

## Using interactive multimedia to document and communicate Inuit knowledge

## Emploi des multimédias interactifs pour documenter et transmettre le savoir inuit

Shari Gearheard

Volume 29, numéro 1-2, 2005

Préserver la langue et les savoirs  
Preserving language and knowledge

URI : <https://id.erudit.org/iderudit/013934ar>

DOI : <https://doi.org/10.7202/013934ar>

[Aller au sommaire du numéro](#)

### Éditeur(s)

Association Inuksiutiit Katimajit Inc.  
Centre interuniversitaire d'études et de recherches autochtones (CIÉRA)

### ISSN

0701-1008 (imprimé)  
1708-5268 (numérique)

[Découvrir la revue](#)

### Citer cet article

Gearheard, S. (2005). Using interactive multimedia to document and communicate Inuit knowledge. *Études/Inuit/Studies*, 29(1-2), 91–114.  
<https://doi.org/10.7202/013934ar>

### Résumé de l'article

La technologie des médias a agi à la fois comme menace contre le savoir local et les langues et comme un outil pour les renforcer. De plus en plus, les peuples autochtones emploient les médias à leurs propres fins que ce soit pour l'art, la communication ou l'éducation. La technologie des multimédias est appliquée de façons multiples, préservant et transmettant le savoir local et les langues, et montrant qu'elle peut le faire d'une façon qui attire les jeunes et qui est plus en phase avec les formes autochtones d'enseignement et d'apprentissage. En examinant un cas d'étude de projet multimédia au Nunavut, cet article évalue les multimédias dans le contexte de la documentation et de la transmission du savoir inuit. Bien qu'il y ait des défis et des problèmes à prendre en compte, le multimédia et les autres techniques devraient être considérés et appliqués de façon créative afin d'aider les populations locales à atteindre leurs buts. Les textes et les autres formes de médias demeurent des ressources importantes pour la documentation et la communication dans le Nord mais le multimédia a le potentiel de devenir un outil clef.

# Using interactive multimedia to document and communicate Inuit knowledge

---

Shari Gearheard\*

**Résumé:** Emploi des multimédias interactifs pour documenter et transmettre le savoir inuit

La technologie des médias a agi à la fois comme menace contre le savoir local et les langues et comme un outil pour les renforcer. De plus en plus, les peuples autochtones emploient les médias à leurs propres fins que ce soit pour l'art, la communication ou l'éducation. La technologie des multimédias est appliquée de façons multiples, préservant et transmettant le savoir local et les langues, et montrant qu'elle peut le faire d'une façon qui attire les jeunes et qui est plus en phase avec les formes autochtones d'enseignement et d'apprentissage. En examinant un cas d'étude de projet multimédia au Nunavut, cet article évalue les multimédias dans le contexte de la documentation et de la transmission du savoir inuit. Bien qu'il y ait des défis et des problèmes à prendre en compte, le multimédia et les autres techniques devraient être considérés et appliqués de façon créative afin d'aider les populations locales à atteindre leurs buts. Les textes et les autres formes de médias demeurent des ressources importantes pour la documentation et la communication dans le Nord mais le multimédia a le potentiel de devenir un outil clef.

**Abstract:** *Using interactive multimedia to document and communicate Inuit knowledge*

Media technology has acted as both a threat to local knowledge and language, and a tool to strengthen it. More and more, indigenous peoples are using media for their own purposes from art to communication to education. Multimedia technology is surfacing as one useful tool in local knowledge and language revitalization efforts. Multimedia is being applied in a number of ways, preserving and passing on local knowledge and languages and showing potential for doing so in ways that engage young people and are more closely aligned with indigenous forms of teaching and learning. Discussing a case study example of one multimedia project in Nunavut, this paper evaluates multimedia in the context of documenting and communicating Inuit knowledge. Though there are challenges and issues to consider, multimedia and other technologies should be considered and creatively applied to help local people reach their goals. Texts and other forms of media remain important resources for documentation and communication in the North, but multimedia has the potential to grow into a key tool.

---

\* NOAA Postdoctoral Research Fellow, Harvard University. Mailing address: P.O. Box 241, Clyde River, Nunavut X0A 0E0, Canada. sgearh@fas.harvard.edu

## Introduction

Technology, from guns to airplanes to television, has played a significant role in language and knowledge shift in the Arctic. Media technology, like television and the Internet, are among the newest, and arguably most controversial, technologies to come to the North. Media technology exposes to its users new languages, new ideologies, new images and symbols, scientific information, alternative lifestyles and pop culture. For minority cultures and languages, these new influences can be overpowering and media technology is a strong force of globalization. However, at the same time, media technology can, and has, acted as a tool for resistance against these outside influences. In this way, media technology contributes to RLKS (“Reversing Language and Knowledge Shift” see Fishman 1991) efforts in many indigenous communities around the world.

One type of media technology that has been used in a number of RLKS efforts is multimedia. Multimedia uses computer technology to link together different types of visual and audio materials. This may be in the form of a self-running presentation (such as a DVD), or in an interactive format via “hypertext,” text (or visual/audio materials, etc.) that are connected through “hot links” or “buttons.” The Internet is a common example of interactive multimedia since a user can click through various “pages” to view text, photos, movie clips, maps, animations, music, etc. The user controls how and when they access the different kinds and types of information by clicking on a computer screen. In addition to the Internet, multimedia can be stored on CD-ROMs or DVDs and it can be accessed through many types of interfaces, from computer keyboards, to voice control, to touchscreens.

Since multimedia technology first became popular in the late 1980s and through the 1990s, it has been used in various applications by those who study indigenous peoples and by indigenous peoples themselves. Indigenous peoples are using multimedia, particularly multimedia on the Internet, for their own purposes; from marketing and selling local crafts, to creating online “chat” networks in Native languages, to creating online dictionaries, to using photos, images and sound to document social struggles and rally against oppressive regimes (as most famously done by the Zapatista Rebels in Chiapas, Mexico). The applications and examples from around the world are wide-ranging but in each case they illustrate the different ways that indigenous peoples, and the people who work with them, have seized aspects of multimedia technology that fit with local needs and local patterns of communication and knowledge (Warschauer 1998).

For Inuit, media technology (from film to television to the Internet) is something they have generally adopted and transformed to their own ends (*e.g.*, National Film Board of Canada 1981; Christensen 2003). Multimedia is simply another tool and the technology is already being applied to revitalize and encourage Inuktitut language learning (*e.g.*, the *Unipkaaqtualiurut* project, Armstrong 2004) and document environmental knowledge (*e.g.*, the *Uggianaqtuq* CD-ROM, Fox 2003, presented in this paper).

