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Technology and Indigenous Languages

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Call for Papers
Theme: The Internet and Global English(es)
FROM THE EDITORS

Aloha! We are pleased to welcome you to this very important special issue on technology and indigenous languages. This theme runs throughout the articles, columns, and reviews.

We thank Nicholas Ostler and Jon Reyhner for serving as guest editors and want to recognize the time and attention they devoted to producing this issue. It is a long but hopefully rewarding process. Our guest editors bring new perspectives which are invaluable to the journal.

We are pleased with the diversity of our growing readership and welcome any feedback or suggestions you might have. Our journal remains free and free from advertisements due to the University of Hawai‘i NFLRC’s and Michigan State University CLEAR’s continued financial support. In order to continue demonstrating the readership that allows us to publish for free, we ask all readers who have not done so to please fill out your free subscription. We thank you for your continued support and hope you find both our regular and special issues interesting and helpful.

Sincerely,

Mark Warschauer & Dorothy Chun
Editors

Pamela DaGrossa
Managing Editor
From the Special Issue Editors

In this issue, a variety of authors, each concerned about the transmission and acquisition of an indigenous language or languages, reflect on the experience of using digital technology. The results are very different in substance from what gets talked about when the emphasis is not so directly on teaching and learning.

Recent initiatives (OLAC, IMDI, E-MELD) aimed at the promotion of language documentation -- something that is of primary concern for languages where transmission and acquisition are not assured -- stress the work that is needed to define and propagate standards. Somehow, a robust common tradition must be established, with sufficient flexibility to accommodate all languages and all types of linguistic records, but with sufficient uniformity to allow linguists and other researchers to find their way about in the vast proliferation of data on indigenous language that must now be achieved.

The present authors give primary attention to cultivating their own gardens, elaborating digital solutions for the use of their various language communities, interested above all in the interaction of these new media with the linguistic and intellectual development of their own communities.

The authors review a wide range of digital technologies, and the implications for language communities are likewise wide-ranging. The introduction of computers into children's classrooms is examined by the developers of Computer-Aided Ndjebbana in the Australian outback (Auld) and Fabula in western Europe (Edwards, Pemberton, Knight, & Monaghan), who consider how taking possession of computer systems can develop children's self-reliance and ability to deal with the complexities of the languages they are acquiring. The uses of computer networking have given the Choctaw a new means of arranging language-instruction for adults (Haag); but it is interesting that, in assessing its success, the leading consideration is its political expedience for the one who makes it happen, the tribal Chief.

Other articles stress how, in the case of various digital and electronic technologies, resolute use has succeeded in integrating communities around their languages in new ways. The Naskapi have overcome the idiosyncratic nature of the Cree syllabary to bring greater control of their own publishing and literacy (Jancewicz and MacKenzie). Villa tells how an individual's quest to record Navajo has generated an authentic archive of audiovisual texts, transcending the recorder's own competence in the language. And McHenry explores the ironies of control and self-determination implicit in the attempt to turn the Internet to the benefit of Native American languages.

All these are important aspects of digital technology for indigenous languages and the people who speak them, or would like to. But the concern is always, in essence, introverted: Each examines the question of what the technology can do for a particular community. This is perhaps part of the shared presumption in favour of "authenticity," noted by Cazden. Decisions are made by the community and for the community, in the light of the community's own experience. No one asks the question "How can we keep in touch, or on a par, with what these technologies are doing for languages the world over?" Even Fabula, aimed at several minority European languages, does not look across to what its children will be encountering in classes for majority languages.
Yet, the technology being applied here is not home-developed. Typically, as all the articles note, it is introduced by outsiders to the communities and is often customized for the languages by outsiders. Indeed, as McHenry implies, there is fair scope for neocolonialism here. Certainly, it is not the technology pushing the developers towards an introverted approach.

There are hints of the standards which could be being applied in the review articles which complement this issue. Cotter reviews IrishNow! from Transparent Technology, a company once famous for its offer (at a price) to apply its techniques of language teaching to materials in any endangered language. By contrast, Dyck notes that Kanatawakhon-Maracle's Tsi-Karhakta, a Mohawk course, loses touch with the established Iroquoian grammatical terminology and over-simplifies its description of the language. It would help learners, after all, to have independent structures to which new material can be related. Likewise, use of a non-standard orthography with learners is hard to defend. This avoidance of common standards might be one cause of a point noted by Halm in her review of Chambers and Davies's ICT and Language Learning: a European Perspective, namely that "the development of teaching materials and approaches to language teaching, [are] areas which are not considered valid for research by many universities."

Now, in taking this somewhat perverse approach to these various papers, we are not trying to lessen the fascination of the diverse stories that they tell or the value of their analysis of the problems that arose and the solutions that were found. But diversity such as we have here is a major challenge for any useful set of standards: The attempt to apply standards can only emphasize, and bring to our attention, what is really distinctive in the new experience. An example of the kinds of comparisons that can usefully be made is seen in Román-Mendoza's review of Uschi Felix's Beyond Babel: Language Learning Online. It forces the standards proposed to meet higher criteria of adequacy. We cannot allow the set of grammatical categories proposed, say, for European languages, to pass as de facto adequate, just because only the European languages have been subjected to this kind of analysis.

Paradoxically, it is only by knowing, embracing, and measuring themselves against the standard practices of language technology, that indigenous languages will be able to have their rightful influence in improving them and educating us all. Let the big technology companies confront the experience of Computer-Aided Ndjebbana, and see how well their products met the challenge. There are over 6,000 more cases they haven't yet thought about.

Sincerely,

Nicholas Ostler
Foundation for Endangered Languages

Jon Reyhner
Northern Arizona University
ON THE NET

Teaching Indigenous Languages: An Essential Reference

Jean W. LeLoup
SUNY Cortland
Robert Ponterio
SUNY Cortland

Certainly one would be remiss if, in listing online resources for indigenous languages, one did not include the extensive site, Teaching Indigenous Languages (TIL; http://jan.ucc.nau.edu/~jar/TIL.html), maintained by Professor Jon Allan Reyhner and hosted by Northern Arizona University in Flagstaff, AZ.

Teaching Indigenous Languages

As stated by the author, this site grew out of a series of symposia on indigenous languages that began in 1994. The goals of the symposia, as enumerated in a brief history of the conferences, are

• to bring together American Indian and other indigenous language educators and activists to share ideas and experiences on how to teach effectively American Indian and other indigenous languages in and out of the classroom;
• to provide a forum for exchange of scholarly research on teaching American Indian and other indigenous languages; and
• to disseminate through the Internet and monographs recent research and thinking on best practices to promote, preserve, and protect American Indian and other indigenous languages.

The last goal is achieved nicely through the TIL site, which maintains online resources on the linguistic, educational, social, and political issues related to the survival of the endangered indigenous languages of the world.

The site provides access to over 80 full text papers from the proceedings of various conferences and symposia on indigenous languages. There are also over 50 columns from the Newsletter of the National Association for Bilingual Education from the past decade and several journal articles dealing with issues in indigenous bilingual education. These references are, in large part, concerned with indigenous languages of the United States and the Americas.

Also accessible from the TIL page is the monograph, Stabilizing Indigenous Languages (Gina Cantoni, Editor). This monograph is an excellent compendium of articles on issues of primary importance to the stabilization of indigenous languages, including a rationale, language policy, and education. The final chapter of the monograph is a treatise by Joshua Fishman on the "dos and don'ts" of maintaining languages. The monograph is maintained by the National Clearinghouse on Bilingual Education, which has recently undergone a name change: National Clearinghouse for English Language Acquisition & Language Instruction Educational Programs to become more inclusive.

The TIL page points readers to several recent publications that may be unknown to those with a budding interest in indigenous languages. One such publication is the summer 2001 issue of Cultural Survival Quarterly and is titled "Endangered Languages, Endangered Lives." This particular issue, guest-edited by Dr. Eileen Moore Quinn, a linguistic anthropologist from the Massachusetts Institute of Technology, presents examples from Europe, Africa, Asia, Australia, and the Americas. This special issue provides advice on how to preserve cultural and linguistic heritage.
Other recent publications mentioned include several journals and booklets dealing with indigenous languages and cultures and books on language revitalization in practice and reversing language shift.

The TIL page also has a section on teaching methods that are viewed as particularly successful with indigenous languages.

The Index of Indigenous Education and Indigenous Language Web Sites is an extensive list of additional links and is organized under topical headings such as Assessment, Bilingual Education & Programs, Book Reviews, Computers, Cultural Values, Curriculum, Dictionary Development, Families, Higher Education, Language Development, Planning, Programs, Preservation, Promotion, & Teaching, Literacy, Policy, Reading, Second Language Acquisition, Special Education, Student Motivation, Teacher Preparation, Technology/Media, Textbooks, Total Physical Response, Tribes, and Writing.

Because so many indigenous languages are at risk and numbers of speakers and learners tend to be small compared to more widely spoken languages such as English, Chinese, Spanish, French, and so forth, the teaching of these languages is at the same time very important and lacking adequate resources. As is also the case with other less commonly taught languages (LCTL), the Web can be a powerful and relatively inexpensive distribution medium for support materials for students and teachers compared to print (see also the LCTL Project page review in a previous "On the Net"). Although this site does not make use of the multimedia potential of the Web, its high quality text content and extensive links make it an essential reference for those interested in teaching indigenous languages.
EMERGING TECHNOLOGIES
Multilingual Computing

Robert Godwin-Jones
Virginia Commonwealth University

Language teachers, unless they teach ESL, often bemoan the use of English as the lingua franca of the Internet. The Web can be an invaluable source of authentic language use, but many Web sites worldwide bypass native tongues in favor of what has become the universal Internet language. The issue is not just one of audience but also of the capability of computers to display and input text in a variety of languages. It is a software and hardware problem, but also one of world-wide standards. In this column we will look at current developments in multilingual computing -- in particular the rise of Unicode and the arrival of alternative computing devices for world languages such as India’s "simputer."

Character Sets

A computer registers and records characters as a set of numbers in binary form. Historically, character data is stored in 8 bit chunks (a bit is either a 1 or a 0) known as a byte. Personal computers, as they evolved in the United States for English language speakers used a 7-bit character code known as ASCII (American Standard Code of Information Interchange) with one bit reserved for error checking. The 7-bit ASCII encoding encompasses 128 characters, the Latin alphabet (lower and upper case), numbers, punctuation, some symbols. This was used as the basis for larger 8-bit character sets with 256 characters (sometimes referred to as "extended ASCII") that include accented characters for West European languages. ASCII has been around since 1963 and was extended by the ISO (International Organization for Standardization) in 1967 to allow for use of character codes for non-Latin alphabet languages such as Arabic and Greek. Later, to satisfy the need for use of languages such as Russian and Hebrew, the standard called ISO 2022 was established, later expanded into ISO 8859-1 (often called "Latin-1") which is widely used today for the interchange of information across the Web in Western languages. Actually, Latin-1 is one of 10 character sets, all 8-bit, defined by ISO 8859; others target eastern European languages, Turkish, Hebrew, Greek, Icelandic, and Celtic. The variety of ISO 8859 encodings is evident in the multiple character encodings which can be set in contemporary Web browsers.

ASCII does a fine job for working in English, since that was what it was designed to do. Likewise, 8-bit ISO 8859 character sets are adequate for displaying most of the world’s writing systems. But they are not capable of dealing with languages with many more characters such as Japanese or Chinese. What is needed for such languages is at minimum a 16 bit or two-byte system which can handle thousands of characters. Sixteen bit encoding was not used initially on personal computers not just because of monolingual shortsightedness but also for technical reasons -- early computers had very little memory and storage capacity. With the current capacity of personal computers one might ask why not simply adapt a 3-byte or even a 4-byte character set system which would supply a virtually limitless number of characters to be displayed, thus guaranteeing the encoding of any of the world’s languages. The problem is that such encoding systems would tend to use many more resources than is necessary for the display of most linguistic data, thereby slowing down network transmission and making display problematic on smaller devices with less processing power and memory. Also, computer operating and networking systems were designed to handle 8-bit data chunks; keeping 8-bit systems helps transactions progress smoothly and avoids the necessity for universal system upgrades.
Unicode

The problem remains of how to encode all the ideographs for Asian languages as well as the alphabets for other writing systems. The solution which recently emerged is known as Unicode, which, for all practical purposes, is identical to the official ISO 10646 standard. Unicode is not the ideal solution some advocates initially envisioned, a limitless (32-bit) system in which the emphasis is on inclusiveness rather than efficiency. But, like other systems that have been modified to accomplish goals not originally intended (such as the World Wide Web), Unicode is being cleverly adapted to work within today’s computing and networking environment and to provide a way to encode all human languages, past and present. It is a compromise, one which takes a roundabout way to accomplish its goal, but in the long run the wide adoption of Unicode promises considerable benefit to the language community, in particular to those interested in preserving and promoting indigenous languages.

Unicode, as so many other innovations in modern computing, grew in part out of research done at Xerox corporation. A multilingual word processor called ViewPoint was developed for use on Xerox’s Star Workstation in the 1980’s. It could process text not only in multiple Latin-based languages but in a variety of Asian languages as well. While the system was too expensive to be commercially successful, the Xerox multilingual character code generated considerable interest among computer specialists and linguists. Eventually an industry project was launched by a number of U.S. firms and called Unification Code or Unicode, the goal of which was to unify all the world’s alphabets into a single, very large, character set. A Unicode Consortium was founded and a prototype developed in 1991, with continual development since then. Parallel efforts at ISO have thankfully been merged with the Unicode initiative.

The most recent version of Unicode is 3.2. The original goal was to use a single 16 bit encoding. However, this allows for just 65,536 distinctive characters, clearly not sufficient to represent all current and past human languages. To expand the capacity, 16 additional sets of 65,536 characters (called "supplementary planes") have been added with a total possible character set of about one million. While each character represents at most 4 bytes, the Unicode standard actually defines 3 encoding forms (UTF-8, UTF-16, and UTF-32) that allow the same character to be transmitted in a byte, word, or double work format (i.e., in 8,16, or 32 bit per code unit). One of the key advantages of how Unicode has been implemented is the fact that the first 256 characters are identical to those defined by ISO 8859-1 (Latin-1), which in turn means that the first 128 characters are identical to ASCII. This provides backwards compatibility with systems and applications which are not Unicode aware. Also, as Unicode grows, compatibility with earlier versions is guaranteed.

Before Unicode, 8-bit character encoding with its built-in limit of 256 characters could have the same character code number represent a different character in different alphabets. In Unicode, each character is assigned a unique number. This means the use of Unicode can eliminate character set variations across systems and fonts, avoiding the "alphabet soup" of multiple ISO 8858 ***8859? character sets. Theoretically a single, very large, font could contain all characters defined by the Unicode standard. In practice, Unicode fonts tend to focus on a single language or family of languages. Unicode is designed to work on any operating system, including hand-held devices. In fact, the Newton Messagepad was an early user of Unicode in its operating system. Some Unicode compatibility has been included on Microsoft Windows since Windows 95 and on Macintosh since MacOS 8.5. Windows XP (as well as NT 4 and Windows 2000) offer robust native support of Unicode. MacOS X offers somewhat lesser support of Unicode as do Linux and other Unix systems. Finding applications which support Unicode and enable true multilingual computing is not always easy, although there are currently a number of word processors and text editors with Unicode support.

The display of Unicode encoded text is dependant on the presence of the fonts needed to display the characters represented by the Unicode code sequences. The core fonts for Windows are all now Unicode based and many Microsoft applications such as MS Office come with additional Unicode fonts. A
ubiquitous Windows Unicode font is Arial Unicode MS (downloadable from Microsoft) which features 51,180 glyphs (i.e., characters), including among others Cyrillic, Greek, Armenian, Hebrew, Arabic, Thai, Bengali, Tibetan, Chinese, Korean, and Japanese. The down side of such a font is that at 23 MB, its use can slow down your system. There are also shareware Unicode fonts, such as Code2000 (from James Kass). It is very easy in Windows to change keyboard layouts to type in different languages, assuming the needed fonts are present, as outlined in Alan Woods’ Unicode Resource pages. On the (classic) MacOS, most applications that include Unicode support require Apple’s Language Kits. The new MacOS X offers better Unicode support, as discussed in a series of recent articles on Unicode and MacOS X in the Mac newsletter, Tidbits. Windows Unicode fonts can be used in MacOS X.

Unicode and the Web

Characters other than standard ASCII display on Web pages have traditionally been encoded in HTML through the use of so-called escape sequences, or as they are officially called, character entity references, so that an unumlauted lower case a ( ), for example, is encoded as \&auml; or its numerical equivalent (\&#228; ). While this system works fine for major West European languages, for which character escape codes were defined early on, this does not hold true for non-Roman alphabets. Although there have been display possibilities from the early days of the Web for character sets such as Cyrillic and Japanese, browser set-up is problematic with no possibility of the mix and match of languages with different alphabets on the same Web page (such as annotating Chinese text in French).

The situation has improved considerably since Unicode has arrived on the scene together with the HTML 4.0 standard. HTML 4.0 specifies Unicode 3.0 as the default character set. It also calls for support of RFC 2070 (“Internationalization of HTML”) which stipulates support for right-to-left languages like Arabic and Hebrew. One should note that Microsoft’s Internet Explorer has taken this one step further, with support of top-to-bottom script systems such as Mongolian. Virtually all recent Web browsers support the 8-bit encoding of Unicode known as UTF-8 and are also able to use more than one font to display a multilingual page. How does Unicode get squeezed into a 8-bit system? Through a complex algorithm that interprets pointers to characters contained in the upper ranges of the "extended ASCII" range of numerical values (129-256); the process is explained in detail by Roman Czyborra. The UTF-8 encoding is the magic which allows the existing Web interface to display Unicode.

Unicode characters can be incorporated into a Web page the same way as character entities by using the decimal numeric character reference preceded by an ampersand and hash and followed by a semicolon (i.e., \&#0228; for \&auml; ). Clearly, this kind of manual editing is fine for testing purposes, but for real Unicode authoring a Unicode aware text editor or HTML authoring environment is needed. Of course, the end user needs to have the necessary Unicode fonts installed in order to view the page correctly. It is sometimes a good idea to use styles to specify preferred fonts, as in this example from Alan Wood:

```html
<style type="text/css">
 .thai {font-family:Cordia New,Ayuthaya,Tahoma,Arial Unicode MS;}
</style>
```

It is then possible to reference the Thai text as follows:

```html
Latin text followed by <span class="thai" lang="th">Thai text</span>
and more Latin text.
```

It should be noted also that UTF-8 should always be specified as the character encoding system with text containing two or more non-Latin scripts. This can be done with a META tag as follows:

```html
<meta http-equiv="content-type" content="text-html; charset=utf-8"/>
```

In addition to Alan Wood’s pages, Dan Tobias has good information on using Unicode on the Web. The advantage of using Unicode for including multiple languages on the Web is illustrated by Andrew
Cunningham in his discussion of how the Maribyrnong Library (Australia) used Unicode to add Amharic and Somali to its Web site.

**Multilingual Devices**

While Unicode provides a necessary means to display the character sets of virtually any language, there still remain a number of issues that make multilingual computing difficult. This is particularly the case if one considers potential users outside developed countries, where fundamental issues like illiteracy, poverty, and lack of infrastructure (power, Internet, phone) combine to erect formidable barriers to users. Mark Warschauer discusses these issues in his upcoming book on *Technology and Social Inclusion* (in press, MIT Press), to which I am indebted for information in this section.

Several recent projects have been started to try to overcome these handicaps and to bring networked computing to unserved populations, such as the Morphy One from Japan or the Pengachu Project (MIT). The Brazilian government is supporting deployment of a stripped-down personal computer known as the "computador popular" or People's Computer, developed at the Federal University of Minas Gerais, which is to be made available for the equivalent of US $250 to $300. To save money on software, it uses the Linux operating system, rather than Microsoft Windows, and relies on flash chip memory rather than a hard drive. Initially the People’s Computer will go to schools, libraries, and health centers.

The emphasis on community sharing of computing resources is also at the core of India’s "simputer" ("simple inexpensive mobile computer"). The simputer also uses Linux but in a hand-held computer designed to be used even by those unable to read. Slated to cost about US $200, the simputer has a built in Web browser and text-to-speech program which is capable of reading back Web pages in Indian languages such as Hindi, Kannada, and Tamil. Input is through a stylus and a program called tapatap which works by having the user connect dots to form characters. One of the interesting innovations of the simputer is the use of a removable smart card which holds personal data for individuals, allowing a single device to be shared by many people. Several companies have begun simputer production, including PicoPeta and Encore Software. It is too early to know if the simputer will be a success. Given its low pricing, commercial viability will only be possible if a mass market is created.

The principal output of the simputer is designed to be in the forms of audio or graphics, thus bringing networked computing to village populations of India for whom traditional keyboard input and text display could be problematic. Interestingly there are also efforts underway in India to develop local software for working in Indian languages, such as the tools available from Chenai Kavigal. This is clearly a necessary development in other parts of the world whose languages are not currently included in mainstream software development. Mark Warschauer discusses a set of Hawaiian language Web tools (Leok ) and points to the benefits such tools have brought in support of the Hawaiian language learning community. Indeed, the Internet by offering connectivity among geographically separated users of languages can offer a powerful medium for both initial learning and language maintenance for languages for which local speakers or classes are not available.

**Resource List**

**Standards and Organizations**

- International Organization for Standards
- World Wide Web Consortium
- Unicode Consortium
- A short overview of ISO/IEC 10646 and Unicode
- RFC 2070: Internationalization of HTML
• ASCII chart
• Character Entity List (HTML 4)

Character Sets
• W3 Consortium’s pages on interanationalization
• Coding the World’s Writing -- from the "Babel" site
• Multilingual Computing: Introduction -- from Middlebury College
• Multilingual Computing and the Problem of Character Encoding and Rendering -- annotated guide
• Text and Fonts in a Multi-lingual Cross-platform World -- from the Digital Odyssey (UCLA)
• A Brief History of Character Codes in North America, Europe, and East Asia -- by Steven J. Searle
• ASCII: American Standard Code for Information Infiltration -- by Tom Jennings
• ISO-8859 briefing and resources
• Omniglot -- a guide to writing systems
• The ISO 8859 Alphabet Soup -- good explanation by Roman Czyborra
• Open Language Archives Community
• Ethnologue -- database of over 7000 languages
• The ISO Latin 1 character repertoire - a Description with usage notes

Unicode
• Why do we need Unicode?
• A short overview of ISO/IEC 10646 and Unicode -- by Olle Jnrnefors
• Character Encodings Concepts -- good overview
• What document(s) define(d) the Unicode standard? -- good overview of successive versions of Unicode (by Roman Czyborra)
• The Unicode Standard
• Unicode Code charts -- glyphs and codes in PDF format
• Unicode and Multilingual Editors and Word Processors for Windows
• Finding Fonts for Internationalization FAQ
• Keyboard Layouts -- includes Arabic, Armenian, Azerbaijani, Ethiopic, Kazakh keyboards
• Free Recode -- program to perform code conversions
• Tutorial on character code issues -- by Jukka Korpela
• Unicode and Multilingual Web Browsers -- up-to-date list from Alan Wood
• Unicode and Multilingual Programs and Utilities -- information on word processing in Unicode with links to programs
• Setting up Windows Internet Explorer 5, 5.5 and 6 for Multilingual and Unicode Support
• Unicode fonts for Windows computers -- from Alan Wood
• Unicode and MacOS X -- from Tidbits
**Web**

- Setting up Windows Netscape Browsers for Multilingual and Unicode Support
- Test pages for Unicode character ranges -- wide variety of languages represented
- UTF-8 Sampler
- Using national and special characters in HTML
- Notes on Internationalization -- older but still informative information on HTML
- On the use of some MS Windows characters in HTML
- English - the universal language on the Internet?
- Babel: Multilingual bookmark page -- page in various character encodings
- Babel: Towards communicating on the Internet in any language...
- Developing your Multilingual Web sites -- from Babel
- Unicode Transformation Formats: UTF-8 & Co. -- wealth of information on how Unicode is dumbed down to 8-bit encoding

**Devices**

- Low-Cost Computers for the People
- Simputer
- Info in Encore Software’s Simputer
- PicoPeta -- another initial Simputer manufacturer
- Computador popular vai rodar Linux -- article in Portuguese on the "computador popular"
- Low-cost 'people’s computers’ target developing nations to get poor on-line
- Morphy One Project -- open hardware Palmtop PC from Japan
- Project Pengachu -- wireless Linux project (MIT)
- Chennai Kavigal -- Indian language computing
- Kualono -- information on Leok
NEWS FROM SPONSORING ORGANIZATIONS

This page includes announcements from the organizations sponsoring LLT.

University of Hawai’i National Foreign Language Resource Center (NFLRC)

Less commonly taught languages, particularly those of Asia and the Pacific, are the focus of the University of Hawai’i National Foreign Language Resource Center, which engages in research and materials development projects and conducts Summer Institutes for language professionals among its many activities.

2002 NFLRC SUMMER INSTITUTES

HERITAGE LEARNERS AND NATIONAL LANGUAGE NEEDS (JUNE 19 - 21, 2002) This symposium, directed by Dr. Kathryn Davis (Dept. of Second Language Studies, University of Hawai’i at Manoa), provides practical information, theoretical considerations, and program/curriculum models for language education that utilizes existing heritage language resources. Recently, there has been expanding interest among language scholars in capitalizing on the linguistic resources of language minority students through developing their heritage language skills. Such a "language as resource" approach has numerous benefits. This symposium will offer a range of language, culture, literacy, and technology workshops by experts who have extensive knowledge and experience in developing innovative K-16 heritage language programs. Special pre-registration rates in effect through May 20, 2002. For more information, visit http://nflrc.hawaii.edu/prodev/si02h/.

IA FAALAUTAOLE LAU GAGANA - SAMOAN PEDAGOGY WORKSHOP (JUNE 24 - 29, 2002) This workshop will bring together experts in Samoan Language teaching, teacher training, materials development, and Samoan Language content areas (e.g., oratory, grammar, literature) to share information and to discuss a range of Samoan Language curriculum development issues (e.g., community awareness, literacy education, resources, language structure, and use). For applications or more information, visit http://nflrc.hawaii.edu/prodev/si02s/.

WEB-BASED WORKSHOPS FOR ADVANCED READING & WRITING DEVELOPMENT & MAINTENANCE (AUGUST 5-16, 2002) This workshop serves as an online professional development opportunity for non-native-speaking teachers of Chinese and Korean language at the K-16 level. As part of our mission to serve the development and enhancement of Asian language and area studies in the United States, we will offer two concurrent 2-week intensive language courses in Chinese and Korean. The intensive courses, delivered entirely over the World Wide Web using a tested and proven pedagogic model, focus on the development and/or maintenance of communicative language skills at the advanced level, with strong emphasis on written communication meeting high standards of literacy. For more information or for an application, visit http://nflrc.hawaii.edu/prodev/si02w/.

The NFLRC is also pleased to co-sponsor the UHM National Resource Center for East Asia’s 2002 Summer Institute...

PRAGMATICS IN THE JFL CLASSROOM: PERFORMANCE-BASED APPLICATIONS (JULY 22-AUGUST 2) In this workshop, participants will be introduced to a wide range of pragmatic phenomena in Japanese spoken discourse, and to explanations, activities, materials, and approaches for the instruction of pragmatics in the JFL (Japanese as a Foreign Language) classroom. The workshop will provide an opportunity for anyone, regardless of their experience with teaching pragmatics, to develop instructional materials and strategies for introducing pragmatics to JFL learners. Interested Japanese language educators teaching at the secondary or collegiate level are welcome to apply (DEADLINE — April 20, 2002). For more information, visit http://www.hawaii.edu/cjs/NFLRC/jsi.html.
NEW PUBLICATIONS FROM THE UH NFLRC

READING IN A FOREIGN LANGUAGE -- a new online refereed journal!

The National Foreign Language Resource Center and the Department of Second Language Studies of the College of Languages, Linguistics and Literature at the University of Hawai‘i at Manoa are pleased to announce their joint sponsorship of the online journal Reading in a Foreign Language, a scholarly international refereed journal founded in 1983 at the University of Aston, Birmingham, England. The journal moved to Hawai‘i in 2002 under the co-editorship of Richard R. Day and Thom Hudson and Reviews Editor Anne Burns, Macquarie University, Australia.

Reading in a Foreign Language has established itself as an excellent source for the latest developments in the field, both theoretical and pedagogic, including improving standards for foreign language reading. This fully-refereed journal is published twice a year, in April and October. The editors seek manuscripts concerning both the practice and theory of learning to read and the teaching of reading in any foreign or second language. Reviews of scholarly books and teaching materials, conference reports, and discussions are also solicited. The language of the journal is English, but lexical citations of languages other than English are acceptable. From time to time, special issues are published on themes of relevance to RFL readers.

For more information, visit our website at http://nflrc.hawaii.edu/rfl/

Michigan State University Center for Language Education and Research (CLEAR)

CLEAR’s mission is to promote foreign language education in the United States. To meet its goals, projects focus on foreign language research, materials development, and teacher training.

FOREIGN LANGUAGE RESEARCH
• Feedback and Interaction
• Longitudinal Analysis of Foreign Language Writing Development

MATERIALS DEVELOPMENT

Products
• Business Chinese (CD-ROM)
• Modules for Assessing Socio-Cultural Competence for German (CD-ROM)
• Modules for Assessing Socio-Cultural Competence: Russian (CD-ROM)
• Pronunciación (CD-ROM)
• African Language Tutorial Guide (guide and video)
• Directory of African Language Offerings (online database)
• Foreign Languages: Doors to Opportunity (video and discussion guide)
• Task-based Communicative Grammar Activities for Japanese and Thai (workbook)
• Test Development (workbook and video)
• The Internet Sourcebook for Business French (Web links from CLEAR’s Web site)
• The Internet Sourcebook for Business German (Web links from CLEAR’s Web site)
• The Internet Sourcebook for Business Spanish (Web links from CLEAR’s Web site)
• Business Language Packets for High School Classrooms (French, German, and Spanish; PDF files from CLEAR’s Web site)
Coming Soon!

• Portuguese Pronunciation and Phonetics CD-ROM
• Thai Tutorial Guide

Game-O-Matic

The Game-O-Matic is a suite of wizards that create Web-based activities for language learning and practice. Teachers can make original Game-O-Matic games by visiting http://clear.msu.edu/dennie/matic/. Have a new idea for a Game-O-Matic activity? Contact Dennie Hoopingarner at hooping4@msu.edu.

Newsletter

CLEAR News is a biyearly publication covering FL teaching techniques, research, and materials. Contact the CLEAR office to join the mailing list or see it on the Web at http://clear.msu.edu/clearnews/.

PROFESSIONAL DEVELOPMENT

2002 Summer Workshops

CLEAR is offering eight summer workshops in 2002 for foreign language educators to help strengthen and expand their teaching skills. CLEAR offers stipends to help defray the workshop fees and travel/accommodation expenses.

The 2002 Summer Workshop offerings are

• Teaching Writing in the Foreign Language Classroom — June 17-19
• Using Communicative Activities in a Grammar-Based Curriculum — June 20-22
• Promoting Motivation and Interest in Foreign Languages Inside and Outside of the Classroom — June 25-28
• Basic Web Pages for Late Bloomers — July 9-12
• Beyond Web Pages — July 15-19
• Putting Flash into Your Course — July 22-26
• Materials Development Marathon: Creating Online Communicative Activities from Start to Finish — July 29-August 2
• Developing and Managing a Tutorial-Based Language Program for LCTLS — August 5-6

For more information on the Summer Workshops, go to http://clear.msu.edu/institutes/02institutes/.

For more information about CLEAR, contact

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Apprentissage des Langues et Systèmes d’Information et de Communication (ALSIC)

ALSIC (Language Learning and Information and Communication Systems, http://alsic.org/) is an electronic journal in French for researchers and practitioners in fields related to applied linguistics, didactics, psycholinguistics, educational sciences, computational linguistics, and computer science. The journal gives priority to papers from the French-speaking community and/or in French, but it also regularly invites papers in other languages so as to strengthen scientific and technical exchanges between linguistic communities that too often remain separate. The editorial board of ALSIC invites you to contact them for any prospective contributions at the following electronic address: infos@alsic.org.
Center for Advanced Research on Language Acquisition, University of Minnesota (CARLA)

CARLA is one of nine National Language Resource Centers whose role is to improve the nation’s capacity to teach and learn foreign languages effectively. Launched in 1993 with funding from the national Title VI Language Resource Center program of the U.S. Department of Education, CARLA’s mission is to study multilingualism and multiculturalism, develop knowledge of second language acquisition, and advance the quality of second language teaching, learning, and assessment by conducting research and action projects sharing research-based and other forms of knowledge across disciplines and education systems extending, exchanging, and applying this knowledge in the wider society.

