarship, I believe that the definitive exposition of culturally responsive pedagogy is still in formation. I hope my current study of the virtual museum project as one culturally responsive teaching strategy will contribute to the effort to understand how one teaches in a culturally responsive manner.

VALIDATING NATIVE CULTURE

In Chapter Two, I traced the origins of culturally responsive pedagogy back to the political activism of the 1960s, when minorities were demanding more recognition of their contributions to American society in children's education. The response to this has been relatively minor changes in textbooks, which still remain a contested ground of educational change today (Gay, 2000; Apple, 1993). Another response has been to implement add-on curriculum pieces celebrating "Brown heroes and holidays," a practice, though appearing to be positive, detracts from the goal of critical pedagogy that moves subordinated minorities from the margins to the center of teaching practice. (Nieto, 1995). Given that the virtual museum project was approximately one-week of special activities with cultural content, one might question whether it suffers the kind of trivial celebration activity to which Nieto refers. Gay (2000) maintains that culturally responsive teaching is validating. "It teaches *to and through* the strengths of these students. It is culturally *validating and affirming* (p. 29)." Part of that validation comes from the legitimizing of the students' culture by including and respecting those cultures in classroom practice.

The discussions and plans by project participants under the themes "The Virtual Museum as an Ongoing Practice" and "Pride" would suggest that the virtual museum projects could manage to move Native culture toward the center of classroom practice and occupy a validating place of pride. When I asked Frances in the Pacific Tribal School case how she saw the project affecting the students, she said,

> Oh, in many ways. Being able to appreciate the value that other people put on our culture, recognizing that the museums themselves appreciate the value of those objects, and how they are related to everybody's history, not just the Pacific tribe, but Broad County's history. So that validates the importance of who we are as community members, and being able to appreciate the history of [the virtual museum] objects themselves. The fact that when you are holding them, imagine that our ancestors, one of our ancestors actually tooled that object and used it in everyday life, and their imprint is there, when we get to touch that. So that's an extension of being able to go back and recognize and appreciate and get to know the people, where we came from, the family, that we have a long history in this area, and the evidence is right there, so it continues to validate, again, our heritage.

Judging from the responses from the students, the contention that the match between the project subject and student heritage can be validating found some support. When I asked what they liked about the project, many students stated it was because they got to learn about their culture or their ancestors. For example, Amy at Bountiful River Tribal School said, "I think that out of all the school projects that we've done here, I like this one the best because it shows a lot about my heritage." When I asked some students at White Pine Tribal School if it was important that the project related to their culture, they agreed. Leah said, "Yes, because I can learn some more things about my ancestors, and I can learn a lot more."

In all of the cases, when I asked students if knowing that their work would be on the Internet made them want to work harder, I received primarily positive responses. For Marie at White Pine Tribal School, the fact it was presenting her culture to the world was an added incentive. She said, "It makes me want to work harder so I can learn more about my ancestors who made baskets."

Marie's classmate, June gave a more detailed response regarding the cultural aspect of the project:

> I thought it was really fun. The activities we did, and like how we learned to use the digital camera and the video camera, and we got to meet you, and that was a big opportunity for us. And I thought it was really cool, the way I was related to most of the people who made the stuff at the museum, and how it compared, I don't know, like how it was back then and now, the different things that have changed. I don't know, it's just back then they used natural things; like they killed stuff to eat every day and use it. I thought that was really neat.

June's statements show how a number of facets of culture can interact intimately in a project to make it responsive to a student's culture. June responds positively to the opportunity to the technology in the project. Later in this chapter, I will consider the culturally responsive aspects of the technology used in the virtual museum projects. At the same time, June talks about knowing people in her community who had items in the museum collection. She then refers to the older materials and speculates how everyday life for her ancestors must have been like.

I also asked students in the last two cases if they could do another virtual museum project at another museum, would they want to do Native Indian objects or work with some other collection. All the responses indicated that the students would prefer to work with "Indian stuff" again.

The positive responses to the cultural content of the project by the students were prominent. It was hard to find any dissenters. Billy, a second grader and the youngest participant in all of the projects said in his interview that he did not like the fact that the virtual museum was about ancestors. For him, the project got "very old, very quick." He preferred the science program and doing experiments. However, in the research video he appeared to be quite engaged in the virtual museum activities.

Several adult participants in the study stated that they thought that young Native Americans were not very aware of their cultures, and that they would gain more appreciation of it as they grew older. Carol at White Pine Tribal School thought the virtual museum project experience would have an effect later on in their lives. She said,

> I think it's going to do a lot to boost their pride in, not so much their culture now, because I think students are at a stage where they just don't think about that. But I think in the future, for these students that were involved, they'll say, "Well, when I was in the fifth grade we did [the virtual museum]." And they will remember this.

The responses from the students would seem to contradict some of the adult assessments of their lack of cultural awareness. It is also understandable that adults would be concerned about the proper enculturation of youth. In a similar way, the study theme "Understanding Who You Are" explored how participants perceived the virtual museum project as contributing to the process of forming a Native American cultural identity. Several adult participants spoke about how the students made a connection to their ancestral past through the objects they selected to work with in the project.

Will, the culture program director at White Pine Tribal School, indicated the importance of the cultural component of the virtual museum when I asked him how he saw the students benefiting from the project. He told me,

> Well, there's two ways. One, they get to do hands-on research, which is to me the best way of learning. However that research takes shape, and with the use of the Internet, and of course then there's a whole new field now. And the other one of course is as they research different things like that thing you just mentioned, the Wabanaki, they'll start to know a bigger picture of the tribe, its participation and its place in all of that. And so the learning is two fold. One is it's a technical research skill. You know, sort of germane and applicable in all areas, facets of their lives. And more specifically the other one is a way in which they can have a baseline for studying their own background and taking it as a comparison to other cultures and other groups of people in the world. So, that's what I'm hoping we spark in projects like this.

The first of the two outcomes Will mentions here, research skills, is one he sees the students using all of their lives. The second, getting to know their culture, will be important because through the understanding of their own culture they will come to understand others, by comparison. Will's observation recalls Gay's (2000) discussion on the validating aspect of culturally responsive teaching which "acknowledges the legitimacy of the cultural heritages of different ethnic groups, and . . . teaches students to know and praise their own and others' cultural heritage (p.29)."

COMMUNITY PARTICIPATION

Another way of validating and affirming the students culture is to make use of community members as respected and valued resources in the student's learning projects. Culturally responsive pedagogy scholars have stressed the

importance of teachers gaining an intimate familiarity with students' cultures so that they can help students build on the knowledge, values, beliefs, and experiences they bring to the classroom (Villegas & Lucas, 2002; Ladson-Billings, 1994a, 1995; Cleary & Peacock, 1998; Smith, 1998). A few have also found it beneficial to encourage community participation in student learning projects (Moll, 1999; Moll & Dias, 1987; Cummins, 1992; Villegas & Dias, 2002). The cases in this study strengthen considerably the proposition that community participation can be culturally responsive. Two themes emerged from the cases that directly related to Native community participation: "Native Community Participation," and "The Need for More Native Community Participation." Essentially these themes addressed how the participants valued the community participation and wished there were more of it when it was lacking.

The participants in the study noted a couple of important aspects of the community member participation. One was their role as subject matter experts. As Vince, the technology assistant at Bountiful River Tribal School, put it, the students were "speaking to a subject matter expert, and they're getting the best information possible, right there on the spot." Mat, one of the teachers in the Bountiful River case added that much of the information that Ernest had about the tribe probably wasn't written down.

Students also mentioned the subject matter expert role of the community members. Several students at the Bountiful River Tribal School talked about what they learned about their objects from Ernest. June, the student at White Pine

Tribal School I quoted earlier, talked about the culture teacher Betty's role in a way that sheds some light on how students might perceive the subject matter expert aspect of the community member role. She said,

> I thought it was, I thought Betty was there to, that she's like real old, that since she was little, like back in the past, I think she knew a lot more about our ancestors, who we're related to and like she learned about all kinds of things. Like I needed help with the kind of wood that the walking stick was made of and she thought, she kind of knew, since she was real little, that it was a cherry stick she used, and I thought that it was really cool the way she was there helping us.

Frances pointed out a second important aspect to the community member participation. They helped the students gain a better appreciation of their culture because they could see that the non-Native adults valued the knowledge and cultural background of the Native community members as they discussed the objects in the museum and other aspects of Native American life. The non-Native museum professionals confirmed that they do indeed value and appreciate the opportunity to interact with the Native community members who participated in the projects.

Culturally Congruent Participation Structure

The project activities that took place at the museums were very different from the kind of activities that take place in the classroom. The environment proved to be very productive for the students, who worked with apparent focus and motivation. In the parlance of the culturally congruent literature, the project activities at the museums offered a different "participation structure" for the students, one that might be considered culturally responsive (Au & Kawakami, 1994). The Native community members played a key role in the changed

participation structure. They interacted with the other adults in a more public space, so their statements could be heard to everyone in the room, and their talk, though informal, was very germane to the students' learning goals. The students generally went about their work quietly, interacting with each other and the other adults in a more intimate, private proximity. This allowed the students to pursue their learning goals by helping each other and seeking help without public scrutiny. Though another ethnographic study of student and adult interactions within the specific communities should be done to better establish the cultural congruence of the museum activities, the cultural responsiveness of the participation structure is consistent with other studies done with Native American children (Philips, 1972; Dumont, 1972; Mohatt & Erickson, 1981; Au & Jordan, 1981).

COMMUNITY CONCERNS

One element of culturally responsive teaching that was strongly addressed by the virtual museum project was addressing issues of concern for the Native community. By addressing the important issues that concern the students' communities, the virtual museum projects express some of the cultural responsive practices recommended in the critical pedagogy knowledge base (Friere, 1970; McLaren, 1995; Villegas, 1988, 1991; Nieto, 1995; Gay, 2000).

Native People Saying Who They Are

One of the community concerns was expressed in the study theme "Improving Relations with the Non-Native Communities." Native community members wanted to the correct misconceptions and dispel the stereotypes about

Native Americans that had grown so common in the mainstream culture. The fact that it was Native children performing this vital service of intercultural communication was an added benefit.

By challenging the pervasive misconceptions and stereotypes regarding their lives and culture, the students and community members are engaging in a critical pedagogy aspect of culturally responsive teaching, one that challenges enduring societal knowledge structures that position Native Americans as "primitive" or as Will, the culture teacher at White Pine Tribal School put it, "The Noble People of the Woods." Challenging such prejudicial conceptions was so important to the participants that it was the centerpiece of the only theme that emerged from all four case studies, "Improving Relations with the Non-Native Communities."

Participants in the study posed a number of sources for the persistent stereotypes Native people encounter, including popular media, Hollywood movies, outdated textbooks, European romanticization of the "noble savage," and the misdirected popularization of Native America in the "Collier Years." The critical anthropologist Fabian (2002) points to a deeper source of the contemporary stereotypes of Native people in anthropology. Nineteenth century anthropologists applied an analytical framework of "evolutionary Time" to place the indigenous peoples they studied in a temporal stage model of development, which, in the case of American anthropologist Lewis Henry Morgan, went from savagery to barbarism to civilization (Adams, 1995). Every culture went through these stages to reach the teleological point of civilization, so that each culture

could be judged "advanced" or "primitive" in relation to any other. All cultures that did not share the civilized stage of the researcher were labeled primitive. Fabian points out that, even though thinking in evolutionary Time was generally discredited by 20th century anthropology, it still persists in popular thought and other realms of discourse today, such as in the global discourse around the Third World and economic development. Native communities also suffer from the perceptions generated by thinking in evolutionary Time.

A few examples from the study illustrate how the Native participants hoped the virtual museum project would challenge thinking in evolutionary Time. Frances at Pacific Tribal School thought the virtual museum would show off the "engineering feats" of her ancestors, whom so many non-Native people would call "primitive." She thought that the tools and artifacts imaged in detail in the virtual museum showed off the true sophistication, intelligence and ingenuity that people would not be able to appreciate unless they had a closer look. In the Bountiful River case, it was important to Annie that the virtual museum showed a "balanced" picture of Wabanaki culture, so that it included not just axes, projectile points, and war clubs—which would tend to reinforce the "savage" stereotype—but also show off the artistry of Native baskets, quill work and carving. Ernest, the Wabanaki Tribal Museum curator, wanted to communicate to non-Natives the message that they too were once a tribal people as well, with deep connections to the land that they should still recognize. He questioned the assumption that non-Natives have advanced as a people because they have advanced technologically, scientifically, and materialistically, because in doing

so, they have regressed spiritually as a people and lost their connections to their roots. These ideas turn the evolutionary Time scale on its head in some respects.

In the 20th century, anthropologists began moving away from the ethnocentric representation of cultural evolution and began adopting "cultural relativism" as a more ethically balanced perspective (Wax, 1993). According to cultural relativism, cultures should not be judged on a graded scale from savagery to civilization because they all share a fundamental equivalence in dealing with the basic issues of life given the resources and knowledge available to a people. Scholars thought that other cultures should not be judged from the perspective of a proposed Eurocentric superiority, but studied on their own merit as valid systems of living. Cultural relativism bids the anthropologist to resist the tendencies of ethnocentrism implicit in the study of cultures in evolutionary Time.

With a new respect for indigenous cultures promoted by cultural relativism, 20th century anthropologists sought to study cultures as they were before contact with Western civilization. They regretted that they had begun their studies "after it is too late" (Sanjek, p 613), when many cultural practices were already on the wane. They felt a need to practice "salvage ethnography," which had the pretense of reconstructing cultures as they existed in the past, before they were contaminated by contact with Western culture. This led anthropologists to ignore certain conditions of present in order to represent an idealized "traditional life." In a new attempt to maintain scientific objectivity, anthropologists began to employ "the ethnographic present tense" (also called "the ethnographic present") to document the "Other" in their studies (Fabian, 2000; Sarris, 1993; Murray,

1991; Sanjek, 1991; Hastrup, 1990). The term refers to "the practice of giving accounts of other cultures and societies in the present tense (Fabian, 2000, p. 10)." Critics of the practice maintain that "the present tense 'freezes' a society at the time of observation, or worse, it contains assumptions about the receptiveness, predictability, and conservatism of primitives. (p. 81)." It also ignores the fact that cultures change throughout time to adapt to new situations and through cultural diffusion. Native critic Greg Sarris (1993) maintains that the ethnographic present tense has the effect of controlling the text of literary discourse about Native Americans in a way that overshadows the Native Americans' worldviews. This may be a subtle effect compared to the powerful forces of popular media and old Hollywood movies on the non-Native misconceptions about Native people that the participants in my case studies identified, or it may be a deeper explanation of how these misconceptions form and persist.

The Native participants in this study wished to counter the popular misconception that they still live in 19th century conditions, and communicate to the world that they were now a modern people, a contemporary people. It was equally important that it was the students who were carrying that message to the world.

For instance, Will spoke of the importance of the "kid-to-kid" intercultural communication that the virtual museum represented. When I asked Frances, the tribal museum board member from the Pacific case study what impact she saw the virtual museum having on the world, she replied,

> With these kinds of projects the access will be in an arena, maybe middle school, elementary school kids, and so when you are able to reach the kids through technology that they are so used to—it's just everyday life to them now to open the computer web page and browse the internet—that the access is a little more freer of judgment, and you're not looking at the textbook that was written in 1950, interpreting life for Native Americans from that point of view, but this is an interpretation by the kids, by the Indian kids themselves, and so the people who access that information are going to get a more accurate picture and a more contemporary picture of Indian life, past and present.

When I asked Catherine, the Great Bear Tribal Museum staffer, a similar question about the impact of the virtual museum she indicated the importance of portraying her people in their modern, contemporary state, and the duty of the students and their descendants to deal with the problems the world would present to them in the future:

> It's hard to explain sometimes when I try to say, well, Indians are about, the first thing you ask one is where are you from, and it's always a point of pride of where you're from. And so this museum will show where the Great Bear people are from, how we got here, what's happened since then, and our current comparatively affluent [lifestyle], and industry because we were able to take advantage of certain opportunities that were presented, one of which was some reservation businesses and the casinos and using that money generated from there to improve the reservation itself, the infrastructure, and provide a lot of jobs. We're modern people. We're modern people with a very deep connection to the past. I know that my great grandma would, could never even imagine now, where this world is, what it's like. But we have children who have to deal with it, who are our descendants, and soon will become grandmas and grandpas and great grandpas themselves.

Catherine's response brings up another aspect of virtual museum project that is culturally responsive: it makes use of and furthers the role the community hopes students will embrace—as culture bearers or storytellers, who must pass on the their culture to future generations, which I will take up in the next section.

The students, studying their own cultures under the tutelage of community members, museum staff, anthropologists, and their teachers, are in a sense themselves acting as anthropologists, but they do not have to position themselves as researchers studying some *other* culture. They can truly speak of the culture as their own, saying for themselves and their community, who they are to the world, and in a way that carries an authority that non-Native academics do not have. Fabian's (2000) corrective advice to anthropologists grappling with the legacy of evolutionary Time and the ethnographic present tense is to take the position of "coeval Time" with respect to their subjects; that is, to share the same time with them, both in the present and historically. Coevalness is "recognizing that all human societies and all major aspects of a human society are 'of the same age'. (p. 159)"

Fabian calls the distancing techniques such as evolutionary Time and the ethnographic present the "denial of coevalness," or allochonism—an almost inescapable need to make sense of the Other by reframing it in the context of Western categories and concepts. He characterizes ethnographic fieldwork, in which the ethnographer must share time and space with the people of the other culture to have communicative interactions with them under the conditions of intersubjectivity, as the anthropologist's purest experience of coeval Time. However, in writing the anthropological thesis based on ethnographic data, time distancing techniques take over the exposition as "their time" becomes reframed in the context of a purported objective timeframe required by the science of the day. Unfortunately, having identified this problem, Fabian fails to come up with

an example or concrete recommendations that would serve to guide the use of coeval Time in anthropological writing.

The virtual museum projects of this study may provide an example of anthropological exposition that uses coeval Time. For the students in the virtual museum project, a coeval relation to their subject was natural because they were talking about *their* community and *their* history. Several Native participants spoke of the awe they experienced in being so close to the objects that were made and used by their ancestors, and they thought the students experienced that connection as well. They also saw connections between the tools of the past and the ones used by Native community members today—for instance, a hundred-year-old adze with stone blades that differed little from the contemporary woodworking tool except for materials used to make it; or the 1,200-year-old cutting tool that consisted of a beaver tooth lashed to a deer handle that the Native participants recognized as the ancestor of the "crooked knife," a common contemporary basket making tool. From the perspective of the students, "These are the tools our ancestors used, just as we use them today." The pejorative appellation of "primitive" would not come up because, as Frances claimed, these were the "engineering feats" of her ancestors.

I have threaded through this section a discussion of a controversy within anthropology regarding its positioning of the Other. I did this because I want to clarify a culturally responsive aspect of the virtual museum project. One of the strongest themes that emerged in the study was, "Improving Relations with the Non-Native Communities," which was comprised largely of the Native

community's desire to correct the pervasive stereotypes and misconceptions about Native people. The participants noted a number of possible causes for the persistence of the misperceptions that have plagued them for so long, but I wanted to see if I could find a deeper underlying source. My analysis should be considered tentative at this point—I am treading in some territory outside my own discipline—but I present it to illuminate how the virtual museum project may be acting to challenge the inequities of the dominant society. This might be especially relevant considering Fabian's position that in its 19th century origins "anthropology contributed above all to the intellectual justification of the colonial enterprise. (p. 17)" Table 8 summarizes the points I have made.