In 2000, I had the opportunity to work on a multimedia project for the first time. I was working with the communities of Baker Lake (Qamani'tuaq) and Clyde River (Kangiqtugaapik) Nunavut, on a project to document Inuit knowledge of climate and environmental change. Early in the research, local research assistants Geela Tigullaraq, Hattie Mannik and Margaret Kaluraq, as well as the elders participating in the project (see Fox 2003 for complete list) and I discussed what research methods and products would be most appropriate and useful to the community. For local participants, there was a great interest in visual methods and products, and products that would connect with young people. Back at my university, the University of Colorado at Boulder, I had been introduced to interactive multimedia technology through the cartography laboratory in my department. I discussed with my research assistants the idea of applying this technology to the project, explaining how we could link the visual interests of participants (such as photos, videos and maps) with audio, music and text to produce an interactive CD-ROM. And since local schools had good computer resources and utilized computers in their teaching, perhaps the CD-ROM could be one way to relate the research to youth as the elders wanted. With the support of the elders who would interview with us, my research assistants and I went ahead with the idea. We teamed up with a technical support team at the University of Colorado cartography laboratory (Jim Robb, cartographer; Evaldas Vidugiris, computer animator; and four cartographic interns Katrin Berger, Sage Connely, Josh O'Brien and Andreas Von der Dunk) and the outcome was an interactive multimedia CD-ROM entitled *When the Weather is Uggianaqtuq: Inuit Observations of Environmental Change* (Fox 2003) (from now on the "Uggianaqtuq CD-ROM").

The four-year project met with much success as measured by local and outside interest and use of the CD-ROM, but there were significant challenges along the way—from technical difficulties to design disagreements. The experience pushed all of us involved in the project to think in more innovative ways about knowledge documentation and communication. It also gave us insight into how interactive multimedia technology can be improved and creatively applied in future research.

This paper examines multimedia technology and its application in indigenous knowledge documentation and in Reversing Language and Knowledge Shift (RLKS). I offer the *Uggianaqtuq* CD-ROM as a case study, considering the positive and negative aspects of the project, the accomplishments and challenges, the impact of the CD-ROM over the time since its release in 2004, and suggestions for future multimedia projects. While this paper is mainly a methodological and technical one, theoretical considerations for multimedia in RLKS are also presented. The paper provides a discussion of the impacts multimedia and information technology can have on efforts to document, preserve, and pass on indigenous knowledge and languages. The *Uggianaqtuq* CD-ROM provides a discussion of this specific to an Inuit context.

## **Multimedia technology in RLKS and indigenous knowledge documentation**

Through its distinctive ability to bring diverse audio and visual materials together, interactive multimedia technology has been able to make unique contributions to

indigenous knowledge documentation, research, and teaching. In particular, multimedia is often able to address issues that the written word and the linear approach offered by books cannot. Interactive multimedia technology offers RLKS efforts and knowledge documentation: (a) a greater ability (over writing) to accurately represent and communicate indigenous language and knowledge; (b) a closer alignment with how indigenous peoples teach and learn; (c) an ability to make RLKS more relevant to local people, particularly youth; and (d) an engagement with critical approaches to research methodology.

### *Advantages over writing*

For many indigenous cultures, language was not written traditionally and knowledge was passed down through oral histories, not written works. Conversely, writing is the key means for communication among those people who study indigenous cultures; writing is the foundation of the “word-centered humanities and social sciences in Western Academia” (Christensen 1994: 2). This disconnection has contributed to recent movements in various social sciences away from writing and away from the intense linguistic focus of the post-war “isms”; structuralism, poststructuralism, deconstructionism, and semiotics (MacDougall 1998). Within anthropology especially, researchers made a “pictorial turn” in recent years, questioning the adequacy, and even possibility, of ethnographic description by writing (*ibid.*). Visual anthropology has always been an important component of the discipline but the 1990s saw a revival of sorts. Along with this came a new recognition of the role one’s body language, emotions, and senses play in social life and the cultural construction of identity (*ibid.*). The result has been a resurgence of interest and use of film and photography in research, to help capture those things that are beyond verbal or written description. In anthropology and beyond, there is increasing interest in exploring what new visual technologies can offer in helping to document and communicate those “non-text” components that are essential to understanding any experience, but are inevitably missing from writing.

Creative use of multimedia can bring the “non-text” into documentation and thus provide a more accurate representation of indigenous languages and knowledge (Kroskrity 2002). From the aesthetics of a culture to the sounds of a language pronounced, the technology has important research and educational implications. For languages in particular, the advantages are clear. For example, although there is no substitute for real interaction with a native speaker, multimedia can provide a close model for speaking (Kroskrity 2002). Blending video, photos and audio, multimedia can demonstrate the exact pronunciation, sound, and shape of the mouth that is required for speaking a language. Used for knowledge documentation and the passing on of knowledge, multimedia is able to record and present images and voice, important for the teaching and learning of activities like dance, hunting, cooking, sewing and craft-making, boat building, and many other examples. The integration of video, speech, music and other elements gives a viewer access to much more than a book can provide such as facial expressions, emotions, voice intonations, body movements and hand gestures.

In addition to providing access to “non-text” emotions, sounds and other elements beyond description, multimedia can provide more appropriate research products, reports and educational materials for indigenous communities who often prefer using visual methods in research and favour receiving visual research products over written reports (Grenier 1998; Fox 2004). Visual methods are often preferred since they are more accessible to non-English speaking and/or non-reading individuals, they hold people’s attention more easily, and a story can be conveyed more easily through images than through text when the viewer and the writer might have very different worldviews.

The interest in communicating research through visual means has seen some new emphasis in the North and parallels the re-energized interest in anthropology on the power of body language, gestures and emotions. For example, both Alaska Native and Canadian Inuit representatives have recently campaigned for a visual approach to raising awareness and understanding of environmental change by making *real people* in the North more visible. The Alaska Native Science Commission has stressed the need to “put a *human face*” on the environmental problems facing Arctic peoples, referring to the need for southerners to *see* Arctic people, their ways of life, and how they are affected by environmental threats (Cochran 2003). In 2004, the National Inuit organization in Canada (Inuit Tapiriit Kanatami) and their partners took a similar approach when they launched their project, “Unikkaaqatigiit - Putting the Human Face Change.” The project’s poster<sup>1</sup> features a close-up photo of an Inuk elder along with a quote and summary charts of Inuit observations of climate change around Nunavut. Other northern indigenous groups have, and continue to use, visual methods to communicate a variety of powerful messages about their traditions, concerns, and ways of life; from an interactive multimedia website dedicated to Saami culture and chat rooms in the Saami language<sup>2</sup> to a recent series of Inuit-produced television documentaries on the controversial dog slaughter allegedly carried out by the RCMP in the 1960s (Taqramiut Productions Inc. 2005).

It is important to note in this section that I am by no means dismissing the importance and need for books and other written works. A number of recent books from the North such as Bennett and Rowley (2004), MacDonald (1998), McDonald *et al.* (1997), Oozeva *et al.* (2004), Thorpe *et al.* (2001), and the “Interviewing Inuit Elders” series<sup>3</sup>, illustrate the creative ways that books can document local knowledge and communicate local voices effectively. The point here is to highlight the advantages of multimedia and the unique and powerful components it offers as an option or compliment to other approaches such as books and texts.

---

<sup>1</sup> See [http://www.naho.ca/inuit/english/pdf/climate\\_change\\_poster.pdf](http://www.naho.ca/inuit/english/pdf/climate_change_poster.pdf).

<sup>2</sup> See <http://www.same.net>.