CARLA’s research and action initiatives include a focus on the articulation of language instruction, content-based language teaching through technology, culture and language studies, less commonly taught languages, language immersion education, second language assessment, second language learning strategies, and technology and second language learning.

To share its latest research and program opportunities with language teachers around the country, CARLA offers the following resources: a summer institute program for teachers; a database which lists where less commonly taught languages are taught throughout the country; listservs for teachers of less commonly taught languages and immersion educators; a working paper series; conferences and workshops; and a battery of instruments in French, German, and Spanish for assessing learners’ proficiency in reading, writing, speaking, and listening at two levels on the ACTFL scale. Check out these and other CARLA resources on the CARLA Web site at http://carla.acad.umn.edu.

The Center for Applied Linguistics (CAL)

The Center for Applied Linguistics is a private, nonprofit organization that promotes and improves the teaching and learning of languages, identifies and solves problems related to language and culture, and serves as a resource for information about language and culture. CAL carries out a wide range of activities in the fields of English as a second language, foreign languages, cultural education, and linguistics. These activities include research, teacher education, information dissemination, instructional design, conference planning, technical assistance, program evaluation, and policy analysis. Publications include books on language education, online databases of language programs and assessments, curricula, research reports, teacher training materials, and print and online newsletters.

Major CAL projects include the following:

- ERIC Clearinghouse on Languages and Linguistics
- National Clearinghouse for ESL Literacy Education
- The Cultural Orientation Resource Center
- Pre-K-12 School Services

CAL collaborates with other language education organizations on the following projects:

- Center for Research on Education, Diversity & Excellence
- Improving Foreign Languages in the Schools Project of the Northeast and Island Regional Laboratory at Brown University
- National Capitol Language Resource Center
- National K-12 Foreign Language Resource Center
- National Network for Early Language Learning
News from the **ERIC Clearinghouse on Languages and Linguistics**

- The **Spring 2002 ERIC/CLL News Bulletin** is now available on our Web site, as is the Spring issue of our electronic newsletter **Language Link**. Both the ERIC/CLL News Bulletin and Language Link include feature articles on various aspects of language teaching and learning, as well as news and notes of interest to language educators.

- ERIC/CLL **Digests** cover a range of topics in ESL, foreign language, and bilingual education. Our most recent Digest is **Spanish for Spanish Speakers: Developing Dual Language Proficiency**.

- **Heritage Languages in America: Preserving a National Resource**, edited by Joy Kreeft Peyton, Donald A. Ranard, and Scott McGinnis is the latest in ERIC/CLL’s **Language in Education** series. This book describes the population of heritage language speakers in the United States and outlines what needs to be done to preserve this important language resource.

- The recent report **Foreign Language Teaching: What The United States Can Learn from Other Countries** is also available from ERIC/CLL. This publication reports the findings of a three-month exploratory study that collected information from 19 countries and highlights eight core methodologies, policies, and strategies that language educators in other countries consider essential to success.

News from the **National Center for ESL Literacy Education**

- NCLE has several new resources on **Addressing Health Literacy in Adult ESL**, including an **ERIC Q&A**, an annotated bibliography, and instructional activities.

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**Computer Assisted Language Instruction Consortium (CALICO)**

Since its inception in 1983, CALICO has served as an international forum for language teachers who want to develop and utilize the potential of advanced technology to support their teaching and research needs. Through its Annual Symposia, Special Interest Groups (SIGs), CALICO Journal, CALICO Monograph Series, CALICO Resource Guide, and numerous other publications, CALICO provides both leadership and perspective in the ever-changing field of computer-assisted instruction. The strength of CALICO derives from the enthusiasm, creativity, and diversity of its members. It comprises language teachers and researchers from universities, military academies, community colleges, K-12 schools, government agencies, and commercial enterprises. To learn more about CALICO activities and how to participate in them, visit the CALICO homepage at [http://www.calico.org](http://www.calico.org).
**European Association for Computer Assisted Language Learning (EUROCALL)**

EUROCALL is an association of language teaching professionals from Europe and worldwide aiming to

- Promote the use of foreign languages within Europe
- Provide a European focus for all aspects of the use of technology for language learning
- Enhance the quality, dissemination, and efficiency of CALL materials

EUROCALL’s journal, *RecALL*, published by Cambridge University Press, is one of the leading academic journals covering research into computer-assisted and technology-enhanced language learning. The association organises special interest meetings and annual conferences, and works towards the exploitation of electronic communications systems for language learning. For those involved in education and training, EUROCALL provides information and advice on all aspects of the use of technology for language learning.

EUROCALL 2002 will be at the University of Jyväskylä, Finland, 14 - 17 August 2002.


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**International Association for Language Learning Technology (IALLT)**

Established in 1965, IALLT (formerly IALL) is a professional organization whose members provide leadership in the development, integration, evaluation, and management of instructional technology for the teaching and learning of language, literature, and culture. Its strong sense of community promotes the sharing of expertise in a variety of educational contexts. Members include directors and staff of language labs, resource or media centers, language teachers at all levels, developers and vendors of hardware and software, grant project developers and others. IALLT offers biennial conferences, regional groups and meetings, the LLTI listserv (Language Learning Technology International), and key publications such as the IALL Journal, the IALL Language Center Design Kit, and the IALL Lab Management Manual. The 2003 IALLT conference will be held at the University of Michigan, June 17 - 21. For information, visit the IALLT Web site at [www.iallt.org/](http://www.iallt.org/).
REVIEW OF BEYOND BABEL: LANGUAGE LEARNING ONLINE

Beyond Babel: Language Learning Online
Uschi Felix
2001
ISBN 1 876768 25 8
$77.00 AUS Book & CD
$55.00 AUS Book only
$27.50 AUS CD only
378 pp. plus CD-ROM
Language Australia Ltd.
Melbourne, Australia

Reviewed by Esperanza Rom n-Mendoza, George Mason University

Beyond Babel, by Uschi Felix, builds on Virtual Language Learning: Finding the Gems Amongst the Pebbles, published by the same author in 1998. Beyond Babel consists of a CD-ROM which includes links to all the Web resources listed in the book, the complete text of Virtual Language Learning, and links to the Web resources from the 1998 volume. The author plans to publish an updated version of the CD-ROM every 2 years.

Beyond Babel is aimed at a wide readership including language teachers interested in creating their own Web-based materials or utilizing Web sites for teaching; teachers, and researchers interested in investigating student perceptions of Web-based language learning; and individuals interested in utilizing or improving their language skills via Web-based materials. The book is divided in three parts: a collection of contributor-authored case studies of language teaching using the Web, a compilation of Web-based resources for language teaching (an updated and expanded list similar to the one in Virtual Language Learning), and a report on empirical research of students’ perceptions about Web-based language learning.

Part 1, "Development: Doing it with more or less," contains eight contributions, each describing the integration of the Web into language courses. Languages covered in this part of the book include Chinese, English as a Foreign Language, French, German, Japanese, and Korean. Institutions represented are not as diverse, with contributors from Australia dominating with six articles, three of them from Monash University in Melbourne. Nonetheless, the collection provides a very complete overview of the different levels of teacher involvement in Web-based language teaching. Also noteworthy is the fact that contributions represent projects with a wide variety of technical and financial support, ranging from some with essentially no budget to projects with $500,000AU ($259,650US). Each article contains a summary page with the name of course, name(s) of the developers, budget, mode of delivery, and URL.

In "InterDeutsch -- going solo: First steps into virtual teaching on a zero budget," Claudia Popov from InterDeutsch (Leipzig, Germany) presents a commercial site that offers three 4-week long individualized distance German courses at the intermediate and advanced level. Students take an entrance test after which they are presented with a specific study plan for 4 weeks. Study plans consist of reading texts, questions, exercises, and a weekly writing activity corrected by a tutor. Students have mandatory chat
room meetings and may use additional materials available through the Studienbibliothek. While access to
courses is restricted, materials in the Studienbibliothek are open and have received very positive feedback
from teachers and learners of German.

In "Advanced EFL online: How can it help?" Miriam Schcolnik from Tel Aviv University (Israel)
describes the development and implementation of an Online Learning Environment (OLE) for
undergraduate students enrolled in an English course for Middle Eastern Studies. In this project, OLE is
not meant to replace classroom interaction but "to provide further opportunities for information searching,
meaningful interaction, and sharing of both educational processes and products" (p. 31). The article
provides a detailed and bibliographically well-documented report on the project rationale, aims,
instructional objectives, and development criteria, as well as a complete description of the assessment
process and its results. Particularly useful are the tables explaining the implementation of the instructional
objectives in the three learning environments (i.e., face-to-face, home/library, OLE) and the means used
to assess the different course activities (pp. 32-34). Forms, observation protocol sheets, and
questionnaires are provided in the appendices.

In "A resource centre on the Net: A model for less commonly taught languages," Injung Cho describes the
development and implementation of an online resource center for the program in Korean at Monash
University (Melbourne, Australia). The center contains learning materials organized in flexible micro-
components, one Web-based BBS and three mailing lists, which complement face-to-face instruction
during the first three years of the Korean program. The center aims to promote autonomous learning, to
attract students with scheduling problems, to increase communication between native and non-native
speakers of Korean, to provide opportunities for professional development to teachers of Korean, and to
serve as basis for future distance learning courses.

"Going online: Can language teachers go it alone and is it worth the heartache?" by Sally Staddon, also
from Monash University, reports on a project to create a Web site for a beginning French course and the
pedagogical approach followed during the development process. The site has been developed under the
premise that "the pedagogical need for, and value of, what is intended must drive the creation of any
CALL materials" (p. 82), although technical considerations and administrative criteria also have to be
taken into account.

In "Sakura: An interactive site for Japanese language learners," Takako Tomoda and Brian May describe
Sakura, a Web site developed at Monash University for beginning students of Japanese. Sakura contains
online exercises and tasks designed to complement face-to-face instruction. The article describes the
development process and the problems encountered both by the designers and the end-users of the site,
which include difficulties handling Japanese characters, using the keyboard, and accessing the site from
home.

"Online German for secondary school students" by Stefo Stojanovski, Fred Hollingsworth, and Jennifer
Saynor-Locke focuses on a German course developed at the Victorian School of Languages (Victoria,
Australia). The article describes the adaptation of a traditional secondary school German course to an
online environment using Blackboard. Stojanovski, Holingsworth, and Saynor-Locke also analyze the
pros and cons of distance education and the need for this kind of training is needed in the specific
educational context.

"Building 'Bridges': Design issues for a Web-based Chinese course" by Jane Orton describes Bridges to
China, an intermediate-level Chinese distance course developed at the University of Melbourne (Australia).
The course consists of texts, exercises, and quizzes, supplemented by an audio CD and a
video CD. Students are required to watch six films (available from state providers) and to take part in a 2-
week study tour to China. The course takes advantage of the Web’s potential to present information
(through colors, hypertext, and help windows), to provide for extensive language practice, to monitor
student progress, and to motivate students’ participation. Course assessment has been very positive since
materials have been proven to allow for "progression from recognition to manipulation throughout the course" (p. 155).

"Worlds of words: Tales for language teachers" by J. Tuner from Queensland University of Technology (Brisbane, Australia) is a case study not of a specific course, but rather of a particular technological environment: the use of MOO spaces as "stages for interaction and collaboration" (p. 165) in the language classroom. At Queensland University of Technology, MOOs were first integrated in classroom activities as a rehearsal space, and then utilized as a constructive and creative space. A list of educational MOOs for different subjects and languages is also included.

Part 2, "Virtual Language Learning Revisited," provides a comprehensive annotated list of more than 600 Web-based language learning resources for approximately 80 languages. The number of resources varies from 30 or 40 items for commonly taught languages such as English, French, German and Spanish, to just one for many of the less-commonly-taught languages. For languages with a large number of available resources, various criteria for selection were applied, such as their potential to be integrated into courses and their immediate usability. The resources are classified according to type of resource (see Table 1) but an index is included at the end of this section to facilitate the location of resources by language.

The categorization of sites is very effective for providing a clear picture of how the Web is being used in the field of language learning, even though, as the author explains in the introduction, there is some overlap among categories. Beyond Babel’s categories have been updated since the publication of Virtual Language Learning’s to reflect the new developments as well as feedback received by the author.

Table 1. Categories in Beyond Babel and Virtual Language Learning

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<tr>
<td>A. Integrated materials</td>
<td>Integrated materials</td>
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<tr>
<td>B. Substantial materials or whole subjects</td>
<td>Substantial materials/whole subjects</td>
</tr>
<tr>
<td>C. Substantial materials -- commercial or protected</td>
<td>Substantial materials -- protected</td>
</tr>
<tr>
<td>D. Small courses and bits and pieces</td>
<td>Activities/Exercises/Tasks based on textbook or magazine</td>
</tr>
<tr>
<td>E. Grammar and grammar-based material</td>
<td>Grammar instruction/pronunciation/dialogues - traditional</td>
</tr>
<tr>
<td>F. Publishers’ sites</td>
<td>Grammar/ vocabulary exercises -- interactive with feedback</td>
</tr>
<tr>
<td>G. Magazines and creative writing</td>
<td>Sites in target language country providing authentic interaction</td>
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<tr>
<td>H. Tools</td>
<td>Moos/ Muds/ Mushes</td>
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<tr>
<td>I. Self-contained interactive tasks</td>
<td>Self-contained interactive tasks -- ideas</td>
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<tr>
<td>J. Web tasks</td>
<td>Self-contained interactive tasks -- proformas to print or submit</td>
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<td>K. Webquests and simulations</td>
<td>Structured teaching plans for interactive tasks</td>
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<td>L. Co-operative ventures</td>
<td>Interactive tasks -- using Chat sites</td>
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<td>M. MOOS, MUDS, &amp; MUSHES</td>
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<td>N. Chat sites</td>
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<td>O. Sites for Children</td>
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<td>P. Structured Teaching Plans for Interactive Tasks</td>
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<td>Q. Professional Development &amp; Resources for Teachers</td>
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<td>R. Metasites</td>
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Part 3, "Absolutely Worth the Effort," focuses on research issues related to the integration of the Web into language learning. To this aim, Felix describes two studies of university, high school, and elementary school students' perception of the Web as a learning environment. The studies also explored whether students' opinions were related to their learning styles, learning strategies, and study preference. Qualitative and quantitative data from both studies show that the advantages outweigh the disadvantages of using online materials for language learning. Nevertheless, the studies were not able to document a relationship between individual learning styles, strategies, and preferences and "perceptions of comfort, enjoyment and usefulness of materials" (p. 351). In order to get a more substantial body of qualitative and quantitative data, which may document a closer relationship between learning styles and students' perceptions of the usefulness of the Web, Felix has embarked in 2002 in a large-scale project involving students in as many different languages as possible.

In conclusion, Beyond Babel contains extremely useful information for the intended audience of the volume. Teachers who want to develop materials and/or integrate existing resources into their curriculum will likely learn from the detailed case studies and as well as discover some new Web-based resources; researchers will identify areas for further research on student perceptions of learning and on learning outcomes; and language learners will find a wealth of useful Web sites. Felix's plan to update the resources every two years can minimize the negative effects of the dynamism that characterizes the Web. As noted elsewhere (i.e., Sussex, 1999), the CD-ROM solution may not be quickest and most effective choice for this purpose, but it certainly provides the author with the best solution to protect the excellent results of a very labor-intensive endeavor.

NOTES
1. Readers may login using "guest" as username and password.
2. Bridges to China is delivered now via Open Learning Australia, which will offer it from June 2002, with tutorial guidance and accreditation provided by the School of International Business and Asian Studies at Griffith University (Queensland, Australia). A CD-ROM version will be available from the University of Melbourne in July 2002 (Personal communication of Jane Orton, March 2002).
3. Other reports on these studies are available online in Felix 2001a and 2001b.
4. Some of the questionnaires used for these studies are available online.

ABOUT THE REVIEWER
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REFERENCES


REVIEW OF ICT AND LANGUAGE LEARNING, A EUROPEAN PERSPECTIVE

ICT and Language Learning, A European Perspective
Language Learning and Language Technology Series
Angela Chambers and Graham Davies (Eds.)
2001
$39.00US
185 pp.
Swets & Zeitlinger Publishers
Lisse, The Netherlands

Reviewed by Erin M. Halm, Johns Hopkins University

According to editor Angela Chambers, in Europe, "multilingualism and language diversity are considered as priorities, not only in the economic sphere as a means of ensuring the mobility of workers, but also in the political context of European integration " (p. 7). As a result, the European Commission has given collaborative language projects significant attention, in particular, those dealing with Information and Communication Technologies and education. The papers in ICT and Language Learning, A European Perspective present the results of some of these collaborative projects and emphasize "the ways in which the use of technology in language learning may be firmly embedded in a theoretical or pedagogical context" (p. 7).

The 11 papers in this volume consist, for the most part, of discussions of the challenges that computer-assisted language learning (CALL) has faced historically and of those it currently faces. Rather than present much in the way of new research, the authors mainly review practical examples and argue for prioritizing clear theoretical and pedagogical principles when integrating technology into language teaching. Finally, they hope to contribute to the efforts of the European Commission to create a "virtual European education area" involving cross-cultural cooperation (p. 8).

In "New technologies and language learning: A suitable subject for research?" Graham Davies discusses the academic recognition of research in the area of new technology and language learning. Such research is often not recognized because it does not take place within a definable theoretical framework. Furthermore, it tends to result in the development of teaching materials and approaches to language teaching, areas which are not considered valid for research by many universities. Davies identifies various areas of CALL in which research is needed, naming issues of learner autonomy, motivation, use of the Internet, and multimedia technology as priorities. He also suggests that scholars engaging in this type of research should clearly define their methods of investigation, tie their research to theories of second language acquisition, and expand their theoretical base to include the research and practice from other disciplines like linguistics, psychology, and education. As would be expected, and as most people currently working in the field would agree, Davies believes that CALL is a suitable subject for research, and notes that it is a growing discipline that is likely to continue to expand.
"Learner autonomy and the challenges of tandem language learning via the Internet" and "Learner autonomy, self-instruction and new technologies in language learning: Current theory and practice in higher education in Europe," authored by David Little and Jeanette Littlemore, respectively, deal with issues of learner autonomy, self-instruction, and CALL. Little’s chapter opens with a discussion of the problems of self-access systems, or systems in which learners work on their own, noting that some universities have invested in these systems thinking that they would save money by having to hire fewer teachers. However, this is never the reality, and choosing this route presents other types of commitments and problems. The vast majority of learners are not fully autonomous learners who are capable of managing and evaluating their own learning process. Little therefore concludes that any self-access system must also incorporate ways in which students can learn to manage and regulate the learning process for themselves. He suggests tandem learning, a type of language exchange via e-mail or chat rooms, as one way to deal with this issue, and goes on to discuss in more practical terms how such exercises can be set up for effective language learning.

Littlemore’s chapter compares current theories of learner autonomy in the higher education system in Europe with the actual practice of universities. The programs that have been most successful in achieving learner autonomy through the use of technology, according to Littlemore, have a clear understanding of the need for strategy training to help students become aware of their own learning. Such strategy instruction helps students to develop the skills and tools to self-evaluate and thus, improve the learning process.

"Criteria for the evaluation of Authoring Tools in language education," co-authored by David Bickerton, Tony Stenton, and Martina Temmerman, is a useful discussion of authoring tools and how an individual or institution might approach the task of evaluating and selecting appropriate tools for his or her particular needs. From a very practical standpoint, the chapter addresses many ways in which authoring tools might be evaluated, including establishing a list of desired features, determining whether or not implementation of a given tool is feasible in different contexts, assessing the skills of the user population, and finally, quantifying such features like the range, ease of use, users, and costs.

In "DISSEMINATE or not? Should we pursue a new direction: Looking for a ‘third way’ in CALL development?" Philippe Delcloque presents arguments for DISSEMINATE, his idea for a potential operating system that he believes could be useful in CALL as well as computer assisted learning in general. As the author states, "Increasingly, the necessity to have a deep reflection on the various components and actors in the process of CALL courseware production is particularly crucial. This might involve an examination of content, media, enabling tools, physical (hardware) support, human factors, collaboration, implementation, evaluation and dissemination" (p. 68). After a discussion of the history and development of the various phases of CALL, Delcloque goes on to present Gagnepain’s theory of meditation as a justification for his proposal, and then attempts to define each component of his proposed DISSEMINATE system. Delcloque presents many interesting ideas for discussion, but does not address from a practical standpoint how any of his ideas could be implemented, or whether the technology exists to put his ideas into practice.

In "CALL material structure and learner competence," Jean-Claude Bertin presents the results of a survey he conducted investigating the relationship between learners’ linguistic success and their expectations regarding autonomy. Using this survey as his point of departure, Bertin encourages language teachers to take advantage of new technology to "diversify the pedagogic structure of the materials they use or design and to match their learners’ needs and levels of competence as closely as possible" (p. 97). In essence, what he argues is that recent multimedia language learning materials make it easier for teachers to develop a more flexible learner-centered curriculum that allows for customization to different learner types and learning styles. This is certainly true. However, one could argue with Bertin’s claim that "very limited computer skills" are needed to achieve such goals, as one of the largest impediments to convincing teachers to create computer-based materials is often the technology itself. Particularly for
those working outside of Europe, it would have been interesting if Bertin had included information about the level of computer training and skills of language educators as well as about the role of the educational technologist in Europe.

"From gap-filling to filling the gap: A reassessment of Natural Language Processing in CALL," written by Sake Jager, and "Human Language Technologies in Computer-assisted language learning," written by Mathias Schulze, deal with natural language processing and human language technologies. Jager reviews the state of the art in speech processing technology and argues that in order for this type of technology to be useful for language instruction, it will be important for language engineers to work closely with language teachers and course designers. Schulze reviews the use of human language technology, particularly programs like grammar checkers and spell-checkers, and notes that the largest problem with this type of software is its inability to anticipate all possible linguistic outcomes in a given situation, which often results in errors being missed or correct answers being characterized as errors. However, he concludes that the software is improving.

In "Learning out of control: Some thoughts on the World Wide Web in learning and teaching foreign languages," Thomas Vogel presents his thoughts on the use of the World Wide Web in foreign language learning and teaching. Specifically, he is interested in whether the Web can be said to constitute a new naturalistic language-learning environment and truly address the challenge of "authenticity" that the regular language classroom faces. Through a small-scale study, Vogel questioned 55 students at his university to determine if they consciously use the Web for language learning. His results showed that none of the students specifically surfed the Web in order to learn foreign languages; rather they were generally in search of information of some sort. However, they did appear to have some feeling that their regular Web surfing activities might be helping their foreign language skills, as they needed to read and understand the foreign language information. Vogel concludes that there are many features of the Web that function like a naturalistic language environment. However, he criticizes many recent Web pages designed specifically for language learning, maintaining that they are not examples of pedagogy-driven technology. Instead, "The learner is faced with a technologically advanced, consumer-friendly version of his textbook from the sixties, with Web pages created by designers who know more about Web design than about new methodological approaches in language learning" (p. 139). He concludes with various practical suggestions for integrating the Web into the classroom.

In "Concordances in the classroom: The evidence of the data," Joseph R zeau discusses the use of computer-based concordances in the classroom and presents various concordance-based exercises he used to help his French-speaking students employ more inductive strategies when studying English grammar. He notes that although these exercises were extremely useful, there are limitations for using concordances, as not all genres of texts are appropriate. Nonetheless, he concludes that, "once you have started relying on the evidence of the data for checking the ‘rules’ found in grammar books as well as your own ‘intuitions’ about language, concordances tend to become an indispensable tool" (p. 154).

"ReLaTe: A case study in videoconferencing for language teaching," by John Buckett and Gary Stringer, describes research that they carried out jointly with the University College, London, as part of a project investigating videoconferencing and language teaching. The main goal of the project was to demonstrate the use of multimedia conferencing to share language teaching resources and to increase language learners’ access to resources and classes not available in their communities or schools. Although their results were favorable overall, and they demonstrated the feasibility of teaching foreign languages over a network, there were some problems, such as variable audio and video quality. However, the authors note that this technology is improving, and they are hopeful that remaining issues will be resolved soon.

In general, ICT and Language Learning, A European Perspective presents some interesting points for discussion concerning the integration of CALL technology into the larger theoretical and pedagogical context. The book touches on some of the most relevant issues facing researchers in this field, namely, the
problem of recognition of such research by the larger scientific community, the struggle to insure that the available technology is used appropriately and serves a valid pedagogical purpose, and the need to determine whether CALL actually enhances learning. However, these are not new issues to the field, and this volume does not add much in the way of new material to the discussion of these problems nor does it present any new solutions to the problems posed. For an educator who has never thought about integrating technology into language learning, this volume might be a good introduction to some of the basic challenges and successes. However, those who have "been there and done that" and have been struggling and attempting to resolve most of these issues for quite some time, will probably not find much new information to work with here.

ABOUT THE REVIEWER

Erin Halm holds a PhD in Romance Philology from the University of Pennsylvania Department of Romance Languages and Literatures. She has extensive experience teaching ESL and Spanish language, and is currently Director of Admissions and Student Affairs at the Johns Hopkins University School of Advanced International Studies.

E-mail: ehalm1@jhu.edu
REVIEW OF TSI KARHAKTA: AT THE EDGE OF THE WOODS

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Reviewed by Carrie Dyck, Memorial University of Newfoundland

OVERVIEW

_Tsi Karhakta_ is a CD-ROM designed to accompany a first-year university course in Mohawk, an Iroquoian language spoken in Ontario, Quebec, and New York State. The author of the CD, David Kanatawakhon, is a Mohawk speaker from Tyendinaga, near Kingston, Ontario. Kanatawakhon has taught first- and second-year university-level Mohawk courses for approximately a decade at the University of Western Ontario, Brock University, and elsewhere in Ontario and Quebec.

As a linguist working on a related Iroquoian language (i.e., Cayuga), and as a second language learner, I can comment on the linguistic content and structure of the CD, as well as on the extent to which the CD is user-friendly.

_Tsi Karhakta_ is organized into seven modules: two that discuss Mohawk grammar; three that provide practice in understanding and producing Mohawk structures; a dictionary; and an index for navigation. Instructions and explanations are in English.

DESCRIPTION

The CD opens with a main menu which provides the user with three options: a) read instructions for how to use the CD, b) use the program, or c) quit the program. The detailed instructions provide an overview of the scope and purpose of the CD, as well as the philosophy behind the CD. Each of the seven modules on the CD are illustrated on the instructions screen, and the user can click on the icon of any module or position the cursor near the module for pop-up help screens in order to find out what the module contains. The seven modules are Supplements, Index, Textbook, Lexicon, Practice, Exercises, and Drills.
The Supplements module contains material additional to that covered in each chapter; in the example shown in Figure 1, a detailed description of Mohawk sounds is overviewed. (One of the many pop-up help screens -- yellow -- is also shown in the screen capture.)

![Figure 1. Supplements module](image)

The Index module provides an overview of the CD’s 16 chapters, as well as hyperlinks to each chapter. The textbook module (see Figure 2), provides grammatical explanation on individual screens, an example form, and then a few related grammatical notes.

![Figure 2. Textbook module](image)
The Lexicon module (see Figure 3) consists of a dictionary of 250 entries listed thematically, and also contains a search engine. Each entry in the lexicon is accompanied by a sound file of the Mohawk pronunciation.

Figure 3. Lexicon module

The Practice module (see Figure 4), allows one to hear Mohawk, record one’s own pronunciation of Mohawk (with the appropriate hardware), and compare it to that of a Mohawk speaker. (David Kanatawakhon’s voice is used for all audio files.) As a method of feedback, this is great, if the user is the type of person who can hear Mohawk reliably and self-diagnose his or her own pronunciation.

Figure 4. Practice module
The Exercises module (see Figure 5), consists of Mohawk-to-English and English-to-Mohawk translation. As discussed later, the program spell-checks the Mohawk answers to accept only Kanatawakhon’s Mohawk spellings. This is perhaps the most frustrating module to use, as only answers that are entirely correct are accepted.

Figure 5. Exercises module

The Drills module poses questions in Mohawk and requires typewritten Mohawk answers in the form of context-free, isolated sentences. Like the exercises, exact answers are required. The drills are designed to give the user practice in "thinking Mohawk" without the aid of English.

EVALUATION

Teaching Mohawk is a complex task because the core vocabulary is richly structured: For example, many nouns and verbs can take 11 to 15 prefixes expressing relationships between individuals or groups to actions or objects (Michelson, 1988, 45-46). Additionally, while nouns always function as such, verbs can function like verbs, nouns (including kinship terms), adjectives, and enumerating expressions; particles can serve as demonstratives, quantifiers, adverbs, interjections, and so forth. Consequently, the second-language-learner is faced not only with acquiring the complex word-formation rules of Mohawk, but also with putting words and sentences together in a manner that is functionally different from English and other Indo-European languages.

There is no consensus on the grammatical objectives for Iroquoian second-language courses. Linguists largely identify the goal to be one of teaching word formation processes (see, e.g., the Mingo--Seneca site); in contrast, many educators view their task as teaching words -- especially culturally significant ones -- and social vocabulary such as greetings (see, e.g., http://www.ohwejagehka.com/lang.htm and http://aboriginalcollections.ic.gc.ca/language/lang.htm). Largely ignored by both groups are detailed treatments of Mohawk sentence structure and particle usage (except for statements such as "Mohawk is a free-word-order language").

Tsi Karhakta adopts the former approach, and it gives a reasonable introduction to some aspects of Mohawk word formation. However, it also has an extensive dictionary (though social vocabulary is
neglected) and it does a good job of introducing the related topics of sentence structure and particle usage. Further details are provided below.

Analysis of word-internal structure is deliberately kept to a minimum; only a fraction of Mohawk’s word-formation possibilities are explored. For example, the CD limits itself to the use of a few pronominal prefixes -- the ones conveying the meanings "I/my," "you/your (singular)," "he/his," and "she/her." According to the introduction on the CD, the remaining 50-odd pronominal prefixes (and their numerous pronunciation variants) are not discussed in order to reduce the complexity of the concepts introduced and to avoid overwhelming the learner. Given that Tsi Karhakta is designed to be used in a class setting, with a Mohawk speaker or linguist present, additional explanations of Mohawk word-formation can be provided by the instructor as necessary. However, to avoid giving learners an over-simplistic impression of Mohawk word-formation, some indication of the complexities to be expected could have been included on the CD, perhaps in a separate module.

The Dictionary

Approximately 250 lexical items are included in the dictionary, including a balance of high-frequency nouns (ohaha, road; Anen, Anne), pronouns (akaonha, she, her), verbs denoting actions (-yena’ohn, to have received something; -atenhinonh, to have sold something) and states (niwa’ah, it is small; -serenhtara’s, to be sleepy), particles (thiken, that one; onhka, who) and particle combinations (akwah iken tsi, very, really). (Hyphens before Mohawk words indicate incomplete words -- prefixes have not been added.)

While more words could have been included in the dictionary, the size of the dictionary is consistent with the CD’s focus, which is not memorization, but rather, the ability to form new sentences using the vocabulary that the learner currently commands. For an introductory-level Mohawk course, the size of the dictionary is appropriate.

Pronunciation and Transcription

Sound files of Kanatawakhon’s pronunciation of Mohawk are included with most of the Mohawk words. Kanatawakhon speaks at a conversational speed, which will likely present some difficulty for novice learners, at least initially. To enhance the sound files, slower versions of longer words and sentences, alongside the conversational-speed versions, would have been useful. It would also have been worthwhile to include recordings by more than one speaker, or at least by a female speaker as well, so that learners would be exposed to more variation in speech and would perhaps learn to hear Mohawk better as a result.