Table 8: Ways virtual museum projects challenge stereotypes and misconceptions about Native Americans

Anthropologists' Temporal Technique	Relationship to the Subject	Virtual Museum Challenge
Evolutionary Time All cultures pass through evolving stages to achieve civilization (e.g., savagery, barbarism, civilization)	All cultures on a conceptual slope that places civilized societies in a superior position to the more "primitive" cultures	Shows off the "engineering feats," intelligence, and ingenuity of Native ancestors
Ethnographic present tense Grammatical convention of present tense implies subject is "frozen in time," culture is unchanging	The other culture remains the same as when first studied; Promotes stereotypes such as, Indians still live in tepees, cling to outmoded traditions, resist change	Shows that Native Americans are a modern, contemporary people with a rich connection to the country's past
Coeval Time Researcher and subject share the same time and history	"Objective" temporal distancing does not take place. Communication, intersubjectivity possible	Students-as-anthropologists speak about their culture today and share history with their ancestors

Students as Culture Bearers

Another concern that Native communities share is their continued survival as a people, or cultural preservation. Many participants recognized that the students were fulfilling that role in their virtual museum participation. A number of themes in the study addressed this role of the students. In "Virtual Museum Collections within the Community," participants spoke of students putting family treasures on record with virtual reality imaging. "The Virtual Museum makes the Museum Collections More Accessible," and "Putting Museum Collections Into Circulation" both addressed the importance of making cultural items in the museums accessible to Native community members wishing to learn more about their cultures.

Will thought that the virtual museum project would "take on a life of its own," because future cohorts of students would see the contributions their cousins, brothers, and sisters had made and wish to make their own. He connected this to the oral tradition that took the story of Native culture back in time. By participating in the virtual museum the students would take the story on into the future. Other participants expressed this notion as well. For instance, when I asked Jack, who is a tribal member of Great Bear reservation, what attracted the students to the project, he told me,

> Just the history of the reservation they're from. They see a picture of their grandpa and great-grandpa and great-great-grandpas, and like I tell them, it's something you need to know. All our elders are dying now and you've got to take over from where we're going to leave off. So they're slowly getting it.

When I asked Joanne and Fred from Northern Lakes Tribal School in what ways did they think the virtual museum project drew upon the students' cultural strengths, Joanne told me,

> I think it's helping instill a sense of pride because they can do something their parents or grandparents never could, in a positive way. They're going to be the storytellers for their grandparents. That's how I look at it.

Fred, who is a tribal member, agreed. He said,

> I remember I was reading, . . . I can't remember what book, but it said something about the children, the tribe; their children were like representatives of the future, you know, and it's true of the tribal customs and culture. So it's the technology that has been able to enhance that in different ways. To teach them things that maybe that's never been taught and other ways. It brings all the people back together. I see it happening.

Fred's remark about technology as another way to pass on culture is another possible culturally responsive element to the virtual museum project that I

will pick up later. His remark about students playing a very traditional role of being "representatives of the future" is another way of saying that the virtual museum project places the students into the role of culture bearers for their communities.

In their recent reformulation of culturally responsive teaching, Villegas and Lucas (2002) urged teachers to move away from the traditional "transmission views" of knowledge, learning, and teaching toward embracing more "constructivist views." For them, culturally responsive teaching means essentially applying constructivist learning theories to minority children in ways that make positive use of the knowledge and experiences students bring to school as a basis on which to construct new knowledge.

One school of constructivist theory is situated learning, which examines how the whole environment in which a learner is situated may scaffold specific types of learning and knowledge production (Lave & Wenger, 1991). One way learning may be supported in a learning environment is through "legitimate peripheral participation," which refers to the ways a novice learner may initially play a minor role in knowledge production on the periphery of a knowledge community and gradually move to the center of the community as their knowledge and skills improve. This implies a learning environment that is very different from traditional classroom instruction. It resembles more closely an apprenticeship in which the learner is initially trusted to do simple tasks in an environment where experts are practicing their trade. Much learning takes place through observation and increasingly more advanced hands-on experience. A

minimal amount of direct instruction takes place on a need-to-know basis in the context of a productive task. This would be an apt description of the young participants in the virtual museum projects who are learning to be the cultural bearers of their community under the tutelage of community members, museum professionals, and teachers in the process of creating a real-world, useful product. The descriptions of virtual museum activities in the cases portray a very apprentice-like setting. The adults, who are community members, teachers, museum professionals, tend to carry on their own level of intercultural dialogue as the students carry out their own learning activities, attentive to the knowledgeable exchanges taking place and engaging in those exchanges when the need or appropriate opportunity arises. The learning the students are engaging in is not just academic and technical. As several participants have noted, the students are learning to become the cultural bearers for future generations and the intercultural communicators to the world at large.

Partnerships with Museums: Changing Society

The importance and urgency of cultural preservation for the Native community has been expressed in several ways by many of the participants in these studies. Museum professionals, who see their mission as conserving the heritage that is imbued in the collections put in their care, feel that they share the important mission of preserving Native cultures with their Native American constituents. This makes the partnership between museum and school itself a site of a critical pedagogy because, by digitally repatriating cultural objects back to the communities from which they came, museum professionals, community

members, and students are working together to redress the unethical practices of the past. I must be very careful in making that claim because many Native people would stress that actual, not virtual, repatriation of all cultural items is their true goal. Since the 1990 Native American Graves Protection and Repatriation Act (NAGPRA), the historical rivalry between museums and Native Americans has reached a truce. Museum administrators are gaining a new appreciation and respect for Native people and many Native Americans are relieved to find that most museums will cooperate with them in pursuing the requirements of the law (Kinser, 2000).

Ernest, as a tribal museum curator, wanted to repatriate all of the Wabanaki items in the museums back to the community, but he realized that would not be possible under the provision of NAGPRA and the current condition of the tribal museum facilities. He recognized the digital repatriation of those objects as the next best option.

Jim, the director of the Provincial Archaeological Commission, expressed the difficulty he had at "breaking the barriers between Native history and archaeological history and working together," to put the cultural items in his care back into circulation to preserve Native cultures. He compared the virtual museum project to a program he learned about ten years ago that involved Apache students videotaping traditional stories told by the Elders. As someone who wanted to put the Commission's collections to work preserving Native culture, he said he had "some frustration there," because,

> We've never had a group from Canada come in to do this [the virtual museum project], in terms of all the other First Nations schools or all the

> Native kids in the provincial schools. We have not yet seen this kind of stuff. We've seen, we've heard of some work that teachers have done, but the missing element seems to be to get the kids involved in it because they're now carriers of the culture by working with this stuff, and you know [we] don't have to, we don't have to because they are doing it themselves.

Jim's comments about the students' role in helping him to achieve an important part his organization's mission are revealing. He has had some frustration because the historical distrust between Native people and anthropologists and museums has made it difficult for those parties to work together. The students are able to overcome that friction because they are themselves community members, achieving the goals of both parties in the virtual museum partnership. This recalls the unique position that students-as-anthropologists have in relationship to their culture discussed in the prior section, which avoids the kinds of objections Jim might encounter from the Native communities if he were to do the interpretation of cultural objects as a non-Native.

The partnership between the school, Native community, and the museum offers a unique forum where an important contemporary cultural and political issue plays out. The partnership is responsive to the vital concerns of the students' communities that find common ground with important aspects of the museum's mission, which is why I consider the partnership itself a culturally responsive element in the virtual museum project.

LEARNING STYLES: COLLABORATIVE LEARNING AND HANDS-ON LEARNING

In Chapter 2, I explored some of the controversy within the culturally responsive literature surrounding the use of learning styles as an appropriate approach to learning theory for minority groups (Chrisjohn & Peters, 1989; Pewewardy, 1999; Ryan, 1992; Swisher & Deyhle, 1989; Wlodkowski & Ginsberg, 1995). In spite of the controversy, many multicultural education scholars still find some of the concepts in the learning styles literature useful when it comes to making recommendations about how to change teaching practice to enhance learning for minority children (More, 1989; Ross, 1989; Swisher & Deyhle, 1989; Dunn & Grigs, 1995; Pewewardy, 1999; Gay, 2000; Hilliard, 1989; Shade, 1994). In a very recent reformulation of culturally responsive pedagogy, Villegas and Lucas (2002) did not address the topic of learning styles at all, instead relying on constructivist learning theories as a basis for understanding how all children learn, including minority and disadvantaged children. Their approach may represent a positive trend in the development of culturally responsive pedagogy that bypasses the controversial issues of the learning styles approach to learning theory.

Collaborative Learning

Gay (2000) maintains that collaborative or cooperative approaches to teaching are especially appropriate for educating marginalized minority students because,

> First, underlying values of human connectedness and collaborative problem solving are high priorities in the cultures of most groups of color in the United States. Second, cooperation plays a center role in these

> groups' learning styles, especially the communicative, procedural, motivational, and relational dimensions. Therefore, they should be key pillars of culturally responsive teaching. (p. 158)

I would not disagree with Gay that collaborative and cooperative teaching techniques should be a pillar of culturally responsive teaching, but I question whether this is due to some exclusive tendency of "groups of color" rather than a learning strength that is more evenly distributed across all learners. She supports her thesis with several studies in which teaching strategies that incorporated collaborative and cooperative learning approaches led to improved academic performance in minority children, but she also mentioned some studies that showed that the approach was effective for non-minority children as well. For instance, in a series of studies demonstrating the effectiveness of a structured cooperative learning teaching strategy, Gay laments that the results were not disaggregated by ethnic groups, "so we do not know who is accounting for what kind of performance." She reported another study that demonstrated that cooperative learning techniques could equalize the status on achievement of individual group members in heterogeneous learning groups by enhancing the learning outcomes of "Latinos, low-income European Americans, and Southeast Asian immigrants. (p. 159)"

One does not need to rely on a special ethnic learning style to explain the effectiveness of collaborative learning approaches. For instance, researchers in the Communities of Learners project that incorporated structured cooperative learning practices with more informal collaborative learning with students in an inner city school applied social constructivist theories to analyze the knowledge-

building taking place (Brown, et al., 1993; Brown & Campione, 1994). They applied and extended the concept of the "zone of proximal development" to their explanation of the learning activities that take place in a social learning environment supported by collaborative activities.

The zone of proximal development is a learner's upper level of competence defined by the difference between what the learner can accomplish on his or her own and what he or she can accomplish with the help of a more competent other or other supportive elements in a learning environment (Vygotsky, 1978). Sometimes this support will come from an adult, sometimes from a peer, sometimes from artifacts in the learning environment, such as a books, videos, scientific instruments, or computers. The Communities of Learners researchers viewed the classroom as composed of multiple zones of proximal development that allowed different learners to learn via different routes at different rates. The collaborative nature of the learning environment allowed students and adults alike to support each other in their learning through "mutual appropriation," in which "learners of all ages and levels of expertise and interests seed the environment with ideas and knowledge that are appropriated by different learners at different rates, according to their needs and to the current state of the zones of proximal development in which they are engaged. (Brown, et al., 1993, p. 191)"

The reason I bring up the Communities of Learners research is to demonstrate that one need not appeal to a collaborative learning style to analyze the effectiveness collaborative learning environments. The Communities of

Learners project was conducted with an urban student population that was 65% African-American and only 12% Caucasian, but the researchers did not refer to this ethnic makeup to explain the effectiveness of the project's design (Brown & Campione, 1994). Of course, there will be a great deal of cultural content to whatever comprises a given student's zone of proximal development, but from the social constructivist perspective, the cultural experience the student brings to the collaborative learning environment will be treated as a positive baseline to build upon as well as a positive contribution for "mutual appropriation."

The virtual museum projects shared some features with the Communities of Learners project. Though formal cooperative learning techniques were not part of the virtual museum project design, the project did lend itself to more informal collaborative learning activities. The students were assigned to small teams of two or three members to select, image, and research each virtual museum object. In some cases the students collaborated on writing the essays that accompanied the objects in the virtual museum exhibit. Also, as in the Communities of Learners project, the virtual museum projects made use of outside experts—museum staff and Native community members—as information resources for student research.

I asked the participants in the virtual museum projects about the collaborative aspects of the activities. The comments I received may be grouped around three aspects of collaboration: 1) as a way of dividing the work as a labor saving device, 2) as a way of enhancing learning, and 3) as a learning goal in itself.

The students were most likely to recognize the labor saving aspect of collaboration, noting also that it kept the tasks from being boring. Nearly all of the students I asked referred to the task of imaging their objects. Typically two students would share the task, with one student operating the camera, while the second rotated the turntable on which the object was positioned. Usually the students would trade roles in the middle of the imaging. Students were very positive about this aspect of collaboration, saying, "Because it's easier," "And it's good team work," and "It's faster."

When I asked students from White Pine Tribal School why they liked working collaboratively, Luke said, "Because it went a lot faster. Take a lot faster. Because you use the camera to take the picture and your partner is moving it, moving the turntable, while you take pictures . . ." ". . . and your partner turns the table," interrupted his partner Dustin.

In a similar fashion, Ellen at Bountiful River Tribal School explained the teamwork was easier, "because like one of us can take a picture and to the other say 'Recording,' and the other one can turn the table." To which Angela added, "And I didn't want to take a picture and then go over to the turntable, and 'click,' got to go over."

Even Neil, who professed a preference for working independently, found an exception when it came to teamwork in the imaging work. He said,

> Well, I would prefer to work independently. Because sometimes in teams you can't exactly do everything because you have to like have other people do other stuff. Like you can take pictures, have someone turn the table, and that person gets to take the pictures and the other person turns the table. It would be really boring. So it would be funner than independently.

Some students collaborated on the essay writing, and they greatly appreciated sharing that work, for which some expressed dislike. When I asked if teamwork on the research paper was a "plus" for them, Ellen responded, "Negative. We don't like writing." But her partner, Amy, corrected her, maintaining, "Well, actually it did [work out well]. You wrote it, [Ellen], Lynne gave you the research. I did the file; I did the typing. So yeah, it came in at the end." Brandi, another student at Bountiful River Tribal School, also appreciated collaboration on the research and writing tasks. She said,

> Well, I liked it because we got to split it in half, you know, and she did the writing and I kind of helped her get all the info together, all the information, and if you were all alone, you'd have to do two of them [essays], both of them at the same time, which would be more difficult.

Marie, the White Pine Tribal School librarian, thought the students worked well together in the imaging, research, and writing tasks. She said,

> The teamwork went really well. Most of the kids worked well together, but actually I'd say in both groups that I went with [to the museums] all the kids that had teamed up together worked really well together, and not only during the picture taking and the question asking, but also in the class when I observed them working on the pieces. They were also working well together, too. You know, brought them together as a team, and showed that they could really work together as a team.

Wendy, the Native community liaison at the Provincial Archaeological Commission, was also impressed by the "kid-friendly" nature of the project activities. When I asked if she thought the collaborative aspect of the project contributed to that assessment, she replied,

> Yes, and it seemed, well, I mean they, the other good thing was they knew each other, too, right? So it kind of makes it easier to work with, I feel anyway, it's easier to work with somebody that you know. I think the way this project is . . . set up, it allows for that. It allows for kids that know

> each other to be able to work well together on something that obviously they're interested in.

The second aspect of collaboration emerged when I asked the students how they thought the collaboration affected their learning. Most of them stated that it had a positive effect. Amy explained it this way,

> I probably learn more with a partner than without a partner because they could find out more things than you could. Like with the spirit club. Glen didn't know it was a war club, well, he knew it was a war club, but he didn't know it was a spirit club, so I found that out and I told him and he was like, "Whoa, I didn't know that." So I think it's better to work with a partner.

Amy's statement is one clue to how the details about Wabanaki war clubs was "mutually appropriated" throughout the community of learners who participated in the virtual museum project. Ernest, the tribal museum curator, had explained the history of war clubs in a taped interview in front of only a few of the students. Some of the students listened to the tape the next day while researching their essays, but not all. Amy got to pass on the information to Glen, who was ready to take it in. The information was "seeded" into the collaborative learning environment so that eventually the war club to spirit club history became incorporated into the virtual museum exhibit essay as well.

Ellen and Angela gave a similar explanation as to why they thought they learned more collaboratively as opposed to independently. Ellen said, "I think we learn more because some of us would ask questions, but if we were by ourselves, like we may not have asked that question, so, yeah, we learned more." Angela added, "And at the end we all come together again. We'll go, 'Oh, I learned this,' and you say, 'I learned this.'"

Lynne indicated how the sharing of ideas extended to the writing phase of the project when she explained that she learned more in collaboration "because you kind of like have two ideas. Like whenever you're writing your thing you like have your idea and their ideas to write up."

Lynne's statement shows how the multiple ideas that have seeded the learning environment get rehearsed at the writing phase, but Marla and Heather at White Pine Tribal School made some statements that indicated how sharing one's ideas with others orally is also a reinforcing rehearsal. Marla claimed that she learned "a lot more" when she worked with other students. Heather agreed, saying, "We learn more, yeah, because if one doesn't listen, the other could." To which Marla added, "Yeah, and you pound it into their head so you'll know it."

Not all of the students thought that collaboration enhanced their learning. Two students said they learned "about the same" working collaboratively as they would working independently.

Several adult participants also commented that they thought the collaborative aspects of the virtual museum project enhanced student learning. I have already mentioned that several participants at the White Pine Tribal School were proponents of peer teaching. Ronald, the fifth grade teacher, indicated that the virtual museum project was a good fit to his teaching practice because he liked to encourage peer learning. When Martha was talking about how the virtual museum technology skills would be spread throughout the school she made a more general statement about peer learning: "It does make a difference for the kids who shows them, you know. They really like learning from each other."

Will thought the students worked well together during the project. He thought that collaborative learning was especially effective when "some students are good at some things and some are good at something else, and one of the excitements is learning how to offset each other's strengths and weaknesses. I think they're capable of that."

Vince, at Bountiful River Tribal School, made a very similar observation. He put it this way:

> I think they learned more than being in a group than individually because kids tend to pick up more on one spectrum than the other, and so they tend to feed of each other, and they also provide that check and balances in terms of, "No, you're not supposed to do it that way, you did it wrong, and are you sure? What did he say to do here? Well I think he said to do it this way," and you know they feed off of each other and they provide that critical balance of ascertaining what is right and what is wrong in terms of the manner that they're supposed to approach their project or do the task.

Several participants made comments that revealed the third aspect of the collaborative nature of the virtual museum projects—that the collaboration itself was a worthy learning goal. For instance, Fred from the Northern Lakes saw the value learning how to collaborate, not just among the students, but among the adult participants as well. He said,

> On this project we worked with the kids here, one of the things I noticed, among themselves they learned how to cooperate, and the idea of teamwork, and even for us adults, we have do that for our own selves, you know, and do it with them, with the kids and elders and all the people who are between there.

The Northern Lakes/Great Bear project involved not only collaboration between school and museum, it was also an intertribal collaboration. Joanne, the Northern Lakes technology coordinator, saw a number of positive outcomes from

the project, including collaborative skills that help students cope with the wider world. She put it this way:

> They're learning the technology; they're learning things about the culture. They're learning how to interact with students of different ages and from different places and adults that they've never met before that they're working with. And I think that's a positive experience. One that helps them cope a little bit more with the outside world.

Roger, the Bountiful River Tribal School fifth grade teacher, thought that the ability to cooperate and work with other people was a valuable lifelong skill. He said,

> Well, I think, if nothing else it [collaboration] gets them to work with other people, and I think that's very important because pretty much that's what they're going to have to deal with for the rest of their lives unless they go into business for themselves, but for the most part, you always have to get along with people. And to be able to work together, I think that's learning in itself.