<sup>3</sup> Published by the Nunavut Arctic College in Iqaluit between 1999 and 2001. It can be accessed at <http://www.nac.nu.ca/publication/index.html>.



## Alignment with how indigenous peoples teach and learn

For many indigenous cultures, like the Inuit, teaching and learning was, and is, a matter of watching, listening, following, speaking, reciting, practicing, and trial and error, not studying texts. Even in formal, Western-style schools in indigenous communities, there is often an emphasis on interactive learning with a variety of media and activities, from drawing, to dancing, to hands-on activities with arts and crafts. In his study of the use of multimedia technology by native Hawaiian communities, Warschauer (1998) found that Hawaiian students related, and responded better to, multimedia material and learning over print materials. One of the students commented,

If you look at Hawaiian culture, they weren't ones to sit down in a classroom and read something. Ours was more of a, was a spoken language, and so what that means is that you interchange, you speak to each other, you work with ideas, you look at pictures, you look at and feel different things. And so that the more dimensions that we can get into, the easier it was for Hawaiians to learn. That's what I think ... I think maybe that's why Hawaiians are having a little bit of hard time in the classroom, it's because that's not the '*ano* [way] for thought for maybe 2000 years, they've been learning through teaching and learning from somebody else, and through visually doing things and working with things instead of just reading out of a book. And so when we add in pictures and colors and voice and everything like that, it's not just a page, words on a page, but it actually like jumps at you, and it comes, it, you can feel it more, more in your brain, everywhere, just in your body, I don't know (Warschauer 1998: 10).

Warschauer (1998) rightly notes that Hawaiian students are not likely to have a greater propensity for learning with multimedia over other non-Hawaiian or non-indigenous students. However, he does note the unique way that Hawaiian educators have made use of this technology in ways that build from the best learning traditions of their students.

Unlike the linear structure of a book, interactive multimedia presents a web or series of branching paths for the user to explore. In a book, one must start at the beginning, building on a hierarchy of information until you come to know the story that the author wants to tell. In interactive multimedia, one learns by experience, and each experience is different from the next, and for each user (Titon 1994). This way of accessing information is more truthful to life learning, where one stops to learn at the places they want to visit, and/or at the places they might accidentally stumble upon (*ibid.*). This type of experience reflects many indigenous ways of knowing and learning more closely, where young people are shown the world by visiting many different places and travelling many different paths with older relatives and friends. In this way, indigenous learning creates knowledge through watching, doing, and listening, and combining these activities with each persons' own practical engagement with their environment (Ingold and Kurttila 2000). Multimedia provides a similar experience as each person assembles information in their own way to create their own analysis, as opposed to accepting another's analysis as might be offered in a book format.

## Multimedia and RLKS relevance for young people

For Fishman (1991, 2001), one of the keys to RLS (Reversing Language Shift) (and RLKS [Reversing Language and Knowledge Shift] for our purposes) is that it has to be relevant. For young people, this is especially key since they often question how traditional ways are relevant in the contemporary lives they know. Multimedia can help make a significant contribution in this regard. As Brandt (1988: 326 in Kroskrity 2002) has observed with RLS in Native American communities, the association of an ancestral language with something like new multimedia computer technology is a source, for most Native people, not only of pride, but also of a sense of inclusion, being on a more equal footing, in contemporary developments. Kroskrity (2002: 191) continues that rather than associate their ancestral languages exclusively with the past, the technological representation of these languages conveys a powerful sense of compatibility with both the present and the future, which is clearly important in boosting the symbolic capital of the Native language (and knowledge). Children who use computer technologies to access their ancestral language and knowledge also exercise valuable technological skills that have a definite value in the job market. These connections are appreciated by community members, especially because language and knowledge renewal are often focussed on school-age children (Kroskrity 2002).

For elders, on the other hand, multimedia is not as relevant an approach to RLKS. Elders are less likely than youth to be computer literate and while the visual aspects of multimedia (like photos and film) might be appealing and audio might be in their language, having a computer-based format can make materials inaccessible. For elders, books and non-computer based visuals are much more manageable. For example, in the *Uggianaqtuq* CD-ROM project, all of the elders in the project received hard-copy versions of the CD-ROM, where each of the “pages” on the CD-ROM were printed and bound into a (Inuktitut only) book. In addition, all of the elders received VHS copies of the full-length videos of the interviews that provided clips for the CD-ROM. This allowed them access to all of the information even if they could only use some of the CD-ROM functions, or none at all.

Multimedia, then, seems to have a targeted place in the North and in other indigenous communities; it does have more relevance for young people than elders in an RLKS setting. But for the most part, youth have been the target audience of multimedia products, like the *Uggianaqtuq* project and projects discussed by Kroskrity (2002) and Warshauer (1998). While indigenous elders encourage youth to learn traditional ways, through traditional methods (*e.g.*, listening to stories, travelling on the land) elders also see an advantage in using technologies that youth are already interested in (such as computers) as tools to engage them in local issues and knowledge (Fox 2004). The result can even help encourage elder-youth interaction, as in one example from Clyde River. Here, a young girl explained how she showed her grandfather (one of the elders on the *Uggianaqtuq* CD-ROM) how to use a computer and the CD-ROM, while at the same time, he watched the CD-ROM’s Inuktitut interview clips with her and visited the CD’s maps and photos, explaining further what the elders were talking about in the project.



## Multimedia and critical approaches to research methodology

Critical research methodologies challenge the practices that separate the researcher from the researched and promote collaborative work (Kurelek 1992; Maguire 1981; Sohng 1995). This separation has been a theme in research with indigenous peoples for some time, and indeed in the Arctic where Inuit have experienced many researchers visiting and studying their communities, many of whom were never heard from again. Participatory research approaches in recent years have attempted to change researcher-community relationships by involving local people meaningfully in all aspects of research design, analysis and reporting (*e.g.*, Chambers 1994; Grenier 1998). Multimedia is able to contribute to all these components, particularly reporting.

Reporting in a critical methodology seeks to empower local people with the research results, not simply describe what was done (Auld 2002). The educational potential of multimedia technology, as illustrated above, is one way that multimedia can contribute to local empowerment through research. The ability to document and present information through a variety of visuals and in the local language, written and spoken, creates a research product more accessible to local people, and therefore they are more likely to use it for their own purposes. At the same time, but in a different way, multimedia used in reporting the research to a wider (academic) audience can also empower local people. Written reports can only describe in words the contribution that local people have made to a project and local people often do not contribute to the writing, nor are they acknowledged in the authorship, except for some recent exceptions (see Krupnik this volume). In this way, writing can still leave indigenous people as research subjects, even if they are given prominence through photos or quotations, and even if the research itself was collaborative. By using multimedia in (or as) a research publication, the status of indigenous participants is raised as a space is created that explicitly values their own language, knowledge and cultural practices (Auld 2002). Viewers can see and hear local participants sharing their knowledge or demonstrating their skills. Together, both participant and researcher information can be presented, through various media appropriate for different types of information. This balance offered by multimedia might help address issues about control over meaning, interpretation, and representation (Csonka 2000; MacDougall 1998). Indeed as viewers/readers have access to the researcher's interpretation, they also have a window to the participants and the knowledge they shared. Hence, viewers are able to make some of their own interpretations. Even if video or audio recordings are edited, thus effectively controlled by the author, images still seem to have a life of their own, and people respond to them in a wide variety of ways (MacDougall 1998).