Mohawk spelling systems (like many others) omit certain distinctions crucial to accurate second language learning. Glottal stops, length, and high pitch accent are often omitted. (Mohawk fonts can be found at http://www.ohwejagehka.com/fonts.htm.) However, novice Mohawk learners must learn to pronounce the omitted information, which is very important for meaning. For example, the presence of a glottal stop [‘] at the end of the verb can signal an event that takes place at one point in time; in contrast, the absence of a final glottal stop in the same verb signals a command. Using the International Phonetic Alphabet (IPA), Kanatawakhon includes accurate phonetic transcriptions together with all spellings, in the process compensating for the omissions in the spelling system.

Complicating the spelling situation, Mohawk speakers use several orthographic systems, and differences between these systems are difficult to reconcile (for a discussion of these issues, see the report of the Mohawk Language Standardization Project). As explained in the introduction to the CD, Kanatawakhon uses his own Mohawk spelling system. However, various Mohawk speakers might object, as this is not an uncontroversial decision. For example, some speakers would dislike Kanatawakhon’s use of the letter y for the "y" sound in yes, since in the (French-influenced) Ahkwesasne Mohawk spelling system, the letter i is used to represent this sound: The verb -iyo (to be good, nice, etc.) would be spelled -iio in Ahkwesasne, and would be pronounced by all Mohawk speakers as [-ːyoː]. As mentioned earlier in this

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Review of *Tsi Karhakta*

The CD accepts as correct only Kanatawakhon’s modified spelling system, and this may give the false impression that there is only one Mohawk spelling system, or that one is superior to others. Although the introduction does warn the user that a modified spelling system is employed on the CD, learners of Mohawk will likely want to learn several spelling systems if they want to interact with Mohawk speakers or read available Mohawk materials.

Finally, the link to the description of the glottal stop in the spelling guide doesn’t appear to work, at least not on my version of the CD, a technical problem.

**Social Vocabulary**

Phrases equivalent to "hi," "how are you," "where are you from," and so forth, are absent from the CD. (For some examples, see [http://www.ipl.org/youth/hello/mohawk.html](http://www.ipl.org/youth/hello/mohawk.html)). While not necessary for learning Mohawk language structure, the presence of such phrases and vocabulary is satisfying to the second-language-learner, and would increase learners’ ability to interact socially with Mohawk speakers.

**Sentence Structure and Particle Usage**

One of the strengths of the CD is its functional treatment of syntactic topics, and a sentence-based, rather than a word-formation-based approach. For example, *Tsi Karhakta* begins with a discussion of how to use the particles *ne* (the), *ne’e* (it is), and *ken* (question): Using *ne’e*, one can form sentences such as *raksa’a ne’e* (It’s a boy!), *ne’e ronkwe* (It is a man / That’s a man!), *ne kentsyonk ne’e* (It’s the fish!), or *ok sere ken ne’e* (Is it a car?).

This strategy immediately enables the learner to form simple sentences consisting of a noun and some particles. Such essential information on sentence structure is missing in many of the other Iroquoian language sources I have examined.

Kanatawakhon’s functional organization of the grammar means that the use of any particles, prepronominal prefixes, pronominal prefixes, and sentence frames needed to perform a given function are discussed in the same place. For example, discussion of how to modify verbs describing states (such as the verb meaning *to be hungry*) is found mainly in one chapter. To modify the verb *katonhkarya’ks* (I am hungry), one can add particles before the verb -- *akwah ijken tsi katonhkarya’ks* (I am very hungry) -- or one can add particles and a prefix to the verb -- *yah othenen tekatonhkarya’ks* (I am not at all hungry). Kanatawakhon’s sentence-based technique gives the learner a set of useful structures expressed in a Mohawk manner. An advantage to this approach is that it seems likely to help minimize the English-speaking learner’s tendency to anglicize Mohawk structure: It provides non-English-like sentence frames which users model repeatedly in the drills, exercises, and so forth. In contrast, other approaches to teaching Mohawk provide only isolated words, which the learner might (incorrectly) tend to insert into English sentence structures.

**Metalanguage**

Iroquoian speakers who have been required to learn Iroquoian linguistic metalanguage, often dislike it. It includes non-intuitive terms such as *translocative*. Partly for this reason, the metalanguage used in the CD is not standard Iroquoianist terminology. For example, the term *adjectival suffixes* is used for stative verbs (such as [-i:yo:], to be good) which incorporate nouns (examples of such verbs can be found at [http://www.tyendinaga.net/mwotw/Tawit/vocab0159.htm](http://www.tyendinaga.net/mwotw/Tawit/vocab0159.htm)). The metalanguage used in the CD is fine for the purpose at hand -- distinguishing classes of verbs, for example -- but it could be misleading in some cases. For example, the "adjectival suffixes" are not adjectives (although they function as such) nor are they suffixes (although they typically occur word-finally). In summary, users of the CD will learn about Mohawk, but not about Iroquoian linguistics.
Format and Navigation

The organization of the CD is hierarchical. As a result, it is often not possible to move directly from one module to the next. For example, if one is in the textbook module, one can access the practice, drills, and exercises modules, or the index. However, from the textbook module, one can only access the lexicon by returning to the index, clicking on the Main Menu link, and then clicking on the lexicon link. In other words, the user has to spend considerable time learning to navigate the CD.

Some fine-tuning is needed in the CD’s format. Several of the links don’t work properly. For example, a few of the links lead to the wrong sound files.

Finally, there are a few typos which would be confusing for the learner. For example, the phrase Is this (thing) hers? should be "Akaonha ken akaownk ne kiken?" but the first word is wrongly spelled as Aha, rather than as Akaonha; and the word I cough (kahshakha’) is wrongly spelled askahshkha’. However, the few spelling errors would be apparent if the user were able to hear the Mohawk sounds reliably.

For moderately proficient computer users, it would not be difficult to work around the complexities of navigation and so forth mentioned above. However, novice computer users might find such factors very frustrating.

SUMMARY

This is currently the only CD available that attempts to teach Mohawk in a systematic linguistic fashion. (For other Mohawk language products, see http://www.worldlanguage.com/Languages/Mohawk.htm). Tsi Karhakta would be most useful for a moderately proficient computer user with some knowledge of linguistics, or with some awareness that languages can have different structure than English, or with some aptitude for language-learning. If the CD is intended for use by completely novice computer users and language learners, it would be best to have a moderately computer-literate Mohawk teacher available. In other words, this CD would be most useful for an introductory, post-secondary language course.

ABOUT THE REVIEWER

Carrie Dyck is an Assistant Professor of Linguistics at Memorial University of Newfoundland. Her research interests include Cayuga (an Iroquoian language), Utku (a subdialect of Netsilik, originally spoken in Chantry Inlet), and disordered phonology, specifically, dyslexia.

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REFERENCES

**REVIEW OF IRISHNOW!**

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Reviewed by Colleen Cotter, Georgetown University

**OVERVIEW**

IrishNow! (Deluxe Edition) is a CD-ROM-based multimedia package designed for beginning and advanced learners of Modern Irish (also known as Gaelic or Irish Gaelic). The Deluxe Edition comes with a microphone to record and compare one’s own pronunciation to native speakers and, on a separate CD, a Multilingual Word Processor program which includes fonts for 100 languages as well as a multilingual spell-checker. IrishNow! promises to assist learners at different stages in the development of speaking, listening, reading, and writing skills.

In addition to word games, grammar tools, online quizzes, and quasi-interactive speaking opportunities, the package features attractive video segments of places, events, and people in Ireland. These videos are narrated by native speakers and they are the basis of numerous "immersion" activities. An invaluable component, particularly for a language with relatively few native speakers, is the opportunity for learners to hear native speaker pronunciation and compare it to their own.

**DESCRIPTION**

The software is organized around four different "titles": Discovering Ireland, An Excerpt from *Angela’s Ashes*, Most Common Words in Ireland, and Survival Phrases. A "title" is the program’s equivalent of a main topic, around which numerous supporting activities are grouped. Three clickable buttons are available for each title: Open, Games, and Listen and Speak. A fourth clickable button, Conversation Practice, is available for Survival Phrases and Most Common Words. The Open button leads a user to the main text of a title. Figure 1 shows the middle of the Discovering Ireland title, a 1,198-word travel narrative with video.
The user can focus on different types of comprehension skills by switching between Video, Sound Palette, Text Only, and Theatre modes, which changes the screen presentation to emphasize different aspects of language learning. The Video mode runs the accompanying video in the upper right of the screen without ambient sound or music, and it gives the learner the option of listening to the narrative (and simultaneously reading it in Irish and English) either as continuous speech or in gloss form with pronunciation of individual words. The Theatre mode (Figure 2) is similar to the Video mode but it has a larger video screen in the middle of the page and it includes both music and ambient sound. Both modes use the same multi-media panoply of maps, illustrations, still photos, and recent video to emphasize history, geography, social and cultural activities, landscape features, and personal interactions. The Sound Palette mode eliminates the video and instead provides a spectrogram (a graphic representation of measurable acoustic properties of the words that are spoken), and a place for speaker recording and playback, as shown in Figure 3. Text Only mode emphasizes reading.
In each mode, a Word Tools button in the lower right corner of the screen allows the user to obtain more explicit grammar information about a highlighted word by providing links to relevant explanations within the Grammar Basics file. The explanations linked to the word button are minimal (e.g., copula, habitual...
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form, etc.), but a comprehensive Grammar Tutorial is always available to pique the interest and to support the advancement of the intermediate learner (at the same time, its background status ensures that the new learner, who may be overwhelmed by some of the unique phonological and grammatical features of Irish, will not be deterred). The Grammar Tutorial is a separate file that can easily be consulted by the learner who has an immediate question that the Grammar Basics file does not cover, or who just wants to read an overview grammar of the language.

Grammar and vocabulary exercises and drills are presented on the Games and Listen and Speak pages for each title. Games include

- Vocabulous!® (which focuses on vocabulary and spelling)
- Unscramble (which emphasizes syntax skills by requiring the learner to put words in grammatical order)
- Plug-n-Play (which builds on knowledge of vocabulary and sentence structure by requiring the learner to drag missing words into the text)
- Crosswords (which emphasizes vocabulary and spelling)
- Video Unscramble (which enhances listening comprehension by requiring the learner to drag video clips from a passage and put them in proper order)

Listen and Speak features three activities: Word Dictation (spelling and listening), Word Pronunciation (speaking skills and vocabulary), and Sentence Pronunciation (to further emphasize the native target -- see Figure 4). The Word Pronunciation activity provides windows which compare the pitch contour, loudness contour, and fricative production (“hissing and buzzing”) of the learner with the native speaker version. Besides the acoustic comparison, a needle points to one of three achievement levels: Keep Practicing, Good Job, and Wow!

![Figure 4. Sentence Pronunciation activity within Discovering Ireland segment](image-url)
The Most Common Words in Irish and the Survival Phrases titles provide a third activity: Conversation Practice. Conversation Practice allows a user to choose one of several short scenarios mostly at the intermediate level and to "interact" with an Irish conversational partner, whose voice and still photo are provided, and then to compare the user’s speaking skill with native pronunciation. A learner is not restricted to one conversational position -- there are five characters to choose from -- and can consult three concealable windows (showing a conversational prompt, an English translation of the line, and the actual line in Irish that is expected) for assistance.

EVALUATION

The implications of computer-assisted language learning (CALL) are writ larger with an endangered but highly valued language like Irish, a language that has been losing speakers for many generations and, by most accounts, is close to extinction despite recent revitalization efforts within Ireland and abroad (Hindley, 1990). IrishNow! is valuable for individual language learners, particularly as it provides a native-speaker model, and also as a tool for the perpetuation of the language. Not only has Irish been in fairly steady decline for more than 200 years, but pedagogical materials and innovations have been very scarce until just recently.

The multi-media program provides for challenge and accomplishment, and it minimizes frustration -- something that is not always the case with more traditional teaching methods. Furthermore, the unique features of the Irish language which often baffle learners (e.g., initial consonant mutation in which complex but patterned sound changes at the beginnings of words do a great deal of significant grammatical work) can probably be better sorted out with a multi-media system. In addition, users receive immediate feedback (e.g., online quizzes are graded instantly), and they can easily compare their own pronunciation to that of native speakers. An unintended benefit of the spectrogram comparisons could be that users learn to read formant patterns. The software affords the user many options in terms of varied intellectual challenges (games and online quizzes, different concealable translation screens) and pacing (the SlowSound feature -- the "green-turtle" button -- slows down the native speaker’s voice). While the LanguageNow! series emphasizes the value of its "Successful Immersion Approach," an approximation of the complexity of actual immersion made possible by the multiple technological capabilities of the CD-ROM medium, they also offer a Step by Step Approach for those who prefer to take a more structured or traditional approach to learning.

The program’s content is substantive linguistically, especially considering the wide range of learner proficiencies it serves, and it is easy to see how learners at different stages would find using the program by turns intriguing, enjoyable, and useful. The treatment of grammar is comprehensive, readily available for those who want it, avoidable for those who don’t. The texts have been vetted by the Bord na Gaeilge (the primary government agency that works on behalf of the Irish language in Ireland).

The program easily blends depictions of life in rural and urban Ireland, in the North (which is part of the United Kingdom) and in the South (the Republic) -- sites of longstanding tensions -- without too much fuss. The presentation is as apolitical as it can be. While there is a certain simplification of Irish life and attitudes that comes with the territory, particularly in an overview, the more tacky and stereotypical images that exist outside of Ireland are mercifully absent. In IrishNow!, Guinness, traditional dancing and music, history, and horses races are embedded in a contemporary social context, aided and enhanced by the video images which convey more cultural complexity than the text can alone. One can hear, for instance, a segment that describes dancing in the streets during festivals and then look at the video window and see a great deal of variety among the people and the activities.
Given its many benefits, there are some aspects to the package that might be seen as drawbacks:

- More traditional learners might find the multi-media "immersion" setup baffling initially; a few hours with the program should set that to rights. Computer savvy learners will be clicking and understanding the hypertextual relations like the native cyberliterates they are.

- There is no accompanying booklet, although online help and tutorials answer nearly all questions learners could be expected to have.

- While becoming proficient in the "four language skills" is part of IrishNow's promise, the opportunities for writing (with the exception of spelling) and speaking by initiating new utterances are fairly minimal. Listening and reading are favored.

- The text on the package is also somewhat misleading and overwrought (perhaps excusable as a marketing decision), promising "full comprehension of Irish Gaelic" and interaction "with your new language like a true native." (Calling it Irish Gaelic in the box text was a somewhat more valid marketing decision, given the non-native audience it is meant to serve. For many native Irish speakers, "Gaelic" refers to the sister language spoken in Scotland and is seldom used to refer to the language in the Republic, a distinction most non-Irish don't make.)

- While the language is described structurally, there is nothing said about the language in terms of its sociopolitical history or in terms of its endangered status and cultural relevance now, although granted, whether to do so is a debatable point. Neither the number of fluent speakers (approximately 10,000 or so; Hindley, 1990), the three main dialect regions which for Irish speakers are highly significant divisions, nor the current status of the language are mentioned. Perhaps this is a good thing, as one criticism of the preservationist paradigm in Ireland over the past 100 years is that the language is only used to chronicle its demise (Ó Dónaill, 1995). IrishNow! instead chronicles its social pertinence, linguistic significance, and potential vitality.

**SUMMARY**

This multi-media language learning system can be used by learners of Irish for self-study and as a supplement to language classes, particularly the many small unofficial classes that have been springing up throughout the US and elsewhere in the past several years. As the multi-media presentation affords examples of native speaker language use via different computer-assisted domains, it is particularly useful for situations outside of Ireland in which the learners have little or no access to native or fluent speakers. For more advanced learners, who may have been to Ireland for language study or attended one of many immersion weekends scheduled by enthusiasts, the software will provide opportunities to build skills and to feel nostalgic. It is software for the diaspora.

Given the paucity of pedagogical materials and approaches until recently (most L2 speakers in the 20th century learned rotely with Bunt's Cainte, Progress in Irish, and the Christian Brothers' grammar) IrishNow! has even more import than it might otherwise. Of course IrishNow! does not replace real immersion but it offers a better approximation than anything else to date.

**ABOUT THE REVIEWER**

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REFERENCES


THE ROLE OF THE COMPUTER IN LEARNING Ndj BBANA

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ABSTRACT

While Computer Assisted Language Learning (CALL) is being superseded by an integrated approach to language learning and technology, it still has great potential to assist indigenous peoples in becoming print-literate in their own languages. This can also help to combat the disempowerment experienced by indigenous people as their world is penetrated by others with radically different backgrounds. This paper reports on research on an application of CALL implemented among the Kunib dji, a remote, indigenous Australian community. It focuses on the use of talking books in Ndj bbana, a language with only 200 speakers; the books were displayed on touch-screens at various locations in the community. Investigations into the roles of the computer to support language learning and cultural understanding are also reported. The computer was found to be a useful tool in promoting Kunib dji collaboration and cultural transformation.

INTRODUCTION

The history of the Kunib dji and the history of CALL are two diverse narratives that have only recently intersected. The 200 Kunib dji people all live in Maningrida which is a remote community on an indigenous Australian reserve in North Australia. All the Kunib dji people have strong links to land and seas in and around Maningrida, as they have for centuries. While all Kunib dji children learn Ndj bbana as their first language, as adults they converse in a variety of languages that are spoken by other Indigenous Australians who live in Maningrida.

About 10 years ago, I arrived in Maningrida. In the last few years, I have had the honour of working with the Kunib dji to implement CAN. My ethnographic research is based on observations and participation in the process of creation and presenting CAN resources around the Maningrida, while working as a teacher at the school. I am not a Kunib dji person, so this paper is presented from the perspective of a non-indigenous Australian.

At the same time as the settlement of Maningrida was being developed, CALL was evolving in other parts of the world. When computers were finally made available to the Kunib dji children at school, CALL was used to support the teaching and learning of English. Computer-assisted Ndj bbana (CAN) was developed in an attempt to support the teaching and learning of Ndj bbana on the computer. This paper examines the role of the computer in CAN in an attempt to find some transferable processes that could be used in other indigenous contexts where the computer is used to support a minority language.

Justification for Introducing CAN to the Kunib dji

Many past reasons for introducing CALL do not apply directly to the Kunib dji situation owing to the different cultural context. Nevertheless, one good reason for implementing CAN is to make the complexity of Ndj bbana print more accessible to the students. McKay (2000) classified Ndj bbana as a non-Pama-Nyungan language as it makes use of prefixes as well as suffixes for derivation in inflection. (p. 155). Ndj bbana verb morphology is "rather complex" (p. 156) and when children begin writing and reading Ndj bbana they soon encounter complex words. For example, Barrar djibanja nalak rrhibiba barrayirr yanja translates to English as "A boy and a girl walking along the road." While CAN does not change the complexity of Ndj bbana, it may provide a useful way of integrating the text with a variety of literacy cues available in the different channels of multimedia.
A second justification comes from the repeated requests from the Kunib dji community over the past 20 years to maintain a Ndj bbana bilingual program that promotes Kunib dji involvement in the school and improves the children’s literacy. CAN has the potential to respond to these requests through the creation and presentation of interactive Ndj bbana resources. Kunib dji electronic literacies can be initiated through the use of CAN in the Ndj bbana bilingual program. Warschauer and Donaghy (1997) describe how students have begun their electronic literacy development in their first language with a similar immersion program.

A third justification for implementing CAN is to support the empowerment of the Kunib dji by increasing their available means of expression. The electronic literacies that will be developed during the production of the interactive resources will embody a new meaning-making system that can be used to express Ndj bbana language and Kunib dji culture. This is not the first time that the Kunib dji have been exposed to a new meaning making system. The development of the Ndj bbana orthography more than 20 years ago contributed to the construction of the Kunib dji culture as "dynamic, open and forever undergoing transformation" (Cope & Kalantzis, 1999, p. 205). The electronic literacies that are incorporated in CAN give the Kunib dji a wider range of available means of expression to understand and contribute actively to their changing life-worlds.

The role of the computer in this study will be investigated in the context of supporting print literacy through multimedia, promoting indigenous involvement in the creation of electronic texts and exposing the Kunib dji to a new means of expression that is linked to powerful global discourses.

**Why Examine the Role of the Computer in CAN?**

There are at least two reasons to examine the role of the computer in CAN. First, it provides a revealing contrast with the roles of the computer originally developed in CALL. The tutor-tool framework identified by Levy (1997a) comes from the application of CALL to an ESL context where issues of cross-cultural literacies were fairly transparent. This study presents CALL in the context of a minority indigenous Australian language whose speakers have a limited history of print literacies. Moreover, the informal location of the study, around Kunib dji homes, is an important factor in addition to the choice of hardware and software, in determining the effective roles the computer will play in CAN.

A second reason is to clarify the process of implementing electronic literacy in Ndj bbana outside the CALL context. Knowledge about the role of the computer in CAN will contribute to understanding the use of the computer to support the teaching and learning of Ndj bbana more generally, something that becomes more important in a changing Kunib dji world.

**LITERATURE REVIEW**

**History of Kunib dji**

Before contact, the Kunib dji all lived around what is now Maningrida. Altman (1987) has divided the post-contact history into "three broad phases that correspond closely to the government’s policy of protection and preservation, assimilation and integration, and self determination and self management" (p. 2).

The **protection and preservation stage** dates from Kunib dji contact with Macassan fishermen early in the 20th century to the establishment of a trading post in 1957 (Altman, 1987, p. 2). The contact by outsiders in this phase was neither extensive nor permanent. Although there were missions established about at Goulburn Island and Milingimbi, both about 100 kilometres from Maningrida, the Kunib dji were "wholly at home" when the missionaries visited (Armstrong, 1967, p. 4).

The subsistence economy declined throughout the **assimilation and integration stage** and as a consequence the Kunib dji became "dependent upon welfare and handouts for survival" (Altman, 1987, p. 4). When Maningrida community officially opened in 1962, there was a hospital, a school, a store, and
administrative buildings as well as housing for white staff (Altman, p. 4). By 1966, the 118 Kunib dji were sharing their land with 554 other indigenous Australians made up of Rembarranga, Burarra, Nakarra, Kunwinjku, Gumawuwurk, and Gorrgone speakers (Armstrong, 1967, p. 5).

Rowley (1971) suggested that the isolated locations of reserves and missions, as well as the limited contact between indigenous and non-indigenous people, may have made the assimilation policies less effective. Such was the case in Maningrida. The Kunib dji lived in extremely poor conditions and worked in low-paying jobs whilst the Balanda lived in a separate housing estate and completely controlled Maningrida (Altman, 1987, p. 4).

A change of government in 1973 began a new phase of self determination and self management that continues today. The result of this change in Maningrida is the gradual return of local political power to the indigenous Australians. During this phase, all indigenous Australians had a right to education and the Ndj bbana bilingual program officially commenced in 1973 (Laughren, 2000, p. 6). Ndj bbana was used as a medium of literacy when school first began under a shelter near the Kunib dji homes in 1978. The relatively recent exposure of the Kunib dji to Ndj bbana print literacy with an aim to overcome disadvantage is a feature of their children’s education.

Today, Ndj bbana is spoken by 150 Kunib dji in and around Maningrida (McKay, 2000, p. 167). There are approximately 1,600 indigenous Australians and 100 non-indigenous Australians also living in Maningrida. The Kunib dji are all multilingual, speaking Ndj bbana as their first language and English as their third or fourth language. While the levels of Ndj bbana and English print literacy are low, owing to a variety of complex social factors, the Kunib dji community members repeatedly request the maintenance and delivery of a Ndj bbana bilingual program. The provision of such a program is an important process of Kunib dji empowerment. A small part of this program is the development of CAN.

Roles of the Computer in CALL

Our understanding of the roles of the computer have developed with our understanding of the relationship between technology and language learning. This section begins by looking at its role as tutor and its role as tool. Learning paradigms will be linked to these roles.

The roles of the computer as a tutor and as a tool are complementary. As a tutor, the computer evaluates the user’s input and responds to it, while as a tool, the computer is employed by the user to enhance his or her own learning or communication.

The role as tutor was initially identified by Taylor (1980, p. 3) where the computer "presents some subject material, the student responds, the computer evaluates the response and from the results of the evaluation, determines what to present next." Levy (1997a, p. 181) suggested in this role as a tutor, the computer is a "temporary substitute" for the teacher. As the capabilities of the computer evolved, the activities they supported became more open-ended. These open-ended activities are a characteristic of the computer as a tool.

The role of the computer as a tool is rather complex and will be split into three other roles for the purposes of this paper. The computer can take on a conjectural role, an emancipatory role, and a collaborative role while still satisfying the more generic role as a tool. In a conjectural role, the focus of the human computer interaction is on the content available for people to evaluate critically; the focus of the computer in the emancipatory role is on the empowerment of the users; while in the collaborative role, the human-to-human interaction remains the focus in a computer mediated environment. Each of these roles will now be examined in more detail starting with the tutor.

As a tool, the computer "augments human capabilities" (Levy, 1997a, p. 184). However, which humans have access to this augmentation is debatable, as highlighted in the exclusion of Kunib dji people from CALL. In this role, the computer needs to be "transparent," matching the tool to the task. One of the
challenges of implementing CAN is to keep the tool transparent for a group of people who have a limited print history. But this can be achieved by the use of appropriate hardware and software.

The role of the computer as a tool becomes ambiguous when the same CALL activity is used by conflicting groups, each as a tool of their own empowerment. For example, Warschauer and Lepeintre (1997) show how the use of electronic network in the classroom can be seen as a tool for a "Freirian community of co-investigators or a Foucauldian model of panopticon control"(p. 86). Viewing the roles of the computer from different perspectives is a useful approach to take in CAN given the diversity and complexity of individual Kunib dji literacies and the non-indigenous Australian involvement in the process of developing CAN resources. The expected roles of the computer in CAN will reflect the "scene of a struggle" (Feenberg, 1991, p. 14) as CALL will be deconstructed to fit a new cultural context.

Levy (1997a, p. 193) covers this problem of ambiguity of the role of the computer as a tool to some extent by linking it to learning paradigms. These learning paradigms were developed by Kemmis, Atkin, and Wright (1977) to "conceive the curriculum task" but also serve to further define the roles of the computer in CALL. As a tutor the computer incorporates instructional and revelationary learning while as a tool the computer covers conjectural and emancipatory learning. Conjectural learning is learner-initiated while with revelatory learning "the focus is on the computer supplying the appropriate data that reveals the pattern or the underlying rule" (Levy, p. 191). Figure 1 below shows how the learning paradigms have been linked to the roles of the computer in CALL.

![Figure 1](image)

When applying this model to CAN there are two contextual differences that need to be addressed. First, there could be multiple learners around the one computer. Second, the limited print and electronic literacy of the users would suggest the computer will need to play some sort of active role (i.e., as a tutor) to reveal and conjecture their form and content.

While the tutor/tool framework includes the roles of the computer identified by other CALL researchers (Higgins, 1983; Philips, 1987; Prescott, 1995; Wyatt, 1984), the emancipatory and collaborative roles could have some application to CAN. The emancipatory role was identified by Kemmis, Atkin, and Wright (1977, p. 29) from Computer Assisted Learning and is characterised by reducing "the inauthenticity of student labour." The emancipatory role of the computer in CAN would also be linked to the empowerment of the Kunib dji as a group "as we offer forms of instruction that are theirs by right" (Gee, 2000, p. 68). Such an application of the role of the computer gives the Kunib dji stake holders a greater choice in the mediums of Ndj bbana language learning and teaching.

An additional role that is worth noting is that of the collaborator where "the initiative is turned over to the student or group of students" (Wyatt, 1984, p. 7). New technologies have potential to enhance this collaboration amongst the students. Debski (1997, p. 60) suggests the new technologies used in CALL are best matched to a "goal orientated, activity and collaborative-based approach to language teaching."

New collaborations will be expected in CAN. There will not just be a collaboration between Kunib dji students but also students and community members as they become involved the creation of interactive Ndj bbana resources. There would be an expected collaboration between indigenous and non-indigenous
people in the implementation of CAN. The cultural literacies offered by the Kunib dji will be combined with the new forms of electronic literacy offered by specific non-indigenous Australians.

**Computers in Indigenous Australian Education**

There have only been limited studies conducted using the computer to support language learning with indigenous Australian students (e.g., Fleer, 1989) and the roles of the computer have not been explicitly identified in any of the studies. However, such an approach is useful to identify the gaps in the research that can help our understanding of the application of the computer to indigenous Australian education.

The role of the computer as a tutor has been linked by Woodside (1985) to the paradigm of indigenous Australian learning styles that were identified by Harris (1980). The choices implicit in choosing styles may be enumerated as follows:

1) Learning by observation and imitation versus verbal instruction.
2) Learning by personal trial and error versus verbal instruction and demonstration.
3) Learning in real-life activities versus practice in contrived settings.
4) Context specific learning versus generalised principles.
5) Personal-orientation versus information-orientation: absence of the institutionalised office of teacher. (Harris, p. 26-102)

The majority of studies have considered the use of computers to enhance Aboriginal learning styles (Coldwell, 1988; Darvall, 1986; Fleer, 1989; O’Donoghue, 1992), particularly in the role of tutor. When applying these learning styles to interactions with the computer, there are arguments for and against using them. Fleer suggests the use of drill and practice software is not designed to support the social interaction amongst indigenous students. However, in a study that linked computer teaching styles and indigenous Australian learning styles, Woodside (1985) suggests the individualised responses on the computer removes the shame factor of incorrect answers.

O Donoghue (1992) identifies several reasons that contribute to Indigenous Australian s success at the computer. These social elements of this success comes from appealing to visual and spatial skills of the children and releasing the children from high level English of non-Indigenous teachers. As a medium the computer is patient, provides instant feedback and provides activities that are fun.

Fryer (1987) suggests the positive benefits of computers with indigenous Australian students reflect the absences of a formal teacher in their society. Computers give indigenous Australian students greater control of their own learning and transform the teachers into helpers rather than presenters of information.

Darvall (1986) used the computer to produce Wytaliba Word Lists as part of a wider use of computers throughout the school. The role of the computer in this study was as a tool, but the methodology of the study is ambiguous. The computer was used as a tool to generate word lists "which listed local dialect words" and has led to the use of "local words in the classroom in both written and oral forms" (p. 5, 7). The use of the computer to promote parental involvement in the school was also noted but this could have been due to the readers that were also developed in English as part of the program.

Czerniejewski (1989) used computers designed to enhance literacy acquisition in Aboriginal children’s own languages, to facilitate the materials production process. Such a use of the computer identifies the role of the computer in providing structural support in for creating a print in indigenous Australian minority languages. At the time of reporting, this would have been relatively recent in for many indigenous Australian languages. The use of CAN will extend this role to provide the Kunib dji with electronic literacies as they create interactive Ndj bbana resources.
Henderson (1993) suggested that the production of locally culturally appropriate software for Aboriginal and Torres Strait Islander students presented the computer as a tool of empowerment. The use of such software means the learning task is open-ended "ensuring the learning context is meaningful" (p.328). This use of the computer aligns it with the emancipatory learning paradigm outlined by Kemmis et al. (1977). The use of CAN could provide a site of Kunib dji empowerment through the application of culturally embedded software that has been suggested by Henderson.

The final role of the computer identified in indigenous Australian education is one where the tutor and tool roles are integrated to produce a "hybrid system" (Levy, 1999). Dench (1990) found language controlled software on touch-sensitive boards was a "powerful tool in bilingual education" (p. 644). The study used touch-sensitive boards as a way of generating legal sentences from groups of pre-selected letters or words. However the meaning was limited by the restrictive nature of the form of the software.

Although the use of a tutor tool hybrid system will not be used in this study, the unrestricted use by Dench (1990) of hardware and software employed to support a minority indigenous Australian language is transferable to CAN. Computer assisted Ndj bbana that allows open ended Ndj bbana text creation and promotes Kunib dji involvement, will use hardware and software that "has gone before, rather than be led purely by the capabilities of the latest technical innovation" (Levy, 1997a, p. xi).

**Culture**

Kroeber and Kluckhohn (1963) reviewed 150 definitions of culture to present two common understandings:

1) culture is a way of life based on a system of shared meanings; and

2) culture is passed from one generation to another through the same system.

Other definitions include systems of standards for believing, perceiving, evaluating, and acting (Goodenough, 1981, p. 41).

Semioticians added to the understanding of culture from a meaning perspective. Culture was seen as a communal system of meanings that provides the means for human beings to translate their instincts, urges, needs, and other propensities into representational and communicative structures (Danesi & Perron, 1999, p. 14).