Though most participants thought that collaboration was a positive aspect of the virtual museum projects, no one suggested that Native American children had a cultural preference or learning style that favored cooperative learning. Some participants rather expressed relief that the students worked so well together, implying that the students had not been as cooperative in earlier activities. When I asked him what he thought about the collaborative aspect of the project, Roger told me,

> Well, I think it's important. Really, I liked that aspect of it. This was a hard group for that. I think we found some good teams that worked really well together. Then there's some teams that, you know, conflicts, power struggles, but I think it's important that they have that opportunity to work. I think that groups are very important. . . . This is a kind of hard, believe it or not, even with eight kids, to get them to work as one unit on a project.

Will and Betty also gave some indication that their students did not always work well together. Betty said,

> Well, put certain ones that do work with each other pretty well, but you have some that don't get along with anyone. Usually the teacher works with them on a one on one basis. But the best time is when they go get together and work at projects all together, without anybody getting mad or anything.

Roger, Will, and Betty thought that the way the students worked well with each other was a positive sign that the students enjoyed the project and were motivated to be on their best behavior during the project activities.

Hands-On Learning

To probe the adult participants' perception of the cultural responsiveness of the virtual museum project, I usually asked something like, "Do you think that this type of project draws on any specific cultural strengths that the students have?" Most of the responses to this line of questioning mentioned the projects' connection to the students' culture, but the second most common response stated that because the project was "hands-on," it was drawing on the students' preferred learning style. Hands-on learning recalls such learning styles as "visual learning" and "holistic learning," which have been ascribed to Native American students (Swisher & Deyhle, 1989; More, 1989; Ross, 1989; Dunn & Grigs, 1995). Again, it is important to point out that some applications of learning style theory to culturally responsive teaching has been controversial. Following the lead of Villegas and Lucas (2002), it may be more beneficial to revisit the claim of the effectiveness of hands-on learning from the perspective of constructivist learning theory. As mentioned above, the theoretical zone of proximal developed which

defines a learner's learning potential at a given point is supported by many elements of the learning environment—peer learners, more capable adults, and artifacts that enhance learning, such as books, videos, computers, calculators, scientific instruments, etc. In the case of the virtual museum projects, the learning enhancing artifacts included the computers and software for creating virtual reality imaging, digital and video cameras, the turntable for rotating the objects, rulers for measuring the objects, and the museum objects the students selected for their virtual exhibits. When participants referred to the hands-on learning they talked about the students' engagement with these learning artifacts in their pursuit of an authentic learning goal—the creation of a virtual museum that would serve the local and worldwide community.

There is a Native wisdom about learning that stresses the hands-on, authentic learning experience. When I asked Will how he saw the students benefiting from the project he said, "One, they get to do hands-on research, which is the best way of learning," He then elaborated on the concept of hands-on learning in this way:

> Whenever you make an object, or whenever you do something, the way that, and I still learn best that way, is let me watch you, and then watch me do it, help me, tell me when I'm not doing it the right way, and then still let me do it myself. Because once I'm done with the process, there's a good chance then they'll know how to do it. Then what you do is perfect it after that. It's like making baskets. When I was younger we had to make big skin baskets, and you were told and you observed and then you got to do it yourself, and if it wasn't right, the master basket maker would make you take it apart and you would do it over again. And when the time came when they liked it you already knew that they weren't just telling you that because they wanted to please you. You knew at that point that you were putting out a good product because they were accepting it. So there's a build-in assessment there. And I think that's the best way to learn, at least

> I find that, and the most comfortable. But if you have to have me memorize all the steps to it at first, I really don't think that way.

Will made a direct connection between the basket making metaphor for learning to the learning the students were engaged in during the virtual museum project activities:

> I think when you shoot, you're teaching kids the process of how to manipulate the object technologically. I see that happening—how to operate the camera, how to set up the lighting, the background. After a while they know if a certain object is colored a certain way, this is the kind of background you have to mount, and after a while it all becomes automatic.

Will wished that the school would accommodate more hands-on learning approaches in its curriculum because he believed that many students became frustrated with the more academic approaches and dropped out.

Ernest spoke of the hands-on learning in the virtual museum project in much the same way as Will, but instead of talking about learning the technology, he focused on the students' interactions with the museum objects. He said when he was growing up in "the schools I went to, the learning I went through was mostly by book." He praised the virtual museum project because the students were able to touch many of the objects,

> and that's the best type of experience for learning there is. You can read about something, and it'll be like dead knowledge in your brain that you might not use again. But if you go out and touch something you touch- you touch a stone that's rough, that's been used for chopping down a tree or something, you know you can feel the texture of the rock. You can feel how sharp it is, you know, where they worked at it, so that they could chop down a tree. You can see the grooves that they made on it to fit a stick into rock, animal hide around it to give it a handle. You know you can experience all that stuff. You don't have to just read it anymore.

Also, like Will, Ernest connected the hands-on learning of the virtual museum project to the Native wisdom about learning that stressed the necessity of direct experience with the world. He explained,

> I mean that's how they grew up a long time ago, because they had to. I mean, you can be shown, "Hold this bow, hold this arrow, put it in there and fire, but watch what you're shooting at!" [laughs] They learn that way, with hands on. You couldn't be told, "Well, read on this piece of birch bark how to hold a bow and arrow," and then try to pick up a bow and shoot it. You have to experience it right from the start. You have to pick it up; you have to use it. To make birch bark containers you have to pick up birch bark, you have to fold it and form it to learn how to make birch bark containers. You have to go out and chop down an ash tree. You have to go out and pluck the plant for different dyes. You have to go out and collect the sweet grass. You have to go out and catch fish. You have to go out and clean the fish. You have to scale them. You have to behead them. You have to learn how to catch it by hook or by net or whatever. You know you have to learn. This was the learning process that they learned by all the time. You have to go out in the middle of night to experience the stars, you know. Maybe shooting stars or the moon, you know the different phases and stuff. Their virtual museum was around Native people all the time because they experienced it. They touched it, and they had to, they had to learn that way.

Ronald was excited about the virtual museum project because it fit his approach to classroom teaching well. He said, "When I got to a fifth grade classroom I try to do as many hands-on projects as I can. This is great, fits right in, perfect." He saw the hands-on nature of the project particularly benefiting Native students. It worked well for both the technology and the cultural learning goals of the project. He put it this way,

> This has been incredibly a hands-on learning experience, and questions the students asked when they visited the museums and some of their reactions when you see them actually handle these ancient objects, and take the time to put the gloves on for some of the bone work that they need to put gloves on to handle, it's just so invaluable to see this process in effect. A lot of the Native American children are so much more hands-on learning types

> of individuals, and this is definitely, the whole project has been a hands-on learning type of process for them, and it's really turned a lot of the students to perhaps getting into the computer field when they graduate from high school or college to make a living.

Frances spoke of the virtual museum project as a whole benefiting the students due to its hands-on nature. For her, the hands-on nature of the project applied to both the technology and the connection to the museum objects. She said,

> I think that special bonus is that kids are able to utilize the technology, and be able to have a more concrete learning environment, that's not just looking at just a two dimensional book, that actually being able to do hands-on, and being able to use different senses to learn about the history, and to learn about the tools of their family.

Other participants connected the hands-on aspect of the project to the whole process of activity leading to an authentic learning product at the end. When I asked Catherine how she thought the project was benefiting the students, she referred to the many hands-on aspects of the project:

> I saw a lot. I think that the children immediately recognized the importance of the project, which is simply by handling these things and asking questions about them. Writing the questions down, doing the technical work by measuring and then at the end, photographing and then finally seeing their own work and their own text on the web page. I mean not everybody can do that—when you have little kids doing it, my god. This is wonderful. This is amazing. I think that the autonomy, for them to choose their own artifact, and given the respect that they are given, to be able to set it and line it up [for shooting the QTVR object], given the autonomy to do that; I mean that really involved them. I know they liked that, you could tell. Some day they, those same kids might say, "Remember that when we did this and it was so old?" But right now it's giving them the hands-on experience. It's so fun; this is how it's done.

Rose, the Gifted and Talented teacher who helped with the Northern Lakes/Great Bear virtual museum project, also connected the hands-on aspect of

the project as a process that ended in a completed "real world" product. When I asked her how she thought the project was connecting with the students' cultural strengths, she said,

> I think that probably because, because it's very task-oriented, beginning, ending, because there's something to see at the end—end product oriented. And so it's very beneficial that way. It's like, "Ok, this is a project, I start it, I finished it, and here's what I just made." I think we try to use those approaches as much you can with other things, too, but that's just an effective teaching tool. And then for them to see that this builds on that, because of course, it's the process too. "Ok now, this experience leads to the next experience," you know. If you complete a paper, or if you even do some other task, well that's ok, but this is a real-world product. This is as real. This is real. Ok, now I made the sugar cake. It's a real thing, it's really real now. I made this project. It's a real thing that the world needs, or that it's useful to people now, as opposed to, "Ok, this is my spelling test that I learned because I need to learn how to spell." It's like, I wrote my description up, and it's important that I do my description right because this is as a real thing.

Theresa, the technology coordinator at White Pine Tribal School characterized the project in much the same way, saying, "It was a real experience, and it's something they actually see and do without being talked to, like in the teaching situation."

Charles, the director of the Laurence Museum in the Pacific Tribal School virtual museum project, also focused on the "hands-on real-life experience" aspect of the project, comparing it to college internships. He told me,

> It gives them a really neat project, in that the project that they'd be doing would allow them to a) touch history, which very few students ever get to do, even on a museum tour b) they would get to learn about history firsthand, especially as you have demonstrated today with you involving elders and seniors from the community, so you get that generation gap bridged, and finally c) they actually get a real-life application. Many times I hear students, especially high school students, say, (it was my excuse in high school, too), "What is this going to do for me in real life?"

> It's great you're teaching me this, but this isn't gonna get me a job." But this is something that actually can, they develop the content, they work on a project based in a real-life situation, and have gotten essentially hands-on real-life experience that wouldn't be gained until an internship in college situation, to produce a public product, something that will be used and viewed either at least by their peers, if not by the local community and visitors to that community.

The student response to the hands-on aspects of the project supports the adult observations. As I will explore later, they clearly enjoyed using the technology in the project. As I explored under the theme, "Bringing Objects Out from 'Behind the Glass,'" the students also responded well to the opportunity to be close to and in some cases handle the cultural objects at the museums. A few additional examples here will further illustrate the students' response to the hands-on experience they enjoyed with the items related to their cultures. Amy said that she selected an arrowhead to image during her visit to the museum. She explained that,

> At the Seaside Museum, I did an arrowhead. I thought that was cool because I got to handle it, and it's really cool how they found it whole and in a shelf, so, that was cool. I like arrowheads because I've never actually found one before. I've seen them on TV a lot, but I've wanted to handle one for a long time.

On the same visit, Amy's classmate, Harry, selected a stone axe blade to image, and he also thought, "That was pretty cool because I got to hold it."

On her visit to the Seaside Museum, Brandi said she thought, "It was really cool how she [Shirley] let us go into that office place [and storage area] and like touch all these little baskets."

THE FAMILIAL AND THE FAMILIAR

Not only were the students excited about the hands-on contact they were making with the virtual museum objects, they were also able to relate to them readily because so many were familiar objects to them. In many cases, the objects that had been collected by the museums were made by community members the students knew or were related to. When I asked Joan if she thought that the virtual museum project was drawing on the cultural strengths of the students, she made the connection to their families, saying,

> I don't really believe that Native American students have a different way of learning, but I think everybody learns better, or an important part of learning is studying things that are important to you, and our students, their families are the most important to them, I think. And, so when you hit up on something that people can say, "Oh, my auntie had a basket like that," that's always powerful, and it would be true with other people too. So, I don't consider that particular to Native American learners, but I do think that's special for any learner.

The virtual museum projects enabled students to identify and identify with the museum objects that were familiar to them. Sometimes students had a familial connection to the makers of the items. The cultural, community, and familial relationships the students were able to bring to the project formed a basis for the knowledge construction they would be engage in as they selected, imaged, researched, and wrote the essays to accompany the objects in their virtual museum exhibits.

In discussing how he thought the project was drawing upon the cultural strengths of the students, Vince gave a clear description of how the familiar and the familial were affecting the students' learning. He said,

> Well, I did recognize in a number of the students, their selection of items, because you and the staff and the curators did not specify individual items that the children had to use for the project. They were allowed to choose. I was very pleased to find the students were actually choosing items based on something they were familiar with, whether it be basket making or it be spirit clubs or arrow heads, snow shoes—they were picking something out that spoke to them in that level. Something that did not necessarily interest them as much they related to it. If they had a relative that made baskets or had a relative who had done snowshoeing or something of that nature, they were more inclined to look towards that. And then, the fact that they learn some things that they didn't know, and they were impressed with what they were learning, that was pleasing. . . . In this case here the children picked out something, and the curator explained all of the history behind it, and all of these things they may not have known before. They added that to their collective knowledge on an article or a piece, and they walked away from the project after they had done their QTVR. They knew so much more about that particular item and its history and how it relates more to their heritage, so their learning experience is compounded greatly.

In this statement, Vince brings up the importance of student choice and how it allowed students to make the familiar and familial connections to the project. I will bring up choice as another culturally responsive element in the next section.

Shirley also recognized the importance of the familial connection. When I asked her if she thought the virtual museum project would work with non-Native children as well, she told me,

> Absolutely would—would, except that there's not that connection. It's really neat when a child walks in and says, "My grandmother made that basket, and I want to use that particular object as my virtual museum piece." So that I think there's that immediacy of connection, is something that a non-Native child isn't necessarily going to appreciate at this museum.

Shirley also noticed a subtle difference between the two schools that visited the Seaside Museum. The Bountiful River Tribal School students seemed

to be “in a real diverse base of materials, everything from canoes to snow snakes—very few of them were interested in either looking for something that was an immediate family connection, or baskets.” It was different for the White Pine Tribal School students. “They’re all children and grandchildren and descendents of master basket makers. They seemed to be much more interested in those.” Part of that difference may have been due to the presence of the culture teacher, Betty, during the White Pine Tribal School visit because she had a detailed knowledge of the basket makers in the White Pine community and which children were related to the donors of the baskets at the museum. Also, Will had selected the Seaside Museum specifically for the contemporary and historical White Pine items in its collection, so those items were sought out by Betty and the students.

Roger mentioned that many of the objects the students selected were ones that were familiar to the students. He said,

> Yeah, I think that, in fact I'm kind of surprised, that arrowheads still seem to be a fascinating object to all of them, and I'm sure it's something they've seen a lot of. The spirit clubs, I'm sure they've seen a lot of those, but still, it's the design, how they're made, that still fascinates them. So I think a lot of the stuff they've seen, but not really thought about.

The virtual museum project gave the students an opportunity to think about and extend their knowledge of these familiar cultural objects, giving the students a deeper appreciation of their cultures.

Strong familiar and familial connections were made in the Pacific Tribal School case, too. One item, the Pacific weaver’s dress, was an instance of community memory that had familial connections for many students at the school.

The fishing industry was still viable in the Pacific community, and the old fishing tools—halibut hooks, fish clubs, model and full size canoes, and a canoe anchor, were featured prominently in the virtual museum. Frances made the connection between the virtual museum project and the school's cultural activities that familiarized the students with traditional aspects of their culture. She said,

> The high school projects the students are allowed to work on—the smaller feast bowls, the cribbage board that's being made by one student, and the paddles, individual paddles that they are going to be using—is a modern-day equivalent to looking at the artifacts in the museum, but yet, utilizing that same engineering, utilizing that same, those same exact tools that made those, more of a little bit similar tools, but with the same exact designs, that are used today to be able to help the kids appreciate that there still is use in the things that they are looking at in the museum, and that they are used not so much in daily existence, but yet used in cultural celebrations, when maybe you take out your wool blanket and you'll get to put on the pin that was pictured in the picture. You'll get to put the pin in and wool blanket to hold it on, or you'll be able to use the drum, or wear your hat on a special occasion. It's not needed daily now, but you can use it on special occasions, but you can still maintain, not only the knowledge, but the skill to keep those going, to keep them alive, to keep the practices alive, woodcarving and weaving.

Statements made by the students supported the observations the adult participants made regarding the familiar and familial connections the virtual museum projects made to the students. For instance, a Pacific Tribal School student, Jeff, had imaged a stone adze with several stone blades. When I asked him if he had ever used one, he said "No," but he had seen his carving teacher use one for "making a canoe," noting that it had a metal blade instead of a "rock" blade.

A Bountiful River Tribal School student, Mitchell, had selected a basket sewing kit to image, "because I can make baskets, and I liked the way they did it."

He also had a familiarity with the spirit club because his mother's boyfriend carved them. Both he and his partner thought the museum spirit clubs were "cool." Jerry and his partner had selected a model of a birch bark canoe made by a Bountiful River community member, "because I knew Bruce Peterson. I just wanted to do some of his work."

Amber and Ellen admired the cultural items they got to image, but claimed to have a great deal of familiarity with them. Amy claimed, "We pretty much know how to make baskets and stuff." She also claimed that, "We know more about that stuff than the woman did [Shirley, the curator], pretty much." Ellen added, "The quill box [we shot] I already knew. I could tell that they were old because of their appearance."

Where they could make a family connection to the objects they worked on, the students readily acknowledged it. June thought it was "cool" that she was related to many people who had items at the Seaside Museum.

Brandi could also identify a number of familial connections between the museum items and people she knew in the community and her own relations. Betty helped her identify a basket that had been made by her grandmother at the museum. She told me, excitedly, "I can't believe my grandmother's baskets!" She was clearly impressed by her grandmother's skill at basket making. She said, "I hope to learn just like her."

The familial connection was also expressed by the students in their desire to show off their work on the virtual museum to their family members. Whenever

I asked them who they would like to see the virtual museum, nearly everybody mentioned their parents, grandparents, aunts, uncles or cousins.

CHOICE

An element of choice was introduced into the virtual museum projects by allowing students to select the objects they wished to image, research, and write about. Choice has been identified with learner autonomy and self-determination that leads to greater intrinsic motivation (Lepper & Hodell, 1989; Deci, Vallerand, Pelletier, & Ryan, 1991; Kohn, 1993). The element of choice interacted in different ways with the other culturally responsive elements of the virtual museum projects. For instance, some students chose items based the item's connection to their cultural heritage. Some students were familiar with the type of object because of its use within the community, like baskets or traditional tools. Some students knew the person who made the museum item, or they were related to the person who made it.

Other aspects of the virtual museum projects placed constraints on student choice. For instance, the collaborative aspect of the virtual museum projects sometimes constrained some students' ability to choose because they had to agree with their partners on which object they would work with. Sometimes there were not enough items available to give the students a satisfying range of choices, which was an issue raised in the second case under the theme "The Need for More Choice for Student Virtual Museum Selections." In some cases, teachers or other adult participants would suggest certain objects to the students to help insure that a variety of items would be represented in the final product. In spite of these

constraints, there appeared to be enough choice for the students to express their cultural connections to the objects and an ownership of the project.

Joan had complained about the lack of a suitable number objects for student selection at the Great Bear Tribal Museum. She thought that the students would have "more ownership" in the project if they had a greater range of choices. At the Seaside Museum, there were a great range of choices, which presented a different sort of problem. As the curator, Shirley, put it,

> I think the hard part about that is that the kids, the way that their choices were made, necessarily had to be narrowed. I could say "We have baskets, we have root clubs, we have crooked knives, we have . . ." but they couldn't look at a whole suite of things and then select. Oftentimes they would pick the first thing they saw because it was very neat, but they don't know what the 500,000 other neat things are. And so, whether they're really, if it's true selection or, the narrowness of the ability, and that's the problem of the logistics of doing it here. If all of our objects were on a database, I think they could thumb through everything, and they might have made different choices. But I think it's important when they make choices made based on that personal connection, I think that's pretty important.

