Cultural Identity in the Digital Age

Design Guidelines for Revitalizing the Native-American Indigenous Languages

Siddharth Maini
MS in Human Computer Interaction Design 2012
Indiana University Bloomington

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Cultural Safekeeping in the Digital Age
Design Guidelines for Revitalizing the Native-American Indigenous Languages

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Siddharth Maini

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Primary Advisor: Erik Stolterman
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Abstract

Native-American culture is going through a phase of cultural endangerment. Many tribes and their future generations risk losing their spoken languages and cultural identities forever. There is an ongoing loss of customs, traditions, and other aspects of their culture that has been taking place at different levels within the United States. Several efforts to save some of the endangered languages are being made using the latest tools and technology but with varying levels of success.

I have come to believe that technology has achieved a local maximum as far as cultural preservation is concerned. Most of the efforts revolve around capturing the information and knowledge without much thought being given into thinking about the ways that would allow meaningful access. While some of these technologies can be classified as innovative from a technical perspective, they have still failed to attract a large constituent audience. Adaptation of a technology that can be functional and meaningful to the Native-Americans while being economical to produce and support is the need of the day.

I believe that there is a lack of foresight in thinking about solutions that can help sustain a culture in a holistic way. Technologies that are being introduced are mostly being designed outside the living context and fail to understand the needs of the Native-American people. I present an opportunity space for design; and identify some technologies that might play some useful role in the continuation or revival of Native-American languages especially the ones that are in their last stages of extinction. I finally propose a set of design guidelines for developing technologies for language revitalization efforts.

A very possible solution might include developing a language communications platform, a platform that could empower members from smaller tribes to develop useful tools in collaboration amongst themselves with support from the public sector, private sector, or both. It is my hope that such helpful tips can lead to the development of seemingly innovative technologies that can be sustained for the generations to come and play a significant role for cultural safekeeping in this digital age in a scalable fashion.

While it is necessary to continue digital preservation efforts of artifacts or other cultural items, the essence of cultural preservation can only be achieved through revitalization of Native-American languages in a way that can co-exist with other languages while allowing Native-American communities to determine their own cultural continuation. We as a society need to challenge our basic assumption about why it is always important to preserve everything using modern technology. I call for using a combination of both human-centered and an activity-centered design approach. There is definitely a need to design for the future without being overly obsessed about current technological environment where we only limit ourselves to thinking about solutions that involve mobile portable access, social media etc. An out of the box thinking is of utmost importance within this context.
“...oral traditions were... of great value to our ancestors and our parents so they taught us the oral traditions....but now day and age my children will communicate better by just texting each other....by knowing computer...Ipod...if you don’t know that and if you are older person how are you gonna communicate with them.....for culture to be passed down to them...”
- J.C., Bismarck, North Dakota, Member of the Native-American “Blackfeet” Tribe

“One language dies every 14 days. By the next century nearly half of the roughly 7,000 languages spoken on Earth will likely disappear, as communities abandon native tongues in favor of English, Mandarin, or Spanish. What is lost when a language goes silent?”
- National Geographic Magazine Article on “Vanishing Voices”, Published July 2012

“In 1995, there were only 175 that were still being spoken, and only 20 of them were being taught to children within the Native community. We don’t even know what we’ve lost. Our best guess is that 200 to 300 languages have disappeared without a trace. Others survived just long enough to be described and perhaps recorded by 20th century linguists.”
- Indian Country Diaries. Today’s Challenges. Revitalizing Native Cultures | PBS1

“Of the 175 indigenous languages still spoken in the United States, only about 20, or 11%, are still being transmitted to children in the traditional way (Krauss 1996). The language loss may be even greater since the reported numbers reflect only those Tribes that are recognized by the U.S. government (Berlin 2000). A cursory review of research finds that there is little available research on the impact of language loss on young children in AI/AN communities and even less research focused on AI/AN Head Start.”
- OHS Tribal Language Report 2012
Introduction

Language is the soul of any culture and as a result plays an extremely important role in the preservation of any culture. Capturing languages using the latest tools and technology can help you to an extent of providing access to basic language content but fail to capture the nuances of the languages itself. Culture is something that changes from generation to generation but relies on transmission of the beliefs, the social value system, the languages, and other existent tacit knowledge. I am of a firm opinion that facilitating daily use of languages can and should play a significant role in language revitalization and cultural preservation as a result of it.