Signifiers have been used by semioticians in this translation process. Danesi and Perron (1999) have integrated the use of signifiers with Kroeber and Kluckhohn’s ideas of culture:

Culture is a way of life based on a signifying order developed originally in a tribal context that is passed along through the signifying order from one generation to the next. (p. 23)

Such an approach to culture would have some merit in this study where the computer could be seen to present a new signifying system to the Kunib dji. Because the computer is a new cultural artefact in this study, other views of culture will be valuable that focus on the dynamics and ideology. Cope and Kalantsis (2000) approach culture from a design perspective that has a focus of change and transformation rather that stability and regularity. The view of transformation of culture "reconstructs meaning in a way which always adds something to the range of available representational resources" (Cope & Kalantsis, p. 204).

The transformation of cultures does not take place in a social vacuum. Smith (2000, p. 81) suggests "cultures can be conceptualised as a space within which struggles between social forces are conducted." One of these spaces is that of social subjectivity, "a domain that is wider than ideology but narrower than society" (Eagleton, 2000, p. 39). The changing space of CAN includes indigenous and non-indigenous people as well as groups of Kunib dji people constructing their own understandings.
Recently the use of the term culture has been challenged. Hannerz (2001, p. 68) suggests its use is a way of "underlying, even exaggerating, the difference." As the world becomes more globally connected these differences are neither absolute nor eternal. Nevertheless, in indigenous Australian education, there could be some truth to accepting difference. After many years of working with indigenous Australians, Harris (1980) suggests the following:

The two cultures are antithetic -- consisting of more opposites than similarities. They are warring against each other at their foundations. Recognising and accepting the truth of the term incompatible was for me in this study the point of theoretical liberation and the starting point for more effective educational theory to be applied to Aboriginal schools. (p. 9)

Even if this is an exaggeration, anybody who has worked in Maningrida would identify the difference between the Kunib dji and non-indigenous people as a daily reality. The rate of change of this difference also needs to be examined relative to the Kunib dji "global connectedness."

Lull (2001, p. 132) proposed the term superculture reflecting culture as a community but "based primarily on the idea that of culture as a personal orientation and experience and on the dynamic ways that meaningful interaction, activities and identities are constructed by people through contemporary modes, codes and processes of human communication." A proposed superculture does not take into account the digital divide many indigenous people are facing, excluded from global connectedness for political and economic reasons. The Kunib dji have no way of actively participating on the Internet as only a handful of people have telephones and no one has a computer. Even if they did have access, they would be excluded from using their first language as there is no Ndj bana on the Internet. In any case, all the Kunib dji live in the one location with limited levels of print literacy.

**METHODOLOGY**

This study used vignettes to describe the process of design, creation, and presentation of CAN using talking books on touch-screens in an informal context. Each talking book created was unique owing to the Kunib dji who chose to contribute to the integration of pictures sounds and print. The presentation of the material was also embedded in a dynamic movement of Kunib dji around the computer. Although data has been captured on video and analysed, observations and conclusions have also been developed from my partnerships with the Kunib dji people.

The talking books were displayed on a touch-screen outside variety of Kunib dji houses in Maningrida. These sessions took place at night when the screen was clearly viewed from the children and parents. As mentioned earlier the groups around the computer were dynamic and each vignette was a unique text in itself based on who was there present. Generally, there were groups of six to 10 children around the computer taking turns at accessing the talking books on the touch-screens.

For the purpose of this study, the interactions around the development and presentation of the talking books were recorded on video. This video data was supplemented with field notes and conversations with Kunib dji adults around the time of videoing. As the analysis progressed videos were classified in a collaborative manner between the researcher an a group of interested Kunib dji adults that grouped the videos as normative depictions, dramas and critical events as outlined by LeCompte and Schensul (1999, p. 181).

The results were triangulated amongst the adults to reach consensus about the English interpretation of the data and the behaviours that were observed around the computer. Nevertheless, the conceptual understandings presented in this paper based on this evidence is from a non-indigenous researcher’s perspective.
Limitations of the Study

Owing to the unique historical and social context of this study, the transferability of the findings are limited. The limited and relatively recent exposure to vernacular print literacy in this remote indigenous Australian community have called for a special use of CAN for the Kunib dji. As technology and the Kunib dji change rapidly, there may be better tools that match the Kunib dji language learning needs in the very near future. This would include new technologies that would suit the Kunib dji choice of language programs, either in Ndj bbana or English.

A second limitation in this study is the absence of a metalanguage in Ndj bbana. The word for voice is *ng ddja* and paper is *dj rrang*. There are no words for letters, words, or sentences. The application of CALL in this context is compounded where text is manipulated in an electronic medium without any metalanguage.

Design of the Talking Books

The talking books were designed by a Balanda to support the Ndj bbana bilingual program. Owing to the limited history of contact with computers and the scripting that was needed to create such a resource, CAN would not have begun without this input. What is at stake here is the balance between the non-indigenous construction of a new form an indigenous Australian language verses the new meanings of Kunib dji understandings that are developed with the use of CAN.

There were two stages to the design process. The first was the evaluation of CALL resources available for the specific Kunib dji context. Due to the Kunib dji living in the one location and the limited history of print literacy, the use of the Internet was not seen as the best software match for CAN. The multimedia phase of CALL development on the other hand, characterised by the use of hypermedia where learners can navigate with the click of a mouse (Warschauer, 1996), showed some potential in this context. The limited computer literacy needed to access the CAN resources, together with the integrated presentation of text sound and graphics motivated the development of simple talking books in Ndj bbana.

The second phase of the design process was to author a contextually relevant electronic resource. The talking books were originally created in Hypercard but have recently been scripted in *Lingo for Director*. The aim of the design was to keep the program simple, so non-indigenous teachers and Kunib dji community members could own more of the creation process. All pages of the books have identical elements of text sound and pictures. When each page is opened the text is highlighted as it is read. An example of a page of these books is seen below in Figure 2. A completed book can be seen by clicking here.

*Barra-róddjiba barra-rówa
barra-réndjeya mikkombo.*

Figure 2. An example of page from a talking book
While the software complemented the production of Ndj bbana books in the school, the access to the finished books was an issue. While many of the talking books were created in the community, there were problems presenting the material back to the Kunib dji. After one touch-screen was successfully tested in the pre-school, several of these were purchased from a grant with the intention of providing access to the talking books by Kunib dji community members with limited computer literacy.

**Creating the Talking Books**

Talking books have been created in several different ways. A description of two successful ways the talking books have been used follows.

One starting point was the creation of talking books from already finished Ndj bbana texts. The Kunib dji children become familiar with the text and when they had understanding of the sequence, they acted out the scenes around the community. This often attracted lots of attention from Kunib dji community members. The computer was usually taken out into the community and the digital pictures taken of the scenes by the children were downloaded onto the computer while other children typed the text into the computer at a later stage. Each page of the text was read, often by different community members, and was recorded by the Kunib dji literacy worker or a non-indigenous teacher using the computer. The sound, text and pictures were all matched together and the text was synchronised to highlight the words as it was read.

Another starting point was the negotiated texts from whole language experiences, which usually began with recording these events on the digital camera. A text was negotiated between the Kunib dji literacy worker and the students and was then matched to a variety of pictures. Sometimes the texts were negotiated with community members and the students on the excursion. The sound was recorded after the literacy worker had checked the entire text with other community members to gain a consensus.

**Presentation of Talking Books on Touch-Screens**

The touch-screens were taken to a variety of locations around the community. While the creation of the talking books has mostly happened during school time, their presentation has occurred after school hours, most popularly in the evenings. The presentation of the finished talking books is in direct competition with other life-world obligations and entertainment. Based on my observations they compete significantly.

When viewing the finished talking books on the touch-screen, there are often up to four generations of people gathered around the computer. There are two components of this language learning site: one involves the interaction with the computer and the other is the interactions between the Kunib dji. Although each talking book can be stopped at any time, they are usually viewed from start to finish. When the books are finished there are commands from a variety of people to the child delegated to be in control of the screen. The simplified form of the talking books is complimented by the dynamic and complex social construction where a variety of literacies mark the site of CAN.

Another setting of CAN is just one or two people at the touch-screen. The site of CAN can change from a dozen people to one when a car comes past that is going to the football game. When there are only a couple of people, the children can tinker with the form to reveal the rules of navigation and learn through repetitive exposure of the content. Free from the demands of more senior people or their peers, the children can play the same page over as many times as they like. However, these opportunities are fairly short lived and as more people gather around the touch-screen, the focus changes to one of repetitively examining the content of the talking books. An example of the use of the talking books on the touch-screen in a Kunib dji family context is shown in Figure 3.
RESULTS: THE ROLE OF THE COMPUTER IN CAN

There are three findings in this study regarding the roles of the computer. First, it is possible to discern the roles that have already been identified by other researchers. Second, some of the roles that have already been identified find new applications. Finally, there are new roles for the computer in CAN that have not yet been described in the literature.

Applying Collaboration and Emancipation

There are two roles of the computer that have been identified in CALL that directly describe CAN. First, the computer was a tool of collaboration amongst the students (Debski, 1997; Levy 1997b; Warschauer & Donaghy, 1997). One example was the critical use of the digital camera by the students. After some initial instructions and modelling from the teacher, the students were very quick to learn how to capture images to their satisfaction. The computer played an important part immediately reflecting to the children their attempts at taking pictures for the stories in the books. This was often done using a laptop in the community. Before the use of the digital camera, the films took between 1 and 3 weeks to be processed in Darwin. This made continuity of production very difficult. The digital camera, on the other hand, promoted meaningful collaboration amongst the students as they came to control an immediate electronic text production process. An example of the use of the digital camera contextualising the literacy resources is shown in the linked talking book.

The second role that has already been identified by CALL and can be applied to CAN is one of emancipation. While creating the talking books, both students and adults were unlocking the knowledge of the computer. The students were exposed to simple multimedia capabilities of the computer in their own language. Once the students and Kunib dji knew the possibilities of the media, they then began to control the exploitation of the multimedia form to present their message in a variety of channels in Ndj bbana. The popular book *Marr kama Nga-b yanga Mud kkang* (Buy Me a Truck) is one example of the use of the computer as a tool of emancipation. The students acted out a book that was 10 years old,
then added sounds to create a production that reinforced cultural relationships and appropriate Kunib dji behaviour. The added channels of sound and the contextual pictures using the digital camera extended the meaning the children took from the talking books so created. The use of the digital camera gives the children access to embedded cultural cues that reflect their life-worlds better than generic illustrations found in the original printed book. The control of the camera by the children is also an important liberating process in the creation of Ndj bbana texts.

**Extending Conjecture and Collaboration**

There are also roles that have been identified in CALL that need to be extended when used in CAN. One is that of conjecture which needs to be extended in two ways to include a CAN context. First, owing to the simple nature of the talking books, the form of the computer as a new media was conjectured. Students have the opportunity in an informal context to test their ideas of forms of print and electronic literacies throughout the production of the talking books. The talking books supported the students matching and sequencing of the forms of pictures, sounds and text for example.

The second way this role is different in a CAN is its supplementary nature. Owing to the large numbers of community members around the computer, any content that is to be tested by the user has most probably been scrutinised by some other member of the group around the computer. One example of this is the navigational commands given to the computer to access the different talking books in a complex and dynamic social context. This can be seen in the following video of the children interacting around the touch-screen.

![Movie 1.](image)

Movie 1. [NOTE: In the Web version, this is a playable movie.]

The younger children who interact with the computer are told by the older children which books to choose. The children learn to navigate by suggestions from other people who have used the computer before. Rather than individually tinkering with the computer’s symbolic representations, the child operating the touch-screen learns a variety of embedded Kunib dji discourses as he asserts or negotiates his choice with other children.

Another extension of the computer’s roles is one as a collaborative tool. This collaboration happened amongst the children, between children and parents, and between Kunib dji and non-indigenous people. The computer as a collaborative tool amongst the students has been discussed above. While the computer has been found to support interest and knowledge exchanges between the school and community members (Fleer, 1989), the informal context of this study promoted parent and child collaboration. The parents not only played an active role in the recording process, they also validated the language used in the resources adding status to CAN. This is shown in **Movie 2**, the popular book *Dj ya Barrang dja K ma Ngabarram yiba* (We Don’t Eat These Animals):
Movie 2. [NOTE: In the Web version, this is a playable movie.]

While the above example is a simple case of a young child repeating her grandmother’s reading, the collaboration across generations may change as the users become more confident with the signifying system found in the talking books. One community member tells of what happened when the adults and children used the computer in her house.

Collaboration also took place between Kunib dji and non-indigenous people. However, this is best discussed by including it in a new role of the computer examined in the next section.

**Presenting Cultural Transformation**

The new role of the computer that will be presented here is to support Kunib dji cultural transformation. There are at least three ways the computer in CAN moves beyond "augmenting human behaviour" (Levy, 1997a) to transforming Kunib dji life-worlds.

First, the computer in CAN increases the available means of expression for the Kunib dji. The electronic literacy that the Kunib dji learn while creating and interacting with CAN resources have not only integrated both oral and print literacies, they have begun the process of demystifying electronic literacy in general. While still in the early stages of implementation, the computer serves as a tool of expanding the Kunib dji world and its representation through application of hardware and software.

The following video of the creating the talking book *Yibarda* gives an example of how Kunib dji lifeworlds are transformed in CAN:

Movie 3. [NOTE: In the Web version, this is a playable movie.]

There are two ways the participants’ views of the world were expanded. First, the Kunib dji woman used the computer to negotiate the text to be read to her father. As this negotiation continued, the computer was almost an invisible part of her reading, something which she only started using a few hours earlier. The
second expansion was the recording of the words spoken by the old man. After a few phrases and testing the microphone, he quickly took on the task at hand with help from his daughter. His participation meant he had a voice, in more ways than one, in the new realm of Ndj bbana talking books.

The second way the computer serves to transform the Kunib dji world is the non-indigenous and indigenous interactions around the computer. Repeatedly, I called on Kunib dji community members to explain to me some of the many complexities of Ndj bbana language, while I also responded to explicit questions about the capabilities of the computer. The explanations about the computer were usually done in English and then translated to the group of community members by a Kunib dji literacy worker. The Kunib dji were learning two forms of literacy while producing CAN resources: the electronic literacies embedded in CAN and their social literacies as they challenged a non-indigenous person to explain components of their social life-world. The "shunting backwards and forwards between one life-world context and another" (Cope & Kalantzis, 2000, p. 211) that happens during the development of CAN resources, supports the transformation of Kunib dji life-worlds.

Finally, the hybridity of Ndj bbana represented in the talking books provides a new transformation of the Kunib dji life-worlds. Hybridity and voice are the two elements of cultural transformation identified by Cope and Kalantzis (2000, p. 204) The elements of hybridity and voice fit well with wider models of cultural and linguistic pluralism across a variety of media proposed by the New London Group (1996). However, on a small scale in the Kunib dji context, the cultural and linguistic pluralism is temporal, rather than global spatial as proposed above. The talking books give younger Ndj bbana speakers access to new media where their texts add to the hybridity of their language rather than supporting the maintenance of a print form of Ndj bbana that was constructed more than 25 years ago. Where the computer is used to record and subsequently reveal the "simplification and regularisation of the language amongst the younger speakers" (McKay, 2000, p. 176), it serves to reflect the diversity of spoken Ndj bbana to the stake holders of the bilingual program. Used repetitively, the talking books present this hybrid construction of Ndj bbana through which individual Kunib dji's will use make meaning of their changing life-worlds. The computer conjectures this hybrid representation of Ndj bbana present in the talking books as the channel of sound is added to the text production process.

The example of this hybridity can be seen in the talking book Njarra-b na M kkombo Malabun wa (We Went Fishing at Malabun wa). This book highlights the hybrid construction of Ndj bbana from the younger speakers reading the book and from the older speakers who contributed the names of the three different fish. The voices of older and younger speakers are included in the text, which was made during a 5-day excursion to Malabun wa.

**Ideological Implications**

There are several ideological implications for the use of the computer as a tool of Kunib dji cultural transformation. These include the loss of linguistic diversity, the pathway to global connectedness, and the changing responsibilities of non-indigenous people to promote Kunib dji electronic literacies.

First, the use of the CAN to support the move from an oral to a print literacy may be have ideological implications if compared to other indigenous experiences of the Pacific. M lh usler (1990, p. 189) suggests that languages were literally reduced to writing when vernacular literacy was introduced to those languages. He also suggested this process of moving from an oral to print culture "contributed to the creation of communicative inequalities and decreasing heterogeneity" (p. 213). CAN, on the other hand, supports and preserves the Ndj bbana diversity. This is achieved by its design and application. From a design perspective, channels of text, sound, and pictures from a variety of contributors are integrated to create the talking books. After one old man saw the comptuer in action the following conversation about how it could be used was recorded. He viewed the extra channels of the multimedia ones in which he could participate in the text production process.
The popularity of the touch-screens suggests the children are willing to access over and over again a variety of Ndj bbana stories in the absence of their authors. A "broadened social-semiotic perspective" (Walton, 1996, p. 3) is available to the children through CAN, a situation which has implications for global learning. At least one Kunib dji community member has identified the use of the electronic literacies of the non-indigenous people as a desirable characteristic for the Kunib dji.

A second ideological observation on the role of the computer as a tool of cultural transformation comes when we remember that the Kunib dji are choosing to use a tool that could lead to global connectedness. While levels of print literacy are generally low amongst the Kunib dji, they are choosing to interact with a Ndj bbana electronic resource that has print content. Non-indigenous people have a certain responsibility to extend the choices available to the Kunib dji. Levels of print literacy, in the short term, are still low, but some Kunib dji could become electronically literate in order to be ambassadors of the Internet for their people. Another approach would be for non-indigenous people to develop new ways of accessing the Internet so that people like the Kunib dji can have a voice.

CAN takes place in a context with low levels of Ndj bbana literacy and spasmodic attendance patterns at school. The willingness of the children to access the touch-screens in this context suggests the re-evaluation of the roles and responsibilities of staff in the school and community. Because the medium can present contextually created resources that are repetitively accessed, it may be more effective for some aspects of education and community development training than classroom-based learning. While the Kunib dji choose to use the touch-screens, there is a ideological challenge to examine non-indigenous roles and responsibilities to enhance and support the use of computers in this context. The long-term benefits of this would support more Kunib dji people making choices about global connectedness discussed above. The role of the computer in presenting Ndj bbana electronic literacies to the young children is the first stage in this process.

The willingness of children to access the computer is complemented by the community members’ wish to use the computer to support the teaching and learning of Ndj bbana as one experienced Kunib dji teacher told me.

FUTURE RESEARCH

There are two roles of the computer that would be worthy of more research. First the computer as a tool of non-indigenous and indigenous collaboration needs to be addressed. The role of the computer to support cross cultural collaboration needs to be linked to the desired responsibilities and authorities of the people involved. The role of the computer to support indigenous self-determination needs more research. Such research is essential if the indigenous peoples are to have access to CALL research and development that will empower their life-worlds.

The second area of future research is the role of the computer as a meta-research tool in an indigenous Australian context. The touch-screens in this study would provide an excellent tool of for reporting research back to indigenous people. Reports commissioned to investigate social issues with indigenous Australians could be presented on touch-screens based in community organisations to make the results more accessible. Such reporting back, particularly if it was done in the community members first language, would see the computer play a role to support the emancipation of indigenous Australians.

CONCLUSIONS

When applying pedagogical principals to CALL, Wyatt (1988) outlines the need to for a fit between the “computer’s capabilities and the demands of language pedagogy” (p. 86). This study would broaden this fit when CALL is used to support an indigenous language. There needs to be a fit between the computer’s capabilities and the demands of language pedagogy and cultural constructions of the indigenous community. This study has attempted to provide such a fit, by using appropriate hardware and software to present Ndj bbana language and Kunib dji culture in a new form that makes a wider construction of
cultural literacy more accessible and controllable to groups of Kunib dji community members in an informal context.

This study has presented the role of the computer from the design, creation, and presentation of CAN resources. The development of Ndj bbana talking books and their subsequent presentation on the touch-screens reinforces the computer as tool of collaboration and emancipation where the students practice constructing contextual texts in their first language. Due to the limited history of both vernacular print literacy and the limited exposure and access to English print literacy, the computer serves to conjecture a link between print and oral literacies by the repetitive presentation of the talking books on the touch screens. This study found the community involvement around the touch-screens supported a supplementary conjectural role of the computer, with social language learning happening at the site of CAN. The collaborative role of the computer between students and community members constructed CAN as a more integrated site of language learning where there were often more than three generations of Kunib dji around the computer.

This study also found the computer supported Kunib dji cultural transformation by increasing their available designs of meaning. While the Kunib dji are interacting around the touch-screens they are integrating new literacies into their complex lifeworlds. The computer was used in this study to represent a hybrid form of Ndj bbana, which also supports the transformation of Kunib dji culture. The inclusive nature of Ndj bbana talking books allowed a range of Kunib dji voices to be spoken across a variety of channels which could be heard on demand in the Kunib dji homes.

The ready acceptance of the computer as a new cultural artifact demands a review of educational roles and responsibilities of people involved in Kunib dji education. The active engagement with the touch-screens in the Kunib dji houses also calls for the development of a framework that would give the Kunib dji a voice in the new global discourses that are supported by the technological literacies the Kunib dji are now learning.

While the creation of the talking books extended the Kunib dji’s electronic literacies, the role of the computer as a tool of cultural transformation was identified. Using the computer to create and present Ndj bbana talking books, the Kunib dji means of expression were extended. The non-indigenous and indigenous collaboration around the computer not only expanded the Kunib dji understandings of the new form of media; it constructed a site where explanations of life-worlds were explicitly presented between two cultures. The inclusive nature of the talking books allowed younger Kunib dji to have a voice in the creation of Ndj bbana texts. The hybrid nature of the talking books constructed a changing Ndj bbana and their presentation invited a critical analysis of this language shift by Kunib dji stake holders.

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ABSTRACT

Fabula, an interdisciplinary project funded by the EU Multimedia Software programme, provides software to enable children learning European minority languages to create bilingual digital books. We share a set of assumptions and approaches to the key issues addressed by the project. First, bilingual books are a powerful teaching tool of great value in multilingual classrooms. Second, the graphic design of books has important effects in finding inventive solutions to problems. Third, multimedia can enrich bilingual books. Finally, self-made materials motivate children. These assumptions led to a general definition of the Fabula software: an easy-to-use software environment for making and viewing interactive multimedia bilingual books, concentrating on "languages of lesser diffusion." The language pairs we currently cater for are Welsh/English, Irish/English, Basque/French, Catalan/Spanish and Frisian/Dutch. We shall present a brief description of the Fabula software and discuss the ways in which it has been used in schools in Europe. We shall also set out our future plans for Fabula, including a Europe-wide competition for schools and the creation of a WWW-based "on-line library" for teachers and children who use the Fabula software.

INTRODUCTION

Minority languages suffer from a dearth of electronic media suitable for children, whether for language learning or for general use. The market for multimedia products in minority languages rarely justifies the outlay required from developers and publishers. However, the availability of electronic media can be a powerful motivator for young people in particular, to develop and maintain their knowledge of a minority language which might otherwise be overshadowed by more glamorous media products in the more widely used languages.

Fabula is a multidisciplinary, multinational project, initially funded by the European Commission, which goes some way to repairing this lack. In its two-year development phase, it involved teachers, children, software engineers, information designers and translators, together with academic researchers in linguistics, education, human-computer interaction and typography. Partners in England, the Basque country, Catalunia, Friesland, Ireland, and Wales set out to produce a simple-to-use tool for making bilingual multimedia story books in the lesser used languages of Europe. The aims were twofold: to help ensure that minority languages were not excluded from the Information Age and to increase the perceived status of lesser-used languages by associating them with new technologies.
This paper offers a brief description of the development and evaluation of the Fabula software and the ways in which it has been used in schools in Europe. We also set out our future plans for Fabula, including a virtual library of multimedia books for speakers and learners of minority languages.

Assumptions of the Fabula Project

The partners in the Fabula project shared a set of assumptions and approaches to the key issues addressed by the project. To begin with, we had a shared belief that bilingual books can be a powerful teaching tool. At a pragmatic level, those of the team experienced in language teaching in the UK context had long been convinced of the value of (paper-based) bilingual books for strengthening the position of minority languages. They had recently published a book of design guidelines for teachers thinking of using such books in the classroom (Edwards & Walker, 1995). Although the language learning setting in some of the other partners’ regions was rather different, with an emphasis on foregrounding the minority language in a monolingual school setting, teachers in each region were open to experimenting with this new tool.

We also believed that the graphic design of books, paper or electronic, has important effects. Designers of paper-based books have struggled to find inventive solutions to problems such as how to position text in both languages on a page without suggesting that one is more important than the other. These details are noted by children given bilingual books as educational material, and influence their attitude towards the languages in question, often negatively. Enabling children to create products that are aesthetically pleasing is an important goal.

We shared the view that multimedia can enrich bilingual books. The specific stimulus for the project was the belief that creating digital versions of bilingual books can at once enrich the books by adding audio and other interactive elements and also solve some of the design problems connected with the paper medium. In addition, and importantly, digital books will give minority languages the high status attached to computer-based material and give children enjoyable, engaging language learning/exploration tools.

Finally, we believed that self-made materials motivate children. Some of the most successful of the paper bilingual books had been created by the children themselves, illustrating the constructionist approach to teaching, which holds broadly that creating an artefact is a more powerful way of learning than consuming another’s product (Druin & Solomon, 1996; Jonassen, Peck, Wilson, & Pfeiffer, 1998). The active involvement of the children as collaborative creators rather than consumers is central to the successful use of the software in classrooms. An important practical spin-off is that these projects produce minority language materials for use in other teaching situations.

These assumptions led to a general definition of the Fabula software: an easy-to-use software environment for making and viewing interactive multimedia bilingual books, concentrating on European "languages of lesser diffusion." The language pairs used in the development phase were Welsh/English, Irish/English, Basque/French, Catalan/ Spanish and Friesian/Dutch. The software consists of two integrated components: a simple multimedia authoring environment (the Fabula Maker) enabling users to create pages of text and graphics, plus interactive elements; and a browser-like environment (Fabula Reader) for reading and interacting with the products of the Fabula Maker.

The Fabula Software

In the development phase, the project had two main objectives. The first was to develop a tool sufficiently usable and flexible to meet the needs of teachers and children producing their own bilingual multimedia materials in a range of different settings. Several multimedia applications were already available and were considered for use: high-end professional programs like Macromedia Authorware and Director can be found alongside others such as the Learning Company’s KidPixor StoryBook Weaver, which are more likely to be available on a school budget. However, the more sophisticated programs require relatively advanced technical and design skills to create a reasonable result. The lower-end products, while easy and fun to use, tend to encourage the use of prepared graphic and audio material with an unmistakably U.S.
flavour. In addition, localised versions of whatever software we produced would be essential, and while authoring packages exist in the major languages, the lesser used languages were not well catered for, and the code of the packages would not have been available to us for localisation. In contrast, we envisaged Fabula as an easy to use tool which would draw on the principles of best practice for screen based learning materials and be designed specifically to meet the needs of bilingual children and teachers in a number of different countries. This objective has now been achieved: the authoring and browsing tools are currently available in the project languages on CD-ROM (for schools which are not yet online) and can also be downloaded free of charge from the Fabula Web site: www.fabula.eu.org.

The early thinking on the project assumed a scenario in which an adult professional -- likely to be a teacher or a translator, or possibly a commercial publisher -- would create a second language version of a pre-existing monolingual text for display in the Fabula Reader. Alternatively, we thought the teacher might take an existing bilingual electronic book in one pair of languages and substitute her own language version for either one or both original languages. The bilingual product would then be given to the children. The team’s thinking on this point evolved, however, and the scenario we worked toward was of children being involved in creating bilingual storybooks, probably from scratch, using their own graphic material. This assigns children a more active role and is in line with current best practice in bilingual classrooms.

The decision to target children as users of the Fabula Maker as well as the Reader meant that it had to be straightforward and simple to use. Maker is used to assemble multimedia objects, acquired for instance from a scanner, digital camera, or audio CD, into an electronic book. We have not attempted to build in media editing facilities (word processor, drawing package, sound editor) as these are available relatively easily elsewhere. There are two screen areas for text, one for each language, to be assigned as the user chooses. Users can add various types of interactivity, such as in the form of links from the picture to media objects such as sound files (containing spoken dialogue fragments or recorded sound effects), labels, or speech and thought bubbles (containing text). In addition, users can place links between a word or phrase of one language and its equivalent in the other to create a kind of simple guessing game for any child reading it. Links can also be made from individual words to a bilingual glossary for the book. If a spoken version of the entire text in a text panel has been recorded, this can be linked in via a special button on the relevant text panel (Figure 1).

The overall look of the package is quiet and plain. Our aim has been for the software itself to melt into the background and become "invisible," that is, so easy to use that it does not present itself as an object of interest in its own right. Perhaps controversially for a children’s software package, there is little room to experiment with font styles, border patterns, or background colours. While the graphics imported into the package may obviously be of any kind the user chooses, once inside the package the choices for fonts and backgrounds are strictly limited to a single set of colour combinations and fonts that "work." We hope that this will enable our users to produce high quality products with the accompanying satisfaction that this gives, while avoiding the confusion and the "where do I start" feeling often aroused by more open-ended software (Druin & Salomon, 1996).
Figure 1. The Fabula Maker window

The Reader stands in the same relation to the Maker as a Web browser to a Web authoring programme. Here a reader can page through the book, explore the interactive elements of the pictures, look words up in the glossary and try to work out which parts of the version in one language correspond to the other version. A more passive use is to click the "Read to me" button on the title page, which takes the reader from page to page as a spoken version of the book is read out in the language of the child’s choice.

**Documentation and Training**

The second objective was to disseminate guidance for teachers intending to create, repurpose, and/or use bilingual multimedia material. The software is accompanied by user documentation and includes information on how to do things such as taking digital photos or digitising sound recordings that are outside the scope of the project, together with teaching tips on how to integrate the programme into classroom practice. This teaching advice has been developed in collaboration with teacher partners in the participating countries. Workshops were arranged in each of the five countries involved to introduce it to an even wider base of teachers and thereby to establish a community of expert users. The project web is also important here, as a focus for discussion by users of the software.
FABULA IN USE

The following section describes three examples of the ways in which Fabula has actually been used in schools. We have deliberately chosen this case study approach so as to highlight not only the different benefits associated with bilingual digital stories, but to draw attention to the ways in which these benefits mutually reinforce each other.

Zaunka ari zen gatua (The Cat That Barked)

Errobi Ikastola is a small four-class school in Cambo les Bains in the Northern Basque country. The teachers’ salaries are paid by the French government, but the buildings and other resources are funded by a co-operative of parents and teachers anxious to provide a Basque-medium education for their children. Although the teachers in the Ikastola had very little experience of IT at the start of the project, they embraced the opportunity to use the Fabula program with great enthusiasm. They were particularly adept at enlisting the help of other members of the community when faced with gaps in their own knowledge and experience.

The Fabula story was developed with a class of 8 - 10 year olds, co-taught by Lilian Hirigoyen and Janine Urruty, as part of work on narratives and the structure of stories. The children were put into groups of two or three and asked to analyse the underlying structure of A Lovely Bunch of Coconuts, a conventional picturebook by English writer Dennis Reader (1991) that had been repurposed as the first Fabula story in order to give children and teachers a taste of what a bilingual digital story might look like. In a subsequent session, they were asked to write their own stories in Basque using a similar structure: introduction of the characters, setting a problem, saying what happened, providing a resolution, giving the tale a twist. The children then read each other’s stories and voted for the best draft.

The winning story was "Zaunka ari zen gatua" (The Cat That Barked). Bintu the cat drinks a magical potion and starts to bark like a dog. He sets off to find the old man of the mountains to help him get his meow back. When he gets back he finds that something else has changed. After having chosen the story, the whole class worked on improving it together. At this stage, the teachers encouraged the children to enrich the language, focusing in particular on connectors and adjectives. Once the Basque version of the story was complete, it was sent to another class, who translated it into French. The story was then read by a class of 6 year-olds with less well-developed Basque language skills, who drew the illustrations.