Lastly, reporting in multimedia enables multiple literacies. A printed book in English greatly limits who can access, discuss and benefit from its content. While working with multimedia, one accepts that written English is only one form of literacy and that knowledge can be accessed and controlled through many other forms. Even local languages that are written might be inaccessible to some elders as they might have difficulties reading or with the diverse orthographies used in different regions. Multimedia can appeal to and be used by individuals who can only speak their own language. This valuing of local literacies brings access of information to a wider

audience and thus provides more choice about how to distribute and use the information (Auld 2002).

### *A note on access*

While written English can be inaccessible to some people, so can computers. It is important to recognize that the inability of people to access computer technology because they are not computer literate, or because they cannot afford the technology, is a real disadvantage to multimedia. While multimedia products might provide creative materials for education, local communities might have little economic ability to obtain expensive equipment needed to use these materials or create their own multimedia.

In the North, schools, for the most part, do have these resources and a number of community programs and small community initiatives in Canada do provide public computer access. To use Clyde River as an example, there are two functioning CAP Sites (Community Access Program, funded in large part by Industry Canada) where the public can go to use computers and/or the Internet. The primary Clyde River CAP Site is located at the Ilisaqivik Family Resource Centre and sees between 120-180 people per week using the eight available computers during daytime hours (9-5 pm, 5 days per week) and 100 people per week during evening drop-in hours (7-10 pm, 6 days per week) (Jakob Gearheard, pers. comm. 2005). The majority of computer use is Internet (searches, games, music downloading) and email, but many people also use computers to access government documents, job listings, various government services applications and to write resumes, proposals, or make flyers for local events (*ibid.*). In addition to the Ilisaqivik CAP Site, computers are available for public use at the school (a second CAP Site) and the Adult Learning Centre (Nunavut Arctic College). At the individual level, approximately 30 Clyde River households (non-Inuit residents not included) have home computers (Mike Jaypoody, pers. comm. 2005). Elder usage of computers either at the CAP Sites or at home is very small and only a few use computers mainly to play some card games like “Solitaire” (*ibid.*).

Since schools have the best access to computer technology in many northern communities, it seems that youth have the best ability to access multimedia. Multimedia, therefore, does have a niche audience in many ways with young people as I have discussed earlier. Youth are more familiar with and interested in the technology and people using multimedia for RLKS understand this interest and seek to use it to connect with them. When combined with other materials in a school curriculum, multimedia products might be best utilized in a classroom environment. But the increasing “user-friendliness” of computers, as well as their dropping costs, might bring more computers into northern homes in the future, especially as school-age children using computers now grow up and get their own homes. As home computer use increases, so will the various uses of multimedia technology.

## Interactive multimedia: An Inuit case study

For over a decade I have worked with Inuit communities on a variety of research projects, mainly on Inuit knowledge of the environment. During this time I have always been very concerned about the best ways to present the knowledge we collected, and in particular, how to produce research products that were accessible and useful to local people and make the impact outside the community that local people wanted to make. I was very mindful of the *siksik* legacy of Arctic researchers. *Siksik* means ground squirrel in Inuktitut and is the name often given to researchers because of their similar sudden appearance, usually in summer, and their equally sudden disappearance, with no one having known what they were up to. I hoped not to be a *siksik* and to do a better job at communicating with, and usefully reporting to, the communities I worked with.

In my early work on Inuit knowledge of climate and environmental change I documented interviews using audio tapes and notes. I took plenty of photographs in the community and out on the land when I travelled with families. Throughout the research I shared copies of photos with people and audio tapes were returned to individuals or deposited with local heritage projects depending on what was agreed to. I wrote short research reports and had them translated into Inuktitut. I presented findings and new phases of research in a variety of venues such as schools and community or public meetings, and held call-in shows on local radio. It seemed these activities worked fairly well to collect and communicate information in the community. But some of the Elders had difficulty reading Inuktitut and the extreme expense of translating documents meant I could only provide limited information back to people to begin with. The radio shows and presentations helped, but I was still looking for different options.

Early in the consultation process for my Ph.D. dissertation research in the communities of Baker Lake and Clyde River, two themes emerged in our discussions over research design and reporting. One was an interest in visual representation of findings (as opposed to written reports) and the other was a great interest in producing something that would help communicate the knowledge shared by elders in the project to younger Inuit, especially students. They suggested that we use photos and maps to talk about environmental observations, and the use of video in interviews also came up a number of times. Knowing that community schools had good computer facilities, and that there was a growing use of computers by Nunavut students and youth, it seemed that multimedia might be a way to bring all of these components together. As mentioned in the introduction, I had learned about multimedia technology from the cartography laboratory at my university and shared the idea with my research assistants Hattie Mannik, Margaret Kaluraq and Geela Tigullaraq and the elders we were working with. Partnering with the technical team from the University of Colorado cartography laboratory, we agreed to give it a try and the idea for an interactive, multimedia CD-ROM on Inuit observations of environmental change was born and approved by the communities.

## *Uggianaqtuq?*

Before continuing with a discussion on the CD-ROM, I should briefly explain the title we gave to the latter. *Uggianaqtuq* is a North Baffin Inuktitut word that means to behave unexpectedly or in an unfamiliar way. It was used in this context by an elder from Igloolik during an interview I had with him in 2000 (Aqqiaruq 2000). It was not a common word and it took some time to realize the meaning (Fox 2002, 2004). Since then, many Inuit have shared other interpretations and meanings of *Uggianaqtuq* with me such as a reference to people fighting, tension, extreme heat, something unseasonable or untimely, and the root of the word refers to a dog taking something in its mouth and shaking it. After the CD-ROM's launch the word also took on a life of its own and I saw it used in a number of contexts; some of them rather unusual or far-reaching. The most interesting would be its appearance in a horoscope for the week of May 2, 2002, telling Sagitarian readers not to worry, that their strange "*Uggianaqtuq*" behaviour would be only temporary<sup>4</sup>. But despite the many meanings *Uggianaqtuq* has—unexpected, unfamiliar, fighting, tension, unseasonable, untimely—they all connect in some way to the changes Inuit have been experiencing in their environment in recent years. For this reason, *Uggianaqtuq* stuck for the title. I should note, however, that the term *Uggianaqtuq* was not known in Baker Lake and elders there suggested other terms from their region to describe unusual conditions they were seeing (see Fox 2003). But Baker Lake elders accepted *Uggianaqtuq* for the title and agreed that 'unexpected' or 'unfamiliar' were good ways to characterize recent weather changes.

### *On design, and lessons learned*

The CD-ROM opens with a main page showing the title and images of an iceberg and receding glacier, and the faces of two elders. A user clicks on the image of an *inuksuk* with the word "Enter" shown over it. The user then finds her/himself on a scrollable map of Nunavut with a map of the globe in the corner that tells them where Nunavut is. On the map, two boxes highlight the "study areas" around Baker Lake and Clyde River. The user can click for basic information on either of these two communities or click on one of the boxes to enter a community.