Annie also thought it would have been better if the Seaside was set up better for facilitating the students' choices, but she recognized that the choice the students did have "made all the difference in the world," and that they would not be as enthusiastic about the project if the objects were assigned to them.

As it turned out, there were enough items on the Seaside database, and enough that were readily available, that the students had an ample number from which to select. One student, Amy, thought the most difficult aspect of the project was making her selection from the number of objects that were available at the Seaside Museum. She said, "Choosing an object was really hard because

there were so many things there, and you had to pick a certain one, and you could have gone back and done another one, but I didn't."

Roger also recognized the importance of the students' ability to choose their virtual museum objects, though he also thought that the students should have had the opportunity to select their objects well ahead of the museum activities so they could "come to grips a little bit more" with it, in terms of researching it ahead of time. He also thought that choice was

> much better than giving them something. I think, but again where it's kind of a first impression sort of thing, maybe again kind of go back to whole thing of having it all out ahead of time, and being able to maybe think about it a little bit more before you did. A lot of them probably wouldn't have picked anything different than the one that they did, but certainly that option of being able to pick out their own I think makes it a little bit more meaningful for them because it is their choice. It wasn't something that was assigned to them. So I think it's a little easier then for the teacher to say, "Well, this is what you chose, this was your choice." I think that kind of puts the onus back on the student. Well, some of them would change their mind, you know, when push comes to shove, and they actually had to do something, they would keep continuing to change their mind. But I think that's the opportunity to choose is very important. That part I absolutely would not change.

Roger sounded a little bit skeptical about the importance of student choice, so I asked him if he thought it affected student motivation in any way. He said, "Well, I think it does, as opposed to assigning this object you're going to do. For some kids, that would be like an automatic deficit, even if they liked the object, I think for some of them."

Vince also thought that having the students select their objects was motivating. When I asked him if the ability to choose affected their response to the project, he said,

> Oh, absolutely, absolutely, because they were picking out objects that sometimes had something to do with their past or their culture. Motivation level was very high. You know, I know these students, and I know which ones tend to be a problematic in different settings, and their enthusiasm to pursue this, and do this, while they still had their problems with paying attention and staying on track and focused, they were very interested and very enthusiastic with doing the project and learning about objects and picking out an object. And that was very pleasing on a level, and it was also expected. But their enthusiasm was high, really high.

Part of the design of the White Pine Tribal School project was to gather a wide variety of materials related to Wabanaki culture. This might have placed a constraint on student choices, especially if there were a tendency for everyone to favor the same type of object. However, both Ronald and Theresa noticed that this constraint had little affect on the benefits of student choices. When I asked Ronald about his observations on the selection process, he said,

> Well I think that makes it more meaningful to them when to be able to have that privilege to select their own object to shoot in QuickTime. But, however, I did try to have them choose different objects. Instead of everybody choosing arrowheads or bone structures or whatever, I tried to have it mix up a little bit. So I think from the three museums, we have a nice variety of Wabanaki objects, and I think this is really going to make our virtual museum really unique because we have such a variety of objects to choose from.

Theresa added that the students cooperated with the project goal to achieve a variety of objects and still managed to benefit from the choices they were able to make under that constraint. She put it this way:

> Yeah, I really think their freedom to choose really helped because everything you saw was important, but I made a suggestion with, as we were going on, before you choose you might want to look at everything, and then try to choose something different so we wouldn't have all the same. And they were wonderful. The other factor that I noticed is each person definitely set their sights on one object, they knew they wanted to do that object and with no bickering or jealousy or any type of aggression

> shown or envy from another student, that people were satisfied. When the person chose an object, it was accepted, and I thought that was wonderful.

Wendy, who had once been a schoolteacher, recognized the power of choice as well. She disapproved of the strict authoritarian environment of school and the effect it had on the students. She thought giving the students the opportunity to choose motivated them to work harder. She put it this way:

> Yeah, I think that's the other part about their given a choice. You're not saying here's an artifact and you photograph it. They get a chance to look at all that's there and pick out the one that speaks the loudest to them. And I think, again, it's based, the project is based on not too much, "Ok, you do this, you take a picture of this artifact." They get a choice. And I think it's like, again when I was teaching at the high school I found it too rigid, too strict. It's like rules. You know, kids tend to not like them. If they approached it in a different, in a more interesting way, then I think they would work better, a little bit harder. I think that letting them themselves pick was a great idea.

Wendy's remark about high school being too strict and bound by rules at this point in the interview would indicate it was her impression that choice was not a common feature in school activities. I asked students how the virtual museum project compared to their other classroom activities. In one group interview the topic of choice came up spontaneously in response to that question. All three students in the interview said that they "very rarely" had choice as feature of their class assignments.

The student response to the ability to select objects in the virtual museum project was generally very positive, though occasionally a student would indicate that they were constrained by having to agree to an object with their partners. Amy spoke directly to the conflict she felt in having to exercise choice in a collaborative relationship. She explained,

> I'd probably like to do both [work with a partner and have an independent choice] because working alone you actually get to choose it without worrying if it's ok with your partner, but with a partner it's easy because like they do half and I do the other half. So that's pretty cool, too.

Jerry said he enjoyed working with a partner on doing the virtual reality imaging, "but I'd rather pick an item independently, though."

Brandi talked about her choices, indicating that her partner was involved in making one choice, but the choice was based on their shared interest. She explained,

> I chose an Indian doll, and me and my partner like it because it had like a lot of designs and it reminded us of us, if we were dressed up, me and my partner, Gracie. It kind of reminded us of ourselves.

Brandi also selected a basket with her partner, saying the "designs on it captured me." She was able to select one item by herself, saying, "Without my partner, I did moccasins, and they had glass beads, and I always wanted a pair of moccasins, and I've never gotten a pair."

Jerry also spoke about the objects he selected in collaboration with his partner. He accepted the first object his team did, saying it was "the pestle, Neil mostly chose, I just went along." However, the other object the team did was a model canoe that Jerry wanted to do for his own reasons, partly because he knew the community member who had made it.

Lynne also had a positive experience in making her selection with her partner. She told me, "Well, the quill basket that me and Angela picked was like we basically picked because we like the quill baskets. Like we didn't have any fights. We just talked about it and picked that one."

For the most part, then, students were able to make choices based on their interests, even in collaboration with their partners. Either they shared the interest for the objects they chose, or they took turns making the choice. Thus, students were able to minimize the constraint on choice imposed by collaboration.

TECHNOLOGY AS A CULTURALLY RESPONSIVE ELEMENT

Because the virtual museum projects have featured a number of technologies, including digital photography, virtual reality imaging, video, and Web development, it makes sense to explore technology as a possible culturally responsive element. In addition to pervasive presence of technology in the virtual museum project activities, the technology element has interacted with other culturally responsive elements of the project, as I have intimated earlier in this chapter. To begin this discussion of technology as a culturally responsive element in the virtual museum projects, I will revisit some participant comments that were used earlier in this chapter that included remarks about technology.

When I asked the fifth grader, June, what she had learned in the project she mentioned, almost in one breath, using the digital camera and the video camera, realizing she was related to many of the people who had made the contemporary items in the museum, learning about how much things had changed for her people, and learning what life was like for her ancestors long ago. June's response to this question, though a little more elaborated, was very typical for the students, who nearly all answered that they learned some aspect of the virtual museum technologies in addition to learning about their heritage. Several adult participants expressed their approval of the integration of technology and culture

in the virtual museum projects. For instance, Francis, spoke of the virtual museum reaching students "through the technology that they are so used to," the Internet, to gain a fresh interpretation of Native American life and history produced by Native American children. In a similar fashion, Fred spoke of technology as "enhancing" Native children's capacity to carry out the traditional role of being "representatives of the future" for their communities.

When I asked her what she saw were the important learning outcomes of the virtual museum project, Joanne mentioned, "learning the technology; learning things about the culture," and learning how to interact with other children and adults from a different place. Her statement, cited in the section on the collaborative element of the virtual museum projects, highlights the way students cooperated with each other in the use of technology to image their virtual museum objects. Several students also cited the need for collaboration to achieve the technical goals of the project when they spoke about working with their partners on the project.

In addition to interacting with the collaborative element of the projects, participants suggested that the technology also contributed to the hands-on aspect of the project. For instance, Francis spoke of how the technology helped to provide a "concrete learning environment" for the students. Of course, it was not technology alone that made the project hands-on. It worked in combination with the opportunity to manipulate the physical cultural objects as well. Will combined these two aspects when he spoke of the students learning how to "manipulate the object technologically."

In reviewing a few of the earlier comments, I have shown how the technology element of the virtual museum project has interacted with some other culturally responsive elements of the project, including the cultural content, the collaborative aspect, and hands-on learning. For the remainder of this section on technology as a culturally responsive element of virtual museum projects, I would like to have a closer look at technology, first as a learning goal in itself, and then as a motivating factor of the projects. Finally, I would like to take a look a how the Native participants have responded to the technological aspect of the projects as Native Americans who for centuries have relied on less technological means for cultural reproduction, such as the oral tradition.

Technology as a Learning Goal

At the beginning of this chapter, I gave a preliminary definition of culturally responsive teaching that stated that it included practices that would provide students with the knowledge, codes and cultural capital they needed to be successful in mainstream society, and to do so in a way that values and affirms the students' cultures. For the past decade and more, due to the increasing importance of technology in society, educators have come to recognize the need for technology integration in the school curriculum (International Society for Technology in Education, 2000). Because the virtual museum projects serve to enhance students' knowledge and facility with technology, they serve the technology requirements of education, providing students with important knowledge for future success.

Much of the activity in the virtual museum project involved technology training, and nearly all of that training was focused on the students. In three of the four cases, themes emerged that indicated the importance of students learning the technologies so that the school might be able to continue with virtual museum projects in the future. Some participants also remarked that technology was an important learning goal in itself. For instance, Theresa said that the technology learning would be important throughout the students' lives because it touched on all areas of learning. Ronald also mentioned that the students would be able to apply the technology learning "throughout the rest of their lives."

Ernest also recognized the importance of learning the technology in the project, and spoke of it as a way of gaining some relevant job skills for a changing economy. He said,

> Well, they learn about new technology. They learn a new way of life. Growing up around here, when I was growing up, all I knew, the different jobs a Native person could do was sew shoes or work in a factory. But now, as the new technology comes along, students will grow up with new ideas on ways to go with their life. The audio-visual world. Produce photography, computer graphics. You know there are so many different things that came in that was involved in this project that the kids got hands-on experience with, and it probably stirred up some feelings in them on that future occupation.

In a similar way, Christine spoke of knowing how to use technology as being "necessary in this world where everything changes so rapidly." She added that

> the way that technology changes so rapidly, it's beneficial for them to be comfortable with it. Because no matter what anybody says, you can do this you can do that with computers, there are still a lot of people who are unfamiliar with it, and these kids will have that hands-on, nitty gritty experience, and say, "Hey, this is how it works," and carrying that with

> them through life. Also, the research on the items, which I myself have found difficult, gives them a grounding for later years when they have to go and do research for their own project or different projects, and they'll be able to write text, to be able to write, because no matter how high technology gets, you'll have to know how to write.

Christine's remarks highlight aspects of the integration approach to technology curriculum, which recognizes the flexibility of the technology that makes it relevant in just about every field of study, as well as the rapid changes in technology that make it difficult to address as a specific subject on its own. Students need experience with a variety of technological tools so they will be comfortable using them to achieve their learning and project goals. She recognized that the virtual museum project successfully integrated the technology with research skills and writing, which are equally important for future learning, if not more so.

Several other participants remarked about the successful integration of technology and academic learning in the project. Joan mentioned several state curriculum standards that could be linked with the project. Theresa and Ronald both mentioned the "cross-curriculum" nature of the project. In addition to the integration of technology learning with such core academic subjects as social studies and language arts, Theresa and Ronald both noted that the project integrated technology with culture. Jack and Rose both brought up the importance of the integration of technology and culture when I asked her about the student motivation in the project. Jack said, "it was integrating the both together," culture and technology that motivated the students to participate in the project. Rose said it this way:

> Initially, anything novel is a good motivator, you know. And they all, almost all kids really do like computers. That is just an interesting thing. And the pairing, I think the pairing the culture, of using the technology to preserve culture does combine two things that are very relevant to them, so that's important.

Martha brought up the subject of integrating technology with culture when she was explaining to me the purpose of documenting the project in video for the community.

> The goal is to show the kids actually using the technology. That is not just teachers doing it for them, but they are actually doing it themselves, and learning from it, not only learning about the technology, but also learning about their culture, and that was one of the really neatest things about doing it up in museums and exhibits.

Technology as a Motivating Factor

The statements by Theresa, Ronald, Jack and Rose cited above noted that technology integrated with culture was a motivating combination for the students. Several other participants addressed the motivational aspect of technology. Ronald elaborated on the motivational aspect of the project when he told me,

> Well, I mean motivation is like in the eye of the beholder, so to speak. They see these neat objects and they know it involves computers, so that really stimulates the students to want to really do the best job that they can do in the project, and that was obvious to see in the way they handled themselves in the museums and the questions they asked the people there and the work they did on the project. It was very good to see.

Ronald talks about several motivational elements of the project that includes technology. His response to the motivation question is similar to other participant responses that include technology in the motivation picture, but do not make it the sole reason for student motivation. The responses I have presented so far indicate that the integration of culture with the technology is a combination

that leads to motivation in the participating students. Jack's remarks on student motivation indicate another reason students may find the use of technology desirable in their learning projects—it gives them a non-threatening way of being successful participants. He pointed out that "those students aren't as scared of technology; it's secondhand to them already," and went on to explain,

> Their interest is already in technology. Now this can be something new they're just going to gobble up. As we have seen from these eight kids we had over here, I mean they just went right through the stuff. Show them once and they've got it.

Joanne made some remarks that supported the idea that students were motivated to use technology because it gave them an opportunity to be successful at something. She thought, "They're putting in more effort and taking more pride in what they're doing, especially the kids that have problems with writing." Annie made a similar observation, saying, "I guess they really enjoyed the mechanical parts of the project and looking at the stuff, more so than the academic portion."

Roger hinted at how the student reluctance to do the academic portion of the project contrasted to their more positive response to the technological portion of the project when he told me,

> I think it's important to do the writing aspect of it. Writing about what they've seen. . . . Forcing them to write it—I shouldn't say forcing, but kind of pushing them to come up with what they saw and to describe it and how it was used. I think that part of it certainly is good. The technology part of it I think it was fun for the kids. I think they liked, at least some of them, liked doing that sort of thing, and seeing the end result.

Roger's aside about "at least some of them" liked the technology part of the project brings up some evidence that technology is not always motivating to

all students. Other participants in the Bountiful River Tribal School project noted that some students did not find the computer work in the project enjoyable. Assembling the digital pictures into a QTVR object movie could be an involved process, requiring attention to detail. It may have been that specific kind of work that put off some of the students. Roger observed,

> for some of them, they can handle it. Others, they need more, I don't know what the word here is, but they need a little bit more something to keep their attention, rather than a repeated task that they have to do, whether it's turning the table and clicking the picture, or if it's putting all the hot spots on, that have to go around. As you saw, some of the girls did it, because it can, that keeps their attention. They find it's a challenge to them. For others, it becomes just a task with them. But that may have been the class. You know this class we worked with is definitely it's hard to keep their attention on things.

Roger went on to explain that his students thought of "computers as games." He thought they did enjoy the "end result to this [the QTVR object movie], but I think for some of them it's really hard to stay on task to get all of the pieces together." Mat made a similar observation about the student response to the computer tasks involved in the project. When I asked about the students' motivation with regard to the technical tasks in the project, he told me,

> Some of the kids are naturally energetic and motivated to do something like this. Unfortunately, there are quite a number of kids who could care less whether they're doing it. It's another chore, "Oh, we've got to do this," and so on. Sometimes there's a learning curve, particularly when it comes to technology, which is often a struggle for some kids, and they have to really have an interest in really doing that particular task, otherwise it becomes a chore. It's a hard question to answer, I think. I think there are a number of kids who really thought this was cool, and just went after it, and had no fears, and were just real comfortable. Others were just kind of plodding through it.

Vince also made some statements regarding the students low "level of enthusiasm with technology." He attributed that to the abundance of computers at Bountiful River Tribal School, which paradoxically led to a "laizze faire" attitude toward them, indicating that computer technology was neither a novelty nor a scarce resource for the students. I am not entirely confident of Vince's analysis, however, because the amount and level of technology was comparable in the other three schools in the study, and I received little indication from participants in the other cases that students resisted doing the computer tasks related to the projects.

The question of whether technology is a motivating factor in the virtual museum projects is not straightforward. Students do seem to respond positively to technology when it is integrated with culture in a learning project. When students are comfortable with the technology, they tend to respond to it favorably, especially when they compare it to the academic task of writing. The perceived level of effort to accomplish a task may also relate to the way students respond to a technical task. Students appeared to prefer the relatively easy technical tasks of taking pictures or recording or videotaping interviews to the more intensive and attention-demanding task of assembling QTVR object movies.

Student responses regarding the virtual museum technologies were generally positive, though a few did complain about the more difficult computer tasks. When I asked for his general impressions of the project, Bountiful River Tribal School student Mitchell stressed that, "Mostly I liked taking the pictures because I like digital cameras." He went on to complain that, "In our other school

work we don't have to take pictures of our work. It's funner taking pictures." Classmate Brandi stated, "I learned how to do QTVR, and that was a good experience for many people." I asked her partner, Amy, if she would like to do more virtual reality imaging in the future, and she replied, "I probably will when I grow up. I'm really into computers. Me and my dad, we've been into computers all our life, so he's taught me a lot about it."

Other students were not as comfortable with the virtual museum tasks as Brandi and Amy. Angela said, "Well, I thought it was o.k. I wouldn't pick this for doing like for a living. . . . I didn't like turning the turntable, but I liked taking the pictures." As for creating the QTVR images, she said, "I think it took too long because I didn't know that much effort had to go into something like that."

Jerry enjoyed both the picture-taking and the QTVR creation, saying, "Well, it was fun to learn how to like take pictures and put them all together and just putting it all together as a movie." Neil also indicated that he enjoyed both of the technical tasks. He said, "I didn't think it was going to be this much fun because [my teacher] didn't say how many pictures we were going to be taking. I thought that was really cool. . . . I've taken pictures and put them on the computer, but never a virtual one."

Neil, Angela, and Ellen all lent some support to the motivating aspect of the technology-culture integration aspect of the virtual museum project when they all said that they would prefer to do future virtual museum projects with "Indian stuff" if they had the opportunity.

Dustin and Dylan at White Pine Tribal School also made some statements that support the importance of technology-culture integration. When I asked them how the virtual museum project compared to other projects he had done at school, Dustin said, "It's better, and I thought this was just going to be just take the pictures and put it on the computer stuff." Dylan interjected, "I really like stuff and how to use them, like the gouge, how it's used to carve things, and the arrowhead—could be used with spears. We got to take pictures and use computers. At school, we can't do it because we don't have the objects." Dustin added, "We don't have the time."

As cited above under the "Validating Native Culture" heading, I quoted June, who also spoke about the technology and cultural aspects of the project being, together, the fun aspects of the project for her. She continued with more statements that touched on the technology learning she accomplished:

> We usually don't use digital cameras, we don't use a video camera, we don't go on field trips usually, but with the project we've used a lot of neat things that we just learned how to use. I thought it was really cool, the way you showed us how the virtual museum, how to twist things around, and the pictures, how we could bring it on the computer, and like how to use those stand up camera thingies [tripods]. We learned about hot spots and how to get our objects on a computer.