The children now had access to the ingredients for making a Fabula storybook (Figure 2). The specially commissioned illustrations were scanned and made into jpeg files and the two older classes made digital audio recordings of both language versions of the story. The older children then combined the story texts, audio recordings, and images into a full Fabula storybook. The entire story-making activity took around one month to complete from initial analysis and drafting to implementation with the software. The bilingual "Cat That Barked" storybook has subsequently been used as the basis for a range of language awareness lessons with the younger children. Another inter-class activity involving the older children was used to develop a bilingual wordlist to accompany the story.
The second example comes from St Illtyd’s Roman Catholic Primary School in Swansea, South Wales. In Wales, both English and Welsh have equal status for official purposes. Small but growing numbers of children are educated through the medium of both Welsh and English in ysgolion Cymraeg, or designated Welsh schools. However, even in English medium schools, Welsh forms part of the National Curriculum and by 1999 almost all pupils between the ages of 5 and 16 were studying it either as a joint or a second language (Peate, Coupland, & Garrett, 1998). St Illtyd’s is an English medium school where children learn Welsh as a second language.

As was the case for Errobi Ikastola, the children at St Illtyd’s were centrally involved in the planning and creation of a bilingual, multimedia story. The class had been working on a school drama project developing their own play based on the ancient Welsh myth of Branwen, and a group of children from the school had been involved in performing the play in the Millennium Dome in London. The children had all written their own English version of the story and it was decided that this would form the basis for a bilingual digital story using the Fabula software (Figure 3).
Agreement was reached on which were the key scenes in the story. The children divided into groups with each group taking responsibility for a scene. They also discussed the layout of the page, the sounds they could use and how they would produce them -- battle raging; cauldrons cracking; waves breaking; gossips whispering, and so forth. The realisation that they would need to produce a Welsh version had the effect of focussing their minds on the English text. At the outset they were only thinking in terms of vocabulary. They saw their task as finding any unfamiliar words in a Welsh-English dictionary. As things progressed, however, they realised that they needed to find equivalents not only for individual words, but also for idioms and grammatical structures and that, in many cases, they lacked the linguistic resources to be able to find appropriate translations. This led them to find other solutions. They realised that the task was more a process of parallel authoring than translation, where the English text needed to be driven by their existing knowledge of Welsh. This process can be illustrated by looking at the first and second drafts of one of the pages of the story:

Bran went to the battlefield with 500 men. You would be able only to hear “For Wales!” and screaming. Mofuloch waited with 500 men also. Wales were behind because Ireland had the cauldron of rebirth so Nisien tried to smash it, but he died. The battle was tiring, long. Blood stained the grass and bodies scattered the battlefield.

This early draft is the product of native speakers of English with little sensitivity to the main structural differences between English and Welsh. The final version embodies a much more realistic view from the children of what they could achieve as learners of Welsh as a second language at their current stage of development:

The battle had begun. Ireland had the advantage because of the cauldron. The battle was long, tiring and bloody.
Interestingly, it is possible to argue that the final draft of the English version is a more focused and more coherent structure. In this sense, the exercise of producing a bilingual story is also incidentally providing support for writing in the children’s first language.

**Annwyl Fferm (Dear Farm)**

The third story was developed in a Swansea school where children learn Welsh as a second language. Sharon Davies is the teacher of a class of 5 - 6 year-olds. Because she was working with younger children, she decided to take a more structured, didactic approach than the teachers in Errobi Ikastola or St Illtyd’s. She began by reading *Dear Zoo*, a well-known children’s book by Rod Campbell based on highly predictable patterns of language:

- I wrote to the zoo to send me a pet. They sent me an elephant. He was too big!
- I sent him back.
- So they sent me a giraffe. He was too tall!
- I sent him back.

The children used this as the model for their own story of a visit to a farm, drawing on the same pattern and structures, but substituting different animals and adjectives.

![Figure 4. Annwyl Fferm / Dear Farm](image)

The highly predictable language patterns not only allowed the children to learn the Welsh constructions very quickly but also to make suggestions for new words in Welsh. For instance, when translating "So they sent me a duck. He was too quacky," they invented the word *gwaciog*, based partly of the sound of the duck and partly on the -iog ending often associated with adjectives in Welsh. Although *gwaciog* is no more a conventional Welsh word than *quacky* is an English word, it was none the less totally comprehensible to a Welsh speaker and showed an impressive understanding of how the language works.
LESSONS LEARNED

One of the things that have become apparent in the evaluation of the Fabula software is the very wide range of ways in which this tool can be used in the classroom. Most possibilities involve collaboration between, on the one hand, children, teachers, and parents who speak the minority language and, on the other hand, children, teachers, and parents keen to acquire it. Such collaboration also offers opportunities to write for real audiences for a real reason, a feature that has frequently been identified as a fundamental in the successful development of writing skills (Hall & Robinson, 1994).

Although the three classes approached the making of their Fabula stories in very different ways, a number of common threads can be identified both in the stories already considered and from the experiences of other teachers and children who took part in the evaluation of the software.

The opportunity to compare two languages allows even very young children to develop their metalinguistic awareness: the fact that word order differs from one language to another; that different languages are sometimes written in different directions; that equivalent words in different languages often bear no physical relationship to each other. Speculation of this kind can lead to greater understanding of the target language.

The comparison of texts can also lead to language awareness of a rather higher order. Children are encouraged to think about the nature of translation: Are they aiming for word-for-word meaning or trying to communicate the sense of the first text in composing the second? Second language learners are also challenged by the need for parallel authoring, a process in which the children’s level of competence in the second language determines the nature of the first language text.

The creation of bilingual digital books encourages the development of skills that benefit writing both in the first and second languages. The advantages of book making have already been well-documented for "paper" books (Johnson, 1994). Children develop a range of social and organisational skills that help consolidate their progress as writers. The organisational and planning aspects of electronic stories are even more complex. As a result, they offer children many opportunities for collaboration and the development of project management skills as well, of course, as for deepening their understanding of Information and Communication Technology (ICT). Indeed, children who author their own multimedia stories will be developing relatively high levels of ICT skills, as they make decisions about multimedia design. In this way they become not just consumers of software but also creators.

The bilingual focus of the Fabula software offers valuable opportunities for language learning. These can take the form of discussion of the spontaneous comments offered by children as they read and create texts in two languages. They can also be more didactic in approach as, for instance, in the case of group writing, where the teacher models particular vocabulary or constructions which children help to develop into their own distinctive story -- or through looking closely at similarities and differences between texts.

Status is another common thread, not previously mentioned, but running through the experiences of all the teachers who took part in the evaluation. The association of high status multimedia technologies with minority languages has far-reaching implications. Educators within these minority contexts are faced with various challenges in relation to both print and electronic resources. Because print runs for paper publications are small, the unit price is necessarily high and, as a result, the range and quality of material are far more limited than is the case for languages with larger numbers of speakers. Electronic resources are also subject to market forces. Whereas "major" languages like English, Spanish, and French feature prominently in commercial applications, minority languages, such as Friesian, Basque, and Welsh, are poorly served.

It is therefore not surprising that the few electronic resources that do exist in minority languages are greeted with enthusiasm. Chana, Edwards, and Walker (1998), for instance, describe how attendance at a Urdu club in a multilingual primary school increased from 6 to 22 (including six monolingual English
speakers) when an Urdu word-processing programme was introduced. The high status associated with the new technologies seems to have been transferred to the minority language. The reactions of children taking part in the Fabula project were very similar. Many commented spontaneously -- and with enthusiasm -- on the fact that the interface was in the minority language; many also expressed approval for the fact that the sound functions allowed them to practice the minority language independently of the teacher.

FURTHER DEVELOPMENT

Current efforts on Fabula (now that the first version of the software has been developed, launch events have taken place, and trained users are in place) are concentrated on the development of the Web site. During the initial phase, this served mainly as a download site for the software and documentation. However, the ambition for the site is that it should be a focus for ongoing development and use of the software, with two major areas. The first is a "Virtual Fabula Community." Here teachers, parents and eventually children, will be able to communicate via e-mail, bulletin boards, and conferencing software. They will be able to hold discussions about their use of the software, as well as presumably provide descriptions of their schools, their classes, their language situations, and so on. Using Fabula as common ground, we hope that this will create a community of teachers and parents interested in discussing new approaches to teaching and learning minority languages. This has already begun within the regions where the project partners are located, but there is clearly potential for increasing the circle of participants to other regions and languages of Europe.

The second major area of the Web site is the Fabula "Virtual Library." Here, those who have used the software to create bilingual stories will be encouraged to deposit their work so that other teachers and children can download it to read it or reuse it in their own classrooms. Versions of "A Lovely Bunch of Coconuts" in five language pairs are already available and other titles are in preparation. The stories will be indexed so that both teachers and children can pick suitable titles and in turn add to the collection themselves. We see this creation of a collection of electronic resources in minority languages as potentially a major benefit of the project. The prospect of having their work published for the rest of Europe to see has proven highly motivating, especially for the older children in the partner schools, and they are keen to see this aspect of the project progress, to make contact with other schools, to hear what they thought of their stories, and so on. This enthusiasm reflects the attitudes of the teachers who have given their own time to be involved in the project. What has become very clear over the course of the project is that Fabula is much more than a software package. While the software is a useful tool, it also forms the focus for a community of users with a commitment to high quality and innovative language teaching, keen to look outwards to share their experiences.

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REFERENCES


EARLY EFFECTS OF TECHNOLOGY ON THE OKLAHOMA CHOCTAW LANGUAGE COMMUNITY

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ABSTRACT

The Choctaw Nation of Oklahoma has implemented some new technological means of teaching the Choctaw language to its dispersed members. After an initial year of telecourses, an Internet course was introduced in 2000 which has served approximately 1,000 students at varying levels of intensity. The design of the course makes direct evaluation of language learning difficult; however, the program has served other goals, such as cultural solidarity and political prestige for the tribal government. The introduction of high technology into the Choctaw Language Program has had other strong effects in facilitating other ventures into high-level preservation, literacy, and pedagogical efforts, the most important of which is putting the Choctaw language into all the public schools in southeastern Oklahoma. The ready acceptance of technology and deliberateness of its introduction is partially attributable to cultural attitudes.

INTRODUCTION

Within the past two years, the potential for the use of the modern communications media, particularly two-way interactive online conferencing, to teach small and endangered languages has been developed, generally in the media development departments in university settings. It may come as something of a surprise that one Native American political unit, the Choctaw Nation of Oklahoma, decided to implement distance learning of the Choctaw language without outside collaboration and without previous experience in distance learning technologies.

This report is a description and analysis of the story of the implementation of an Internet Choctaw language course and its development as a teaching and learning tool. Most important, it describes the effects that the presence of the technology has had upon other departments and services in the Choctaw Nation government and on individuals in the Choctaw communities. This report describes how two distance learning technologies, videoconferencing and interactive Internet, have been appended, if not integrated, into the existing institutions and cultural milieu of Oklahoma Choctaw communities. The problematic nature of evaluation of the objective goal of language learning is discussed, particularly with respect to competing cultural and political goals.

This report does not draw on any theoretical models, but will serve instead as one of the first descriptions of the impact of technology on endangered language preservation for later reference and theory formulation. Included in the discussion is pertinent cultural material to the extent that it has shaped the outcome of community response and acceptance of this technology.

The report first describes the Choctaw people in a brief historical sketch, then describes the early innovations of the Choctaw Language Program since its institution in 1997. The report focuses on the latest of the program's developments, an Internet-based, live, interactive language instruction program. The problems of curriculum development and especially program evaluation are discussed in light of the challenges that this kind of program encounters. Finally, the report describes far-reaching effects that can be attributed to the presence of the new communications technology, and their shaping by cultural attitudes and practices.
THE SETTING

To understand and appreciate the effects of current technology on the Choctaw community, it is important to understand something about the history of the Choctaws and new technologies in general. As one of the first native groups to encounter Europeans in the mid-16th century (most notably Hernando de Soto, Tristan de Luna, and Juan Pardo), the Choctaws had yet to learn that eventually Europe would vanquish all natives; nor were they aware of a European agenda beyond the self-evident benefits of trade. Choctaws entered into active trading relationships with different European groups, engaging in the play-off system (White, 1983), wherein the dissension between European groups was exploited for Choctaw gain. The Choctaws amassed considerable wealth and political power during the 18th century in this way, until the newly formed United States evicted the European powers and playing off one trading partner against another no longer brought results (Wesson, 2001).

The Choctaw people were similarly heavily engaged in trade and other social intercourse with United States citizens and institutions. The Choctaws, far from resisting Christianity, invited Christian missionaries to teach them what they knew, including the contents of the Bible, and how to read and write (Kidwell, 1995). It is fascinating, though now a source of embarrassment to modern Choctaws, that the Choctaw word for "white person" is nahullo, which means "sanctified being." It was the Presbyterian missionary Cyrus Byington, following in 1821 the first missionary to the Choctaws, Cyrus Kingsbury, who had arrived in 1818, who did virtually all the early language work. From the time he preached his first Choctaw sermon in 1823 until his death in 1868, Byington worked on the language, producing the only full Choctaw-English dictionary ever written, a grammar (in its seventh revision on his death), and several translations of books of the Old and New Testaments (Byington, 1915).

Choctaws were quick to recognize and appropriate material goods that would benefit them, even adopting the dress of nahullo settlers. The traditional women's dress today is not deerskin, but the long, deeply ruffled, prairie-style dress of the 19th-century frontier, and men abruptly gave up the traditional turban and began wearing hats of that era.

Socially, the Choctaw leadership intermarried with white Americans. This led to discontent and factionalization when the mixed-blood leaders began to treat with the United States Government over land cessions. That being said, these intermarriages also permitted the Choctaws considerable access to American institutions. In numbers greater than their proportion of the population, Choctaws served in American wars under American command, perhaps most famously Pushmataha in the War of 1812, and more recently, the Choctaw Code-Talkers of World War I. Because they lived in the slave-holding states, some Choctaws owned slaves themselves when they were wealthy enough; these slaves accompanied them on the Trail of Tears to Oklahoma during the time of Removal, 1830-1833, and became members of the tribe by virtue of this relationship.

In their new home in Oklahoma, Choctaws formed a government that closely followed the model of their victors': an elected tripartite (legislative, executive, judicial) government with both bi-cameral legislative and two-tiered judicial branches (Lambert, 2001). This government was quite different both from the traditional chief and moiety system in place only a hundred years earlier. This Choctaw Republic in Oklahoma lasted until 1906, when the United States government terminated it through the new land policy of allotment which did not permit American Indians in Oklahoma to own land in common. During the existence of the Choctaw Republic, many modern institutions such as law enforcement, schools, and newspapers were established and operated in the Choctaw language, which was written and studied in schools.

These features, among others, are the basis for the Choctaws, along with their southeastern neighbors the Chickasaws, Cherokees, Creeks, and Seminoles, to be known as the Five Civilized Tribes.
might have wrought in these cases, but it was a valued distinction earlier and a name that older individuals still use with pride.

**The Modern Scene**

After the fall of the Choctaw Republic in 1906 and Oklahoma statehood in 1907, the Oklahoma Choctaws began a period of decline, marked by the loss of their government, few civil rights, and little integration into the white society. Together with the boarding school system of conscripting Indian children and ridding them of their home languages, a devastating world-wide economic depression, and common racism, Choctaws seemed destined to join their Native American brethren at the economic bottom of American society.

This, however, has not been the case. Beginning in 1972, when the Choctaws were permitted to elect their own chief, the modern government (the Choctaw Nation of Oklahoma) has moved from a Bureau of Indian Affairs appendage to a very different government. The new government is quite unlike the imitation of the United States government that the Choctaw Republic successfully attempted to reproduce. The modern government has a powerful chief, more akin to the *miko* of traditional times (this term is, in fact, used to refer to him). A Council approves actions and policies, but it is the Miko who holds the major power and, thus, can act quickly and deliberately.

The way that modern chiefs maintain their popularity, and thus their power, with the people who elect them is through a system of redistribution of resources through myriad tribe-owned businesses, which then preferentially employ Choctaws. More recently, Choctaw Nation is in the business of consulting for the United States government, has contracts to do eligibility work for the Immigration and Naturalization Service, and sets up offices and training world-wide for the WIC (Women, Infants, and Children) Program. This is not a tribe that fears involvement with any aspect of modern society.

**THE CHOCTAW LANGUAGE PROGRAM**

Because of the great influence of the *miko* over the kinds of activities the government engages in, the Language Program as a direct, programmatic activity within Choctaw Nation is unequivocally the result of the interest of the present *miko*, Gregory Pyle, who was first elected in 1997. In that year, a Language Coordinator and a Language Specialist were hired to develop community classes in the Choctaw language. The primary qualification for these positions was the ability to speak the language; of course, other organizational skills that could be brought to bear on the development of a new program were highly desirable.

**Community Language Courses**

The community language courses are similar to those developed by many other Native American communities: They are based on literacy, vocabulary acquisition, and conversation. The community language courses are based on a 48-week, three-phase curriculum. The first 16 weeks are devoted to what is called preparatory work for the language: This is essentially history and culture with minimal exposure to the language itself. Classes are often organized around pot-luck meals. The meals parallel the church-based social gatherings of the larger culture. The goal of the initial phase is to help students become comfortable with classroom learning, and to feel pride in being a Choctaw. Another motivation for this extended period of socialization is the expectation on the part of the program's designers that many rural Choctaw people, having little education, would fear that their educational deficits would be exposed, resulting in a high drop-out rate.

The second phase of the community classes consists of the learning of the orthography (the one established by Cyrus Byington) and its associated sounds. Additionally, a selection of nouns and adjectives are taught (numbers from one to 10; colors), as well as conversational formulas.
The third phase of the community classes consists of more vocabulary and simple sentences, including declarative and question sentences, and negation. A few selected grammatical points are made, such as the attachment of the possessive marker to nouns. In all phases, care is taken that students should not be overwhelmed by the difficulty of learning a language that is both highly valued in the community and very different structurally from English, which has been for decades the first language of most Oklahoma Choctaws.

In 1998, Assistant Chief Mike Bailey happened to see a copy of some linguistics-based pedagogical materials developed for University of Oklahoma language classes, and brought them to the attention of Chief Pyle. At the same time, through his association with other Native American institutions of higher learning, Chief Pyle became intrigued with the possibilities of distance-learning technology: he became convinced that unless these technologies were harnessed, too few people wanting to learn the language would be served.

After an initial plan to simply use the community teaching network to perform the distance learning curriculum, the two programs were separated. The community teachers continued to meet with classes throughout southeastern Oklahoma following the fellowship model, and new personnel, the producers of the grammar-based pedagogical materials, were hired to implement the distance learning program.

**The Experiment with Telecourses**

Chief Pyle had been impressed with the idea that only multiple sites connected to the ever-scarcer teaching resources could make any dent in the need to bring the Choctaw language to all sizable Choctaw communities. He and the Council agreed to commit major monetary resources to telecourses. Under this plan, a teacher in a studio at the University of Oklahoma taught the language via a closed-circuit television system that used the telephone system. Choctaw communities in New Mexico, eastern Oklahoma, and California were served in this fashion.

The telecourse language program enjoyed mixed success: To the good, Choctaw Nation gained valuable public visibility and was lauded among the remote communities, whose members were often hungry for connection to their culture and who responded enthusiastically. The new curriculum, about 14 weeks long, was grammar-based and introduced the language and its structure immediately. To supplement the courses, Choctaw Nation had professional audiotapes made for students to purchase at cost, and developed a workbook with tear-out exercises that could be mailed to the teacher for correction. Schools in New Mexico and Oklahoma offered college credit for the course.

After the initial pilot course, what we might call the "college credit" course as described above, was offered concurrently with a televised version of the community class, broadcast to different students in different communities in California, with different teachers, and based on the community model described above.

The two major difficulties with the telecourses were a) technical problems and b) expense. First, technical problems surfaced week to week: annoying failures in the broadcast on either end of the connection sometimes led to entire sessions being canceled, leaving frustrated students who might have driven miles to attend. If there were two classes tuned in at once, the failure of one class to participate meant that the classes were no longer synchronized. Similarly, semester start and end dates were so disparate that in one case, one group was a month ahead of the other, forcing a challenge upon the teachers that was only partially met. Since the class was broadcast live, the coordination of a single time that was feasible for teachers in Oklahoma and students in other timezones presented and would always present a limit to the number of communities, if not students, who could be served via telecourse.

The second and more important problem was the cost: It cost many thousands of dollars to broadcast one single meeting of the course. In keeping with Choctaw tradition, it was unthinkable to charge students for
the course. Choctaw Nation bore the expense as a service to the community. Furthermore, the enrollments at all sites were disappointingly small, and dropouts high. Per capita, the cost was simply unbearable.

With respect to the quality of the Choctaw language teaching and learning in the telecourses, students enrolled in the college-credit-level course performed somewhat lower with respect to vocabulary acquisition, pronunciation, comprehension, and understanding of grammar than did students enrolled in a similar course taught at the University of Oklahoma, with the same teacher and curriculum. Some reasons for this are, impressionistically, the markedly lower preparedness of the telecourse population (the University of Oklahoma students must meet higher admissions standards); the high frequency of equipment breakdown, leading to several hours of missed or compromised instruction time; and unrealistic expectations about the experience of language learning. With respect to this last point, only one of the telecourse students had ever studied any foreign language, and these students had little sense of the cognitive challenges, and practice, that would be involved.

The community-style telecourse suffered similar technical difficulties, and additionally, incurred the frustration of a number of students who wanted to learn the language intensively, and had learned through informal channels about the intensive "other" course that had books and audiotapes.

These courses, which on balance were unsustainable, nevertheless provided valuable lessons about the details of distance learning to the members of the Language Program. They allowed the Internet division of the Language Program to build a curriculum that would prove to be adaptable to the multimedia that would come next.

THE INTERNET LANGUAGE CLASSES

To curb the costs of the long-distance language learning program, Chief Pyle arranged through his own contacts for a private company, Rotor, to put their product, the Rotor Learning System, into use as the replacement for the telecourses in December of 1999. The Rotor Learning System had not been designed particularly to teach languages, but had been selected for other practical reasons, most important of which was an attractively low price. The language program personnel were to be trained in the technology on the job. On February 22, 2000, the Internet course was begun with teachers who had no experience whatsoever with this medium, and one technician who had been recruited 6 weeks earlier.

The Language Program began with three separate live broadcasts: one daily Beginning Choctaw class, one daily History and Culture class, and one Thursday evening review of the language class. Cumulatively, 393 people enrolled in these classes which ran for 16 weeks.

In the summer of 2000, the Language Program broadcast live two sections of the Beginning Choctaw class, dropping the History and Culture section, due to the language teacher's successful protest that she was not qualified to teach this topic. The total enrollment for these courses was 346.

In Fall, 2000, an intermediate level language course was added, and it was taught 4 days a week, live, along with the Beginning Choctaw. The course was reduced to 14 weeks; the observation was that teacher and student fatigue after this many weeks resulted in abrupt drop-outs among the students.

In Spring, 2001, two sections of Beginning Choctaw, one day and one evening section, and one section of Intermediate Choctaw were taught. The total enrollment for both classes was 353.

The Technical Set-up

The Language Program makes use of streaming audio and video on Choctaw Nation's own T-1 line. The signal is delivered at 8 frames per second, though it is capable of 30. The student enrolls in the course by visiting the Choctaw Nation Web site (www.choctawnation.com). He or she can navigate the site to reach the enrollment form and enroll online. There is no restriction on who can enroll. As an alternative, the
student may call the Nation's toll-free phone number to enroll. The student is given a user name and password upon enrollment.

The Rotor Player can then be downloaded by clicking on the appropriate button. The downloaded Rotor Player icon and its title will appear on the student's desktop portion of the monitor screen. A standard program loading procedure with respect to copyright and options is presented.

About 30 minutes before broadcast time, the students can begin to log on. At log-on, the Rotor Player will download to each student's computer the graphics that have been pre-loaded into the Projector function. These graphics may include pictures, maps, drawings, paintings, or text. The students cannot at this time view the graphics, but during class the instructor can show a graphic to the students instantly to coordinate with the lesson feature. This pre-loading feature allows the bandwidth requirements for the classes to be reduced considerably, and it prevents long download delays during broadcast.

The Curriculum

Supporting the natural gifts of the online language teacher is a grammar-based curriculum which was adapted along the lines of an existing course in use elsewhere, particularly at the University of Oklahoma. It was recognized early on that most language students do not continue their study beyond the beginning level. This has been strikingly true in this program, where around 5% of original enrollees in the beginning course enroll in the intermediate course. Therefore, it was critical that Beginning Choctaw be a self-contained course that included as much internally consistent grammar as possible (i.e., without reference to grammatical concepts with which most students would never grapple) and would contain the most useful concepts in communication. Besides a vocabulary of basic, high-frequency words and conversation formulas, the concepts that were selected for teaching based on utility and transparency were the following:

- the structure of noun phrases
- the word order of the basic sentence
- yes/no questions and interrogative words
- the simpler form of negation (a morphologically complex form comes later)
- four kinds of pronominal (illustrated below)
- three kinds of time marking roughly comparable to present, past, and future

Most of these concepts can be mapped to an English grammatical concept fairly straightforwardly, with the exception of the pronominals. In the experience of all Choctaw teachers we have queried, beginning students falter on the pronominals because they denote semantic rather than grammatical roles. In the following simple illustration, note that the second-person particle that is glossed with English you changes form with the semantic role of the second person. Further note in the last example that the recipient marker chim, which is the subject "you" in one construction is used for the possessive "your" in another context.

ish- balilih
2agent run
"you are running"

chi- hohchaffoh
2affected hungry
"you are hungry"

chim- achukmah
2recipient good
"you feel well"
chim-ofi
2recipient dog
"your dog"

Beginning Choctaw is divided into 10 modules, each based on a vocabulary set and a major grammatical concept. Each one-hour class period is devoted to selected topics among a master set that comprises the lesson plan for that module. Lesson plans have activities that include introduction of the vocabulary; practice in pronunciation of new words; drill in previously introduced words; introduction of the grammatical concept; copious illustrations (oral and written) of the new concept; oral comprehension of a short story (five sentences); student composition; introduction of conversation formulas and idioms; pronunciation drill in sentence melody; review of previous concepts; homework assignment from the workbook; and question and answer interaction with the students. Each daily class does not contain all activities, but each activity is covered before moving to the next module. The teacher may remain in a particular module until she is satisfied that it has been thoroughly explored, even if some students have not mastered it completely.

Intermediate Choctaw introduces complex sentences, which are singularly difficult for non-linguist language learners because they have a very large number of subordinators that are both marked for switch-reference and have finely graded distinctions in meaning. Also emphasized in the intermediate course are aspect in verbs (see discussion which follows), another very difficult topic; the morphologically marked negated verb forms; various ways of expressing number (not a morphologically obligatory category); and some mood markers. The intermediate course moves quite slowly, because it takes time for students to develop even rudimentary intuitions about these concepts.

Aspect is an example of a difficult concept encountered by students. Since English does not treat aspect as an obligatory grammatical category, aspect is denoted through vocabulary choice, adverbs, particles, and idioms. English-speaking students of Choctaw have to perceive that an underlying notion, denoted by one Choctaw verb, can be predictably altered by marking with one of the morphological aspectual forms, even though the resulting forms are glossed with completely different English lexical items.

In the following example, the base verb form *ikhana* is taken through all the aspectual inflections:

<table>
<thead>
<tr>
<th>Verb Form</th>
<th>English Equivalent</th>
<th>Aspect Type</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>ikhana</em></td>
<td>&quot;learn&quot;</td>
<td>eventive aspect</td>
</tr>
<tr>
<td><em>ikhahna</em></td>
<td>&quot;suddenly discover&quot;</td>
<td>momentaneous aspect</td>
</tr>
<tr>
<td><em>ikhaana</em></td>
<td>&quot;know&quot;</td>
<td>stative aspect</td>
</tr>
<tr>
<td><em>ikhahana</em></td>
<td>&quot;periodically observe&quot;</td>
<td>iterative aspect</td>
</tr>
<tr>
<td><em>ikhaiyana</em></td>
<td>&quot;remember&quot;</td>
<td>resolutional aspect</td>
</tr>
</tbody>
</table>

Intermediate Choctaw makes more use of several half-hour videotapes that have been made of the consulting linguist, who is an experienced university instructor, explaining the most complicated of the grammatical notions such as aspect, switch-reference, grammatical roles, and the like. Utilizing a professional linguist was seen as ideal since these explanations require not only application to the language at hand, but also intuitions about the kind of work they do in language in general. The videotapes also provide relief for the teacher by extending her time and energy. They also are a way of keeping the linguist separate from the class proper: a conscious decision was made to keep the image of the nahullo expert from encroaching on the language community. The linguist is a resource who, in the structure of the Internet course, does not form relationships with the class members -- these personal relationships are formed among members and with the teacher.

The program has an inventory of around 100 instructional supplements, including texts, lexicons, stories, and drills that can be found on a Web site. A selection of them is featured in each session.
The Teaching Experience

Rotor Player system is imperfectly adapted to language teaching in that, while the student can see and hear the teacher and enjoys the benefits of a variety of supplemental graphics, the student cannot speak back to the teacher. Communication from student to teacher is by typing text.

The Choctaw teacher is a native speaker of the language who was hastily selected to be the Internet teacher when the original teacher could not participate. This new teacher then delivered a spectacular unrehearsed performance. The effects on the Program of finding this particular teacher cannot be overestimated, and it also points out the paramount importance of language teaching as a human activity, irrespective of technology at any level of sophistication. Since this teacher cannot hear or see her students, who comprise a different mix each session, she must have an extraordinary ability to visualize the students as if she were in the room with them. Furthermore, she must be able to teach multiple levels of difficulty within the same timeframe. She must be able to work as though she has feedback. In this case, the teacher has learned to identify particular students and their needs based on the kind and quality of the typed messages she receives from them.

Much of the success of the Internet program has depended on the human skills of the teacher; she is endlessly patient with the same question being asked again and again, and she is willing to repeat lessons in slightly different ways for the intermittently attending.

In her own view, the major content of language teaching is to stress oral comprehension and production. She invests her time in Choctaw speech, from stories spoken aloud to careful lessons in sentence melody and phoneme production. While there are plans to eventually convert to a two-way system that allows students to be heard, this represents a leap in bandwidth and quality of computer that students must own or have access to. The projection is that, once students commonly have DSL lines or cable modems, the Rotor company can produce two-way audio in perhaps a year's time. What is most interesting about this teacher's method is that she has not turned to text, by far the easier way to use the technology, and has persevered with the laborious method of presenting orally.

PROBLEMS OF EVALUATION OF THE INTERNET COURSE

There are significant problems associated with evaluating a distance language course such as the one offered by Choctaw Nation. To begin, there are a number of unrelated goals that are both overtly and implicitly being pursued by the sponsoring entity. First, there are the goals pertaining to learning the language per se; second are the goals pertaining to cultural solidarity; third are the goals pertaining to administrative and political effectiveness.

Language Competence

With respect to language learning proper, the Language Program grapples with two questions: How do we decide whether we have succeeded in teaching Choctaw to long-distance learners, and what counts as success? A distance learning experience could hardly be expected to replace a child learning the language in a natural speech community -- something that likely may never return. What, then, counts as good enough? What has happened specifically in this program is that there are very many enrollees in the Internet courses (in the hundreds). Of these, a far smaller core, 15 to 20, log on each session. Of these, around 10 log on regularly. These numbers are reflected in the enrollment in the intermediate courses -- of the 353 total enrollees in the Spring 2001 semester of the beginning course, 17 are enrolled in Intermediate Choctaw. Those enrollees frequently have taken Beginning Choctaw two or even three times, sometimes enrolling in both courses. From this pattern we infer that students perceive the need for a great deal of practice in simpler concepts before they feel they can take on harder ones. This long incubation is, after all, the choice of the students, and not something that a credit-granting institution would allow. Students in Intermediate Choctaw are self-motivated: there is no reward other than learning the language, not even grades or certificates. The mastery level of these students is quite comparable to
that of those who have studied languages for the sake of learning to speak them. An excellent measure for comparison might be to compare the skills of Choctaw students with those of the thousands of students enrolled in Beginning Spanish: how many in each case go on to become speakers of the language? However, such a measure may be nearly impossible to design and implement. Similarly, it would be useful to know how other Internet language programs teaching endangered languages are faring with respect to language competence in their students, but such information is not likely to be available for some time to come.