The next level, or page, is where most of the CD-ROM navigation is based. This page, and indeed the entire CD-ROM, was constructed with two audiences in mind. The first audience was the communities and the second audience was students, teachers, decision-makers, researchers, and the public outside of the communities. The navigation choices from this page addresses these two audiences since users can choose to learn about Inuit observations of environmental change by selecting either individual elders (through their photo) or by selecting topics to explore (see Figure 1).

When an individual is selected, one can view a page that lists video clips of the person speaking on various topics and maps that he/she drew about environmental change (e.g., Figure 2). This ability to search the CD-ROM through individuals was something we discussed often in the communities and it became a key aspect of the

---

<sup>4</sup> See <http://www.freewillastrology.com>.

CD-ROM design for several reasons. First, in the community, viewing/listening to what particular people have to say is more meaningful than reading information organized by topic. Who says what is extremely important and local people can choose to listen to the particular elders whose knowledge means something to them. For users outside the community, individuals do not carry this same kind of meaning. Instead, these users can select from the various topics of environmental change that Inuit identified and read summaries of these topics, get links to pages for local experts on the topics, links to video clips, and related maps and photos. Ultimately, all users are directed to the same information, but the CD-ROM offers multiple path choices for diverse users with different interests. It offers locals a path through familiar elders or family members rather than topic searches, indexes, or tables of contents.

A second reason why searching by individuals was significant in the CD-ROM design was the visual connection between individual Inuit and their knowledge. In the past, Inuit informants were often not credited for their knowledge. Later, Inuit were anonymously credited and more recently their names have been attached to their knowledge (unless anonymity is requested or necessary, *e.g.*, in some health research). The CD-ROM adds another level to recognition of knowledge by using video to capture people speaking about their own observations, in their own words, with their own emphasis and voice. This aspect was also important to the communities as it provided a place to preserve not just the words of elders who are passing on and taking their knowledge with them, but also their image, movements and voice. Several community members, upon viewing the draft version of the CD-ROM in 2003, commented that, to them, this was one of the most important contributions of the project. Further, the videos and photos of Inuit attach specific people and their experiences to the impacts of environmental change, something that may have more of an affect on outside users than a written report. Creating an impact to outside users about local experiences of environmental change was an important goal set out at the beginning of the project.

The video clips on the CD-ROM are really the heart of the project and there were both positive and negative aspects to video taping interviews. The positive aspects included those already mentioned—being able to see an elder or hunter talking about his/her knowledge on screen, as opposed to being limited to a lengthy written quote on a page. The video captures their gestures and expressions of humour, sadness or frustration which would have been lost in a written transcription. Video also preserves the original language, something important and useful to speakers of Inuktitut, especially when many of the words and phrases used by elders are dying out. Finally, participants received copies of the full-length videotapes for their own use, another element in the effort to keep a flow of feedback to the community.



Figure 1. Main navigation page for Clyde River on the *Uggianaqtuq* CD-ROM. Users can navigate by person (bottom: represented by their photo, hovering with the mouse enlarges the photos and shows their name) or by topic (represented by the different symbols in the circle, the topic name appears when moused-over). The background is a map of the Clyde River area.



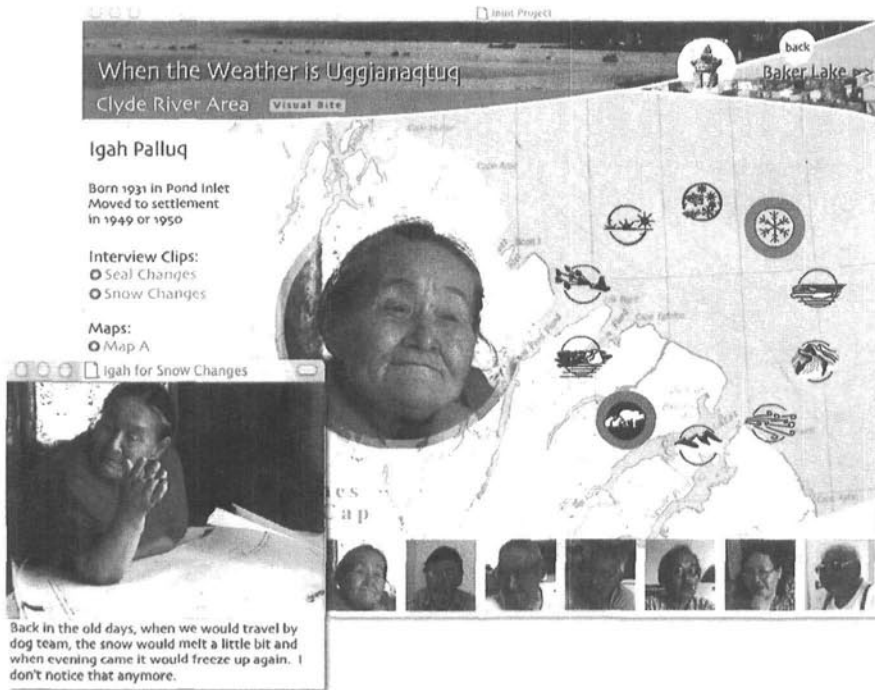


Figure 2. Example of a page from *Uggjanaqtuq* for one individual. This is the page for Igah Palluq, an elder from Clyde River. The page highlights in red the topics she chose to talk about (topics vary between elders), leading the user to more information such as summaries, maps and photos. There is also a list of maps Igah drew on the left. The window in the lower left illustrates a video clip. Note the buttons at the top of the page to take a user to the main page (via the *inuksuk*), back, to the other community of Baker Lake, or to a “visual bite” (short video) of the community.

Negative aspects were related primarily to the logistics of filming and the editing of clips for the CD-ROM. Videos were taped using a digital camera that I operated myself during interviews using a remote control and tripod (keep in mind this was not a professional production, but a pilot project as part of a doctoral dissertation). At times, this was awkward due to the locations of filming (*e.g.*, the small bedrooms of elders or outpost camps where background noise was an issue) and the need for me to tend to the video camera while still trying to be fully engaged in the interview. The interviews in Baker Lake were easier since we filmed all interviews in the same location, in the Elders Room at the Inuit Heritage Centre, where it was well lit and usually quiet, and I *hardly had to touch the camera*. But Clyde River was filmed first, when I was less adept with the camera and filming was all done at elders' homes or on the land. Though many family members did help me with filming, and I had the procedure down quite well by the time I was filming in Baker Lake, in retrospect I should have planned for and hired a designated cameraperson.

Editing video clips (there are approximately 60 clips, 2-6 minutes each, in Inuktitut with English subtitles) for the CD-ROM was a serious issue, as the participants, research assistants and I had to decide what material would best represent Inuit observations on the CD-ROM, while at the same time ensuring a balance of information between communities and topics, all the while dealing with the space limitations of the CD-ROM. The visual nature of the video clips added to the difficulty in deciding what parts would never make the CD-ROM since often whole one or two-hour tapes were interesting to watch. On the other hand, there were hours of tape difficult to edit because while the information was important, there was poor lighting, ringing phones, or windy weather. I worked with the research assistants and the participants to discuss what topics and sections were important and I did the actual video editing on a computer. The research assistants checked the video clips a number of times and in the final stages elders previewed their video clips and the CD-ROM to check that the clips were appropriate.