From these student statements sampled here and some cited earlier in this chapter, it should be fairly clear that these students were comfortable using the various technologies in virtual museum project and especially enjoyed using technology to learn about and to teach about their culture. I am hesitant to go on to say that the virtual museum technologies used as they were in these projects are culturally responsive, because I know there is some controversy within the Native

American communities regarding the appropriateness of using such advanced Western technologies to preserve their cultures (Delgado, 2003). Because an important a aspect of designing virtual museum projects with Native American communities involves the negotiation of areas of cultural sensitivity, I asked most of the Native adult participants in the study about the issue of using modern information technology for cultural preservation.

The Native American Response to Technology

The Native community response to the virtual museum project has been very positive, with Native participants actively identifying the potential benefits the virtual museum may hold for the tribes under the case study theme categories "Tribal Museums," "Community-Museum Relationship," "Community Relations," and the individual case theme "Bringing Objects Out from Behind the Glass." Under these themes community members spoke of the ways that the virtual museum projects might improve relationships with museums and the general public, improve access to important cultural items, expand to include the digital collection of cultural items within the community, preserve cultural items by minimizing physical handing of fragile objects, and provide a virtual experience that is in some ways superior to viewing an object "from behind the glass." Still, many Native people consider the proposal that the use of new technologies to help preserve and pass on Native American heritage with caution. Some culture teachers in the Four Directions schools have told me that many elders have objected to having traditional stories written down because the Native community would lose control over the stories, which should be only part of an

oral tradition that respects culturally understood constraints upon the telling of the stories. Putting the stories in print or on tape might deprive the traditional storytellers of the respected role they hold within the community (Cleary & Peacock, 1998). Also, pulling the stories out of the experiential context of their telling deprives them of the unique significance that emerges from a given oral performance (Delgado, 2003; Murray, 1991).

For many Native Americans, technology offers a way of preserving heritage that is in great danger of being lost, but it is a "double-edge sword" that has the potential to harm the people through the invasion of privacy, digital control, and manipulation. Some Natives mistrust the new technologies because they are "a product of the corporate western mind; we [Native people] do not know that the sacred was part of the thought process that produced these objects. For some Native people, this concept—being surrounded by the non-sacred—goes against the very tenets of Native life and thought. (Delgado, 2003, p. 90)."

When I asked Will if the virtual museum project contradicted the traditional Wabanaki ways of passing on knowledge and culture. He told me,

> I don't think so. You know, from what I know, we've always been a very adaptive group of people. I think I'm speaking about Native people in general, but most specifically about us. We had something that happened on a larger scale when the White man came, and so our skills at adaptation had to be even more enhanced. And so I think before the dawn of television and telephones and the mass communication, where all we have to do is lift a hand and we can talk to somebody ten thousand miles away—that changed all of us forever. And so I think that our communities are grappling with how do we deal with this. One of the things that happened to us since 1960 is our storytelling tradition just started to disappear, or has disappeared. There are a few storytellers, but there are almost no listeners right now because of the language problem that we're facing, and so we're in a survival mode. And so I don't think

> that our elders find us trying to rescue something, I think they're more concerned to make sure that it survives, and that there again, forced to adapt into another mode. Now, other tribes in other places feel more secure, but I think that the same things that are hitting us is going to hit them if they're not already, and they have to address these things from a practical sensibility. Even the Navajo who once thought that they would never lose their language, statistics indicate that they are having as much of a language threat as we are, even though we are a small tribe, and the other languages also. I mean there's a big national struggle for language survival. . . . And so right now, the most immediate thing is to go into our language survival mode. I think that I'm a little bit nervous when we put all of our stories out there on the World Wide Web. I think you don't put out all of them because, and this if from the history of manipulation, you have to be really careful. You want to teach the outside world, but you have to be careful about how you do that, and until there's a better sense of trust. And some of the elders do not trust that much because all they see is another outside entity trying to destroy us. That's a real thing. So we kind of have to discuss that and talk about that. But I think that at this point we have to spend so much time at the survival part. If we don't do something in the next forty years or fifty years we might not have a language working. And so whatever we're doing right now is meeting those purposes. And we work hard at it. It's difficult.

Will's remarks about being in "survival mode" echoes similar statements made by other Native participants when I asked about the appropriateness of using new technologies to preserve Native culture. Will also referred to the caution many Native people have toward the "double-edged sword" aspect of technology. I asked him if he considered technology as part of the problem or part of the solution to the problem of culture and language loss, and he replied, "I think it is part of the solution."

When I asked Ernest a similar question—is there anything wrong with the use of modern technology to preserve Native culture—he replied,

> No, not at all, because, because that's what we need. A lot of our elders have been passing away recently, and what culture, what history, what things that we have, has to be kept, one way or another. There has to be

> someone who can keep this information for future generations, and if we have no one to tell the stories latter on, if we just keep it an oral tradition within families, maybe the family will die off, and you won't have those traditions, those stories any more. It's best to, from my point of view. We're some of the first Native people who were encountered [by European colonists], and [we] have been surrounded by a non-Native culture for so long and we've lost so much that I can see that's what we have to do. We have to grab what we can and put it down the fastest way in the hardest copy that we can and try to keep our traditions, if only that way, because, as these kids grow up, they're growing further away from the culture. . . . But if we can get these stories and parts of our culture taken down to be shown, get a new museum, they'll be more community involvement there. More people will see it. There will be more of a tide that will grow out of this. It's like a seed that's been planted. It's the best of two worlds. It's our culture on one side and new technology on the other side, and with these two things coming together, it makes the seed of our stories in the future, and for our future generations of people.

I asked Ernest if the Wabanaki Nation was adapting new technology to become a modern nation, and he said, "We have to. We have to adapt. I mean that's how people have survived for so long. We learn to adapt. We had to. It was either that or die." His response was very reminiscent of Will's statements about the people entering a "survival mode" in which they adopt the new Western technologies out of necessity. Jack used the word "adapt" in much the same way as Ernest when I asked about the Native reaction to the use of technology for preserving culture. He said,

> We've got to adapt to it. Everything has been handed down from generation to generation, but now we're to the point of where the elders are getting very old, and our younger people who are supposed to pass it down have no interest in it any more. I see technology as a way of preserving it. They tell their stories to us, which will be recorded, documented, again, ask the elders if it is sharable or not with the general public, but there's a whole lot on the reservation that can all be documented. It could be stored here and shared with the culture on the reservation, but then with the elders' advice they could share what they wanted with the outside world.

Jack refers to a policy that had been adopted in the Four Directions project that recognized that some curricular materials created in the project may be created strictly for local use because it might contain cultural property deemed non-sharable with the outside world. One aspect of adapting new technologies to Native cultural reproduction efforts is devising protocols for maintaining control over cultural properties. Devising these protocols and deciding how the technologies should be used to preserve Native culture, if at all, is a local issue. When I asked Jack if the use of new technologies was being integrated into Native American values, he told me,

> Yes, it's becoming integrated. They're slowly learning that we need to preserve the culture, and has to be done in a digital manner. We're slowly getting the counsel on it, which they are now, they all have their own computers now, which was one of the biggest obstacles, but once we got them interested, then we got support with them.

Will, Ernest, and Jack all use similar terms to express the necessity of adopting modern technology in order to "adapt" and "survive" as a people. Wendy expressed a similar idea when she explained, "we've managed to adapt to whatever changes [that] come along, but are still able to hold on to who we are." She saw Native people being like "chameleons" in their ability to adapt to their changing historical conditions. Like other Native participants in the study, she hinted at some worrisome changes within the community that indicate an eroding of the valuing of Native culture. She saw in the virtual museum project a way of recovering some of the valuing through the integration of modern technology with traditional culture. She said,

> I've found in our community, and I've also heard from other Native communities, they don't see—and I'm not saying they're all like this—but

> like they don't see a value in culture. They want people to succeed, and so [they] go along with whatever is coming up, or whatever is the hot occupation or whatever, and technology is, computers. And so what you're doing [in the virtual museum project] is you're putting them together and by doing that it's being accepted as being of value. You know what I mean?

Jim responded to Wendy's statement by pointing out that by integrating the technology with cultural activity, "you don't have to make a choice between culture and technology." Wendy agreed, saying, "No you have them both. Yeah."

Fred had a slightly different view, seeing Native American adoption of technology not so much as a choice forced by necessity, but as something that is much more in keeping with Native American values. When I asked Fred if he thought the virtual museum technologies were in keeping with Native American traditions he told me, "Yeah, because it's a tool, and it's a gift from the Creator, like anything else, and it's for everyone's benefit." I found this response surprising because it reverses the conception that technology comes from a strictly secular sphere of Western science and capitalism. Fred especially enjoyed the intertribal collaboration that went on in the Northern Lakes/Great Bear virtual museum project. He saw a great deal of sharing of technical knowledge and equipment taking place, and connected that activity with an ancient tradition of intertribal commerce. He said,

> I really think that it's the tribes getting involved with each other and them to share cultures among the tribes themselves, not only the culture, but the technology and the different things that go along with it. And that's important too—it's sharing, always that sharing. Yeah, I think it's like when we used to always trade like beads for shells and things like that, and now it's sharing the technology.

The acceptance of the new technologies for some of the role of cultural reproduction in the new "survival mode," as Will has expressed it, may also be affected by the generation the participants are from. Will and Betty were able to reminisce about their childhood when their grandparents would not allow the English language to be spoken in the home. When I mentioned to Martha the statements I had heard from other Four Directions culture teachers about the elders' resistance to having stories put into print, she identified a generational divide within her own family that reflected a gradual change in that attitude. She told me,

> Yeah, my grandmother is like that, whereas my father, he's 65, he likes the idea that [culture is] being preserved. Because of intermarriages a lot of the culture and things are being lost, so my father really likes the idea of it being preserved this way because this is the way the kids are going to learn how to use it. You know, we can't stay in the past, but yet we can't leave it behind us either. Whereas my grandmother, she still prefers the oral tradition of passing down stories. She's [in her] 90s now. Yeah, I see it more of a change because a lot more people are embracing it, especially on this reservation, with a good number of kids who have access to a computer either at home, and they definitely have access to one at school. You know, even the parents, if they've never used it they're learning from their kids on how to use the computers, and they're seeing the benefits of it. But they're also leery because there are a lot of pitfalls [to using the] Internet. I think that they're seeing the benefit of it too.

Part of the "pitfalls" of the Internet that Martha refers to is the issue of safety that all schools must grapple with, but in addition, there is the loss of control of the virtual museum cultural content once it is published globally. Martha responded to this issue in a way similar to other participants, which indicates that there are always some community members who still object to publishing cultural materials. She said, "You know, some don't like the idea of

the pieces being out there, but at the same time you can see, anyone can see it in the museum, too." Several other participants made statements that indicated that there would be community members who would object to having cultural information "out there." For instance, John, the elder who assisted with the Pacific Tribal School project, told me, "Well, I suppose you'll get some ridicule from different sources. There's always somebody out there that's going to object. There's always somebody there who's going to find negative stuff. Then there's going to be people who are in favor and be part of this project."

The struggle to maintain the culture is also a struggle within the community over how that is to be done, so it is not surprising that the virtual museum projects, even with substantial community participation, would still remain controversial to some sectors. The proponents of such projects have recognized that earlier efforts to preserve the culture outside the oral tradition have had some success. I asked Ruby, an elder who helped with the Pacific Tribal School project, what her sense of the controversy over the use of new technology to pass on culture. She replied with a little personal anecdote about how she had personally benefited from earlier efforts at cultural preservation outside the oral tradition. She told me,

> Some people say that they want this out or that out. I was just happy finding some things, you know. I've done research in genealogy with the archives in Seattle. I pulled them down from different people that interviewed with my grandparents or my grand aunties. I was able to find some, like going back to the Native names, Indian names that were given to my sons. I had a hard time finding in my dad's family. I was able to find it with the people that interviewed my people. [Were it not for those interviews], I wouldn't be able to find it because they weren't supposed to talk about it.

Ruby's personal story illustrates the value Native people have found in earlier efforts at cultural preservation by Western scholars and scientists. The fact that the virtual museum efforts are carried out by Native students and community members represents a positive development, one that will hopefully garner greater approval in the Native community. As Will exclaimed, "Thank god some of those guys came and recorded our language way back when. You know that helps us an awful lot. Or even those pictures and stuff. We knew how people dressed and how they sang and so the place of technology and the students' knowledge of it is so vital."

By participating in the virtual museum project, Native students are participating in the adaptive changes in Native culture. Like other aspects of the virtual museum project, students' use of technology to help preserve Native culture places these student activities at the center of contemporary Native American concerns.

SUMMARY

In this chapter I have explored the ways virtual museum projects might contribute to the developing conceptualization of culturally responsive teaching. Table 9 below gives a review of the main points that have been discussed in this chapter.

Table 9: Culturally responsive elements of virtual museum projects

Culturally Responsive Element	Description
Validating Native Culture	Cultural content of the virtual museum project validates and affirms minority culture and helps students form their cultural identities.
Community Participation	Community members provide expertise on cultural content and helped students appreciate their own cultures. Provided a culturally congruent participation structure.
Native People Saying Who They Are	Students helped to correct stereotypes and misconceptions about Native people. Spoke with an authenticity that Western scholars do not have.
Students as Culture Bearers	Students participated in their developing role in the cultural reproduction of their communities.
Partnerships with Museums	The virtual museum partnership provided a forum where students participated in the social and political struggle for cultural preservation through digital repatriation.
Collaborative Learning	Collaborative teamwork was a labor-saving strategy and enhanced student learning. Collaboration was also valued as a learning goal in itself.
Hands-On Learning	Students benefited from the virtual museum's concrete learning environment that provided them with personal contact with cultural items and the use of technology to produce a useful real-world product.
The Familiar and the Familial	Students could build on their knowledge of cultural items they were familiar with. They were motivated by the familial connections they had with the objects.
Choice	The ability to select their object for the virtual museum provided some motivating agency for student learning.
Technology	Technology is an important curricular component that was integrated with cultural learning. Students participated in the community controversy of using Western technology for preserving Native culture.

In examining the culturally responsive elements of virtual museum projects, this chapter took a closer look at how students responded to the projects than the previous chapters, which were more concerned with developing the process of designing and implementing these types of school-museum partnerships. Some of these culturally responsive elements, such as collaborative learning and hands-on learning, have been presented in the learning styles literature. Following more recent trends in the development of culturally

responsive pedagogy, I have tried to recast these elements under the perspective of constructivist learning theory.

Perhaps the strongest culturally responsive elements provided by the virtual museum projects have connected with the critical pedagogy aspect of the literature. These are the elements that place the students in a position where they are participating in the social and political struggles of their communities. In many ways, the virtual museum projects are as responsive to the students' communities as they are to the students themselves as learners. The level of community participation, though it varied considerably in the four cases of this study, was substantial when compared to the few culturally responsive projects that involved community participation in the literature. It is in this close connection to community concerns through community participation that the virtual museum projects contribute most to the development of culturally responsive teaching.

Chapter 10: Conclusions and Recommendations

In chapter 8 I combined the information presented in the four case studies into a condensed form, collapsing the numerous themes that emerged from the studies into a composite picture of virtual museum projects in Native American schools. These projects all took on a general form that had been established in earlier work I had done in the Four Directions project (Christal, Roy, Kriepe de Montaño, Resta, & Cherian, 2001; Resta, Roy & Christal, 2000; Roy & Christal, 2000a, 2000b; Resta, 1998). The composite view I presented in chapter 8 introduced a number of implications for the conduct of virtual museum projects that were summarized in Table 7.

In chapter 9, I took a fresh look at the research data to address my research question regarding the ways in which these projects support a culturally responsive teaching practice for Native American students. As summarized in Table 9, this discussion uncovered a number of possible culturally responsive elements that virtual museum projects may possess.

In this concluding chapter I would like to step back and approach these findings from a broader perspective and see what this study may recommend in terms of future research and teaching practice. The title of the study, "Virtual Museum Projects for Culturally Responsive Teaching in American Indian Education," suggests the three broad topics I will discuss in the following: virtual museum projects, culturally responsive teaching, and American Indian education.

VIRTUAL MUSEUM PROJECTS

The virtual museum projects I examined in these case studies followed a fairly consistent model and involved a specific type of school, the tribally controlled American Indian school. The study suggested several ways that these types of projects may be improved, which I detailed on chapter 8. I believe that virtual museum projects may become more effective if they apply these improvements, and future case studies of improved projects may lead to further enhancements. It will also be valuable to see if similar virtual museum projects might work well for different types of schools and other student populations, but before trying to generalize the virtual museum project innovation we should consider carefully which aspects of the innovation will likely translate well to other venues.

School-Museum Partnerships

One aspect of these projects that distinguishes them from other learning projects is the school-museum partnership. Because both museums and schools are educational institutions, the partnership would seem to be a natural one. To the extent that the projects were meeting the missions and programs of both institutions, the virtual museum projects of this study proved to be of mutual benefit to both parties in the partnerships. However, museums are also charged with the care and preservation of their collections into perpetuity, a responsibility that conflicts with the virtual museum activities that pose a certain level of risk to museum items. Museums maintain their collections for the general public, but the relationship that the Native community has with the collections persuaded the

museums in the direction of access in their considerations regarding project activities. For this reason, it was easier for the museums to agree to the partnership with American Indian schools than with other public or private schools. These case studies suggest that nature of the student population and the cultural relationship those students have with a museum's collection will have an influence on a museum's decision to participate in similar virtual museum projects with other student populations.

In addition to the cultural connection that students had with the museum collections, the participation of community members proved to be a facet of the projects in which both the school and museum partners found benefit. The community members provided expertise in cultural information for both students and museum professionals. They helped students realize and appreciate their personal, familial, and cultural connections to the museum objects. The participation of community members helped museums achieve their service mission to the Native community, justify the access they granted to their collections, and helped to heal the historical tensions between the Native communities and the museums. The response to community participation in this study suggests that similar benefits may be anticipated in virtual museum projects with other student populations.

The tribal museums in the study proved to be excellent partners in two of the cases. The museum professionals in the tribal museums shared the cultural and community identification with the students, and they readily formed close connections to the schools. They were also in close proximity with the schools,

so that the virtual museum activities could take place with little or no travel time involved. The tribal museums benefited from the partnership as a forum for the development of further activities between the museum and school, including the possibility of ongoing programs of mutual benefit, such as digital collections by students within the community. It would be hard to find an equivalent of a tribal museum partner for other student populations, but tribal museums provide by example some features that might characterize a prime candidate for a museum partner in a culturally responsive project. Such a museum would likely be one that is small and within or in proximity to ethnic neighborhoods or regions. It would be primarily dedicated to the culture of the students and supported by an institution that advocates the interests of the ethnic or cultural group. The staffing of the museum would also strongly reflect the students' cultural identities.

The case of the Provincial Archaeological Service demonstrated that potential collections for a virtual museum project might not reside with a traditional museum. This enlarges the potential partners for a virtual museum project to similar institutions such as universities, research facilities, and government offices that collect important items for research, preservation, and archival purposes. As several participants noted, families also have their keepsakes that form a collection that is dispersed throughout the community that may be accessed in a virtual museum project, further widening the prospective sources for participants in virtual museum projects.

Virtual Museum Technologies

The "virtual" in the virtual museum projects brings up the question of technology and how it is affecting both the teaching and museum professions. The case studies indicated that both the museums and the Native communities welcomed the extension of access to cultural materials that the virtual museum technologies offered, but they also shared some concern about the loss of control over these materials once they were published on the World Wide Web. There were many more favorable comments about enhanced access than comments expressing concern about loss of control.