The design of the Internet course encourages several countermanding phenomena to our goal of evaluating success by the production of speakers. One of these is that students are anonymous. The program cannot track individuals and their progress except to the extent that particular students allow themselves to be identified throughout their involvement with the program. More significantly, because enrollment is continuously open, persons can sample the course once or at intervals without engaging in any kind of study. The program cannot differentiate between samplers and serious students, so it is difficult to identify what might be meant by the term "student." Therefore, surrogate measures have to be found to measure indirectly other phenomena that might be associated with language learning.

A second obstacle is that the program offers no competency standard acknowledged in the form of credit. Students decide what constitutes sufficient Choctaw language learning. A satisfied student may be one who has learned to greet a grandparent, count, and sing hymns.

Another obstacle is that the program does not test students in the usual sense of that word, with objective examinations and quizzes. It is not possible to track the performance of a group of individuals with reference to one another and to a corpus of material to be mastered such that they could be validly graded.

Yet another obstacle is that the technology itself is a bar to the promotion of an environment that fosters natural human communication. Students cannot hear each other or the teacher, making basic oral competence, one of the linchpins of language learning, unjudgeable.

With respect to the development of surrogate measures, the Language Program has begun tracking the number of talkbacks, or number of times per session that students respond to the teacher or another student, plotted against the average attendance per session. Such a tally directly tracks the level of interaction in a session; the inference would be that high interaction is associated with more questions, more opportunities to instruct, more opportunities to correct, and more opportunities to rehearse language. However, while high levels of interaction may be a measure of better class instruction, we do not have any association between these and students speaking the language. Additionally, while we have raw data (shown below), without an association to some outcome, we can only establish what seems to be normative for classes in our program over some period of time.

Table 2. Attendance and Talkbacks.

<table>
<thead>
<tr>
<th>Semester</th>
<th>Avg. Attendance/Session</th>
<th>Avg. &quot;Talkbacks&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2000</td>
<td>14.91</td>
<td>25.36</td>
</tr>
<tr>
<td>Summer 2000</td>
<td>28.33</td>
<td>48.18</td>
</tr>
<tr>
<td>Fall 2000</td>
<td>12.833</td>
<td>26.94</td>
</tr>
</tbody>
</table>

What these figures show is that the average number of responses per student per class session hovers around two, and that this number is rather stable throughout all the courses. We do not have another measure yet that shows how well students know the language that could then be examined in light of this statistic.

With respect to that problem -- a measure of language competence -- it has been mentioned that the program does not test the students, and so has no record of individual performance. However, the
program planners are considering a way for the teacher to gather information on the performance of the students on exercises in the aggregate. This would allow for the number of correct responses given in a particular exercise to be measured as a class statistic. We could at least establish what is normative for our own Internet classes and then compare the substantive performance with that which is accomplished in aggregate in other classroom settings (e.g., University of Oklahoma Choctaw classes).

A second measure, which has also been mentioned previously, is the number of students who enroll in the intermediate course. Self-enrollment and the ability to interact in that class is a measure of having mastered the material in Beginning Choctaw. To repeat the numbers stated above, in the Spring 2001 semester, 17 students were enrolled in Intermediate Choctaw, of 353 total enrollees, or only 5%. Recalling that we don't know what fraction of enrollees is made of samplers, while we believe that 5% is a good measure of total progress, we do not know what percentage of faithful attenders goes on to the intermediate course. One tack the program might take is to get voluntary information from the students in the form of a gently-worded questionnaire. In its insistence on the placement of control of the learning process with the student, the program has not yet ventured to simply ask students questions about their experience.

Cultural Solidarity

While learning to speak a native language greatly enhances the sense of identification with a culture, the paraphenomenon of language learning overtly serves the same purpose. Speaking the Choctaw language is highly valued by Choctaw people, but talking about attending classes, buying books, attending classes with friends, and the like are also valued as a demonstration of involvement with the culture. The existence of the Internet course provides many public relations opportunities for Choctaws to have media coverage about their culture. Pointing out such features as the large number of people who have at least examined the courses and the distant locations of some students provides a way for Choctaw language learners to feel that they are engaged in a culturally significant endeavor. The program is popular at least partly because it puts Choctaws in the public eye and gives them yet another cultural token to display.

Political Success

The Internet course also needs to be evaluated in terms of the goals of its sponsor, the Choctaw Nation of Oklahoma. Recalling that the miko is popularly elected and holds great unilateral power, programs that reflect the effectiveness of the miko in bringing benefits to Choctaw tribal members are those that will be likeliest to continue, irrespective of other concerns. Thus, the fact that the miko is sponsoring innovative, easily-accessed, cost-free language classes is paramount. It is more important to its political success that the course be enjoyable than that it be disciplined. It is more important that many people recall having heard about the course or log on to investigate than to finish the lessons themselves. Choctaw Nation is politically served if members feel satisfied that the language is being taught in a way that reflects positively upon them as a people. At this time, given the number of persons, in the thousands, who at least investigate the course, and the amount of attention from persons in distant locations, the program would have to be considered a political success.

THE TECHNOLOGY'S INDIRECT EFFECTS

While the Internet courses' success in language teaching is difficult to assess, tribal resources (particularly the personnel and equipment) that have been committed to language work have had a multiplying effect on other areas of language work in the community.

First, while the community language classes are still taught in the peripatetic, individualistic style, a number of the teachers have begun to borrow the linguistic-based materials used in the Internet course. Even such a simple term like "subject marker" can give the teacher a way to talk about a concept that is absent in English, and a set of examples that students can model. Even if a teacher shops around for the most appealing or simplest lessons, the fact that they are put together in a way such that the grammar is
internally consistent saves the teacher from having to invent ersatz theories that can deeply confuse students, or to go on teaching only word lists. The Internet course and its precursor have made people less mistrustful of linguistic methods and their value.

Second, the Language Program decided to take on the daunting task of revising and modernizing the 170-year-old dictionary. Previously unthinkable because of the labor involved, the Dictionary Committee has been encouraged by the knowledge that the existing pages of the text can be scanned and edited without rewriting the entire document. With their new familiarity with linguistic methods, the Language Committee insisted on and now receives regular linguistic consultation on all topics of lexicography from sound-symbol associations to word boundaries to parts of speech.

Third, encouraged by the possibilities suggested by the Internet course, the Choctaw Education Department has decided to put the Choctaw language into the area public schools in compliance with a recent state law making provision for the teaching of Native American languages in public schools. This has meant hiring and training a certified teacher who is also a speaker of Choctaw. To multiply her effectiveness, she will use distance learning techniques to bring the language classes to four schools beginning in August, 2001, eventually going to 69 middle and high schools in southeastern Oklahoma (where Choctaw residency is highest). The Language Program developed the curriculum for these courses based on what has been used for the Internet course; this curriculum is presently being reviewed by the State Board of Education. This extremely ambitious program is the direct result of investment in the idea of two-way interaction and online educational aids such as online quizzes and Web sites for viewing written materials and doing homework.

Fourth, the Language Program has decided to apply for federal funds for the production of a professionally produced children's video series with animal puppets that speak Choctaw. The hope is that nursery-school-age children will become aficionados of the puppets and so begin to hear and imitate the language.

Finally, the Language Program has in production a series of five children's hardcover, professionally illustrated stories of a Choctaw grandmother, her two grandchildren, and their dog (the first three are now in bookstores). The original stories appear in both Choctaw and English, and are some of the only modern literature in the Choctaw language. Choctaw Nation hopes that modern writers will come forward with other works that can begin a modern literary tradition, with at least some of the works appearing in Choctaw.

**Choctaw Cultural Nuances Amid the Technology**

It would seem that the Choctaw people, with Choctaw Nation of Oklahoma as their representative, have tightly embraced the possibilities of modern technology with respect to language preservation and pedagogy. This would be in keeping with the Choctaws' historical sense of entrepreneurship, inclusiveness, and political sensibilities. There are some decidedly Choctaw features to this modernity, however, that are quite unlike those of the dominant culture.

It has already been noted that the means to study the Choctaw language are treated as benefits provided by the *miko* to Choctaw people as their due. Whenever possible, services are free. Not only are courses free, but books and audiotapes are often given away to students, or if sold, sold at cost. Choctaw Nation plans to buy the books the public school students will require. Choctaw Nation keeps tight control of most programs by financing them itself. By using tribal funds, the *miko* and his deputies can move very quickly, even precipitously, to begin work on projects that would be considered understudied were they being developed by public entities. In return, the *miko* expects to receive credit and ample publicity for his contribution, and for the members of the Nation to recognize the results of their support of him.

A second cultural aspect has to do with avoiding competition. The effects of this attitude on the objective evaluation of language learning are repeated here: The Internet course has the capacity to give quizzes
and assign grades to online learners, but these are never used. Students who lag behind for whatever reason, from lack of comprehension to failure to log on, are always accommodated without comment. The pace of the course is always geared to the slow end, and teaching does not go forward until students are comfortable and competent. No one fails. The authors do not feel that the program directors could be asked to choose between the present culturally comfortable arrangement and one that might bring better scientific data at the risk of placing the students at the risk of direct evaluation of their language competence.

Another important and curious feature of Choctaw culture is the expectation that people will meet face-to-face. This is especially interesting in light of the fact that Internet courses are a way for people to do business without being in the same room. In a somewhat dissociative fashion, Choctaw Language Committee members travel long distances to meet together a week at a time over issues that could be decided by a conference call or by e-mail. On several occasions, the teachers of distance-learning classes have made special trips out of state to meet the people who were viewing them online or on television. The community courses exist side-by-side with the Internet course, involving as they do many miles and hours of road travel by both teacher and students for the experience of meeting in the same room for a bit of language study but a great deal of shared social experience. The Choctaws seem so far to be able to separate the purely utilitarian advantages of eliminating long distances as a factor in learning from the purely cultural meaning associated with being together.

Lastly, the Choctaws are very open with their language, as can be seen from the fact that everyone is welcome to learn it. This is not an attitude that can be taken for granted among Native Americans in general. In the pragmatic words of the Choctaw Nation Director of Education, "In a hundred years, all the native languages will be gone, and the only one anyone will remember will be Choctaw because of what we are doing today."

NOTES
1. This word has long ago taken the second meaning of "white person" polysemously.
2. The Choctaws remaining in Mississippi re-adopted traditional farming and cultural practices, but were now without regional economic power (Peterson, 1979).

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APPLIED COMPUTER TECHNOLOGY
IN CREE AND NASKAPI LANGUAGE PROGRAMS

Bill Jancewicz
Naskapi Development Corporation and SIL International

Marguerite MacKenzie
Memorial University of Newfoundland

ABSTRACT

After an introduction to the parameters for the application of computer technology in Cree and Naskapi language programs, it will be shown that the deliberate and structured introduction of these technologies to indigenous language programs can facilitate indigenous language stabilization and development. Using first-hand accounts from within Cree and Naskapi language communities as case studies, both the successes and frustrations associated with computers for language work will be described, and recommendations made for the future use of computer technology in these projects.

INTRODUCTION

The Naskapi and East Cree languages are members of the Algonquian language family in North America, and form a part of the Cree-Montagnais-Naskapi dialect continuum (MacKenzie, 1980), stretching across the central Canadian sub-arctic woodlands from the Labrador coast to the Rocky Mountains.

The Naskapi community of Kawawachikamach (population c. 780), located near Schefferville, Quebec, is organized as a politically and administratively distinct First Nation. The only other dialect of Naskapi (Mushuau Innu) spoken at Utshimassits (Davis Inlet) on the Labrador coast, will not be treated in this paper.

The nine communities of East Cree speakers, located in northwestern Quebec from the eastern coast of James Bay and Hudson's Bay inland, range in population from 300 to 3000. Although united both politically and administratively, these nine communities represent two distinct Cree dialects, with additional inter-community lexical and phonological variations.

These Cree and Naskapi communities share not only related languages, but also similarities in culture, traditions, and physical environment. However, despite these similarities, the use of computer technology for language maintenance has taken a very different path within each group. In both areas Cree or Naskapi is the first language of all, including children. The primary second language is English, with some provision for French. Both Cree and Naskapi use similar syllabic orthographies. This use of syllabics has had a unique influence on the development of applied computer technology used in their language programs.

SYLLABIC ORTHOGRAPHIC SYSTEM

The orthographic system is based upon the syllabic system innovated by James Evans, a Methodist minister serving the Ojibwa and Cree in Ontario and Manitoba from the 1820's to the 1840's (Murdoch, 1981). Evans was an avid philologist whose desire for an easy-to-learn "shorthand" method of writing these Indian languages provided the initial framework of the syllabic writing system. In the fall of 1841, while lodged at Norway House in Manitoba, he produced, after planning and experimentation, the first syllabic chart and some hymns in Cree. After some relatively minor changes, syllabics became the basis of the writing systems used today by the Cree, Naskapi, Ojibwa, and Inuit.
The system is referred to as "syllabics" because for the most part each character stands for a single syllable: a consonant-vowel pair. The shape of the character represents the consonant onset of the syllable, while the orientation of the character represents the vowel peak of the syllable. Characters for consonant syllable codas, consonant clusters, and stand-alone vowels make up the rest of the syllabic repertoire (Cree Regional Authority, 2001).

For the first 100 years following its innovation, the syllabic orthography was written conventionally by hand and painstakingly copied, or reproduced by means of custom-made typefaces and presses, usually located some distance from the communities, often overseas in England. This meant that the later stages of language material production could not involve Native speakers. Eventually, syllabic typewriters were made available to the Cree and Naskapi communities, and Native speakers themselves began to be involved firsthand in the production of documents in syllabics. Because mastery of syllabic typing required the memorization of a unique keyboard layout, with every key or combination of keys representing a character, only a minority of speakers became typists.

COMPUTERS AND SYLLABICS

In the 1970s, mainframe computers began to be used extensively by university linguists for lexicography. The words and definitions that had been transcribed on thousands of cards were input by assistants unfamiliar with the language. Data entry of the East Cree and Naskapi lexicons at the university was expensive and time-consuming, requiring the employment of programmers with little knowledge of linguistics, let alone aboriginal languages (MacKenzie, Whiskeychan, Salt, Blacksmith, & Louttit, 1987; MacKenzie & Jancewicz, 1994). Cree and Naskapi words were entered using a roman orthography and then converted to experimental syllabic scripts in the final printout. Unfortunately, all this took place far from the Native communities where these written materials would be used, making proofing difficult.

Later, as computers became more portable, linguists were able to bring equipment to the communities, and in some cases Native speakers were able try their hand at keyboarding in their own language. The technology was for the most part still beyond the reach of the Native people whose language it would serve.

Indeed, the practical use of any non-roman script on a computer remained an elusive goal. At first, an entire alphabet had to be designed and "hard-coded" into the microprocessors, as part of the computer hardware. Another method was to modify the output device (the screen or the printer) somehow, often by physically replacing the conventional roman characters with syllabics. It was not until the later 1980s, with the simultaneous development of the IBM Personal Computer (PC) and the graphical user interface (the Apple Macintosh and Microsoft Windows operating systems) that it became possible to produce a "software" solution to the problems of using syllabics on a computer.

SIL International, formerly known as the Summer Institute of Linguistics, has had a legacy of providing technological support to field linguists working in minority languages. Their computer programmers developed a series of tools that made it possible for linguists, using a personal computer in the field, to define and use their own character sets in the MS-DOS family of operating systems (Reitz, 1988). The appearance of these software tools coincided with the PC's introduction to the Native communities.

In 1988, SIL linguist Bill Jancewicz arrived in the Naskapi community and was asked to assist in developing a means of typing and printing Naskapi syllabics. The Band Office (the seat of community authority in Native communities in Canada, equivalent to municipal government) had acquired its first PC a year earlier to be used for accounting and general word-processing. Using the software tools provided by SIL, he produced a word processing system for syllabics and trained the office employees in its use. By 1989 the Band Office was regularly producing Naskapi language materials. That same year the Naskapi School and the Naskapi Development Corporation also acquired their first PCs, and the syllabic word processing system was installed on these computers as well. The Naskapi computer users were
trained to open, type, save and print documents in syllabics, using a system that allowed the roman equivalent of syllabic spelling to be typed on a standard English keyboard, thereby eliminating the memorization of a different keyboard layout.

Because Bill was residing in the community and learning to speak Naskapi himself, technical support was always close at hand. As with any new technology, the syllabic word processing system had to go through a number of refinements and improvements, but at each step, backward compatibility was implemented, so that the Naskapi community was able to maintain a growing corpus of digital language materials.

The system itself remained simple, if not crude, consisting of a plain-text editor that could produce either roman text or syllabics. Screen fonts were bit-mapped characters formed on an 8 x 8 or 8 x 16 pixel grid, while printouts were accomplished by either downloading 8 x 8 or 24 x 24 bitmapped syllabic fonts to a 9-pin or 24-pin dot-matrix printer, or by instructing the computer to print the text information "graphically," that is, as if it were a bit-mapped "picture." Naskapi files were saved in plain-text format, and could be archived and read by any MS-DOS-based computer. The syllabic characters themselves were "mapped" to their roman spelling, each consonant-vowel pair in the syllabic repertoire represented in text as English consonants and vowels.

As computers and software became more sophisticated, the syllabic system was continually upgraded. Laser printers provided a much higher resolution for reproducing printed material, and bit-mapped syllabic character sets were developed for this technology, painstakingly "drawn" in various typesetting point sizes. Even though syllabic fonts of this type take up considerable disk space, and it could take several minutes to download and print one page of text, the result at higher resolutions was far superior to the earlier dot-matrix printout. The proofs for the first edition of the Naskapi Lexicon were produced by this procedure in 1993 in the offices Development Corporation in northern Quebec (MacKenzie & Jancewicz, 1994).

In 1994, PCs utilizing Microsoft Windows, the graphical user interface that was beginning to enjoy widespread acceptance for business applications, became available in the Native communities. One important facet of this development was the implementation of TrueType font technology. Among other benefits, these fonts could be "scaled," that is, displayed and printed in various point sizes, with the same font data being used for both the screen and printer. Further, Windows provided a "WYSIWYG," or "What You See Is What You Get" environment. True publishing capabilities were now available on the desktops of Native speakers.

About the time this technology became available in the community, Bill Jancewicz was retained as the resident linguist for the Naskapi Development Corporation. He developed a Naskapi TrueType font designed in collaboration with the Naskapi readers and writers. Computer programs that could convert older Naskapi texts already keyboarded in Naskapi syllabics into the TrueType font encoding were developed as well.

Concurrently, SIL participated in the release of a keyboarding utility now known as Keyman that allowed the programming of custom keyboard input for various languages and character sets (Durdin & Hosken, 1994). The original Naskapi keyboarding system was adapted to Windows and TrueType using this utility, allowing Naskapi who were already trained to use the older MS-DOS system to easily move to a Windows computer without having to learn a new keyboard layout. As more Windows-based computers came into the community, more and more Naskapi were trained to use them to produce language materials.

Since 1984, when the Apple computer company introduced the Macintosh, a computer with a graphical user interface and publishing capabilities had been available. However, the decision to use either Macintosh or IBM compatible PCs was often made independently of language-related concerns. In the Naskapi community, some Apple computers were purchased for the Naskapi School in the 1990s for
educational purposes. The resident linguist developed yet another TrueType font for the Macintosh, and eventually Naskapi educators began to produce curriculum materials using this equipment.

The Cree School Board, on the other hand, was advised that Macintosh computers were preferred for multilingual word processing, and initially purchased Macintosh computers for Cree language personnel, providing the basis for all their language production work in the Cree communities. The approach to keyboarding in Cree was different than Naskapi, because it was constrained by commercial vendors rather than an "in house" font developer. The Cree keyboarding system was loosely based upon the old syllabic typewriter keyboard layout. Because of the logical layout of the Cree syllabic chart, each row of the typewriter keyboard could be arranged to represent one of the vowels, and thus be somewhat easier to remember than a random layout: the resulting keyboard was based partly on the syllabic chart and partly on the sound of the characters. This meant however, that a completely different keyboard layout had to be memorized by the Native speakers who would be typing their language; in many cases, new key-caps or labels were glued to the keyboard. During the mid-1990s, the commercial font vendor changed the layout slightly, so that key sequences had to be re-learned, and moreover, texts that were typed in the older font could not be displayed in the newer font. These setbacks were inevitable however, since the use of syllabics on computers was such a new, groundbreaking yet ad-hoc technology, and there was as yet little collaboration between language programs.

COMPUTERS AND RESOURCE PEOPLE

In the Naskapi community, the presence of a locally-based linguist specializing in the language with some programming ability has obviously helped to integrate computers into language work. Since 1988, the resident linguist has maintained all of his own language learning materials and language data on computer. He has also provided the local technical support that is needed in a small, isolated community, especially with regard to the esoteric development of computer programs that allow syllabic word processing. While it is not impossible to use computers in Native language work without a full-time, on-site computer resource person, it has been an obvious asset to have such a person available to provide training and technical support.

During the 1990s, several non-Native teachers attempted to improve the educational opportunities for students to learn to read and write the Naskapi language. As this was linked to the realization of the importance and efficiency of using computers to produce materials, the Naskapi curriculum development department was formed. This approach, whereby key teachers in the school are seen as important catalysts for Naskapi language material development and computer use (Jancewicz, 1998) has unfortunately not been consistently maintained from year to year.

In contrast, the Cree School Board, an educational organization that has had notable success in implementing Cree language in the school system (Burnaby, MacKenzie, & Bobbish-Salt, 1999a, 1999b; Burnaby & Mackenzie, 2001), has achieved this without continuous on-site computer support. The Cree commitment to Cree as a language of instruction, not just as a subject, came about through an explicit vision incorporated in Board policy, which led to administrative and pedagogical support, adequate budget allocations, and on-going staff training (Grand Council of the Crees, 1997). Over the past 30 years, Dr. MacKenzie has assisted in the production of lexicographic, orthographic, and grammatical material, encouraging the Cree language workers themselves to maintain data and produce materials (MacKenzie, 1992). To this end, the Board originally retained the services of non-Cree-speaking computer professionals to assist them with technical matters relating to the Macintosh machines found most efficient for producing syllabic materials. The irregular availability of a linguist familiar with both Macintosh systems and syllabic orthographic issues was found to be unsatisfactory. A recent administrative decision obliged Cree language workers to switch to Windows-based computers. The linguist from the Naskapi community was contracted to provide training in word processing in Cree, and in the use of use computer database programs to maintain and revise the lexicon. While this situation may
be an improvement, the absence of an on-site specialist with expertise in linguistics, computer systems and syllabics has resulted in an emphasis on the production of reading material only, rather than foundational linguistic or lexical database material. Although resource people are now available by telephone and e-mail, they are still located great distances from the communities and are not present to provide routine guidance.

**COMPUTERS AND ABORIGINAL PEOPLE**

In the Naskapi community, computers were introduced gradually, due to the initial expense, the relevance to the needs of the community, and the difficulty of providing adequate training. The first computers were purchased and deployed for purposes other than the production of Native language materials so that Naskapi computer users became familiar with them, and non-users grew accustomed to the presence of a computer in the workplace.

At both the Naskapi Nation and the Naskapi Development Corporation offices, the promotion of written materials in Naskapi has been mandated. This has resulted in the establishment of a number of ongoing language projects: the translation into Naskapi of all official business of the administrations, a lexicon, a grammar, a history, a monthly newsletter, legends and stories, and Bible translation. Both offices retain several full-time employees involved in language work, all of whom have eagerly adopted computers for their drafting and production work. As the number of projects increased (and funding became available) additional personnel were hired to translate and development language materials and were trained to use the computers; in every case, without exception, their ability to read and write the language improved.

Of course, part of this increased ability must be attributed to a greater exposure to and practice in reading and writing Naskapi, which became their full-time job. There is also evidence that increased levels of confidence in literacy are directly related to the use of computers for their own language. In two separate cases, the Naskapi responsible for office language work had already been employed for a number of years prior to the acquisition of computers. Their ability in reading and writing was observed to be adequate, but unremarkable. Following the introduction and continued use of computers, both employees noticeably improved in their reading and writing ability, as well as in linguistic confidence.

Although most Naskapi employees were initially quite uneasy with having to use a computer in their work, this discomfort diminished rapidly after some basic training, and as their familiarity and confidence with computers increased. Using a computer for mother-tongue language work raises speakers' assessment of the worth of their own language, as well as provides an avenue for sharing their work and ideas through reproduction and publication.

Because of employee turnover, many individuals in the Naskapi community have been trained in basic syllabic word processing. Even for those no longer employed in language work, this initial training has made a great difference in their own literacy, language skills, and confidence. Thus, courses in adult literacy in syllabics, usually rather difficult to deliver, might well be presented as "computer courses" in that includes basic syllabic keyboarding, with spelling and grammatical training as well.

Although the school at Kawawachikamach has had a number of computers available for student and teacher use since the early 1990s, these were seldom used in the teaching of the Naskapi language. Owing to a lack of vision, direction, or ambition, it does not appear that this situation will change any time soon. This is unfortunate, even though there appears to be a great deal of potential for increasing confidence in first language skills of students and teachers alike by using computers. Regrettably, the situation shows no sign of changing in the foreseeable future.

On the other hand, the youngest primary school students are now benefiting from a new focus on Naskapi language literacy. Through the establishment of the curriculum department, sophisticated computer publishing equipment was put in the hands of a few Naskapi-speaking staff, who are then able to bring a
project from conception to production completely "in-house." Unfortunately, while these materials are prepared by speakers knowledgeable in the culture, there is currently no full-time curriculum specialist on hand ensuring the pedagogical appropriateness and effectiveness of the small amount of materials produced.

In contrast, members of the Cree Programs unit of the Cree School Board, beginning with minimal support for computer use, have provided sufficient pedagogically-appropriate materials in Cree in all subjects making instruction solely through the medium of Cree a reality from pre-kindergarten up to Grade 8. At present, several hundred Cree speakers work as full-time curriculum developers, pedagogical consultants, and elementary teachers without recourse to English or French. On the other hand, outside the educational sector, the use of written Cree has received little more than lip service.

COMPUTERIZED PROJECTS

Over the last two decades, the role of computers for language development projects has become increasingly important. Both the Cree and Naskapi Lexicons were begun prior to the introduction of computers in the communities, but were completed and are currently under revision using Shoebox linguistic database software developed by SIL specifically for lexicography in minority languages. In these communities, it is now the speakers themselves who maintain and revise their own lexical databases, as well as creating curriculum materials.

Archival analog language tapes have been acoustically enhanced and transferred to CD-ROM in order to prevent the further deterioration of this irreplaceable data. By means of computers, this material can be edited, transcribed, analyzed, copied, and distributed by resource persons and Native language workers, then reproduced for distribution on audio CDs to be played on local radio and used in education.

By using computers for text analysis, Native speakers and linguists are able to facilitate the compilation of much-needed grammatical reference material. Bible translation projects, again computer based, have had an positive impact on vernacular church life, by providing the written Scriptures in contemporary language, involving Native speakers in complex language work and providing ongoing employment to local translators. While in some language communities it may be supposed that such an emphasis on the production of religious texts may limit the use of Native language literacy in secular community institutions, the Cree and Naskapi cultures treated in these case studies traditionally do not draw a sharp distinction between the secular and spiritual in their day-to-day life. The technical expertise gained by local speakers involved in the production of religious texts has always had a positive effect on the quality and accuracy of secular materials they also produce. Indeed, the meticulous checking procedures developed for religious texts have been broadly applied to all areas of Native literature production, including secular and pedagogical work. Still, the exclusive use of translated religious texts as literacy material certainly does not provide a broad enough range of text genres. For this reason, it is important that many kinds of contemporary and archival Native-authored texts be used for literacy instruction and exposure. Computers are routinely used to produce administrative and historical documents, as well as articles in newsletters and notices. Obviously, these communities could benefit from an increase in the production and distribution of Native-authored materials of all genres.

DIFFICULTIES AND DRAWBACKS

As computers were introduced to these communities, isolated solutions to the problems of using syllabics on these computers were developed for each community and for each type of computer. Thus, independent solutions for the Naskapi and Cree syllabic orthographies using either Windows or Macintosh systems were being developed concurrently and as a result were completely incompatible with each other. At the same time, other Native groups across Canada were developing their own syllabic systems for computers or depending on commercial contractors to develop these systems for them. There
were literally dozens of syllabic encoding systems, and more were developed with each passing year. This situation, with the potential for incredible fragmentation and incompatibility, was replicated around the world in many other languages (e.g., Greek, Russian, Hebrew, Chinese, Cambodian) that did not use a standard roman character set.

The Unicode Consortium, which was formed to address this problem, developed a method of encoding every possible glyph used in each of the world's writing systems that would work on all computer operating systems (The Unicode Consortium, 2001). While the decisions as to the specific encodings required were made in the mid-1990s, the computer software industry has been slow to adopt the Unicode standard, and has only recently begun to gradually introduce Unicode support.

The relatively recent requirement to provide multilingual language processing on the Internet and the World Wide Web has focused attention on the need for the Unicode standard, but the computers and applications, which will make the wholesale switch to Unicode practical, are not yet in place. Currently, for the Cree and Naskapi communities, computers can adequately carry out complex word processing and desktop publishing jobs, but cannot readily share their data with unlike computers or unlike syllabic systems. For the time being, this difficulty has been overcome by maintaining careful inventories of the specific encoding schemes used by the various computer platforms and syllabic systems, which are then used to develop conversion programs. For example, the Cree School Board is currently producing all of its new curriculum material on Windows computers running Microsoft Word using the Cree font developed by Bill Jancewicz while the commercial publisher for these materials uses Macintosh equipment. Because of this, a programming procedure had to be developed to convert the Windows formatted material for the Macintosh platform. When Unicode is finally supported by the relevant applications and computer operating systems, this kind of conversion will be unnecessary. However, for now, "work-arounds" such as these will have to be employed.

SUGGESTIONS FOR FUTURE DIRECTIONS

Until the complete implementation of the Unicode standard, difficulties can be minimized through inter-organizational collaboration and communication within a language community, by coordinating the purchase and deployment of computer equipment, software, and operating systems; commercial publishers and other service providers should be expected to conform to community preferences. In this regard, it is vitally important to establish community-level language planning and development teams, which can provide the structures needed for intra-community cooperation and collaboration necessary in small language communities with limited resources. Language planning teams can then be responsible for standardization of the orthography and lexicon, spelling reform, and for developing programs for language use within the community. In multi-community language situations, such as the two dialect areas of the Cree communities, there is an additional need for a centralized language planning team in order to provide coordination and standardization. Otherwise, there is a genuine danger that language workers may very quickly deviate from established standards. The language planning team must therefore establish a system of monitoring work produced in widely separated communities.

The authors hope that the dichotomy between "resource people" and "aboriginal people" reflected in the section headings above would become less and less distinct. By all means, steps toward ending this division are being taken in both the Cree and Naskapi communities that will allow technology and Native language literacy to work together to enhance the vitality of these languages. As a growing number of local people gain experience and expertise to become their own resource persons, such a dichotomy will dissolve, and all the vital resources for language development will exist at a community level. However, until this ideal is realized, small language communities such as these must continue to identify and avail themselves of professional and academic resources found outside their communities.
The Online Interactive Cree grammar project conceived by Marie-Odile Junker of Carleton University is a good example of cooperation and integration of resources. She has begun to initiate a collaborative effort that combines and coordinates the efforts of Native language speakers, trained Aboriginal language technicians, computer programmers, commercial software providers, Internet specialists, linguists, and other important resource people toward a common goal of producing Cree linguistic materials on the World Wide Web (Junker, 2001).

Since the SIL International computing department may be relied upon as an ongoing, multilingual software provider, language planners or Native language workers should develop a collaborative relationship with local or regional SIL representatives in order to benefit from their collective linguistic computing expertise (SIL, 2001).

The identification and use of key resource personnel to provide computer support, linguistic consultation and training is still an important consideration when applying computer technology to Native language work. Often it is difficult if not impossible to secure this kind of assistance in remote communities. In such situations, the planning and execution of intensive training sessions and workshops for Native language workers can make up for the lack of full-time, on-site resource personnel.

In any case, adequate and immediate training of new language workers is essential. Refresher courses should also be scheduled for Native language workers on a regular basis in order to upgrade skills and to keep them abreast of new technological developments.