“Seventy-eight percent of the world’s population speaks the 85 largest languages, while the 3,500 smallest languages share a mere 8.25 million speakers. Thus, while English has 328 million first-language speakers, and Mandarin 845 million, Tuvan speakers in Russia number just 235,000. Within the next century, linguists think, nearly half of the world’s current stock of languages may disappear. More than a thousand are listed as critically or severely endangered—teetering on the edge of oblivion.”
- National Geographic Magazine Article on “Vanishing Voices” Published July 2012

The above quote from the National Geographic presents us with a real scenario being faced by several indigenous communities around the world. Several efforts have been made in the past decades and many involve using technologies that try to provide a way of capturing the cultural knowledge of the indigenous tribes in a hope that it can be preserved for the forthcoming. Much focus has been on capturing the data first while not trying to figure out ways of making it convenient, intuitive, and easy to access this data.

In this rapid age of globalization, the preservation of the cultural heritage of indigenous people around the world is of utmost importance in order to ensure the survival and sustainability of their culture. In order to for this to succeed it is important to revitalize the languages that these cultures are part of. The indigenous tribes and/or nations are facing a threat due to several reasons that are out of the scope of this report to discuss in detail.

Within the Native-American (NA) context, the younger generation is increasingly adapting to the mainstream society by choosing to learn English as a first language and is mostly comfortable using the latest new media available in the market. There is also a lost generation of tribes that bore the brunt of the policies of the Federal Government for around a century before 1970. As a consequence, they were mandated to go to English-medium schools, taught English, and were prohibited to speak their own language. This led to a huge loss of languages and cultural identity for many tribal youth since 1870s.

The elder generations that actually speak the native languages serve as a vast resource of cultural knowledge and wisdom to the local communities. Most of them, unfortunately, are not proficient enough in using the latest technology gadgetry. Moreover, many tribes are only left with a handful number of tribal elders and those too are the only ones who speak the language. What will happen to these languages once they are deceased? How can we as technologists help preserve and/or revive a dying language? In other words, a culture gap exists that is preventing the transmission of cultural information to the current and next generations and is gradually adding to a significant loss of the spoken languages.

The Native-American tribes are aware of this threat and are trying their best to preserve their language and indigenous knowledge (IK). Many of them do acknowledge the role information
technology is playing in digitizing cultural knowledge, language, and wisdom they possess that can be conveniently accessed in a way that would enable the future generations to continue their traditions, customs, and language they are proud to be associated with.

The use of web and mobile technologies have generally been the main source of information access in today’s world and unsurprisingly most of the technologies being developed by researchers and scientists from around the world are only limited to the web and mobile platform. This predisposes us to believe that developing solutions within a web or mobile platform is the best way for addressing this sort of a problem. While these technologies hold huge promises in the services they are meant to provide, due to the rapid changing world of the digital web, they have not yet been adopted in the mainstream by their constituent (Native-American) audiences.

Furthermore, the needs and expectations of the Native-Americans vary from tribe to tribe. There have been efforts in releasing mobile tablet applications (apps) that allow you to learn some parts of a tribal language. However, these apps have been released by the tribes that are thriving and usually have the resources to develop such solutions. These tribes are relatively small in number. All these attempts have only been a drop in the bucket for the vast amount of progress that still needs to be made as far as learning a language and preservation of culture is concerned. I argue that this calls for a paradigm shift so technologies outside the predominantly web and mobile domains can be explored.

Most of these technologies have not reached a point where they are easy to use for their respective target audiences. I argue that this is primarily due to a lack of emphasis on using design thinking for improving the overall user experience with the technology. Can this possibly be due to the solutions essentially being developed outside the context of the problem at hand?