Some of the museum partners were clearly impressed by the technical abilities of the students, and showed interest in making their own uses of the digital materials they produced. A few made comments that suggested that student work could be a valued contribution to the museum's own program, one which the museum would find it difficult to afford otherwise. Several museum partners also recognized that the virtual objects could serve as a proxy for delicate items in situations where they might suffer damage from even the most careful handling. The projects also opened the eyes of some museum staffers to the potential of virtual museum technologies for their own operations.

For the schools, the virtual museums were a technology-intensive project. This was not a plug-and-play technology project, and it required a certain level of skill on the part of the participating students. Hence, one issue that came up repeatedly involved the question of who in the project would be responsible for the technical tasks. Training for both students and teachers was another

consideration. Most participants believed that the students demonstrated the capacity for accomplishing most of the technical tasks, and that teachers did not necessarily have the be the "technicians." Others thought that teachers should receive training on the technical tasks so that they could help their students. These issues raise an important consideration for future virtual museum projects that may not be supported by a university participant-observer researcher: what level of technical expertise within a school community is required to make such projects feasible?

The question of feasibility has been partially addressed by recent changes in the technology market. When I first began training the Four Directions schools in the virtual museum technologies, QTVR media was technically difficult to create, requiring knowledge of a specialized scripting language. Digital cameras were just beginning to emerge on the consumer market, and they were expensive and had limited quality and resolution. In the past few years, easy-to-use QTVR software and the falling costs and improved quality of digital cameras have made hands-on virtual museum projects more feasible as a classroom practice. This study shows in detail how these projects may proceed with these newly available technologies, which should be helpful for educators thinking about pursuing similar learning projects.

From a wider perspective, the virtual museum project addressed some issues about the appropriate use of technology in education. Morrison & Goldberg (1996) have referred to two scenarios that may be taken in the use of technology in education. Scenario A describes the use of network technology to

provide a centralized delivery and assessment system for education. Under this scenario, experts far from the local school communities develop curriculum content that is delivered as carefully programmed instructional units with built-in assessment. The built-in assessment may help to pace the instruction to individual student needs, providing remediation when needed. The curriculum may be delivered over network technology or the Internet typically in a computer lab setting, and would be aligned with state educational standards. Such a system may well serve educational goals such as uniform standards, increased accountability, and national educational goals.

Scenario B has computer and information technologies distributed throughout the school, typically in individual classrooms rather than computer labs. Rather than software for top-down uniform curriculum delivery, the computers are equipped with a number of flexible software tools for knowledge-building tasks such as word processors, spreadsheets, graphics software, multimedia software, groupware, Web scripting software, Internet browsers, and email programs. Teachers use this computerized information infrastructure to support a curriculum that is under more local control, supporting more constructivist teaching practices such as collaborative knowledge construction, projected-oriented teaching, and student-centered teaching. In this scenario, educators do not necessarily bypass State standards, accountability, and national education goals, rather, it is up to the local education professionals, primarily classroom teachers, to design and implement a learning environment that meets student needs, while achieving those goals.

Apple (1993, 1991) connected computer technology to the trends he saw in textbook publishing that led to the "deskilling" of teachers, which involved taking the pedagogical decisions away from the local educators and placing them in the hands of curriculum experts who were interested in meeting the marketplace demands for efficiency, cost effectiveness, and accountability. He was concerned that reliance on such prepackaged software erodes the developing pedagogical skills of teachers such as curriculum planning, individualized evaluation, and critical educational practice. His critique clearly applied to a strong Scenario A vision of educational technology. However, the prevailing wisdom of how to use computers in education has changed over the years, and Apple was writing at a time when integrated tutoring systems were still an influential approach in educational computing (Office of Technology Assessment, 1995). The Four Directions project was predicated on a perception of curriculum development that counters the cultural politics of the textbook criticized by Apple (1993, 1996) by using technologies that support the local development of curriculum for Native American schools. The guiding concern of the training provided by the project was the promotion of culturally responsive teaching practice using computer technologies. The virtual museum projects grew out of this highly collaborative partnership between teachers, community members, and project partners that included universities and museums. The Four Directions approach to technology was a good example of a Scenario B vision of educational technology that promotes a locally designed curriculum that fosters culturally responsive teaching.

CULTURALLY RESPONSIVE TEACHING

When Cazden & Leggett (1981) first proposed an approach to minority education called *culturally responsive* they drew upon two primary sources. One was the research into aptitude treatment interactions that had been pursued in educational psychology since the late 1960s. This research led to the idea that central tendencies of cognitive styles of different cultural groups might guide the choice of instructional approaches. This general approach led to the learning styles research in minority education, which has proven to be controversial. In this study, I have linked two elements, collaborative learning and hands-on learning, to the learning styles thread of culturally responsive teaching, but taking the lead from Villegas & Lucas's (2002) recent synthesis of culturally responsive teaching, I have tried to reframe these element in terms of constructivist learning theory to place them on a firmer theoretical basis. By doing this, I also hope to avoid the dangerous tendency of stereotyping the cognitive abilities of whole racial, ethnic, or cultural groups in a way that leads to educational approaches that perpetuate social inequities.

The second primary source that Cazden & Leggett drew upon came out of ethnographic educational research such as Phillips' (1972) study of Native American children on the Warm Springs Reservation in Oregon and the research on the Kamehameha Early Education Program (KEEP) in Hawaii (Au & Jordan, 1981; Au & Kawakami, 1994). These studies looked at the culturally responsive participation structures that matched students' interactional styles that researchers had observed in the children's communities. I have discussed these approaches as

part of the culturally congruent thread of culturally responsive teaching. In this study I noted that the inclusion of community participation helped to change the participation structures learning environment of the virtual museum projects in a way that may favor the interactional styles of the students. Further research would be required to explicitly connect such changes to the interactional styles prevalent within the communities. When I read the culturally congruent teaching literature, however, I wonder if the alteration of the classroom participation structures the studies propose might work equally effectively with mainstream students as well. After all, the traditional classroom structure has formed around conditions that are very different from most communities' standards for interacting with children. I would suggest that in future culturally responsive research it may be worthwhile to also examine the change of classroom participation structures in terms of constructivist learning theories.

Culturally responsive teaching that is informed by constructivist learning theories will recognize the need validate student knowledge that is brought to the learning environment and forms the basis for zones of proximal development where new learning takes place. In addition to the tacit knowledge exemplified by interactional styles, my study also identified the more explicit knowledge represented by the familiar and the familial as an appropriate basis for building new student knowledge. In my study I have documented how the familiar and the familial have operated to motivate student learning and how the element of choice permits students to guide their own learning in culturally affirming directions. Culturally responsive teaching validates student cultural knowledge by placing it

at the center of classroom practice along with the mainstream knowledge and skills they will need to succeed in their lifelong endeavors with their communities and the world at large.

Early on in the development of culturally responsive teaching, researchers recognized the importance of community participation in the education of minority children, but few studies examined the nature of this participation closely. This study has found that community participants in the virtual museum projects help to promote students' appreciation of their own culture. Community participants have also helped to bring community concerns to the fore in virtual museum projects. These findings connect with the critical pedagogy thread in the development of culturally responsive teaching that seeks to promote democracy through education and challenge social inequities. Community members found it crucial that the virtual museums would enable Native people to say who they are to the world and correct the stereotypes and misinformation that has been promoted by the mass media and the social science of the past. It was equally important that it was Native children who were involved in this intercultural communication because it promoted the enculturation of the students into their roles as culture bearers into the future. It is in this way that these virtual museum projects are culturally responsive to the Native communities as a whole, in addition to being culturally responsive to individual Native students as learners. Future research into culturally responsive teaching may profit from widening its scope and ask in what ways teaching practice may be responsive to community concerns.

I have also suggested that the school-museum partnerships may also be culturally responsive because both parties in the partnership were confronting the historical tensions between Native communities and museums and anthropologists. In this sense, the virtual museum projects may be considered culturally responsive to the museum and anthropologist communities as well. I believe a great deal of work remains to be done in this arena where Native communities and museum communities negotiate standards and protocols for cultural exchange and cultural property rights. Again, future culturally responsive teaching research may profit from examining the ways teaching practices respond to efforts that operate in cultural borderlands to improve societal relations.

Another contribution this study makes to the culturally responsive teaching literature is my examination of new technologies as a possible culturally responsive element. As one Native participant noted, these technologies have changed all of our lives forever. Cultures are not static, but change over time, and technology plays a significant part in that change. I stopped short on claiming that technology is a culturally responsive element of virtual museum projects because I was aware of the controversial nature of the use of modern Western technologies for the preservation of culture within the Native communities. As much as possible, I tried to let my Native participants' voices speak on that issue. This is but one area where Native researchers in education will lend an authenticity to studies that I, as a non-Native, cannot (Swisher, 1996). This leads me to the recommendation that the academic community support and promote Native researchers for research in Native education.

Other than the controversial aspect of technology use for cultural preservation, it was clear that students were very capable and comfortable with the virtual museum technologies, and many adult Native participants in the study believed in the importance of technology as a learning goal in itself. The virtual museum technologies also played a role in the hands-on aspect of the projects. These are facets of the technology element of the virtual museum projects that I am more comfortable in identifying as culturally responsive. Future research into culturally responsive teaching may develop these connections more clearly.

Perhaps the most important aspect of culturally responsive teaching was not addressed adequately in this research, and that is the primary goal of academic achievement. Making such a case would seem to require more quantitative research designs. I believe this study did demonstrate that virtual museum projects provide a great potential for academic learning, and that these educational opportunities would be missed if the projects are not carefully designed and implemented. The lack of adequate classroom teacher participation in the design and implementation of the project in several of the cases exemplify the missed opportunities and implied ways to improve future projects. Future research into virtual museum projects that seeks to demonstrate improved academic achievement should be predicated on the adequate design and implementation of the projects.

Given adequate project design, another problem that quantitative researchers would face in examining the academic outcomes of virtual museum projects would be getting enough subjects to provide a research design powerful

enough to detect significant treatment differences. The limited number of students who can participate effectively in virtual museum activities at any given time—four or five students—poses a problem in accumulating a sufficient number of subjects for such a study. Such a research program would need to examine several projects at once or an ongoing program over time to accumulate enough subjects for an adequate study. Another challenge to quantitative research would involve coming up with a valid control group with which to make the experimental comparisons.

Each virtual museum project ends with a product that is an educational resource in its own right. The virtual museum that results from the virtual museum project was at the boundary of the cases in this study. A number of research questions may be applied to the effects of these virtual museums. For instance, do they succeed in correcting the misconceptions about Native American culture that non-Natives have, as many of this study's participants hoped? May the virtual museums function as an effective educational resource within the Native American school's culture program? Do they serve as an effective educational resource for teachers of mainstream students in different parts of the country and in other nations? How effective is the Web design of these projects, and how may they be improved? How do virtual exhibits compare to actual museum visits in terms of learning outcomes?

Multicultural education in not just for minority students, but for all students in our pluralistic society. Part of the worth of virtual museum projects will be realized in how they meet this goal.

AMERICAN INDIAN EDUCATION

The history of American Indian education in the 20th century began with the slow realization that the forced assimilation agenda of 19th century education policy did not work, and the affirmation of indigenous language and culture within American Indian schools was a necessary component of a successful education program for Native Americans. In the 1960s the first tribally controlled schools in the Bureau of Indian Affairs system enabled Native people to devise their own language and culture school programs for their children. Today, most of the B.I.A. schools are tribally controlled, and the schools feature classes devoted to Native language, history, and culture.

Though the culture and language teachers share the same tribal affiliation as their students, most tribal schools still must rely on non-Native teachers to fill many of the regular classroom positions, and these teachers must find ways to teach their students in a culturally responsive manner. Textbook publishers do not develop lessons that adequately meet this goal. To address this issue, the Four Directions project explored ways to use computer and information technologies to help teachers of Native students develop the culturally responsive curriculum materials and learning projects, a task that, due to the sensitive question of who gets to teach culture, must be done by or in collaboration with teachers who themselves are Native, which often meant teachers in the schools' culture programs. Virtual museum projects were but one approach of many that the teachers explored in the Four Directions project. This study examined four of those projects in detail.

The tribally controlled school provided some special features for the projects that would be difficult to duplicate in other school settings. The culture teachers within the schools provide a special link to the Native community, so they were able to garner community support, and in most of the cases, they played the role of the community participants within the projects themselves. The inclusion of Native community members as valued information resources and the need for community approval of the cultural information that the virtual museum projects publish on the Web is a feature of the virtual museum projects that may not be a requirement for other student populations, but it is feature that I would recommend strongly because of its strong positive effect on the students in these case studies and to guard against improprieties that might ensue if a virtual museum project took place without community participation.

Another feature of the virtual museum projects in these studies that ensued from the nature of the tribally controlled school is the fact that all of the participating students were tribal enrollees. Students in a given B.I.A. school do not need to be enrolled in the same tribe, and the tribal membership in some of the schools, especially the boarding schools, may be quite mixed. Virtual museums projects may need to be multi-tribal for such schools. This was an aspect of the design of the second case, which was a collaboration of two different tribal schools, and it involved community member participation from both Native communities.

Fewer that 10% of K-12 American Indian students attend schools in the B.I.A. system. About 38% of American Indian students go to schools that have

25% or more Native American students attending, and most of these public schools are within or adjacent to reservation lands (National Center for Education Statistics et al., 1997). Because most high Native enrollment public schools are so close to the reservations, it should be possible to involve Native community members in similar virtual museum projects using integrated classes within the schools. In that case, the virtual museum projects may themselves be exercises in intercultural communication as Native and non-Native students work together on creating exhibits about Native culture. Another possibility for such schools might be a multicultural, multi-community virtual museum project as envisioned by the Laurence Museum director in the Pacific Tribal School case.

Just over 50% of American Indian students attend schools with less than 25% American Indian enrollment (National Center for Education Statistics et al., 1997). Most of these students would be living in cities that may be far from their tribal reservations, and they may be in the most danger of losing their cultural connections to their Native heritage. Virtual museum projects for these students may need to involve some fresh approaches. It may be possible to locate organizations, such as American Indian community centers in large cities, or Native American student organizations at large universities, to provide the kind of community participation that was readily available in the projects of this study. The museum partners in such projects may be able to take a stronger role in recruiting Native community participants.

The museum may be a key figure in efforts to include Native American students from public schools. For the projects of this study, the tribal schools

were the primary instigators and planners of the virtual museum projects. If museums were to devise programs for virtual museum projects with similar goals, they may be able to recruit Native American students from public schools and bring them together with Native community members in a way that approximates the type of participation that resulted from the tribal school initiated projects. Similar museum-initiated projects may be pursued by museums with different ethnic-related collections for different student populations. Approaches like these may help expand the type of virtual museum projects described in this study, where students of a given ethnicity and culture say who they are to the rest of the world, to a wider range of student populations.

In the last case the participants from the Provincial Archaeological Commission expressed the desire to apply the virtual museum project innovation to Canadian First Peoples. This opens up the possibility that virtual museum projects may be a desirable approach for cultural revitalization for indigenous peoples in all parts of the world who are struggling to maintain their languages and cultural identities in the face of globalization. Globally, indigenous people find themselves in the same kind of "survival mode" that Will spoke of in the White Pine Tribal School case study. Awareness of these conditions became a focus of the United Nations International Year of the World's Indigenous Peoples in 1993, which sparked a number of conferences, studies, position papers, and declarations regarding the survival of indigenous cultures (Almeida, 1993). Two declarations have special relevance to the possible application of virtual museum projects to the education of indigenous children. One is the Coolangatta

Statement on Indigenous Peoples' Rights in Education (1999) that was ratified during the World Indigenous Peoples Conference on Education in Hilo, Hawaii. The statement declares the right of indigenous identity and calls for self-determination in all matters, especially education. This would set up conditions similar to the American tribally controlled schools, allowing for educational programs that seek to preserve indigenous knowledge, language, and culture. Another declaration, the Mataatua Declaration on Cultural and Intellectual Property Rights of Indigenous Peoples (1993), was issued at an international conference in Whakatana, Aotearoa, New Zealand. This statement declares the right for indigenous people to define for themselves their own intellectual and cultural property and to exercise control over it. The Mataatua Declaration calls for steps leading to the repatriation of human remains and important cultural property from museums and other institutions, in a way that is similar to NAGPRA. Together, these declarations would establish the kinds of conditions that made the virtual museum projects in this study a fitting strategy for culturally responsive teaching in American Indian schools, and suggest that similar school-museum partnerships may be applicable in indigenous education the world over.

RECOMMENDATIONS FOR FURTHER RESEARCH

The foregoing discussion has alluded to many avenues of research in virtual museum projects that researchers may wish to pursue in the future. Based on the findings of the present study, it is recommended that future studies:

- Explore how virtual museum projects fare when the improvements suggested by this study (Chapter 8) are applied to their design and implementation.
- Examine how museums evaluate the benefit vs. risk of school-museum partnerships, and how those judgments are affected by the relationship between the cultural content of the museum collections and the cultural identity of the students.
- Explore virtual museum partnerships with institutions similar to tribal museums but for different ethnic or cultural groups.
- Examine how community member participation affects the school-museum partnership and the conduct of virtual museum projects.
- Explore virtual museum projects that partner with institutions other than museums that have cultural materials appropriate for the projects.
- Develop a flexible model that specifies a spectrum of technology solutions for various virtual museum capabilities and the level of funding, training, and technical support each component requires.
- Determine the effectiveness of virtual museum projects that apply constructivist learning theories to investigate knowledge construction in project-based collaborative learning environments.
- Examine how student cultural knowledge operates as a basis for new academic knowledge in virtual museum projects.

- Investigate choice as a culturally responsive element in virtual museum projects.
- Examine how the affirmation of the students' cultures in virtual museum projects affect motivation and learning.
- Determine how community member participation in virtual museum projects affect student learning and student attitudes towards their cultures.
- Explore virtual museum projects that seek to widen the scope of cultural responsiveness to include the community-as-a-whole and intercultural partnerships in the concept of cultural responsive teaching.
- Examine how technology operates as a culturally responsive element in virtual museum projects
- Employ Native Americans researchers to help validate and legitimize the studies for the Native community, especially in those studies that address sensitive issues such as technology uses for cultural preservation, cultural property rights, and spiritual concerns in virtual museum projects.
- Investigate the effects of virtual museum projects on core academic learning. Such studies should use a quantitative approach with sufficient power to detect significant outcomes when they occur.

- Examine virtual museum project products (typically Web sites), including learning outcomes of school children and adults using the products and Web design effectiveness.
- Explore virtual museum projects with Native American students in public schools.
- Examine virtual museum projects with integrated classrooms.
- Develop museum-initiated projects that draw Native student participants from several schools far from reservations, perhaps connecting them with adult Native participants with cultural knowledge to which the students have not had access.
- Explore virtual museum projects with indigenous peoples in other parts of the world.

This study has examined four virtual museum projects to develop a clearer understanding of how they may be designed and implemented to provide Native American students with culturally responsive learning opportunities that validate their cultures. The findings of the study reveal several aspects of culturally responsive teaching that may further the development of teaching practices for Native American students and students from other ethic and cultural groups. In addition to the goal of improving student learning, the case studies have illustrated ways that virtual museum projects may serve museums in accomplishing their educational missions, promote the cultural revitalization of Native communities, and foster intercultural understanding between Native and non-Native communities.