Methodologically, one of the most interesting opportunities the CD-ROM provided was to see the reactions of Inuit to their own interview video clips and those of others. I remember several years ago a colleague told me how Inuit elders are so respectful to one another that they would never dismiss the knowledge of another elder. I had that in my mind as I met with all the elders individually, to preview the CD-ROM, check their material, and gain their feedback. In many cases, the reactions I witnessed were quite different than what my colleague had mentioned. Starting with the main page for navigating community information, where the headshots of participating Inuit are shown across the bottom of the screen (Figure 1), we showed elders how to select themselves and they had an opportunity to watch and correct any of their information. We then asked individuals if there were other elders whose clips they wanted to see. Some chose a person, or several people from the photos making comments like, "this person really knows what they are talking about, I want to see them," or "yes, this person knows a lot about weather prediction, I'm interested in what they have to say." Alternatively, they would skip over people commenting, "I don't think that person knows anything," or "I don't listen to that person." Then we would take the CD-ROM to the next participants and they might say similar comments, but in regards to totally

different people, sometimes in complete contradiction to the previous elder's opinions on the same individuals. The experience of checking the clips with elders raised questions about how Inuit validate knowledge and how they judge the knowledge of others. Clearly, much of this is based on the experiences of the knowledge-holder, though the interactions we had also suggested that personal biases come into play (*e.g.*, family politics). How these biases and assessments of knowledge and experience govern the ways Inuit interpret, accept, reject, or transfer knowledge is perhaps an issue for further study.

While the completed CD-ROM met with enthusiastic approval from the participants, communities and other reviewers, there are a number of limitations that it suffers from. Some of these are unavoidable technical issues. We were limited by space on the CD-ROM and so while we fit as much information as possible on the disc, there is much more that could be added to summaries, photos collections, maps and video clips. We also thought about adding a whole section on the science of environmental change to make this information easily accessible along side Inuit observations, but there was not enough space and we preferred this project to highlight Inuit knowledge. The size of video viewing windows is unfortunately limited to a small screen (due to the technology at the time) and we were also limited, of course, by time and funding resources. For example, it would have been ideal to have an Inuit research assistant and/or elder come to the University of Colorado to meet with the technical team and be with us during technical editing (or have the technical team go to the communities), but this was not possible with the project budget.

Another technical issue that occurred was a printing problem in the production of the hard copy books for elders. As I mentioned earlier, hard copy books were made that contain each "page" of the CD-ROM with the information translated into Inuktitut. The books were approximately 30 pages each, full colour, including photos and maps. A separate book was made for each community (*i.e.* all the pages from one community plus any common pages) since we thought that this would be the most interesting information for the elders and we had to work with a limited budget for book production. The books were distributed to the participating elders when they previewed and gave feedback on the CD-ROM draft in 2003. Along with VHS copies of the complete interviews, the Inuktitut books gave elders access to all of the information on the CD-ROM. However, there were printing errors in these books due to difficulties with the Inuktitut computer font misprinting some characters; a problem we discovered post-production. The result was that some words were printed with very poor spelling. Mistakes in written Inuktitut are already common because of various opinions, spellings and differences in regional dialects, but the font printing problems in the *Uggianaqtuq* books added to this. I was greatly disappointed, but the elders were still pleased to receive the books and found them useful even with the typos. We are currently working on plans to update these books with information from recent research and during that time will take great care to solve the font problem.

What might be called "creative differences" were also challenges in the design of the CD-ROM. As the CD-ROM began to take shape, there were a number of conflicting opinions on design based on each team member's experience and point of

view. One good example was the title page for the CD-ROM. In the original version, the background was a landscape photo of tundra and ocean, with an Inuk man dressed in sealskin fishing in the foreground. After previewing this with the elders and different community members, they felt that the person pictured was not old enough and that older people should be represented, highlighting the fact the CD-ROM contained elders' knowledge. Next, they thought that the landscape in the background should show more obvious signs of environmental change. Based on these comments, the final cover was re-designed with two of the oldest elders from the project pictured, along with a receding glacier and an iceberg, two symbols of environmental change.

In another example, the cartographer and computer programmer were always very mindful of things like colour, shape and size of objects on the screen. Their experience with web design, computer animation and computer users, had taught them what attracts or distracts people in using multimedia and their experience was invaluable. In the original draft, they suggested that the CD-ROM's *inuksuk*, the stone cairn symbol that helps a user navigate through the project, be red. But when I previewed this to the elders and community members, they were puzzled and plainly said that *inuksuit* (plural of *inuksuk*) were not red, they were grey or brown, the colour of rocks. Although they understood the designer appeal of a red *inuksuk* for computer users, the Elders encouraged the team to find another way to highlight the *inuksuk*. Eventually, the *inuksuk* was emphasized with a surrounding circle and by the word "Enter" that would appear when one moused-over the symbol, and a successful compromise was reached.

A last limitation (or at least serious consideration for prospective projects) is cost. Depending of course on how complex the project is, a CD-ROM can cost two to three times more than a book to produce. For example, it currently costs about \$12-15,000 (U.S.) to design and print an illustrated (black and white) heritage book of a few hundred pages (Igor Krupnik, pers. comm. 2005). This estimate accounts for 1,500 book copies. The *Uggianaqtuq* CD-ROM cost approximately \$22,000 (U.S.) to produce (note both costs are production/equipment costs only and do not take into account fieldwork, elders' honoraria, or other associated costs). And the *Uggianaqtuq* production costs can be considered extremely low since all of my time was in-kind (I did all of the video, photo and text work along with design and proofing), the computer programmer and cartographic assistants were all undergraduate interns making low wages compared to what professionals would cost, and the university cartography laboratory where the CD-ROM was produced was very generous in offering us free workspace, computer time and many other resources. If the *Uggianaqtuq* CD-ROM was a professional production, the cost could be upwards of \$80,000 (U.S.) or more.

The advantage of a CD-ROM post-production is that once the CD-ROM is completed, copies are very cheap to produce (less than one dollar per CD-ROM). Indeed it is possible that books that need to issue more copies might catch up to the cost of a CD-ROM project via printing costs down the road. If large, unexpected requests for a CD-ROM come up (*e.g.*, for a whole class of students or for every employee in an organization) these copies can be easily met. A book might be limited in getting out copies due to funding (note CD-ROMs are also cheaper to ship/mail).

Yet, the future of CD-ROM technology is uncertain and years from now it is difficult to say if people will still be able to access CD-ROMs as this technology might become obsolete. Currently, the shelf-life of CD-ROMs, depending on a variety of environmental factors and label ink types, is 5-50 years. A book may last longer depending on paper type and environmental factors, though a CD-ROM is much more cheaply replaced. CD-ROMs are small, light and very portable, but they can also be more easily lost or damaged. In the end, a project must weigh all these things to decide whether a book or CD-ROM would have more utility for their needs and goals.