CONCLUSION

Simply providing computers for Native speakers to use in their daily work does little to develop their language skills. In fact, since computer use requires some literacy in a majority language (English or French), Native computer users may find themselves using the majority language more. Computer equipment has to be thoughtfully and deliberately deployed in order for indigenous language user to benefit. First, the equipment has to be matched to the situation, as it is unwise to introduce new computers that are not compatible with existing systems. Any attainable goal for the use of computers must focus on the intended results. The Naskapi and Cree communities are producing stories, curriculum materials, translations, administrative documents, and dictionaries, among other language materials. Software must be developed to appropriately use Native language elements (orthographic system, character set, left or right rendering system, keyboard modifications, etc.). Most of all, the Native speakers who will be expected to use the computers must be adequately trained and have plenty of opportunity to practice. The initial learning curve is sometimes steep, but there is no substitute for hands-on experience.

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INTEGRATING TECHNOLOGY INTO MINORITY LANGUAGE PRESERVATION AND TEACHING EFFORTS: AN INSIDE JOB

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ABSTRACT

The recent explosion in technology, in particular in computer and digitizing systems, has many implications for heritage language maintenance and learning. In particular, authentic language usage can be easily recorded and preserved for those goals. That same explosion, however, can lead to a less than appropriate implementation of technology for language maintenance and learning. Further, certain cultural boundaries can make it difficult to have access to authentic language usage, particularly by out-group individuals who work on indigenous languages. This paper presents a pilot study that attempts to both implement technology in an appropriate manner and surmount the problems faced by out-group language researchers by training an in-group member, in this case a speaker of Navajo, in the methodology and technology necessary for recording and preserving her heritage language. The results of this work are discussed, as well as the role of computer and digitizing technology in language maintenance and teaching.

INTRODUCTION

The loss of non-English languages in the United States, either indigenous or of other origin, appears to be an inexorable process. Regarding indigenous languages, Krauss (1998) notes that of the estimated 300 present before European contact in what is now the United States and Canada, some 210 survive. Many of those languages, however, are only spoken by the oldest members of the speech community, and will die along with them. At the same time, Krauss sounds a very faint note of hope. Members of minority language groups have been, or are becoming, increasingly aware that an important linguistic and cultural tradition is disappearing, and some have chosen to take measures to try to stem the incipient loss of their heritage language. These efforts take place at many levels, but undoubtedly the recent explosion in technology presents opportunities to aid in efforts at learning or re-acquiring a heritage language.

At the same time, the sheer rapidity of that boom can place that same technology out of the reach of all but a select number of highly trained individuals. The purpose of this paper is to illustrate one way in which the technology gap may be bridged so that members of a minority language group can take advantage of technology for language teaching, preservation and maintenance in a manner appropriate to their cultural and linguistic realities. Described here is a pilot project carried out at New Mexico State University (NMSU), under the auspices of the Kellogg Foundation, to train a speaker of an indigenous language, Navajo, in both language maintenance issues and the technology needed for creating authentic materials for language maintenance as well as instruction.

TECHNOLOGY AND LANGUAGE PRESERVATION

Not long ago, a people's record of their traditions, culture, and their very way of viewing the world died with the oldest member of the community unless that record was memorized by subsequent generations. Even the introduction of a written record did not solve this situation. Writing down a story does not capture how talented storytellers pass on cultural history, or the language skills they use to do so. However, the invention of new technologies changed that limitation. It became possible, with the appearance of Edison's phonograph toward the end of the 19th century, to capture sound, and at that point it became at least theoretically possible to record ancestral stories and languages. Even after an older...
generation disappeared, their voices could still be heard, as many times as one wanted, so that their lives and their memories did not disappear at their death.

However, the new technologies were not, nor are they presently, foolproof and permanent. For example, some of the earliest language researchers used magnetic recording machines that do not exist anymore, except perhaps in museums. In addition, the recording medium has become obsolete, as some of the earliest recordings were made on magnetized steel wire. Even in the event that a machine capable of playing the original recordings can be found, some of the magnetic coatings are so fragile that trying to use them may result in the recording's destruction.

Technological advances now permit those who wish to preserve ancestral voices to do so in a way that is relatively easy and inexpensive. At one time, recording a voice in a permanent manner was difficult and expensive, but that has changed. Computer design has advanced so quickly that it is now possible to acquire a system for preserving languages relatively cheaply. But the use and implementation of recording and digital storage technologies require individuals who are capable of dealing with the necessary hardware, software, and key components of these electronic innovations, and who are sensitive to the language needs they confront. I return to this point below.

**TECHNOLOGY AND MINORITY LANGUAGE TEACHING**

A major problem in the teaching of heritage languages, at least in the United States, is identifying and obtaining authentic materials for instructional purposes. Here, the phrase "authentic materials" is defined as original texts, films, and recordings of language usage, among other media, that accurately reflect how a language community employs its heritage tongue, materials that have not been specifically created for instructional purposes. Thus, a dialogue in a language textbook contrived solely to illustrate a certain usage of a verb or exemplify some grammatical structure is an example of non-authentic materials. A recorded oral history carried out by a member of a minority language group with another member of that language group, used to illustrate language use, falls into the "authentic materials" category.

Even minority languages commonly taught in the US that have relatively large numbers of speakers face a dearth of authentic materials. For example, materials employed to teach Spanish to U.S. Spanish speakers, the largest linguistic minority in this country, often reflect a willful denigration of native U.S. varieties of the language (see Villa, in press), mirroring instead the writing and speech of Spaniards, Mexican nationals, Colombians, Venezuelans, and so forth, but rarely the language of U.S. Spanish speakers as they hear it at home and in their communities (García, 1993; Rodríguez Pino & Villa, 1994; Villa, 1996, 1997). This situation is exacerbated in the case of other minority languages in the US which have far fewer numbers of speakers and a shorter history of a written form of the heritage tongue. This is particularly the situation in which indigenous languages in the US are found. As Adley-SantaMaria (1997) notes, "Another obstacle to learning indigenous languages is a lack of pedagogical materials and one of the reasons for that lack is because some native people oppose having their languages written down or recorded" (p. 36).

This citation points to another problem that is particularly acute for indigenous languages. Those who might wish to create materials for teaching may not have access to situations in which the heritage language is authentically employed. This is partly owing to what will be termed here as "cultural mining." Certain researchers have entered indigenous groups for study, taken the data they sought, and then left to publish their research without returning any information to the people with whom they worked. Adley-SantaMaria (1997) describes this situation from an in-group member's point of view:

Linguists, anthropologists, and other scientists extol methods of scientific inquiry utilizing the Euro-Western philosophical underpinnings of the various disciplines in American academics. Linguistics seemed like anthropology, a field of study that did not have a good reputation among some of us Native Americans because of its connection with scientific inquiry that has exploited
indigenous societies and kept us rooted in the past. It seemed as if we native people were like "bugs" on a microscopic slide for anthropologists (scientists) to examine and "dissect" into our varied parts: kinship patterns, material subsistence, cultural artifacts, marriage obligations, types of shelter, ceremonial life, and so forth, all of the past, as if we are invisible in contemporary society. Some of us have long abhorred the tunnel vision of these disciplines that generally do not consider non-Western societal world views as legitimate. (pp. 136-137)

In this context, the term "in-group" refers to a set of individuals who share common ethnic, social, geographic, historic, and linguistic ties, among others. The White Mountain Apache would be an example of an in-group, and the scientists Adley-SantaMaria refers to members of the out-group. It is entirely possible, of course, that heterogeneity exists within the "in-group"; not all members may speak the mother tongue, they may have been raised in different geographic areas due to migration patterns, or there may be divisions based along gender or age vectors. Be that as it may, for the purposes of this article the in-group consists of those individuals who have a voice in determining such matters as who has access to its language, culture, and other dimensions of that group's physical and spiritual realities.

As one result of that cultural mining, many indigenous groups in the US closely control who is allowed to enter the community to carry out work on language, among other areas of study. Further, certain functions, such as religious ceremonies, may be closed to out-group individuals. Such situations motivate the title of this paper; one solution to this problem is to train members of the language group in the use of advanced technology in order that materials for language preservation and teaching can be collected, archived, and prepared by in-group members for other in-group members.

METHODOLOGY

The work described here was carried out under the auspices of the Kellogg Foundation, which supported this project via the NMSU Bridges Program for American Indians in the Social Sciences and Humanities during the summers of 1999 and 2000. As noted at the Bridges Program Web site, "The program's purpose is to strengthen educational functions at the tribal schools through faculty development and to facilitate student transfer to and retention at our mainstream institution." Students from the Southwestern Indian Polytechnic Institute (SIPI), the Crownpoint Institute of Technology (CIT), the Institute of American Indian Arts (IAIA), and Diné College were invited to the NMSU campus for a series of presentations in which faculty members shared their ongoing research projects. The students then chose the research project in which they wished to participate, and were invited to campus during the summer to collaborate with NMSU faculty members.

During the early stages of the Bridges Program, the author presented work he was carrying out regarding language loss, and a student from the Crownpoint Institute of Technology, Millie Smallcanyon, decided to participate in that research. Her choice was fortuitous in that Smallcanyon had already received training in computer assembly and maintenance at CIT. She arrived at NMSU in the summer of 1999 with a sophisticated knowledge of personal computer technology, which was to accelerate the progress of the research collaboration. The first stage of the pilot project was dedicated to developing an awareness of the concept of language loss. Smallcanyon and the author (hereafter, the research team) spent the early weeks of the summer of 1999 researching their experiences as speakers of heritage languages that they had lost and re-learned, Navajo and Spanish, respectively.

The research team used an investigative and pedagogical technique employed by Shor and Freire (1987) and Freire and Faundez (1992), among others. That is, they established a topic for discussion, language loss, and revival, and then carried out a series of dialogues on that theme during a number of meetings. From these conversations they extracted and wrote down their personal experiences of language loss and maintenance, comparing and contrasting their individual histories. They used these data as a means of trying to identify what it was that brought them back to their native tongues, and to explore their
experiences to see if there were any common cross-cultural experiences that led them to reacquire their heritage languages. They found that despite sharp differences between their cultural backgrounds, they shared certain events in the process of language loss and language re-acquisition. They related those experiences to the literature in the field, such as Fishman's (1991) work on reversing language shift and McCarty and Zepeda's (1999) discussion of language and identity (Villa & Smallcanyon, 1999a, 1999b).

At the same time, the research team worked on building skills in collecting oral data. They employed an on-line handbook for the collection of oral histories (Hunner, Villa, Staski, & Wall, 1998) for such details as the following: how to select an appropriate site for an interview; how to prepare for the interview itself; and how to prepare the recording equipment, in this case a small, hand held tape recorder. After this initial work, Smallcanyon carried out a number of on-campus interviews with other participants in the Bridges Program, in both Navajo and English, in order to put into practice the data collection procedures she had worked on. After she felt comfortable carrying these out, and the recordings had been reviewed for clarity and content, she returned to her hometown of Kayenta, Arizona. There she carried out a number of interviews in Navajo with family members and acquaintances. Upon returning to the NMSU campus, the research team digitized these recordings, used a software package to "clean up" the resulting files (remove noise created by the recording system) and then copied them to a compact disk (CD). At that point, the end of the first summer's collaboration, an easily accessible, highly transportable sample of authentic Navajo dialogue had been created.

Space does not permit a detailed analysis of the materials that the research team created. However, with regard to the definition of authentic materials, the author will point out that in one particular session Smallcanyon's grandmother described their clan structure. This particular segment of the CD, then, contains not only the Navajo language modeled by two native speakers, but also important cultural information as well. Navajo is used in this instance as not just an exercise in demonstrating certain syntactic or lexical features, but rather as a means of passing on at least part of a worldview that its speakers embody. This language sample stands in contrast to non-authentic materials in which invented characters participate in a dialogue created solely for the purpose of teaching one grammar point or the other. The initial purpose of carrying out the recordings was not to create materials for teaching Navajo, but in the event that they were drawn upon for that purpose, they would provide a model for language usage as well as offering cultural content.

The result of the first summer's work was a series of CDs which represent a number of intergenerational conversations in Navajo. The second session, carried out in the summer of 2000, focused on creating a system similar to the one used in the first year's work, that is, on the technical end of creating authentic language materials. Before presenting this section, however, the author must begin with the disclaimer that, in discussing the various components utilized to create a system capable of producing language CDs, he endorses neither a particular product brand nor operating system. Components at hand were used, but similar systems certainly can be built using other makes and models of technology as well.

As noted above, digital technology has plummeted in price over the last two decades. To be sure, certain equipment is still expensive, but the technology explosion has resulted in powerful computational technology that can be had for little or nothing. The result of this reduction in the cost of highly useful equipment is that individuals or organizations interested in preserving language and creating education materials can have functional systems at very little cost. In the case here, NMSU has a facility which receives equipment that has failed or been replaced. The research team scoured this facility for random access memory (RAM), hard drives, machine cases, and power supplies, among other components.

In order to begin the process, Smallcanyon disassembled and cleaned a computer with a 233 megahertz Pentium processor. She then installed additional RAM, for a total of 64 megabytes, a card for an audio-to-digital processor, a CD-ROM (compact disk, read-only memory) drive, and a CD-ROM recording device. Concurrently, she audited a class on DOS (disk operating system) software. The machine was
reassembled, and an operating system installed. The software necessary to run the various devices mentioned above, included with the hardware, was also installed. The system was then turned on and tested. At that point the researchers had the technology to take an analog audio signal, digitize it, edit it, and then store it to an easily played medium. As they had salvaged the majority of components, the only ones that had to be bought were the CD-ROM recording device and the audio-to-digital signal converter, for a total of about US$450.

The research team had the advantage, of course, of access to essentially free equipment. However, at the time of writing of this article, it is possible to get a very powerful computer, for example a machine with a Pentium III 667 MHz processor, for about US$350. Add to that a decent monitor and the components listed above, and US$1,000 or less will purchase a system that will digitally preserve an elder's voice. It may be that a single individual may not have the economic resources for acquiring this type of technology, or even know how to use it. However, once several people join together who are interested in preserving their culture and passing language on to subsequent generations, costs are reduced proportionately, and those who can deal with technological issues to assist in the creation of authentic materials can be identified.

What this means is that those who wish to preserve their heritage language, who would like to develop materials for teaching that language, do not necessarily have to be dependent on some governmental or academic institution to keep their language and history alive. Technological developments have moved along so fast that it is now possible for minority language speakers to record their language and history, and create materials for its teaching as they deem appropriate. In addition, this kind of preservation can remain usable for extended periods. Magnetic recordings, such as those on audiotape, will start to deteriorate after a certain length of time. Digital files have the potential to survive much longer, if handled properly.

The process may sound simple, and basically it is. However, the description above represents a broad sketch that leaves out various details of the process. For example, most, if not all, of the software needed to run older components such as hard drives or CD-ROM drives can be found on the Internet and downloaded. This does take some time and practice, though, as well as a fairly fast Internet connection. These are not always available at all sites, so partnering with those who can facilitate finding such information and software becomes crucial. Further, Smallcanyon entered the project with a sophisticated knowledge of computer technology, as noted above. Not all minority language groups may have institutional support such as the Crownpoint Institute of Technology to train in-group members in electronic technology, necessitating other means of providing such expertise to minority language speakers. Once again, collaboration is essential in addressing these issues.

Bearing these difficulties in mind, what this pilot project demonstrates is that a speaker of a minority heritage language acquired the skills needed to collect language data and to preserve it in a period of about 12 weeks. This results in an individual who has an in-group member's access to the contexts in which the minority language is used in authentic contexts, and who has the necessary technical skills to, minimally, assist someone who wished to create audio (or indeed video) materials for teaching that language. There exist precedents that underscore the importance of an in-group member working with out-group members in order to create (and disseminate) such materials. Angayuqaaq Oscar Kawagley, for example, has a Web site (http://www.ankn.uaf.edu/oscar.html) which offers on-line electronic materials for indigenous peoples, through the Alaska Native Knowledge Network. That Web site results in part from the collaboration between the author of the site and those who provide technical support at the University of Alaska Fairbanks. Finally, the project described above directly addresses the concerns of Adley-SantaMaria (1997), who writes, "On the one hand, I do not want our languages exploited and also believe that study of our languages should be done only for our people who want to learn their language and not for the wider audience. On the other hand, writing and video- and audio-recordings of our languages should be done for our tribal archives to be preserved for future generations of Apaches" (p.
As asserted earlier, partnering to facilitate the use of electronic technology results in in-group members resolving such conflicts as they see fit. If a minority language group decides that recordings will indeed be made of its language, and that only that group should have access to those materials, the technology currently exists for it to do so.

There does exist the possibility that certain in-group members could create materials that other in-group members do not approve of, owing in part to the ease with which those materials can now be assembled. As noted above, any particular in-group is not necessarily homogenous, and the heterogeneity of that group could result in differences of opinion as to what is appropriate or not to record and digitize, and what materials might be adequate for language teaching. However, the author returns to a central tenet of this article, that even in the event of such a lack of accord, it is ultimately the in-group that would resolve such a dispute, in ways that are appropriate to that group. This would not be a possibility in a scenario in which the in-group did not have control of the collecting, storing, and pedagogical use of their mother tongue.

The Role of the Computer in Teaching a Heritage Language

The appearance and rapid growth of computer technology opens new doors to heritage language maintenance and teaching, and at the same time presents challenges in its implementation for those tasks. In the relatively distant past (regarding the lightning fast advances in computer development), Nidia González-Edfelt (1993) wrote that technology had passed the pedagogical bases needed to effectively implement it in the language learning process. At that time, she stated, "The full impact of the microcomputer in education, however, has not yet been realized, as its influence continues to increase daily" (p. 172). Her assertion held to be true; for example, a technology not commonly available a scant 7 or 8 years ago, the CD-ROM drive, is now standard equipment on most systems. That technology provided new opportunities for language teaching, but also created new pedagogical demands for its effective implementation.

One example of these challenges is the so-called "interactive" programs for language teaching on CD-ROM. The majority of these require that a language learner sit in front of a computer and click on various icons to listen to language samples, learn vocabulary, perhaps produce the language, and take tests, among other activities. This may be interpreted as an extension of the audio-lingual method that followed the development of the reel-to-reel tape recorder in the late 1950s. The language learner is using a new technology as a tool for providing comprehensible input. There may be some benefits that derive from such pedagogical activities, but there simply is not an authentic communicative environment present in such situations.

Krauss (1998, p. 18), for example, expresses certain reservations towards computers with regard to their usefulness for language maintenance and teaching. He writes,

…even in the US Southwest, where so many indigenous languages are still spoken by children, specialists in these languages often become preoccupied with more and better technologies such as the computer and multimedia for teaching language in the school. I am sure this is good, and this teaching is serious and earnest. At the same time, though they may note that the children are no longer "producing" the language, they are distracted from the real reason for this: the language is no longer consistently spoken to children in the home as a mother tongue.

The author believes Krauss' concerns are justified. Computers cannot become a surrogate for one generation of minority language speakers passing that tongue to subsequent generations. The teaching of a language, its intergenerational communication, depends on individuals dedicated to both transmitting and learning the heritage tongue. Hinton (1998) and Sims (1998) detail one attempt to preserve an indigenous language, in which a speaker of that language tutors a learner in intensive one-on-one sessions.
To repeat a previous assertion, I believe that computers can support language maintenance and teaching efforts, not replace them. For example, the existence of authentic materials can fit well into an appropriate pedagogy for teaching a heritage language. Benally, in his 1994 article "Navajo Philosophy of Learning and Pedagogy," consistently emphasizes the importance of elders passing on knowledge to younger generations. He writes, "Our ancient tribal stories identify the creators of this world..." (p. 24), "...our elders have explained that we have a male-like, protective and aggressive side..." (p. 24), "The elders have added another dimension that grounds traditional knowledge" (p. 26), to note only a few examples. This tradition of intergenerational teaching forms a central core of an in-group pedagogical practice. Preserving the voices of the teachers in a culturally acceptable manner can provide valuable materials for that particular pedagogy. Regarding the interaction between language and technology, Smallcanyon provides an anecdotal example of her experiences with re-acquiring her heritage tongue that underscores such a relationship. She writes, When I think back on those days back in boarding school, there were a lot of students that would speak Navajo; they weren't ashamed to speak it, either. I knew if I spoke Navajo I would be made fun of because I was "different." So it wasn't until I was in high school and joined the Miss Sevier Indian Princess pageant that we had to say a formal introduction in Navajo and then in English. My friends taught me how to say what, then I buckled down and from there I would just ask my grandmother "How do I say this? What does this mean?", just all kinds of questions and learning the language all over again. But it wasn't as difficult to relearn the language. Today I speak fluently in Navajo and I'm proud that I do because I can sit and talk with my grandmother or my elders and family members, just to be able to hold a conversation with them feels great. (Villa & Smallcanyon, 1999b)

Her reacquisition of Navajo took place among family and friends, her teachers, not in front of a computer or a CD player. However, she now possesses permanent records of some of the voices that taught her; these archives may allow future generations of Smallcanyon's family to listen to histories as recounted by their forebears, to hear the world-view of an older generation as expressed in Navajo.

In sum, computer technology has the possibility of filling a very important niche in minority language maintenance and teaching. Its accessibility increases as time passes. Between the time of the original composition of this article and its current revision, prices for computer technologies have continued to tumble, so that ever more powerful systems become available for ever decreasing sums. Partnering between in- and out-group members can lead to the appropriate collection, processing, and distribution of language materials for their use in maintenance and teaching efforts. The means of resolving the dilemma for language recording and the preparation of pedagogical materials created by cultural mining are now more easily resolved, to whatever degree may be possible, through inexpensive access to computer technology. There can be no doubt that such rapid advances may create new problems. As noted above, not all in-group members may be in agreement as to what is appropriate or not regarding the recording of their mother tongue, and the fact that certain individuals could feasibly proceed with such work before an accord was reached presents a distinct possibility. This is but one of the challenges presented by new technologies. However, as the author observed earlier, the means of resolving such conflicts rest with in-group members, and increasingly solutions to such problems are not dictated by access, or the lack of it, to technological resources. Rather, they may be dealt with in ways that are internally appropriate to the group in question.

CONCLUSION

This paper outlines a pilot project in which a native speaker was trained in both the methodology and the technology to elicit, record, and preserve her heritage language as it is used in authentic contexts. In doing so, she continues a tradition of the intergenerational use of Navajo in her family. The author hopes to have
shown that such an activity can result in materials that are useful for language preservation as well as for teaching. The fact that an in-group speaker of a minority language carried out this work demonstrates that it is not necessary to rely on out-group members to provide such materials. Further, the technology needed for this process is not tremendously expensive, and will become increasingly inexpensive as prices for computers continue to fall.

There are, of course, shortcomings in this work that hamper its replication in other minority language communities. As noted above, not all minority language groups have an institution such as the Crownpoint Institute of Technology to provide training in electronic technologies to their members. Some indigenous languages may have no younger speakers such as Smallcanyon to carry out the work described here. If indeed there are younger speakers, they may not be interested in learning how to manipulate technology. Not all speakers of the language may be interested in language maintenance and teaching issues.

Further, there are limitations to the technology described here. The storage devices used in this project are not permanent; CDs will begin to deteriorate after a number of years, and do not constitute a truly long-term storage medium. Hard drives, another means of storing the digitized recordings, are prone to failure that destroys the data they contain. If the technology explosion creates powerful systems that are relatively inexpensive, it also renders some older machines obsolete, as was the case with the steel wire recorders. The current flux in digital technology makes it difficult to predict what systems will be in place in a short span of time, and makes re-training a constant necessity. Again, while technology has much to offer, it is no panacea.

What the author does hope to have shown is how individuals of U.S. minority languages have been able to collaborate in a project aimed at keeping their linguistic heritage alive. Language maintenance and its teaching are sides of a single coin; the two are not mutually exclusive. Teaching the language to subsequent generations implies its maintenance, and vice versa. The cross-linguistic and cross-cultural interactions the author presents here may be useful for a concerted effort at minority language maintenance and teaching. Regarding the situation of indigenous languages, Krauss (1998, p. 19) observes,

…I have found their [indigenous language speakers] determination is very firm, and rather that they are in need of realizing that they have much more company than they thought -- that many groups around the country and the world share their problems and could share solutions -- and that there is much to be gained by organization and cooperation.

The work that the author and Millie Smallcanyon have carried out suggests that such collaboration is both possible and fruitful. The author notes this as Adley-SantaMaria (1997) writes, with regard to the status of non-English languages in the US,

Speakers of Chinese, Spanish, or other so-called "world languages" have non-speakers who can always find a speech community even into the future that will be available to them if they want to learn their languages, but indigenous languages are unique speech communities. Once our native speakers are gone and the younger generations become completely monolingual in English, the loss of our languages is permanent. (p. 136)

The accuracy of this observation is undeniable. At the same time, speakers of non-indigenous, non-English languages face many of the same challenges in maintaining their heritage tongues in a predominantly English speaking environment. Native varieties of U.S. Spanish, for example, are as prone to loss here as any other minority language (see, e.g., López, 1978; Veltman, 1988; Bills, 1989; Solé, 1990; Pease-Álvarez, 1993; Bills, Hernández Chávez, & Hudson, 1995; and Rivera-Mills, 2001, to name only a few). That loss concerns many individuals of Spanish speaking origin, who see an important aspect of their community life slipping away. Sharing resources, pedagogical techniques and technological
expertise cross-culturally and cross-linguistically can only benefit all those dedicated to preserving their unique cultural heritage as embodied in their mother tongue.

NOTES
1. The author is grateful to the three anonymous reviewers of Language Learning and Technology, whose extensive comments have led to substantial improvements in this article.
2. As work that Millie Smalcanyon and the author have presented at conferences is cited in this text, her name has not been changed. The author requested and received Smalcanyon's permission to use her real name in this article.

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WORDS AS BIG AS THE SCREEN:
NATIVE AMERICAN LANGUAGES AND THE INTERNET

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ABSTRACT

As linguists working with the revival, maintenance, and survival of Native American languages have noted, the forces causing languages to become obsolete are not merely linguistic: Political, economic, and social factors all influence the viability of indigenous languages. Thus, researchers addressing Native American issues must pay attention to these factors in order to understand more fully the complexity of language decisions for Native Americans. However, the majority of research done on Native American languages is done by non-Natives. This Native subject/non-Native researcher relationship is a problematic one, given the longstanding practice of non-Native people making decisions for and about Native Americans. To make matters even more complex, the dominant North American culture has a long tradition of mythologizing Native Americans as pre-literate "children of nature" -- an outdated stereotype that does not reflect the sophisticated appropriation of computer technology by Native American communities during the "Internet revolution" of the last 10 years. This paper explores the complex history of Native American language research before discussing how one Native school is utilizing Web technology.

NATIVE AMERICANS AND TECHNOLOGY: WELCOME TO THE FUTURE

A scene from an episode of the popular television show The X-Files offers a telling example as a way into a discussion of the misrepresentation of Native Americans vis-à-vis technology. The episode, entitled "Paperclip," was the final installment in a three-part season finale in the spring of 1995. The plot, which is too complex to explain in detail here, involves the FBI's attempts to acquire and protect data concerning an international and even extraterrestrial conspiracy. FBI agents Mulder and Scully find evidence of the conspiracy on computer files and realize that they need to protect the data in a more secure way than electronic storage media allow. In resolving this problem, the story pays homage to the Navajo code talkers of World War II: The important data is encrypted in the Navajo language and memorized by a Navajo elder, Albert Hosteen. The episode ends with the FBI Assistant Director parading Hosteen in front of a representative of the forces of evil as he triumphantly explains the utility of Navajo in a postmodern world:

I'm sure you're thinking Albert is an old man, and there are plenty of ways you might kill him, too. Which is why in the ancient oral tradition of his people he's told twenty other men the information in those files. So unless you kill every Navajo living in four states, that information is available with a simple phone call. Welcome to the wonderful world of high technology. (Carter & Bowman, 1995)

In this example, the usually high-tech FBI triumphs over multinational and perhaps extraterrestrial forces by reverting to the ultimate low technology -- the preliterate and, of course, pre-computer oral tradition of North America's indigenous people. While innumerable episodes of The X-Files involve hacking, firewalls, and encryption as elements of plots about protecting truth from the malevolent forces that conspire to suppress it, this episode privileges the human over the machine in this process. But not just any human -- an elderly Native American and his community serve as the storage medium for the
valuable data. This choice exemplifies the dominant cultural convention of equating Native American
languages with authentic culture and history. The conflation is ostensibly positive here, as the oral
tradition is what safeguards the truth. However, Albert Hosteen serves only as a passive receptacle of
knowledge for the federal government in this situation. His "ancient oral tradition" exists only in
contradiction to the modern, written tradition exemplified by the data on the disks -- the viability of this
oral tradition is never tested, explained, or problematized. His authenticity as an elder from a traditional
society makes him the antithesis of a de-personalized intergalactic conspiracy and thus makes him a safe
carrier of important information, not the source of it.

This example demonstrates America's fascination with Native languages and history. According to the
dominant cultural coding, Native languages and cultures are located in the historical past, while English
language and culture are associated with a technological future. To be an authentic Native is to be an
immutable part of history. Conceiving of the Indian as an essentialized and fixed part of history, existing
only in museum artifacts and linguistic grammars, is a manifestation of what Said (1978) calls
"Orientalism" -- Western academics' fascination with and systematic study of the non-white Other. One
problem with the Orientalist discourses of linguistics and anthropology is that only specialists have
agency while Native Americans exist as silent subjects to be studied and preserved. Such discourses
implicitly assume that Native people lack the agency to chart their own linguistic future.

The Internet, with its promise of providing a venue for diverse voices in an egalitarian and color-blind
online society, may appear to be a tool useful for countering this tradition of silencing Native Americans.
However, the challenges facing Native Web site authors are more complex than might be assumed at first.
Native Americans have to deal with lack of access to technology before they can begin the bigger struggle
-- countering a history of silencing and misappropriation in order best to represent their language and
culture as they determine. This article discusses how issues of ownership and agency problematize Native
American language research. After a brief survey of some of the relevant issues in Native language
education and the use of technology, the article goes on to examine how students and teachers at one
Native American school have used their Web site to promote their language and to facilitate learning.

LANGUAGE LOSS, LANGUAGE SHIFT, LANGUAGE RENEWAL

The terminology used in discussions of the viability of Native American languages varies widely. Some
refer to language "loss" while others prefer the term "language shift." Traditionally, the focus of much
linguistic research was on the language itself -- its lexical items, verb tenses, and, perhaps, number of
speakers. This focus was due in part to the non-Native speaker status of most of the researchers, who
sought to document and classify scientifically the features of a language. More recent work in this area
has addressed people's perceptions of and attitudes toward language loss, such as Watahomigie and
Yamamoto's (1992) article about the Hualapai tribe and the creation of the American Indian Languages
Development Institute in the Southwestern US. They found that one of the obstacles facing revitalization
of the Hualapai language was the belief of the people, students and teachers alike, that the language was
incapable of expressing abstract thoughts and thus was "inappropriate for use in the school" (p. 11). A
Native/non-Native husband and wife team, Dauenhauer and Dauenhauer (1998) document the various
aspects of language loss -- technical, emotional, and ideological -- experienced by Native people in
southeastern Alaska. Joshua Fishman, one of the leading scholars focusing on language preservation, uses
the term "language shift" in his 1991 book Reversing Language Shift: Theoretical and Empirical
Foundations of Assistance to Threatened Languages while Dick and McCarty (1997) refer to "language
renewal." Northern Arizona University holds a conference each year addressing Native language issues;
conference themes from recent years include stabilizing indigenous languages (Cantoni, 1996) and
teaching indigenous languages (Reyhner, 1997). In these conferences, Native Americans, non-Natives,
language scholars, teachers, students, and community leaders all come together to discuss issues facing
indigenous languages past, present, and future.
While Krauss (e.g., 1992) has often referred to the loss of languages as "language death," many scholars and those who work with indigenous languages prefer to focus on what can be done now, rather than what has already happened. As Dick Littlebear urges, "We must quit endlessly lamenting and continuously cataloguing the causes of language death; instead, we must now deal with these issues by learning from successful language preservation efforts" (1996, p. xv). In his Appendix to the Northern Arizona University conference proceedings from 1996, Littlebear provides a model for these efforts that focuses on using trained native speakers and context-appropriate teaching methods. In the following section, I briefly outline some frameworks for Native language education.