Appendices

APPENDIX 1: RESEARCH PROTOCOL AND PERMISSION FORMS

The Virtual Museum as a Strategy for Culturally Responsive Teaching
in American Indian Schools

Synopsis of Project

1. Sources of Potential Participants

The researcher has been working with nineteen Native American schools in the Four Directions project for nearly five years. Four Directions is funded by a U.S. Department of Education Challenge in Technology grant. As part of his activities in the project, the researcher has assisted several of the schools in virtual museum projects. The source of participants will primarily be out of the Four Directions schools. The multiple case study will examine a small number (2-3) of ongoing school-museum collaborations for learning projects leading to the creation of virtual museums by elementary and secondary Native American students. The human subjects for the study will be key individuals planning and participating in the learning project, which will include the students, teachers, museum professionals and members of the school community (parents, tribal cultural experts). The children and adult community members in the study will be of Native American descent. The teachers and museum professionals may not be Native American. For each case study site, the study will begin when the researcher begins assisting the school and museum participants with the virtual museum activities at the museum and in the students' classrooms. The study will examine virtual museum projects as a process, which means the participants will be part of the study for a period of 2-3 weeks, even though the learning project itself will likely go on for a longer period. The researcher will consult with the teachers and school administrators to discover if any of the students' parents will require a different language version of the parent consent form, and acquire expert assistance in translating the form.

2. Procedures for the Recruitment of the Participants

The researcher has been in contact with schools that are candidates as study sites. These are Four Directions schools that have had experience in virtual museum projects, or have expressed interest in conducting such projects. Once a school has decided to do a virtual museum project, all of the adult and child participants will be invited to participate in the study. The researcher will make it clear that participation in the virtual museum project will not be contingent upon participating in the study.

3. Procedure for Obtaining Informed Consent

Active consent will be sought for all study participants. The researcher will describe the study to all adult participants. The researcher and teachers will describe the study to the students. All adult participants will be asked to sign consent forms for their participation in the study. All students will be asked to sign and have their parents sign consent forms for their participation in the study. The study includes video taping selected project activities. In the event that adult participants, students or their parents do not provide consent, the researcher will make every effort to avoid video taping these adults and students. Since it is likely that these adults and students will still appear on the video tape, any data from these adults and students will not be used as a part of the study. Young children between 7 and 13 years of age will have special assent forms to sign with age-appropriate language. Samples of the consent and assent forms are attached to this application.

4. Rationale for Proposed Study

The study will examine virtual museum learning projects that involve collaboration between schools and museums. More specifically, the students in the learning projects will be of Native American descent in tribal schools, and they will be working with museum materials that are related to their American Indian heritage. Another component of these virtual museum projects is the participation of members in the school community, who will help students in the interpretation of the virtual museum objects and contribute additional material to the virtual museum that complements the material from the museum collection, such as stories, songs, heirlooms, contemporary arts and crafts, Native language, and an intimate knowledge of Native culture. Because students will be working with subject matter that relates to their heritage and involves members from their home communities in the role of subject matter experts, these virtual museum projects may be studied as examples of a culturally responsive teaching strategy.

There are a number of issues in the case studies that might be a subject of inquiry, but two in particular will be the focus of this study. One aspect of the study is to examine the nature of virtual museum learning projects that result from school-museum collaboration. Both schools and museums share a common mission of education and the perpetuation of cultural heritage. The virtual museum collaborations in this study will shed some understanding on how these two types of institutions might work together to achieve their missions to the benefit of their clients.

The second focus on the study will be on the nature of culturally responsive teaching. The term "culturally responsive teaching" was coined nearly thirty years ago to describe a number of teaching practices that drew upon anthropological and sociolinguistic research on the home life of minority students. Researchers postulated that the mismatch between the home culture of the students and the dominant White culture represented in the school put these students at a disadvantage academically. When teachers conducted their teaching so that the culture of the classroom became more "congruent" to the home culture of the students, teaching became more culturally responsive, and student achievement improved.

More recently, a more complex concept of culturally responsive teaching has been emerging that includes more types of classroom practice. Now, classroom practices that take strategic advantage of the culture, knowledge, language, values, and concerns of the students' communities are being described as culturally responsive. Some of these practices incorporate a critique of society at large, and how certain social, political, and economic circumstances have resulted in inequality and oppression. Teaching strategies that incorporate local cultural resources and community member participation are considered to be culturally responsive as well. Several aspects of the virtual museum projects in this study make them subject to analysis as culturally responsive teaching strategies. Part of the rationale of the study will be to see how these cases might contribute to the emerging synthesis of culturally responsive teaching, especially for Native American students.

To capture a more complete understanding of these types of learning projects, the study will examine a small number (2-3) of virtual museum projects. By comparing a number of case studies, the study will give a better description of how virtual museum learning projects vary across sites and what common features might be anticipated.

The primary research question combines the major concerns of this study: In what ways do school-museum collaborations for virtual museum learning

projects support a culturally responsive teaching practice for Native American students? There are at least three component research goals that will provide insight into this research question. One goal is to give a description of this emerging teaching strategy based on a comparison of several virtual museum case studies. Another goal is to determine how virtual museum projects might contribute to the concept of culturally responsive teaching. A third goal is to examine the extent to which these virtual museum projects support a culturally responsive pedagogy.

5. Protocol of the Study

The study has a qualitative, participant-observer research design. Drawing upon prior experiences in similar learning projects, the researcher will take an active role planning and implementing the learning project. Teachers will be taking advantage of an opportunity to enhance their professional teaching skills through the virtual museum learning project with the full support of the school administration. Students will be engaging in the virtual museum project as part of their scholarly responsibilities. Community member participants will be contributing to the project based on their relationships with the school and the student population and their desire to make a valuable contribution to the students' education. Museum professionals will be taking advantage of the opportunity to participate in an innovative activity that serves the mission of the museum and its responsibilities to its clientele.

The study of each case will take place over a period of 2-3 weeks at the sites of virtual museum activity, which will be at the museum and in the classroom. The researcher will be making written notes of his observations of the virtual museum activities during this time, collecting written and electronic documents that relate to the virtual museum, engaging study participants in non-structured interviews and focus groups, and recording video tape of virtual museum activities.

The adult participants in the study—teachers, community members and museum personnel—will be asked to participate in study interviews and answer follow-up questions, which will take less than two hours of their time. To help stimulate discussion of their experience, students will be interviewed in small focus groups for shorter period of time, less than an hour. The non-structured interviews will take place toward the end of the study, after the participants have experienced the virtual museum project and had an opportunity to reflect upon it. The interviews will be recorded on audio tape and will take place at the school and museum, as the opportunity presents itself. A list of initial interview topics for each of these participant groups is appended to this application.

Video tape will be recorded of virtual museum project activities when they are most intense, at the museum and in the classroom. The rationale for videotape data is three-fold. First, video tape will give the researcher an opportunity to capture project activity he would not be able to observe directly, due to his own participation in the activity. Second, because he is from a different culture and a relative stranger to the children in the study, it may be difficult to get a reliable, articulate response in the focus group interviews. Video tape will give the researcher a glimpse of how students respond to the project through their interactions and remarks during the video taping. Third, video tape data will contribute to the triangulation of findings during the analysis stage of the study.

6. Potential Risks

One of the known risks for this study is the loss of confidentiality of the study participants who have responded to interview questions, appeared in the researcher's video tape of project activities, and have had their activity and statements recorded in the researcher's observation notes. Another known risk is the release of cultural information about tribal peoples, which they regard as sensitive or non-sharable with people outside their community. Other than these, there are no known physical, psychological, social or economic risks of a serious nature involved in the study.

To protect the confidentiality of the subjects, all research data materials will be kept in secure, locked places when not in use. These materials will be seen only by the researcher and the researcher's associates who also understand the confidential nature of the data. The video and audio tapes will be erased soon after the conclusion of the study to help further the confidentiality of the participants. Transcripts of audio tapes and video tapes will use pseudonyms of the participants to further protect their confidentiality. Pseudonyms will also be used in the research report. Fictional names will also be used for the schools and museums in the research report. Because the schools involved in the Four Directions project is in the public record, it will be possible to figure out which schools are the subjects of the study. It may also be possible for members of these small communities to guess the identities of the individuals mentioned in the study. However, due to the non-controversial nature of the study, such limited loss of confidentiality may be considered acceptable when compared to the value of the research.

Native American communities continue to be wary of the way some non-Native people have represented their cultures. They are particularly concerned about revealing information about their sacred practices that they consider

sharable only with other members of their community. They also have specific ideas regarding cultural property rights that the researcher may not be aware of. The researcher will ask for guidance from knowledgeable school personnel and willing community members regarding such sensitive cultural matters. He will request that community culture experts review relevant sections of the research report drafts to avoid making insensitive representations, revealing sacred knowledge or violating cultural property rights. It has been the experience of the researcher that Native American communities have been vigilant in protecting the integrity of their heritage and cultural knowledge. By actively collaborating in honoring such concerns, the researcher will minimize the potential risks of violating them.

7. Potential Benefits

In this participant-observer study the researcher will be working alongside students, teachers, museum professionals, and community members to implement an innovative approach to classroom practice. By hosting this study, teachers and museum professionals will be gaining new experiences, skills, and knowledge relevant to their professions. Students will gain new knowledge and skills by engaging in a learning project that is designed to be authentic and motivating. Community members will be making a contribution to the education of the children within the community. Because the project is about creating a virtual museum on local cultural heritage, all project participants will be doing important work for cultural preservation. The study will advance scholarly knowledge in several areas, including technology-supported classroom practice, school-museum collaboration and culturally responsive education.

8. Sites or Agencies Involved in the Research Project

In addition to The University of Texas, the study will involve the participation of schools and museums. The researcher has been in contact with several schools in the Four Directions projects that have expressed interest in conducting virtual museum projects. These schools have identified regional museums that are suitable for virtual museum partnerships, and in some cases, the schools have contacted museums about possible partnerships. Once the schools have gotten to the point of identifying participating teachers, dates for virtual museum activities and museum partners, the researcher will proceed with acquiring permission letters for conducting the study from all of the institutions that will be involved. The study will not begin until after the researcher receives the appropriate letters of permission.

PARENTAL CONSENT FORM

Virtual Museum Projects as a Strategy for
Culturally Responsive Teaching for Native American Students

Your child is invited to participate in a study of a learning project that involves working in a museum to photograph and research museum items for a computer-based virtual museum related to Native American heritage. My name is Mark Christal and I am a graduate student at The University of Texas at Austin. This study is for my dissertation. I am asking for permission to include your son or daughter in this study because he or she is a member of class that is doing a virtual museum project. The study will examine how students react to virtual museum learning projects that relate to their cultural heritage. The study will examine the reactions of adult participants, such as teachers, community members and museum workers, as well as students. I expect to have about 50 participants in the study.

If you allow your daughter or son to participate, I will be making observations and video taping his or her participation in the learning project at the museum and in the classroom. The period of study will be for two or three weeks, during times of virtual museum project activity, which will be only a portion of the students' daily school activities. I will also be interviewing your son or daughter with a small group of other students about their thoughts on the learning project. The interview session will last less than one hour and will be audio taped. Your son or daughter will not be required to answer the researcher's questions. Both video and audio tape cassettes will be coded so that no identifying information is visible on them. The tapes will be kept in a safe, locked place for the duration of the study. The video tapes will be viewed and the audio tapes will be listened to only for research purposes by the investigator and his associates. Transcriptions of the video and audio tapes will use fictitious names instead of the names of the study participants. The video tapes and audio tapes will be erased at the conclusion of the study.

By participating in this study, your son or daughter will be benefiting from an innovative learning project that relates to his or her cultural heritage. The study will contribute to our knowledge of technology-supported classroom practice, school-museum collaboration and culturally responsive teaching.

The risk to your son or daughter in this study is minimal. One known risk it the possibility of the loss of confidentiality of you son or daughter's responses and interactions in the study. To avoid that risk, fictional names will be used in the research report. Any information that is obtained in connection with this study and that can be identified with your son or daughter will remain confidential and will be disclosed only with your permission. His or her responses will not be linked to his or her name or your name in any written or verbal report of this research project.

Your decision to allow your son or daughter to participate will not affect your or his or her present or future relationship with The University of Texas at Austin, <<the school, or the museum>>. Your decision to not allow your son or daughter to be a part of the study will not affect his or her right to participate in the learning project as a member of his or her class.

If you have any questions about the study, please ask me. If you have any questions later, call me, Mark Christal, at 512-232-3526 (office) or 512-459-5791 (home); or you may call my supervisor, Professor Paul Resta, at 512-471-4014.

You may keep the copy of this consent form.

You are making a decision about allowing your son or daughter to participate in this study. Your signature below indicates that you have read the information provided above and have decided to allow him or her to participate in the study. If you later decide that you wish to withdraw your permission for your son or daughter to participate in the study, simply tell me or a school administrator. You may discontinue his or her participation for any reason at any time.

_____
Printed Name of Son or Daughter

_____
Signature of Parent(s) or Legal Guardian Date

_____
Signature of Investigator Date

I have read the description of the study titled "Virtual Museum Projects as a Strategy for Culturally Responsive Teaching for Native American Students" that is printed above, and I understand what the procedures are and what will happen to me in the study. I have received permission from my parent or guardian to participate in the study, and I agree to participate in it. I know I can quit the study at any time.

_____
Signature of Minor Date

CHILD ASSENT FORM

Virtual Museum Projects as a Way of
Teaching Native American Students

I agree to be in a study about working with a museum to create a virtual museum on the computer about Native Americans. This study was explained to my parent or guardian and they said that I could be in it. The only people who will know about what I say and do in the study will be the people in charge of the study.

In the study I will be watched and video taped by the researcher while I work on the virtual museum project. I will also be answering questions about what I think about the virtual museum project when the researcher sits down with me and my classmates to talk about it. I know that he will be recording the talk on a tape recorder so he can study it later.

Writing my name on this page means that the page was read by me (or read to me) and that I agree to be in the study. I know what will happen to me. If I decide to quit the study, all I have to do is tell the person in charge.

_____ _____

Child's Signature Date

_____ _____

Signature of Researcher Date

CONSENT FORM
(For Teacher Participants)

Virtual Museum Projects as a Strategy for
Culturally Responsive Teaching for Native American Students

You are invited to participate in a study of a learning project that involves students working in a museum to photograph and research museum items for a computer-based virtual museum related to Native American heritage. My name is Mark Christal and I am a graduate student at The University of Texas at Austin. This study is for my dissertation. You are being asked to participate in the study because you are one of the teachers involved in a virtual museum project. The study will examine how students react to virtual museum learning projects that relate to their cultural heritage. This study will also examine the reactions, perspectives and judgments of adult participants in the project, including teachers, school community members, and museum. If you participate, you will be one of approximately 50 people in the study.

If you decide to participate, I will be making observations and video taping your participation in the learning project at the museum and in the classroom. The period of study will be for two or three weeks, during times of virtual museum project activity, which will be only a portion of your daily teaching activities. I will also be interviewing you about your thoughts on the virtual museum project toward the end of the study period. The interview session will last less than two hours and will be audio taped. You do not have to answer the researcher's questions. Both video and audio tape cassettes will be coded so that no identifying information is visible on them. The tapes will be kept in a safe, locked place for the duration of the study. The video tapes will be viewed and the audio tapes will be listened to only for research purposes by the investigator and his associates. Transcriptions of the video and audio tapes will use fictitious names instead of the names of the study participants. The video tapes and audio tapes will be erased at the conclusion of the study By participating in this study, you will be furthering your own professional knowledge, as well as giving your students the opportunity to participate in an innovative learning project that responds to their cultural heritage. The study will contribute to our knowledge of technology-supported classroom practice, school-museum collaboration and culturally responsive teaching.

The risk involved in this study is minimal. One known risk it the possibility of the loss of confidentiality of your responses and interactions in the study. To avoid that risk, fictional names will be used in the research report. Any information that is obtained in connection with this study and that can be

identified with you will remain confidential and will be disclosed only with your permission. Your responses will not be linked to your name in any written or verbal report of this research project.

Your decision to participate or to decide not to participate will not affect your present or future relationship with The University of Texas at Austin, <<the school, or the museum>>. If you do not wish to be a part of the study, your decision will not affect your right to participate in the virtual museum learning project.

If you have any questions about the study, please ask me. If you have any questions later, call me, Mark Christal, at 512-232-3526 (office) or 512-459-5791 (home); or you may call my supervisor, Professor Paul Resta, at 512-471-4014.

You will be given a copy of this consent form for your records.

You are making a decision whether or not to participate. Your signature below indicates that you have read the information provided above and have decided to participate in the study. If you later decide that you do not want to participate in the study, simply tell me. You may discontinue your participation in this study at any time for any reason.

_____

Printed Name of Participant

_____

Signature of Participant Date

_____

Signature of Investigator Date

Note: similar consent forms were created for the Native community member and museum professional participants in the study.

APPENDIX 2: RESEARCHER AS INSTRUMENT

As mentioned in Chapter 3, in order to improve validity and reliability it is important for a qualitative researcher to give a description of his or her positionality in terms of the proposed research study to reveal to the reader the kinds of biases that inevitably enter into research that is so dependent upon researcher judgments. The following statement is a description of my life experiences that have led up to this research, focusing on information that with reveal my attitudes and biases toward the subject.

Probably the most important thing to know about me as the researcher for this study is the fact that I am not Native American, nor do I have any Native American ancestry that I am aware of. The second most important thing to know about me regarding this research is that I have not had any direct contact with Native people until my involvement with the Four Directions project, which has gone on for five years and is currently in an extension for its sixth year.

My own heritage is primarily Scotch-Irish American. Before my parent's generation, my ancestors were farmers who had lived in the Southern states and then moved to North and Central Texas. We cannot trace our family tree to Europe or before the seventeenth century. My father met my mother in college after he had completed his wartime service in the Navy. My parent's siblings also went to college, so their generation of the family represented a departure from agrarian life to professional, suburban, middle class European-American culture.

I was born and raised in San Antonio, Texas, in a suburban neighborhood near one of the five military bases in the city. My father worked as a personnel psychologist for the Air Force, devising tests and procedures to evaluate and place personnel and developing training programs. Much of his work involved basic psychology. He earned a PhD in psychology early in his career, the first and to date only person in the family to attain such an advanced degree. He did not bring his work home with him, so I only have a vague idea of what his work involved. At home, he pursued a hobby in electronics and enjoyed hunting and fishing.

My mother and father were devout Baptists who took an active role in church activities. Their religious view was of liberal bent, far from being the "hard shell" Baptist. I do not think that a my father would have been able to reconcile his eventual status as a world class applied psychologist with the kind of far right religious beliefs that have taken such a strong hold on the Southern Baptist Convention. I sense that he was admired by friends and colleagues in the church and the scientific community for his ability to be a man of both faith and science. His influence on me has been primarily on the science end of that spectrum, through his electronics tinkering, his career, and later, his interest in computing, both professionally and as a hobby.

My mother became a schoolteacher as soon as my youngest sibling became of school age. She began teaching at my elementary school when I was

in the sixth grade. Teaching is a profession that has been a one chosen by several family members of my generation. My sister, one of my cousins, a sister-in-law, my wife and myself have all been public school teachers, though I only taught for a couple of years.

San Antonio has a long and rich Mexican-American history. A city that grew out of the Spanish mission system, it has now and had during my upbringing a majority Hispanic population. The schools I went to were integrated, but starting in middle school, de facto segregation was approximated through tracking mechanisms in the school. I attended college-track "accelerated" classes for my core academic subjects, which achieved a strong Anglo majority enrollment. In high school these classes awarded an additional course credit, so that I was able to graduate with a GPA higher than 4.0, something that would be impossible for students who did not attend the accelerated classes. Because much of my socializing in school was based on who my classmates were in the accelerated classes—we worked together on assignments in much of our free time at school—the system tended to keep me from forming friendships outside of my ethnicity and social-economic class.