### *Impact of the Uggianaqtuq CD-ROM*

Since its release in May of 2004, there have been upwards of 2000 requests for the CD-ROM at the National Snow and Ice Data Center, the CD-ROM's distributor<sup>5</sup>. Requests have come from as far away as Fiji, Japan, Wales, and Germany, and the International Polar Foundation is currently translating the CD-ROM into French for use in schools in Belgium and Switzerland. Many of the requests for the CD-ROM are from those interested in the issue of Arctic environmental change, but equally as much, people are interested in the application of multimedia technology in local knowledge documentation. For example, the Great Lakes Regional Assessment Project at Michigan State University is using the *Uggianaqtuq* CD-ROM as a model for producing a multimedia project on local farmers' knowledge of climate change (Jeanne Bisanz, pers. comm. 2005). Other uses of the CD-ROM are in climate and anthropology classes at UCLA and Oregon State University; as part of a polar learning display at the EdVenture Children's Museum in South Carolina; and in high school and elementary classes in Nunavut and other provinces of Canada. The CD-ROM has raised awareness about Inuit knowledge in the scientific community and many natural scientists wrote to me after receiving a copy of the CD-ROM with various questions about how Inuit observations and knowledge might help their work in fields from glaciology to fisheries. Feedback and reviews of the CD-ROM have been positive so far (e.g., Shirley 2004).

But what was the impact of the CD-ROM at the local level? In the community, there were very positive responses to the CD-ROM when we met with elders, schools, teachers, government officials and others to demonstrate it. In Baker Lake and Clyde River, the CD-ROM is being used in schools and some Inuit organizations have been using the CD-ROM for various presentations and events related to Arctic environmental change (e.g., at the COP 11 conference in Montreal). As well, Nunavut Tunngavik Inc. (NTI) offered to distribute copies of the CD-ROM to schools in all the Nunavut communities and this was recently completed. I hope to find out in the coming year if other communities found the CD-ROM useful.

Outside of local classrooms, I would guess that the CD-ROM is used very little for teaching and learning knowledge of the environment. At home, computers are not yet a regular feature of learning and mothers, fathers and grandparents are still taking young people out on the land to learn environmental knowledge. But a youth's interest in the

---

<sup>5</sup> See <http://nsidc.org/data/arcss122.htm>.



environment or being out on the land could indeed be sparked by their use of the CD-ROM in school or by elder-youth interactions with the CD-ROM (as in the elder and his granddaughter mentioned earlier). It is this kind of complement to other ways of learning that the CD-ROM is hoped to provide.

Unrelated to its focus on environmental knowledge and observations, the CD-ROM is used occasionally in local homes to access photos or video clips of family members. Indeed, I have been asked for extra copies to use for this purpose and to save for children to have when they are older. In my opinion, this use of the CD-ROM is just as important as any other.

### *Final thoughts on the Uggianaqtuq CD-ROM*

The *Uggianaqtuq* CD-ROM was a pilot project and is only one small effort and tool in trying to document Inuit knowledge and find innovative ways to communicate it. It succeeded in fulfilling the communities' wish to bring attention to the issue of Arctic environmental change by offering a unique presentation of Inuit observations and knowledge. It also succeeded in creating a visual product from research and presenting something engaging for local youth that could be used in addition to their school curriculum.

Even though it can portray only a snapshot in space and time, the CD-ROM, in particular the integrated video clips of elders and their maps, helps bring to life what environmental change really means for life in the Arctic and how in tune Inuit are with what is going on. Lastly, the images and sounds preserved on the CD-ROM also provide an important resource for community and family heritage conservation efforts.

### **Conclusion**

Every new media form from schools, radio, museums, TV, or books, initially posed a threat and did damage to indigenous communities until they were re-worked and re-formatted (with or without the help of researchers or heritage specialists) to fit local interests and goals. Computers and the Internet are recent additions to the list of technologies that have been adapted to local life. Multimedia in particular is a recent addition that holds promise for harnessing the great interest that many young people have in computers to create relevant RLKS materials for youth. With its emphasis on visual material and ability to allow users to navigate through information along their own chosen pathways, multimedia is a particularly powerful tool for indigenous youth, as it can more closely resemble indigenous ways of teaching and learning.

The power of using computers and new computer technologies for reaching out to youth is recognized by many indigenous elders. The *When the Weather is Uggianaqtuq: Inuit Observations of Environmental Change* project was an example of this from the North. Interactive multimedia was used to get students in Baker Lake and Clyde River interested in what their elders were saying about recent environmental



changes—to recognize both the issue of environmental change and the value of Inuit knowledge. The result was positive as elders were pleased with the CD-ROM content and functions, and youth were interested in the technology and applying it to their classroom studies. Unexpected uses of the CD-ROM also created positive outcomes for the project such as local families valuing the photos and video footage of elders and family members preserved on the disc.

Outside the communities, the CD-ROM has had an impact greater than expected. Elders had desired that the CD-ROM make a strong statement about Arctic environmental change and raise awareness about the value of local knowledge. The elders' wish was achieved as measured by the number of requests for the CD-ROM, its use in schools in Canada and outside North America, and its use by northern indigenous groups in presentations and discussions over issues of Arctic environmental change.

Multimedia does have its challenges and problems, however, and these must be carefully considered before a project is undertaken. Depending on who the target user-audience is, multimedia might not be an appropriate technology. Access to computers, knowledge of computers, and high costs of equipment might be obstacles. Cost of production might be another factor and as in any creative project with multiple partners, multimedia design will require some negotiation.

Overall, multimedia provides us with an additional tool for documentation and communication that brings new elements and different media together. It offers a new paradigm for reading, teaching, and even understanding, since the webs of information that multimedia weave together let readers explore, see, and hear (and who knows in the future even smell!) for themselves along their chosen paths to knowledge. This may indeed provide a more similar way to indigenous learning and understanding. This makes multimedia a powerful tool for indigenous peoples as they continue to find ways to document and pass on their own knowledge and languages. As computer use continues to rise as generations of indigenous youth grow up with computer skills, multimedia may have a special role in future RLKS efforts.

## Acknowledgements

In October of 2004, I was fortunate to be invited to the “Reversing Language and Knowledge Shift in the North?” symposium honouring Michael E. Krauss. The symposium gave me a chance to learn from many experts in the RLKS field, and present the *Uggianaqtuq* CD-ROM project during the “Knowledge Documentation” panel chaired by Igor Krupnik. The feedback from the symposium participants and my interactions with the group over those few days, including Michael Krauss, were invaluable in helping me to evaluate the *Uggianaqtuq* CD-ROM experience, and the technology behind it, in an RLKS context. The result is this paper and I am extremely grateful to the symposium organizers for the opportunity to write it and explore this topic.