**Native Language Education Programs**

Three models for Native language education – language and culture, bilingual, and immersion – are discussed. Each represents a distinctive perspective on the goals and objectives for maintaining and preserving Native American languages. In the following section, I briefly survey several representative studies and use them to show that while they encourage autonomy and self-sufficiency for Native Americans, the programs nevertheless often underestimate the importance of relevant language use for Native Americans.

**Culture and Language Education -- Two Approaches.** The first framework views the intersection of language and culture as a teaching goal. Eastman (1981) describes what she calls a "culture language" or "language reintroduction" program that could be used in areas where languages that are no longer "widely used for practical purposes" are "to be reintroduced as 'cultures' within the school curriculum" in the dominant language (p. 302). Eastman defines language's role as an enrichment tool within the normal curriculum:

> A culture language, so conceived, does not involve using the Indian languages to speak or communicate in general. Rather, it consists of a stock of vocabulary reflecting Indian cultural concepts (e.g., unique cosmology, counting systems, mythology, fishing and hunting techniques, oral tradition). (p. 302)

This approach, she says, is different from second language learning because it focuses on "culture" and not language learning. Her approach centers on the culturally loaded connotations of the ancestral languages and the assumption that knowing Indian words will make one feel more Indian. While this may seem to be a conservative approach with manageable goals, this "culture language" proposal is highly problematic. These problems will be addressed in conjunction with the next approach.

Palmer (1988) takes issue with Eastman's approach and offers his own variation. He names his version "language and culture" in order to emphasize that the two are not identical. While he readily acknowledges the limitations of his version when he says that "the language and culture approach is limited as a means of imparting functional cultural knowledge" (p. 310), he asserts that his theory is more realistic than Eastman's. By emphasizing morphological, syntactic, and semantic approaches to folk taxonomies, which uncover more of the "cultural constructs" of these languages, his method stresses crucial aspects of learning a language as a means to a culture.

Holding on to a history that is becoming lost to younger Natives is certainly a noble goal. Nevertheless, it is problematic as well. Linking the use of the language to the realms of environment, culture, and history seems to locate the language as part of history, as an archaeological artifact rather than as an everyday part of modern life. While learning about history is definitely important, it pales in comparison to goals that Native people have for themselves and their children, such as educational advancement, economic achievement, and recognition beyond the village or reservation.

Whether discussed in terms of language and culture or language renewal, revitalization, or preservation, the goal of these language programs is essentially the same: to keep Native languages in the
consciousness of Native people. With a limited goal such as "cultural enrichment," students may succeed in learning a few words for "hunting" without developing a working knowledge of pronunciation, grammar, or most importantly, the context in which these words are used. Immersion programs seek to remedy the problem of context by "immersing" students in daily language use.

**Elders and Immersion Programs.** Britsch-Devany (1988), in her language renewal plan for a Tachi Yokuts (California) preschool, points out that in effective language programs, the school extends into the community as the elders become involved, and the community then extends into the school as the elders become "the embodiment of the traditional culture in the school, both through their presence and the acting out of their roles as the knowers, as the 'real teachers' of the language" (p. 299). This "use" of the elders as the teachers of the language is essential in the current movement away from what Brandt (1988) sees as the personal goals of the researcher and toward community goals:

> The focus of work with languages and Indian communities has changed from the solo fieldworker model of an academically motivated single nonspeaker linguist working with a language consultant to the benefit of the academic community or the individual researcher's career, to the collaborative model of jointly constructed work with native speakers on goals defined by the community, tribe, school or program. (p. 322)

Britsch-Devany (1988) delineates a solid plan, according to which the linguist/teacher, instead of being the primary source of native language knowledge, can serve as a consultant. This would perhaps "lower" the status of the linguist/teacher and would simultaneously raise the status of the elders. In this way, the community would be allowed to decide for itself what it wants. There are historical reasons why Native people have negative feelings about their own language; such feelings may cause hesitation in developing a language program when community members recall being punished for speaking that same language only 30 years before. Thus, the situation is not as clearly defined as some would believe: Elders are not always as motivated to "save" the languages as outsider experts may hope, and younger people are not always as uninterested. The situation varies from state to state and even reservation to reservation.

Members of both the Native and educational communities often express the worry that students who learn the Native languages will not learn English well enough to function in the world at large. While researchers have shown that bilingual education does not impede English learning, their concerns should still be listened to. No one wants Native people to learn their ancestral language at the expense of English language skills that are truly necessary to function outside the village. However, these programs have to set their sights high to allow for more than partial success. The goal is to have students who are able to speak both their Native language and English fluently, without the Native language "hurting" their English. An emphasis on English education can assuage the fears of the elders who want the community's children to be fully proficient in English so that they can succeed in the world beyond the village or reservation if they so choose. In the following sub-section, I discuss one such program.

**Yup'ik Immersion Program.** A part of the Lower Kuskokwim School District, the largest school district in Alaska and one that consists of almost entirely of Yup'ik Eskimos, Bethel is a representative Native village in Alaska. With a population of 4,700 people, it is the regional center for 56 villages in the Yukon-Kuskokwim River Delta. Approximately 50% of the general population and 66% of the student population are Yup'ik Eskimos; as well, 25% of the teachers are Yup'ik, the largest percentage of indigenous teachers in the state of Alaska (Williams, Gross, & Magoon, 1996, p. 157). Most of the children in Bethel speak little or no Yup'ik, but Iutzi-Mitchell (1992) notes that in nearby Yup’ik villages with higher numbers of young speakers, K-3 is taught primarily via Yup’ik, which remains the primary language for 30 minutes a day for "maintenance" in later grades. According to Iutzi-Mitchell, this is a transitional program which does not develop academic abilities in Yup’ik L1 students as they conform to the public school insistence on English. The eventual result is mediocrity or worse in both languages.
In contrast, he presents a proposal for a new language policy that will maintain performance in English while promoting the use of Yup'ik. In consultation with Yup'ik parents and elders, he proposed a total immersion program starting in kindergarten. K-1 would be entirely in Yup'ik; 80% of grades 2-5 would be in Yup'ik; and grades 6 through 12 would be split 50-50, Yup'ik-English. The local college would offer about half its classes in Yup'ik as well. In addition, a Yup'ik Framework Committee has been created to establish cultural values and concepts in order to modify curricula to a suitable framework. This bilingual program focuses on the students; the culture and language are secondary. Complete revitalization of the language is not expected; that is, it will not become the first and only language of the community. Since proficiency in English in highly valued in Bethel, as it is elsewhere in the United States, this plan calls for giving students the ability to function in two languages while acknowledging the global implications of both Yup'ik and English.

Discussion

One problem with all of these methods is the relationship between specialist and community. While it is less true today than in the past, it is still common to have non-Native specialists, often with PhDs, working with Native populations, whose members generally do not hold advanced degrees. If these language-preservation programs are to work successfully, linguists must become members of the community while retaining their positions as non-Native specialists. However, as non-Native academics, linguists and anthropologists cannot become a complete part of the community they are working with, nor can they distance themselves in order to make disinterested determinations about what should or should not be done. It is at this point that the culture aspect of a "culture language" becomes problematic, since it is doubtful that someone outside of a culture can be best suited to determine what is culturally significant. Immersion programs can remedy this problem by making elders and other fluent speakers the center of language programs.

One solution to the problem of non-Native specialists working with non-specialist Native people is to encourage Native people to study and write about their languages. Swisher and Deyhle (1987) argue that Native Americans should be the people doing research on Native American education; Swisher (1996) continues this discussion. Mihesuah’s 1998 collection of articles is written entirely by Native academics who discuss how anthropology, American Indian studies, history, and literature continue to have non-Native scholars addressing Native concerns, to the chagrin of the Native scholars in those fields. Speaking specifically about Native language research, Kari and Spolsky (1978) call for an increase in the number of Native American linguists: "Thus, where once an Athapaskan linguist meant a scholar studying Athapaskan, it will soon also mean an Athapaskan speaker studying linguistics" (p. 659). Iutzi-Mitchell's proposal for college classes in Yup'ik would make Yup'ik a course of study leading to a degree and maybe give interested people a reason to go to college while still being able to stay involved in the community. By teaching a survey course on Native languages at the Bethel branch of the University of Alaska, Iutzi-Mitchell is demonstrating the value of Yup'ik as a subject of university-level study. While a Yup'ik college program will not save the language in itself, it does provide new avenues of use.

ALTERING THE FUTURE THROUGH LANGUAGE ONLINE

The question of whether or not native languages should be allowed to continue on their current trajectory, even if that means death, is a deeply troubling one for many educators, anthropologists, and linguists. As a linguist working extensively with Alaskan Natives, Krauss (1992) has pointed out that linguistic diversity and biological diversity can be seen as two parts to the same whole. The loss of an undocumented language can be viewed as akin to the loss of an unstudied plant species. Biologists are currently experimenting with substances found in rain forests as potential remedies for cancer. What if, in a similar way, languages spoken in these imperiled areas contain features essential to the advancement of linguistic science, perhaps through modifications of phonological or syntactic theory? Underlying such a
view is the belief that undocumented languages can and should serve to further linguistic research, even if they may still not be "saved" from disuse by their speakers.

Since much, but not all, of this language research is done by non-Natives, it runs the risk of perpetuating the Orientalist history of academic scholarship by white Western scholars on non-white, non-western languages and cultures. This "remorse that produces anthropology" (Derrida, 1976, p. 114) has not gone unnoticed by linguists. Phillipson's 1992 work *Linguistic Imperialism* addresses the long tradition of the British- and American-sponsored spread of English throughout the world, often at the expense of local languages. Pennycook (1994, 1998) also addresses this problematic history of English language education and research worldwide while Deloria (1969), Krupat (1992, 1996) and Keenan (2000-2001) focus on the troubling history of scholarship on Native Americans done by non-Natives. While their focuses may vary from anthropology to history to American Studies, they share an insistence on local control of Native issues.

Inherent in the belief that languages should be part of the daily lives of their speakers is the belief that languages are not merely ornamentation. If certain languages cease to play the roles assigned to language, then there seems to be little purpose in maintaining their existence artificially in books and computers. However, the complex history of Native Americans in the United States makes this issue even more unclear. The traditional privileging of languages associated with the dominant class in society renders the linguistic playing field uneven. Native American languages are not thriving in this country (see Zepeda & Hill, 1991, for an overview) and there are clear historical reasons for this failure to thrive. Does the relative lack of vitality today of some Native American languages indicate that they are destined for obsolescence? This death sentence does not seem fair to people who want to learn these languages and people who want to study them. The "underdog" status of non-dominant languages motivates many people, speakers and non-speakers alike, to work for the preservation of languages that seem to have been unfairly marked for death. However, this preservation work is fraught with complexity as indigenous people struggling to make decisions for their language's future are confronted with linguistic and even technological details for which they may be unprepared. In the following section, I address some of these concerns.

**Community Issues**

As mentioned above, members of both Native and educational communities wish to ensure that learning a Native American language will not interfere with students' English language skills to the detriment of their success in the larger world beyond the village or reservation. Native villages like Bethel, Alaska, are not isolated villages. Although they may be hundreds of miles from a "real" city, most homes are connected to the outside world via cable/satellite television and the Internet. Like students everywhere in the United States, Yup'ik-speaking children spend a large amount of time watching television, playing videogames, and surfing the Web, all of which are predominantly in English. Since virtually none of these media offer content in Yup'ik and since it seems doubtful that there will be an increase in Yup'ik-language television broadcasts or Web sites, exposure to popular culture for children in Bethel continues to accentuate English and to hinder any communicative possibilities of Yup'ik.

Natives and researchers both want Native Americans to make what Morrow (1987) calls "the best of both worlds" by maintaining fluency in English while learning or maintaining the Native language. The task facing those interested in Native language survival is to create contexts for real-life indigenous language use. A particularly relevant context for language use in recent years involves computer technology. Native communities are slowly but surely becoming wired, and the significance of having a Web presence is not being ignored. However, traditionally, as noted above, much language research has equated Native culture with authenticity, nature, and the past. Reduced to academic discourse in anthropology and linguistics, to museum artifacts and linguistic grammars, Native American languages often exist outside the living practice of everyday use. The problem of Orientalism remains: Native languages continue to be
viewed as remnants from America's past and not as an active part of its future. A primary way of asserting utility and value and an orientation toward the future in today's world is the skillful use of technology. The next section discusses the problems and opportunities facing Native Americans as they develop a Web presence.

**Outnumbered and Out-Typed: Natives Online**

While interest in computer-aided language learning (CALL) is growing for teachers of foreign languages (Herron & Moos, 1993) and English as a second language (see Chappelle, 1997, and Liddell, 1994, for further discussion), relatively little interest has been shown in computer-aided indigenous language education. Bernard's 1992 article is one of the first specifically to address Native American languages and the use of technology. Simonelli (1993) argues that when Native-based educational practices encounter Western technology, the production and sharing of wisdom beneficial to Natives and non-Natives alike becomes possible. Lockee and Moore (1998) examine the intersection of Native American educational practices and the use of technology. They point out that many "traditional" language pedagogical practices are not in accord with Native American holistic learning practices and that hypermedia can address these issues and can thus become particularly useful to Native Americans. In a special issue of the journal *Wicazo Sa Review* on technology and Native American culture (1998), Jacobs, Tuttle, and Martinez describe how University of Washington researchers worked with the San Juan Pueblo Tewa to develop a CD-ROM which incorporates dictionaries, songs, photographs, and natural resources.

How specific Native groups use technology is addressed by a number of researchers. Warschauer (1998) describes how the relatively small population of Native Hawaiians have begun to use technology to generate their own materials for and about their own people. He notes also that the great majority of "Hawaiian" Web sites are created by tourist agencies, often promoting their businesses with images of Native Hawaiians. In an extended discussion of this same contrast, Margolin (2000) carefully and elaborately examines the many varieties of Native American language use online, and he includes an eight-page Appendix listing dozens of Native American Web sites. In his study, he addresses the often conflicting images of Native groups available on the Web, including those from sites that seem to serve only as calls to investors, such as oil and fishing sites owned by Alaska Natives, or as advertisements for Indian gaming establishments. In a similar vein, Mizrach's 1999 anthropology dissertation focuses on a Sioux tribe's use of television and Internet technologies. He contextualizes this use vis-à-vis the history of American fantasy images of Indians and the problems these images leave for contemporary Natives. These works highlight two issues affecting Native American Websites: access to technology and accuracy of representation.

**Access to Technology.** The 1990s in North America have been characterized as the Internet decade. In the early 90s, few people had even heard of the World Wide Web, but by 2000, many Americans had an e-mail address if not a Web page. Whereas in the earlier years of the decade most Internet users were students or researchers, by the end of the decade everyone from self-employed free-lancers to telecommuting business people to retirees was using e-mail. Ignored in much of the discourse surrounding the Internet is how minority populations access technology. Kahin and Keller's (1995) collection of articles addresses how the American public accesses the Internet. The authors note that areas with high minority populations are less likely to have access to computers, which are essential to having access to the Internet. Following this logic, it is likely that Native Americans living on reserve lands have been some of the last people to become wired in the US. The U.S. government's Office of Technology Assessment issued a 1995 report discussing these concerns. Casey, Ross, and Warren's (1999) report for the Benton Foundation analyzes the challenges facing Native Americans and information technology. Aust, Newberry, and Resta (1996) document the steps they took to establish Internet access at eight Native-run elementary schools for their pilot project promoting use of the Internet for collaborative learning. Allen, Christal, Perrot, Wilson, Grote, & Earley (1999) discuss this same project from an
educational perspective. Both groups' discussions of the Four Directions Project, developed through a grant from the Department of Education, highlight the idea of a model: the eight Four Directions schools are seen as models for the other 177 Bureau of Indian Affairs schools in the US.

**Accuracy of Representation.** In Kahin and Keller's collection, Baldwin's contribution focuses exclusively on Native American access to the Internet. Baldwin points out that Native leaders are concerned about how the concepts of tribal sovereignty and self-determination will be actualized online (1995, p. 143). The questions of who is Indian and how online identities can be verified worry Native leaders as they begin to address the role computer technology will play in their tribes' futures. Not only do Native groups need to ensure that they have the skills and tools to put their material online, they also need to worry about possible inaccurate and misleading information online, often created by non-Natives working without supervision. As Baldwin indicates, as of 1994, only one federally recognized tribe, the Cherokee, had a Web address (p. 147). As one Native leader cautions, "we don't want to find ourselves the road kill on the Information Superhighway" (Baldwin, p. 151). Even the number of Native-themed Web sites may not represent the numbers of Native Americans online, as many so-called Native Websites are generated by non-Natives. A native author's discussion with a non-Native author of a dubious "Native" Web site is cataloged here. According to Baldwin,

> There is an overwhelming presence of non-Natives in the newsgroups and listservs of the Internet that were originally created to serve Indian interests. Outnumbered and out-typed, many Indian networkers have become passive viewers of conversations about themselves. (p. 144)

This passivization of Native Americans continues a long tradition of non-Natives co-opting Native ideas, beliefs, and images for their own use, regardless of the accuracy of the representation (see Whitt, 1995, for more on the marketing of Native America). As the example from *The X-Files* demonstrates, Native American cultures and traditions can be used by non-Natives for purposes most Native Americans would never even have considered. This situation problematizes the notion of what a Native Web site is. Many, perhaps most, of the Native-themed Web sites are not created by Native American tribes but by individual people who may or may not be identified as belonging to a Native group. Increasingly, however, many recognized and un-recognized tribes do have Web sites. The contexts of these Web sites are as diverse as their authors: Some provide Native-American-generated history and information about customs, beliefs, and policies; others promote business opportunities available and provide information about tribal gaming facilities; still others provide linguistic and cultural information of widely varying levels of sophistication. Since my current focus is Native language preservation, I will now address the use of Web sites for language education; the other genres of Native-oriented Web sites will not be discussed further. In the following analysis, it is important to remember that authorship of Web material is a complex and sometimes controversial subject.

As educators have increasingly stressed over the past decade, computer skills are rapidly becoming necessary for educational and professional advancement. While some schools on reservations are well-equipped with computers, many are not, just as poorer school districts in cities and suburbs are less likely to have current computer hardware and Web access than school districts in wealthier areas. However, having a computer, authoring tools, and Web access is not all it takes to make a Native American language Web site. Jerry Mander's (1991) book *In the Absence of the Sacred: The Failure of Technology and the Survival of the Indian Nations* criticizes the "blind" devotion to technology espoused by some educators and policy makers. Technology on its own does not save anyone, and it may in fact harm those it is purported to help by fostering stereotypical and essentialized notions of what an Indian is.

Nonetheless, most people have embraced computer technology for its ease, accessibility, and reach. These qualities matter. For people who may not be willing or able to travel far from home, the Web offers a wealth of knowledge and experience. If Native Americans can acquire the materials and skills needed to
produce a quality Web site, they may introduce their language and culture to people whom they have virtually no chance of ever meeting in person.

Regardless of the wide reach offered by the Web, content is what ultimately matters. Decisions about what should be presented online, who should write it, and who should be addressed face all Web site authors. In addition, developing online language-learning materials requires more complex preparation than just "knowing" the language. Even something as simple as a font may present a challenge to authors unfamiliar with technology. For languages not written in English or roman orthography, fonts must be developed or purchased. The only other option is not to use the language-specific font if one exists but instead to rely on English approximations of the International Phonetic Alphabet (IPA).

Perhaps seemingly unimportant, this choice about fonts is significant for two reasons. First, being able to see the Native language on a computer screen may be just the 21st-century touch that makes learning "old" languages interesting and maybe even fun for contemporary learners. Brandt (1988) notes that the ability to print out the language in its own orthography on a laser printer serves as a "striking demonstration to community people that their language is not a factor holding them back or an obsolete and even embarrassing remnant of the past" (p. 327). The validation of seeing words printed or published online cannot be underestimated. Perhaps the more important reason for using language-specific fonts, though, is the symbolic privileging of the native language over English. McLaughlin (1992) describes the empowering benefits of Native-language print-based literacy. For students used to seeing only English on computer monitors, "typing Yup'ik words as long as the screen" (Dunham, 1999, p. A8) can bring great joy. And with this joy may come learning. Educators have found that having Native elementary school children create their own language-oriented Web sites effectively encourages the students to learn the Native language and also helps them develop computer skills, organizational methods, and presentation ideas necessary for such a project. As an example of the power -- both linguistic and cultural -- of a Native American language Web site, I will discuss Tulalip Elementary School's Lushootseed page.

**Tulalip Elementary School's Lushootseed Page**

Lushootseed is the Native language of the east side of Puget Sound in Washington state. The fourth grade students of Tulalip Elementary School have created a magnificent Website: http://www.msvl.wednet.edu/elementary/tulalip/home.html. The site serves as an excellent example of a Native language online project, displaying carefully developed technical, linguistic, and cultural aspects.

**Technical Aspects.** The page loads relatively easily from a variety of platforms and connection speeds. In addition, the beautifully rendered and intricate images on the site load quickly. The navigation bar is an image map of a totem pole with "rings" corresponding to different pages of the site such as language, art, stars, science, and math. Each page presents a manageable amount of text, all in clear prose and an easy-to-read font. Most importantly, while the site invites exploration, it is nearly impossible to "get lost" even if you do not read Lushootseed: Each new topic opens a new page with its own navigation buttons.

According to the "About Our Site" page, on which the title phrase is represented in Lushootseed, the artwork for the Web site is based on a story pole carved by William Shelton, a Tulalip elder. On this page, students tell a traditional story accompanied by music produced by the Tulalip Tribes and KVOS studios and performed by former students and community members. The authors thank the tribe, the school district, and one elder in particular. This Web site is clearly a collaborative project with input, resources, and ideas coming from a variety of sources. However, the students themselves are largely responsible for the site's design. Recently, they have added a page selling an interactive, bilingual CD-ROM of one of the stories from the site. All proceeds from the $20 sale price go to the culture and technology teaching project at the school.

**Linguistic Aspects.** Unlike many foreign language sites meant for non-speakers, this site does not contain pages of vocabulary words out of context. The language section provides a variety of introductory-level
lessons in Lushootseed, from how to use greetings to how to count to 10. These lessons are all bilingual. The user can click on the Lushootseed word to hear it spoken in Lushootseed or translated into English. After being clicked, the Lushootseed and English words remain visible, with the English in a darker color slightly beneath the Lushootseed. Most striking is the section using Total Physical Response (TPR), a method of language learning encouraging whole-body involvement. Users read a brief explanation of this theory before clicking on a circle of human figures that perform simple actions upon being activated, such as shutting a door or lifting an object. Users are encouraged to "act out" the actions as they click, read, and hear the words.

In addition, the language is used for contextually relevant lessons. Certainly, counting lessons and learning to say "good morning" are features of all basic language-learning methods and are thus not surprising here. However, the site also includes longer and more sophisticated examples of Lushootseed, as the students tell stories accompanied by traditional music. While no one can expect to become fluent in the language just from this Web site, it nonetheless represents a clear and accessible introduction to Lushootseed.

**Cultural Aspects.** The most amazing aspect of this site is its non-reliance on English. It's ironic that many, if not most, sites on languages other than English that are intended for English speakers use English almost exclusively. This site makes use of almost equal amounts of English and IPA transcriptions of Lushootseed. Most buttons on the site use IPA transcriptions of Lushootseed words -- not familiar to most readers -- with English translations available only when the cursor is moved over the word. In addition, clicking on the button causes the user to hear the pronunciation of the Lushootseed word. The result is unsettling for those accustomed to reading about Native languages in English or those used to surfing silent, English-based Native sites. To see so many non-English words, especially in unfamiliar IPA characters, while hearing the Lushootseed words spoken at the click of a mouse can serve as a visceral reminder that the world does not speak English only and that Native American languages like Lushootseed have a much-deserved place on the World Wide Web.

**CONCLUSION**

As an Ojibwe technology specialist working on his reservation in Minnesota, Kent Estey has encountered non-Natives "concerned" that Indians should not be using modern technology because it is not part of their "tradition." He responds to such patronizing concern by referencing the history of oppression experienced by the indigenous people of the United States: "Non-Indians are concerned about 'preserving the heritage' and they want us to stay back there and not move forward. Isn't that a form of prejudice?" (quoted in Simonelli, 1993, p. 15). To many Americans, Native Americans represent an untarnished idyllic past, free from the contamination of modern society. By association, Native languages are aligned with ancient tradition more than anything else. This conceptual alignment in turn affects the perception of language revitalization efforts, as linguists and leaders interested in ancestral languages are sometimes assumed to be enamored of the past and out of touch with the present: "Even in Indian country today, language retention and maintenance efforts are often argued to be social movements that run counter to not only colonization, but often to modernization as well" (Brod & McQuiston, 1997, p. 150).

Herein lies a crucial obstacle facing language revitalization efforts: If indigenous language use continues to be associated primarily with tradition while Native communities desire to keep pace with American society at large, it seems inevitable that English will flourish while other languages will falter. One way of ensuring Native language vitality is to find new contexts of usefulness, perhaps co-existing with English contexts.

For many educators and language specialists, the Internet offers such a new context. However, the Internet is not moderated, and anyone can put up a "Native" Web site. This problem of authenticity and authorship makes a discussion of Native Americans on the Web problematic. Similarly, not all Native-
themed sites address the topic of language. But for those that do address language, and even better, provide information and instruction, use of the Web has proven valuable. Contrary to fears and stereotypes saying that Native languages are links to the past and thus perhaps not relevant for use in today's world, Natives have used technology to make linguistically and culturally relevant language materials available on the Web. While the nature of the Web can make authorship difficult to establish, it also permits anyone with Internet access to view these Websites. In this way, Native-generated Web sites such as the Tulalip Tribe's site can reach members of the community as well as interested people outside the local area. Furthermore, these Web sites are an indication of indigenous language vitality in the 21st century, demonstrating that Native Americans can seize control of their traditional languages and cultures through a medium associated with the future while still thriving in the predominantly English-speaking world.

APPENDIX: WEB SITES

Teaching Indigenous Languages  http://jan.ucc.nau.edu/~jar/TIL.html
Revitalizing Indigenous Languages  http://jan.ucc.nau.edu/~jar/RIL_Contents.html
Stabilizing Indigenous Languages  http://www.ncbe.gwu.edu/miscpubs/stabilize/
Index of Native American Language Resources on the Internet  http://www.hanksville.org/NArources/indices/NAlanguage.html
Native Languages: Links for Resources and Study  http://www.kstrom.net/isk/stories/language.html
Endangered Languages  http://nativelanguages.org/

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Originally from Alaska, Tracey McHenry is an assistant professor of English at Eastern Washington University, where she teaches in the MA-TESOL program. Her research interests are sociolinguistics, World Englishes, native language issues, and cultural studies. She is a big fan of The X-Files.

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REFERENCES


COMMENTARY

Courtney B. Cazden
Harvard University

Electronic media are coming into more widespread use in education, and movements for indigenous language revitilization are simultaneously gaining momentum. So it is not surprising that integrating technology into revitalization efforts is growing in many places, and descriptions of such integrations are gaining visibility as well. The annual conferences on indigenous language co-sponsored by Northern Arizona University (and subsequently published in widely used volumes) highlighted the contributions of technology in 2001 (http://jan.ucc.nau.edu/~jar/TIL.html). The splendid new book, The Green Book of Language Revitalization in Practice, edited by Leanne Hinton and the since deceased and deeply mourned Kenneth Hale (2001), includes an 80-page section on technology in its 400+ pages. And now we have this theme issue of a specialized journal in the field. It is an expression of, and tribute to, the sharing of experiences among indigenous communities across tribal and national boundaries that all three of these sources are international in scope.

One can categorize the potential uses of technology for language learning in many ways. One simple cut focuses on what the technology creates: language materials, or contexts for language use, or both. In the materials category, Villa reports how a native speaker of Navajo gained sufficient computer skills to create CD-ROMs of "authentic" intergenerational interaction, and Edwards and colleagues describe shareware that can be used for creating bilingual books in many languages. In the contexts category, Auld describes an unusual communal setting in a remote Aboriginal community in Australia where up to four generations gather around a touch screen displaying a "talking book." As in projects described in other articles, Aboriginal speakers participate in the creation (with digital cameras) of these books-on-screen as well as their use.

Auld suggests a more fine-grained differentiation between computer as tutor and as tool and then among three kinds of tools. Historically, tutoring was the first role, with the computer substituting for a teacher in the now-classic three-part instructional sequence: presenting a task, accepting the student's response, and evaluating it. As computer capabilities have increased, and instructional philosophies have shifted from just transmitting a pre-set curriculum to also supporting learners' purposes, the role of computer as tool has become more prominent. Auld further distinguishes three kinds of tool use: a conjectural role stimulating critical evaluation, an emancipatory role empowering the user, and a collaborative role among users in a computer-mediated environment.

All these articles assume, explicitly or implicitly, that decisions about computer use -- like educational decisions more generally -- are made, or should be made, within the indigenous community. But that said, wide variations and tough issues remain. Jancewicz and MacKenzie compare the use of resources in Naskapi and East Cree communities, similar in many ways including the special problem of syllabic orthographies, that led one to emphasize use in the workplace, the other in schools. Haag and Coston relate shifts in computer use over time in a Choctaw community to shifts in its governance and leadership. Several of the articles argue for incorporating computers into indigenous language programs for the symbolic value of demonstrating, especially to young people, that learning their heritage language is for more than preserving the past, but there may well be opinions within a community against, as well as for, that value.

For material developers, this is a fundamental issue. I have put Villa's use of the adjective "authentic" in quotation marks not at all to question the authenticity of his materials but to call attention to issues embodied in that loaded word. Villa defines "authentic materials" as "original texts, films, and recordings
of language usage … that accurately reflect how a language community employs its heritage tongue," and a CD-ROM of naturally-flowing intergenerational conversation fits that definition. But the language games accompanying the Yupik bilingual CD-ROM, "How the Crane got Blue Eyes," produced by the school district in southwest Alaska discussed by McHenry, do not fit that definition. And neither would materials created for, say, math lessons in some other partial or full immersion program. Materials embodying and supporting both authentic and non-authentic language use can have significant educational value. It all depends on the program's governing purpose and values.

The special defining conditions of language revitalization programs may make the exclusive use of authentic materials impossible. In one oft-cited metaphor, the collective language resources of any community will be a leaky bucket in need of endless refilling unless or until the community's youngest members are learning that language in the home. Realistically, many young parents are themselves not fluent speakers, and so some non-authentic ("non-natural") forms of support, electronic or not, are needed. Maori researcher Margie Hohepa (1998) documents the benefits when young children carry little indigenous language books from school to home. Non-authentic in the sense that Maori elders speak of theirs as an "oral" culture (despite widespread Maori literacy in the 19th Century), the books contain mature language models for parents to read aloud and converse about with their child.

Two non-indigenous scholars who have devoted their professional careers to the revitalization movement, Michael Krauss and Joshua Fishman, stress the crucial importance of such inter-generational transmission. Several of the authors echo that concern, and Villa explicitly states, "Computers cannot become a surrogate for one generation of minority language speakers passing that tongue to subsequent generations." There is much to be learned from these articles about how computers can contribute support for oral face-to-face transmission, as long as there is at least equal attention to preventing them becoming a substitute for it.

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REFERENCES


Call for Papers for Special Issue of LLT

Theme: The Internet and Global English(es)

Guest Editor: Denise Murray

This special issue of Language Learning & Technology will focus on research on the effect of the Internet on language use. While the theme recognizes "Global" English(es) as a reality, we welcome articles that problematize this concept. In what ways are the notions of "Global" English(es) reinforced or mitigated by the use of English on the Internet? What new English(es) are developing online? What new registers or genres are developing in computer mediated communication? What is the impact of globalization on the English teaching industry? What are the implications of Internet-specific language change for English language teaching?

Articles based on empirical research or proposing original theoretical frameworks are welcome. Since LLT focuses on language learning and teaching, it is expected that all articles will demonstrate the relevance of the findings or framework to language learning and teaching.

Possible topics include, but are not limited to

- how the Internet diffuses English(es) throughout the world
- how the Internet has affected English usage in online and offline communication
- descriptions of new genres
- economic, political, and cultural ramifications of English use on the Internet
- teaching English via the Internet
- developing critical literacies through the Internet
- varieties of English for international communication(s)
- "Global" English in an historical context
- visual literacy and its role in online communication and English language teaching

Please send an e-mail of intent with a 250-word abstract by August 31, 2002, to Denise Murray (dmurray@nceltrnw.nceltr.mq.edu.au).

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