My awareness of Native America was very ill-informed. I can barely remember it coming up as a topic in school, and none of that would have dealt with the contemporary conditions of American Indians. I literally knew no one who was Native growing up. Most of my knowledge about American Indians was

formed based on Hollywood movies and television. As a youngster, I played cowboys and Indians with toy six shooters, toy bows and arrows, and homemade spears.

I went to college at the height of the Vietnam War. I was enrolled in a general program of study designed for elite students in the top of their high school classes that offered special classes of restricted enrollment taught by tenured professors. It was essentially tracking at a college level. I did not have to declare a major within this program, but due to my father's influence, I did some concentrated study in psychology.

The social crises brought on by the war and Watergate helped to form a counterculture that I subscribed to during my college years. Toward the end of my undergraduate years I essentially "dropped out" to pursue the avocation of poetry. It was within the poetry community of Austin in these years that I encountered Native American culture in another guise. Part of the local and national trends in poetry at the time was also associated with the developing New Age movement included the appropriation of ideas, beliefs, themes, and narratives from non-European cultures, including Native American culture. This fascination with Native knowledge and narrative found its way into the poetry of influential poets such as Gary Snyder. In the Austin community, the poet Jim Cody translated Tonkawa stories into verse. We were influence by books such as *Bury My Heart at Wounded Knee* and the anthology of indigenous poetry *Shaking the*

Pumpkin. One of my girlfriends was related to Cynthia Ann Parker, the Anglo mother of the Comanche leader Quanah Parker, a connection she valued highly. One summer I attended the Naropa Institute in Boulder, Colorado where the beat poet Allen Ginsberg had established a school of poetics within a Buddhist academy. One of the classes I took was on shamanism and poetry taught by the New York poet Anne Waldman.

To some extent the fascination with Native cultures represented the counterculture's effort to develop authentic cultural connections that would challenge the hegemony of Western culture, which had been discredited in the years of the Vietnam crisis and Watergate. These connections led me to a better understanding of Native American history and culture, but it was still a long way from the kind of understanding that would come about from knowing and working with Natives and visiting American Indian reservations in the Four Directions project. I have learned more recently that many Native Americans consider the kind of cultural expropriation practiced by the counterculture and New Age proponents as another form of colonialism perpetrated against them.

I supported myself in my post-undergraduate years with low paying jobs in the mental health profession. I primarily worked at the state school with mentally retarded adults and in private institutions with emotionally disturbed adolescents. My poetry activities led me to pursue a community college degree in offset printing, and soon I was working in the graphic arts trade. During these

years I developed some technical skills in photography as well. My motivation for this career change was so that I could serve the poet community with my graphics and printing skills, a desire that was only partially satisfied, because the best job I could find was in a government printing shop, which precluded doing any outside work. Still, I was able to aid several publishing projects with my skills. I helped form a poetry non-profit organization that received grant funding to distribute regional publications, conduct book fairs, and put on poetry readings and performances. The graphic arts skills I gained in these years have served me in learning and teaching the virtual museum technologies I will use in this study.

After over a decade in the printing trade, I became disenchanted with what had become for me low-wage drudgery in a toxic environment. I decided to return to college to get my credentials to be a schoolteacher. I took classes to become certified in the secondary subjects of mathematics and physical science. My experience as a classroom teacher was a very difficult one. I do not believe that my college training in education prepared me for the challenges I faced. It is not surprising that most new teachers burn out within five years. I managed to last two years. I found that high school classes were still tracked in much the same way as they had been when I went to school. As a new teacher, I was given some the toughest assignments at the school, teaching remedial math classes, which were disproportionately attended by minority students. By high school these students had experience years of failure in the subject and had little

motivation to endure more. I tried to supplement the textbook lessons with special lessons of my own design, but with limited success. I had not learned about culturally responsive approaches to teaching. One thing I did learn in my teaching experience was how extremely challenging the teaching profession is and it helped me to gain an immense appreciation for the dedication it requires.

When I returned to college to get my teaching qualifications, I acquired my first personal computer and became something of a hobbyist with it. This was at a time when schools were just beginning to acquire computers as a hopeful solution to education. The few computers at schools I taught in were not available for my classes, but I did use my home computer for class records and creating tests and worksheets. One time, I brought my computer to school to give a lesson on fractals, which I had been exploring.

When I left teaching after my second year, I had to return to printing to support myself financially, but I continued learning more about computing. Soon I decided to explore educational technology as a possible career change. I managed to get into graduate school at the University of Texas in the Instructional Technology program, and I had the added fortune of getting a graduate research assistant position under Paul Resta to study an innovative network technology to support collaborative learning called CSILE (Computer-Supported Intentional Learning Environment). Along with my graduate classes, the work I did on the CSILE project, and later Project CIRCLE, were very formative in my thinking

about the potential of learning technologies in education. When I began the program, I thought of computer technology primarily as a flexible and rich delivery mechanism for learning. My classes and graduate research assistant jobs led me to a new understanding about human learning—constructivism. It sounds a bit strange to me that I had not encountered these theories before in my education classes or my undergraduate career. I was taking psychology classes in the late 1960s and early 1970s, but just about the only learning theories that I remember being taught were classical and operant conditioning—behaviorism. The "cognitive revolution" was not part of the discussion in the undergraduate program. I don't remember the constructivist theories of Piaget and Vygotsky in my undergraduate courses, either. Piaget was mentioned in my later education courses, but only in terms of his developmental model.

The CSILE and CIRCLE projects were very fulfilling to me because these were projects that were conducted in the area schools, and I could renew my contact with education, as it exists in the classroom. I primarily provided technical support in the project, but the working relationship between participating professors, classroom teachers, graduate students, and public school students was rich in discussions about the nature of learning, collaboration, and the role of information technologies in teaching. The learning technologies we used in the projects were design for collaboration and communication, so the social constructivist theories provided a natural language for explaining what we

were examining. The technology made the learning very public. Students were publishing their thoughts to electronic forums where they could learn from each other and correct each other's learning. One of the tools we used was FirstClass, a groupware communications system we dubbed "TeachNet" that eventually became the email and conferencing system for the whole College of Education. TeachNet has doubled as a research tool, as professors have experimented with innovative ways of teaching and incorporated it into other funded projects like the Four Directions project. Another collaborative tool we used was Daedalus, a networked tool designed by the university English department to support process writing.

One of my graduate research assistant jobs involved a qualitative research monograph on the teachers who had used CSILE with their classes. I worked closely with two other graduate students who had been involved in the CSILE and CIRCLE projects. This was my first experience in designing and conducting qualitative research. The monograph documented how CSILE changed the teachers' practice to one that was more learner-centered and collaborative.

I had a brief experience in another research project that was to create an online professional development environment for classroom teachers who were learning how to adapt their classroom practice using a computer-supported learning environment based on CSILE, but project was abandoned due to

difficulties in funding. With these experiences as a graduate research assistant behind me, I was brought into the Four Directions project in early 1996.

The Four Directions project represented a change in direction for me. I was asked to explore a new technology, QuickTime Virtual Reality, so I could provide training in the technology for the project participants. I also created an online collaborative environment for project participants on the university's FirstClass system. The goals of the Four Directions project led me in new directions regarding education theory and learning technologies. I immediately realized that I would need to research Native American history, especially regarding the contemporary conditions of Native America and Native American education. Almost immediately, I began to work with American Indian teachers and students and non-Native teachers of Native students. Because the project involved schools on reservations all over the country, a great deal of travel was involved in my work. As soon as I had acquired my own knowledge of QTVR, I developed training materials and put together a few QTVR kits and began traveling to the schools that showed the most interest in the technology.

By the first summer institute at Haskell Indian Nations University I Lawrence, Kansas, I was well prepared with training materials and sample media to show to the Four Directions teams that came from each school. The first years of the project were a slow beginning because most of the schools were not connected to the Internet, which meant our online support would be able to

connect to only a few of the participating schools. There was a wide spectrum of computer knowledge among the Four Directions team members, which meant I had to be able to do training for all levels of skill. So, instead of teaching one specific computer application that had been designed to support collaborative learning, I became involved in teaching a wide range of computer and telecommunications applications that would support the local development of culturally responsive curriculum.

The Four Directions project was also my introduction to the term, culturally responsive teaching. Cornell Pewewardy, and Native educator at Kansas University, provided the first thorough description of culturally responsive teaching for Native American students for the project participants. It was not until I began to tackle my literature review for this dissertation that I explored the concept thoroughly. For the Four Directions project, teaching culturally responsively meant honoring and making use of Native knowledge as much as possible to teach students their academic subjects. Because Native knowledge, especially that which is specific to a given tribe, is not represented in textbooks, it would be necessary for the local schools to develop the lessons that would.

This was the goal of the Four Directions project—to support the local development of culturally responsive curriculum using technology. This approach called for the use of telecommunications for collaborative projects among Native students, for the delivery of a database of the culturally responsive

curriculum materials developed by Four Directions, for professional development support, and for the use of multimedia in curriculum projects and products.

One controversy that developed at that beginning of the project was the question of who gets to teach culture and who should develop the cultural content of the curriculum materials. Native Americans are very guarded about their sacred traditions, which have been denigrated or appropriated in the past. Deciding what aspects of Native culture may be shared or not shared is a decision only Natives may make, and non-Natives may not be able to tell where the division between sharable and non-sharable lies. I learned that taking pictures of certain objects or telling certain stories at the wrong time of year may violate Native sensibilities. As a result, the project partners, such as myself, had to listen carefully to the Native concerns about education and position ourselves as resources and enablers for Native self-determination. This smoothed over but did not eliminate the friction that sometimes occurred. One university partner who was charged with teaching curriculum development had to struggle hard to counter the perception that she was teaching culture, a confusion that was difficult to shake off. When visiting the reservations, I worried that I might offend by taking pictures of certain places, activities, or objects. There were a few times I did this, and the only thing I could do was apologize and delete the photographs I had taken.

After the first year and a half in the project, I wanted to develop a dissertation proposal on technology adoption in a Native American school. I was invited to stay at one of the Four Directions schools where I would be acting as a technology assistant while I gained the insight and rapport I believed I needed to design and conduct a research project. I spent nearly five months at the school, getting to know the teachers and the students well, and becoming acquainted with many people on the reservation. I also became acquainted with many of the troubling issues that come up for Native communities that stem from extreme poverty and conflicts with adjacent non-Native communities. I had a hard time coming up with a way that would fairly address all the troubling issues I was seeing, and I realized what American Indian education needed most in terms of research would have to be very positive and optimistic, not another depressing recapitulation of the problems that were already well documented. Tragically, my Native friend who had invited me on my sojourn at the school passed away, a loss that affected all of the participants in the Four Directions project. I keep remembering one of his responses to some incident when the U.S. failed yet again in its trust responsibility to Native Americans: "Rent is due."

After about three years in the project, I had managed to provide equipment and training in QTVR to most of the 19 Four Directions schools. It was time to take the potential of the technology to the next step: using it as the showcase technology in a virtual museum project. One of our partners in Four Directions

was the Smithsonian National Museum of the American Indian. I describe the first Four Directions virtual museum project done with the NMAI in detail in Chapter 1. The experience was one that had the kind of positive attributes I desired for a research project in Native American education. I have been able to do a number of smaller virtual museum projects since the NMAI project, hoping to refine the innovation so the educational potential I saw in the projects might be better realized. Every project has taken me closer in realizing that goal, but I do not believe I have experienced a virtual museum project that is fully successful in all respects. One of the motivations I have for conducting the current study is to satisfy my desire to further develop the virtual museum project as an effective teaching practice.

I also hope to come to a better understanding of the nature of culturally responsive teaching through a systematic study of virtual museum projects. Since conducting my literature review I have begun to form my own attitudes (and biases) toward certain culturally responsive practices. One attitude I have developed is based on the controversy surrounding the so-called "learning styles" movement. Some of this movement is based on approaches that seem to me to have very little theoretical support. I fear that other aspects of the movement, especially the "cognitive style" components hold some dangerous potential for teaching practice. I distrust the approaches that might propose a fixed entity view of learning aptitudes that might replay some of the worse educational uses of the

first widely used aptitude tests for general intelligence. Such a practice might lead to the type of tracking that I experienced in my own education, to the disadvantage of the minority student population. I say this knowing that many researchers in culturally responsive teaching with a great deal more experience than I have may still find value in some aspects of learning style. I do not want to completely dismiss their valuable work. I want my research to be a part of the discussion, and I hope my approach will be a positive contribution to the development of culturally responsive teaching practice.

APPENDIX 3: RESEARCH CODES

Free Nodes

1. Inter-tribal collaboration
2. Respect for the school
3. Using knowledge & technology in the right way
4. Outside requests for information
5. Oral History
6. Prior experiences with museums
7. Time issues
8. Communication Issues
9. Who should teach culture?
10. Researcher- or Teacher-driven project
11. The nature of culture
12. Non-natives' interest in native culture
13. Identity
14. Cultural awareness comes with maturity
15. Community computer access
16. Getting close to object behind the glass
17. Hits on the school or tribal web site
18. Waning interest in culture in the native community
19. Real vs. virtual objects
20. Attributes of a "virtual" museum
21. Virtual Museum project as a replicable model for schools and museums
22. Adults learn from children
23. Native Americans appreciate museum role in cultural preservation
24. English forbidden in the home
25. VM projects as something students will remember
26. The need to include more students
27. Preparing students for the VM project (spiritually, emotionally)
28. Nature of the tribe-museum relationship
29. Museum-School relationships
30. Purpose of Museums in Society
31. Non-natives' sense of culture compared to Natives' sense
32. Using VM project with non-Native students
33. Focusing on the positive aspects of culture and history
34. Spirituality
35. People (Non-native?) get thesis or diss done on reservation
36. Need Adequate Staff
37. Virtual Museums compared to actual
38. VM Needs to be and ongoing project

39. VM perceived as being advanced work for children
40. Guidance from the ancestors
41. Lack of information about museum objects
42. Student complaints
43. Students as teachers of their cultures via VM
44. Older students (teenagers) don't want to learn about culture
45. Is the VM an Indian thing?

1. VM Project (different issues regarding specific VM project)

1. Student Role
2. Teacher Role (or other school staff)
3. Community Member Role
4. Museum Role (museum professional or the museum institution)
5. Logistics
6. Research Component
7. Improvements
8. Problems
9. Plans
10. Implementation
11. Training Component
12. Goals
13. Compared (to other culturally responsive projects)
14. Promotion
15. Pride
16. Ownership
17. Selection Process
18. Earlier Experiences
19. Support
20. Researcher Role

2. Impact of the VM Project

1. Teacher Impact
    1. t.i.tech (how the project affects teacher's knowledge of technology)
    2. VM as a teaching resource

2. Student Impact
    1. s.i. tech (how the project affects student technology skill and knowledge)
    2. s.i. academic (students gain academic knowledge and skills)
    3. s.i. culture (students gain knowledge and appreciation of their culture)
    4. s.i. pride (students gain pride in who they are as American Indians)\

5. s.i. enrichment experience (VM project as "enrichment" as opposed to core curriculum)
6. s.i. has personal meaning
7. s.i. life skills

3. Community Impact
    1. c.i. tribal museum (stimulates planning for a tribal museum)
    2. c.i. more access (community gains more access to cultural artifacts)
    3. c.i. digital repatriation (virtual museum as a way to bring cultural items back to the tribe)
    4. c.i. development (VM helps develop the community, introducing new tech and skills)
    5. c.i. culture ed. (community learns about its culture)
    6. c.i. sharing (VM as a way for community members to share valuable items & knowledge)

4. Museum Impact
    1. m.i. programs & goals (VM helps museum fulfill its mission and met important goals)
    2. m.i. digital repatriation (VM as a way of repatriating items back to N.A. community)
    3. m.i. responsibilities (VM as a way of fulfilling important responsibilities)
    4. m.i. promotion (VM helps museum to promote itself)
    5. m.i. gaining valuable service, products (the mutual benefit of VM for the museum)
    6. m.i. making connections to the community it serves
    7. m.i. use digital reproductions to preserve collection (virtual access minimizes handling)

5. Wider Impact
    1. w.i. correct misconceptions (VM corrects non-native misconceptions about Native Am.)
    2. w.i. education (VM as education resource for community at large)
    3. w.i. community relations (VM works to improve native—non-native relations)

3. Responses to the VM Project

1. Teacher Response
    1. t.r. technology (how teachers respond to technology in VM and in general)
    2. t.r. involvement (indications of teacher involvement in the project)
    3. t.r. tech resistance

4. t.r. VM resistance

2. Student Response
    1. s.r. tech
    2. s.r. motivation
    3. s.r. use NatAmKnowSkills
    4. s.r. collaboration
    5. s.r. independent work
    6. s.r. involvement
    7. s.r. showing off work
    8. s.r. responsibility to community (students as "storytellers for their grandparents," etc.)
    9. s.r. not interested in culture
    10. s.r. resistance
    11. s.r. staying on task
    12. Student selections
    13. Student impressions
    14. Student effort
    15. Student awareness of VM on the Internet (responses and implications)
    16. Students estimate interest in VM
    17. Students feel special or lucky to be in project
    18. Students prefer learning about their cultures

3. Community Response
    1. c.r. involvement
    2. c.r. concerns
    3. c.r. working with students
    4. c.r. interest

4. Museum Response
    1. m.r. concerns
    2. m.r. willing to do similar future projects
    3. m.r. to Native student interpretation of objects
    4. m.r. concerns about staff time
    5. m.r. process vs product nature of project
    6. m.r. concerns about VM images and intellectual property rights
    7. m.r. concern to minimize damage to collection

Other Codes

4. Education Issues
    1. Culturally Responsive Teaching

2. Integrated Curriculum
3. Hands-on instruction
4. Authentic learning
5. Cooperative Learning
6. Peer teaching
7. Native teacher of native children
8. Culture-related studies not "official knowledge" for schools (no requirements to teach it)
9. School as an "acculturation tool"
10. Native American schools (distinct from public schools with high Nat. Am. enrollment)
11. Learning centered teaching
12. "Traditional" teaching approaches
13. Critical thinking skills
14. Task oriented process (students become involved in a longer process with end goal)
15. Gifted-talented class

5. Native American Issues

1. Tech and Nat. Am. Values
2. Repatriation
3. Cultural preservation
4. Loss of culture
    1. Language
5. Nat. Am. Adaptation
6. Pride
7. Native American technology
8. Land claims
9. Equity
10. Communal aspect of Native culture
11. Museums have obtained Nat. Am. materials unethically

6. Technology

1. QTVR
2. Tech use at school
3. Technology adoption
4. Internet
5. Technology as a "back door" for culture studies and other issues
6. Future and cutting edge technology
7. Technology and Museums
8. Negative or harmful aspects of technology

5. 4Directions Project

6. Stories

Free Nodes:	40
Index Tree Nodes:	129
Total	169

APPENDIX 4: EXAMPLE RESEARCH GUIDE

Virtual Museum Assignment

Name: _____ Date: _____

1. Select an object that interests you. What object did you select?

_____

2. Why did you select this object?

_____

_____

3. What are the object's dimensions?

_____

4. How old is the object?

_____

5. What tribe/culture is it from?

_____

6. What was the purpose/use of this item (how was it used)?

_____

How was it made and what materials were used to make it?

_____

_____

_____

_____

7. What else have you learned about this object? What are your sources?

_____

_____

_____

_____

_____

8. With the assistance of a Virtual Museum team member, create a QTVR of the object. What method did you use to create your QTVR (i.e. Kaidan object rig, turntable, or panorama)?

_____

_____

Using Microsoft Word, compose your essay at the computer. Have your Virtual Museum mentor proofread your essay and make corrections as needed. Save it to your disk.

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Vita

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