Languages, in general, need to be preserved to allow cultural transmission of knowledge and wisdom accumulated over several generations and centuries. It is almost impossible to sometimes capture nuances of a particular language, and develop a diverse way of thinking about things in general. Cultural diversity is an essential part of how we identify ourselves. Globalization is often said to have a negative effect on cultural diversity as an unintended consequence [1].

In my opinion, language is essential in maintaining the cultural diversity of any culture and therefore, there is an urgent need to revive endangered languages. Most of the cultural knowledge indeed gets passed down the generations using oral traditions. In other words, there needs to be a transmission of cultural knowledge from older generations to the newer generations using a different tradition. The need of the day is to develop better tools that can facilitate multi-lingual communication.

There is also a huge amount of cultural information available online spanning several tribal websites, social media networks, library resources, museums etc. that can be accessed over the internet. Accuracy and access of this data is another issue that is outside the scope of this report. At present, there also does not seem to be a way that would allow tribal individuals to store cultural information about themselves, and their family in a coherent fashion. The information is dispersed and embedded within the vast expanse of the internet.

With only about 20 Native-American languages (out of the 175) being taught and transmitted in the traditional way in the US, there should be an emphasis on creation of innovative technologies for rest of the Native-American languages. It is a big challenge to accomplish. A lot of work is being done these days in an attempt to provide access to rich cultural information. Museums such as the Native-American Museum of American Indian (NMAI) or the Autry museum have been collaborating
with educational institutions such as American Indian Higher Educational Consortium (AIHEC) to develop cultural repositories of knowledge.

I personally have had the opportunity to lead one such cultural repository project called eHumanity [3] and will describe some insights that I derived from conducting the user research in-situ that adds to my main argument about delivering information technology to Native-Americans within a different paradigm that would be innovative yet transparent, ubiquitous yet contextual.

According Amanda Stevens [4], it is important to develop indigenous knowledge management tools that meet the needs of communities in a way that would allow the non-native professionals building the tool to question his/her own understandings of the knowledge, the tools, and strategies in order to be more sensitive towards the tribal population.

However, the unpopular use of such web technologies points to various concerns. In my opinion, the idea of cultural preservation needs an ecosystem of devices that would enhance the Native-American language learning experience that is integrated with learning languages in a cohesive way. Technologies that involve engagement and collaboration with tribal members at all levels are definitely going to be promising as long as their goals are translated in a proper way. I also think that many tools that are developed today are not easily accessible nor convenient or easy for people to use. There is a need for the discipline of Human Computer Interaction (HCI) to create user interactions that provide a better user experience.

I present my findings from user research, literature review, and a review of technology exemplars that seems promising. I finally propose a set of design guidelines for developing better language learning solutions. I do not seek to answer questions about preserving ancient Native-American history etc. but rather my main interest lies solely in the preservation of the dying languages and cultural knowledge that 5.2 million Native-Americans still possess and are finding it hard to pass it on.

**Personal Motivation**

I have had the fortune of working with the eHumanity (http://e-humanity.org) project, and during this process I have realized the importance of cultural preservation since I have been living outside my home country (India) in the United States for the past eight years. There has never been a time when I would not remember the fond memories of the various cultural and religious festivals happening in my own country. I feel that the amount of the cultural loss I have experienced over the past few years is significant and there is nothing I can do except for going back to my country and resuming my career there, which would not be a trivial decision. I do suffer from a similar dilemma.

However, I wonder if a solution can be developed that can help me in reducing the loss of cultural knowledge. This thought made my resolve stronger than ever about thinking deep about the problem in hand. I started thinking about ways to learn missed customs or traditions that I would like to pass on to my next generation. I found that the technologies these days were not appropriately designed for capturing this cultural knowledge in a way that seemed just right for the job.