I am very grateful to Igor Krupnik, Louis-Jacques Dorais, and Murielle Nagy for organizing the “Reversing Knowledge and Language Shift in the North?” Symposium and for supporting my participation. I am grateful to Michael E. Krauss for his work and for inspiring so many efforts in local language and knowledge documentation. I am so very grateful to everyone involved in the *Uggianaqtuq* CD-ROM project including the communities of Baker Lake and Clyde River, all the elders, Jim Robb, Hattie Mannik, Margaret Kaluraq, Geela Tigullaraq, Evaldas Vidugiris, the cartography laboratory student interns Katrin Berger, Sage Connely, Josh O'Brien and Andreas Von der Dunk and all the people in Nunavut and beyond who provided support and feedback. The project could not have been completed without generous funding and support from the National Science Foundation (OPP-9906740), the Social Sciences and Humanities Research Council of Canada, the Cooperative Institute for Research in Environmental Sciences at the University of Colorado at Boulder, the ARCSS Data Coordination Center, and the National Snow and Ice Data Center. Lastly, many thanks to Igor Krupnik and two anonymous reviewers for their helpful comments on earlier drafts of this paper.

## References

- AQQIARUQ, Zacharius  
2000 Tape of interview with Zacharius Aqqiaruq by Shari Fox and Ruby Irngaut, Igloolik, Igloolik Oral History Project.
- ARMSTRONG, Colleen  
2004 Unipkaaqtualiurut StoryMaker Interactive CD-ROM, presented at the 14<sup>th</sup> Inuit Studies Conference, Calgary, University of Calgary, August 11-14, 2004.
- AULD, G.  
2002 Why should I present a thesis on computer assisted Ndjébbana on DVD?, *Australian Association for Research in Education 2002 Conference Papers*, AARE, Melbourne, paper AUL02383.
- BENNETT, John and Susan ROWLEY (eds)  
2004 *Uqalurait: An Oral History of Nunavut*, Montreal and Ottawa, McGill-Queen's University Press.
- BRANDT, Elizabeth A.  
1988 Applied linguistic anthropology and American Indian language renewal, *Human Organization*, 47(4): 322-329.
- CHAMBERS, Robert  
1994 The origins and practice of participatory rural appraisal, *World Development*, 22(7): 953-969.

CHRISTENSEN, Dieter

1994 On Ethnomusicology, Multi-Media and Epistemology, *Ethnomusicology Research Digest*, 5(7): 1-3.

CHRISTENSEN, Neil Blair

2003 *Inuit in Cyberspace. Embedding Offline Identities Online*, Copenhagen, Museum Tusulanum Press and University of Copenhagen.

COCHRAN, Patricia

2003 Comments made to the Human Dimensions of the Arctic (HARC) meeting in Seattle, October 24, 2003.

CSONKA, Yvon

2000 Interpreting oral data in ethnohistory: a transposition of cultures? Paper presented at the 12<sup>th</sup> Inuit Studies conference, Aberdeen, University of Aberdeen, August 2000.

FEENBERG, A.

1991 *Critical theory of technology*, Oxford, Oxford University Press.

FISHMAN, Joshua A.

1991 *Reversing Language Shift*, Clevedon, UK, Multilingual Matters.

FISHMAN, Joshua A. (ed.)

2001 *Can Threatened Languages be Saved?*, Clevedon, UK, Multilingual Matters.

FOX, Shari

2002 "These are Things That are Really Happening": Inuit Perspectives on the Evidence and Impacts of Climate Change in Nunavut, in Igor Krupnik and Dyanna Jolly (eds), *The Earth is Faster Now: Indigenous Observations of Arctic Environmental Change*, Fairbanks, Arctic Research Consortium of the United States: 12-53.

2003 *When the Weather is Uggianaqtuq: Inuit Observations of Environmental Change*, multi-media, interactive CD-ROM produced at the Cartography Lab, Department of Geography, University of Colorado at Boulder, distributed by the National Snow and Ice Data Center (NSIDC) and Arctic System Sciences (ARCSS), National Science Foundation.

2004 *When the Weather is Uggianaqtuq: Linking Inuit and Scientific Observations of Environmental Change in Nunavut, Canada*. Ph.D. dissertation, Boulder, University of Colorado at Boulder.

GRENIER, L.

1998 *Working with Indigenous Knowledge: A Guide for Researchers*, Ottawa, International Development Research Center.

- INGOLD, Tim and Terhi KURTTILA  
 2000 Perceiving the environment in Finnish Lapland, *Body and Society*, 6(3-4): 183-196.
- KROSKRITY, Paul V.  
 2002 Language Renewal and the Technologies of Literacy and Postliteracy: Reflections from Western Mono, in William Frawley, Kenneth C. Hill and Pamela Munro (eds), *Making Dictionaries: Preserving Indigenous Languages of the Americas*, Berkeley, University of California Press: 171-192.
- KURELEK, C.  
 1992 Anthropological participatory research among the Innu of Labrador, *Native Studies*, 8(2): 75-97.
- MacDONALD, John  
 1998 *The Arctic Sky: Inuit Astronomy, Star Lore, and Legend*, Toronto and Iqaluit, Royal Ontario Museum and Nunavut Research Institute.
- McDONALD, Miriam, Lucassie ARRAGUTAINAQ and Zack NOVALINGA  
 1997 *Voices From the Bay: Traditional Ecological Knowledge of Inuit and Cree in the James Bay Bioregion*, Ottawa, Canadian Arctic Resources Committee and Environmental Committee of the Municipality of Sanikiluaq.
- MacDOUGALL, David  
 1998 Visual Anthropology and the Ways of Knowing, in Lucien Taylor (ed.), *Transcultural Cinema*, Princeton, Princeton University Press: 61-92.
- MAGUIRE, P.  
 1981 *Doing Participatory Research: A Feminist Approach*, Amherst, The Center for International Education, School of Education, University of Massachusetts.
- NATIONAL FILM BOARD OF CANADA  
 1981 *Magic in the Sky*, Documentary film directed by Peter Raymond, 57 minutes.
- OOZEVA, Conrad, Chester NOONGWOOK, George NOONGWOOK, Christina ALOWA and Igor KRUPNIK  
 2004 *Watching Ice and Weather Our Way*, Washington, DC, and Savoonga, AK, Smithsonian Institution, Arctic Studies Center and Savoonga Whaling Captains Association.
- SHIRLEY, Jamal  
 2004 Review: When the Weather is *Uggianaqtuq*: Inuit Observations of Environmental Change, *Weathering Change*, summer 2004: 5.

SOHNG, Sung Sil Lee

1995 *Participatory research and community organizing*. A working paper presented at The New Social Movement and Community Organizing Conference, Seattle, WA, University of Washington, November 1-3, 1995.

TAQRAMIUT PRODUCTIONS INC.

2005 *Echo of the Last Howl*, Television documentary produced for Makivik Corporation.

THORPE, Natasha, Naikak HAGONKAK, Sandra EYEGETOK and the Kitikmeot Elders

2001 *Thunder on the Tundra. Inuit Qaujimajatuqangit of the Bathurst Caribou*, Vancouver, Generation Printing.

TITON, Jeff

1994 Hypertext and Ethnomusicology: Two Scenarios for EF/hm, *Ethnomusicology Research Digest*, 5(7): 3-4.

WARSCHAUER, Mark

1998 Technology and indigenous language revitalization: Analyzing the experience of Hawai'i, *Canadian Modern Language Review*, 55(1): 141-161.