From a Native-American perspective, I ask a few questions. What would it take to revive the dying languages before they become part of the known history? How can a tribal elder use a personal computer or a smartphone or a tablet for documenting his/her language for example? Is that really the most important feat to accomplish? Why would they use it? Do they have the time or the motivation to learn a new technology? What incentive do they have to do this? My personal
conviction tells me that none of the current and omnipresent mobile/web technologies are best suited to capture this information in a way that is more meaningful, convenient and easy to use.

**The need for Design Thinking/Strategy**

The Native Americans account for less than 2% of the total US population [5]. Some say that it is just a matter of time or perhaps a few decades or so before their culture and language becomes a permanent part of the history. In order to prevent this from happening, I believe that this problem should be approached from a different perspective and a design viewpoint is what I have chosen to undertake. It might help to compile a design strategy that affords to us a holistic understanding of the actual problem. There definitely exists a technological gap between the needs of the Native-Americans and the way the current technology accommodates their needs. Felix refers to this gap as a “design gap” [6]. He mentions that the cause of such as “design gap” is directly related to the under-performance of the technology, functionally and emotionally. Felix talks about using design strategy to embed design thinking into solving a problem that requires a certain set of skills.

“**skills as observation, facilitation, visualization, and clear communication. A design strategist must be able to consider multiple options simultaneously: Brainstorming, scenario, planning and prototyping skills are critical as is the ability to subsequently edit and organize ideas. Throughout the process, one must be able to convey information in ways everyone involved can relate to.**” [6]

According to Felix, A Design Strategy can be described as an innovative way to think about a problem from different perspectives that helps in bringing clarity to an organization. According to Breman, it helps one make a decision about “what to create, with a perspective beyond the current cycle” [7]. Tim Brown, CEO of one of a global design consultancy firm, IDEO, talks about a five-point plan to encourage individuals and firms to think like a designer [8]. IDEO has been attributed with successful projects in different areas using their approach in design thinking. Tim talks about how abstractions in a business strategy often are inadequate to move the company forward in its execution [8]. He is a strong believer in the power of storytelling.

“**People need to have a visceral understanding -- an image in their minds -- of why you've chosen a certain strategy and what you're attempting to create with it. Design is ideally suited to this endeavor. It can't help but create tangible, real outcomes.**” - [8]

He is trying to emphasize the importance of using design in communicating the strategy to your clients and stakeholders. Using visual representations of how a final product might look like via an appropriate medium is essential in providing a clear understanding of the vision. The idea of design thinking revolves around thinking about a problem in non-traditional ways and approaching it in a new ways that makes it easier to innovate.

“Even after you've rolled out your new product, service, or process, you're just getting started. In almost every case, you move on to the next version, which is going to be better because you've had more time to think about it. The basic idea for the notebook computer came out of Ideo some 20 years ago: Ideo cofounder Bill Moggridge is listed on the patent for the design that lets you fold a screen over a keyboard. Since then, the laptop has been redesigned -- and greatly improved -- hundreds of times, because design is never done. The same goes for strategy. The market is always changing; your strategy needs to change with it. Since design thinking is inherently rooted in the world, it is ideally suited to helping your strategy evolve.” - [8]
Furthermore, he advocates for an increase in the magnitude of design thinking within an organization.

"It all comes back to the fact that in order to really raise innovation productivity within organizations, at the strategic level and everywhere else, you have to increase the amount of design thinking inside organizations. Doing so helps you get to clarity faster, helps your organization understand where you're taking it, helps you figure out whether you're on the right track, and enables you to adapt quickly to change. Those are pretty valuable survival skills." - [8]

Kuutti describes a simple model of how humans mediate in the world through artefacts [9]. She proposes three dimensions that are important for the success of any artifact. They are functionality, meaningfulness, and economic viability as shown in the figure below. I do advocate for solutions that can be defined within the dimensions Kuutti proposes.

Figure 1: The triple mediated-ness of artefacts [9]

**Design Thinking Example**

Southwest Airlines has managed to stand out as a success story [10] that has become an envy of the major players in the market. It is just a difference experience to travel with Southwest Airlines. The boarding process, the color of its seats, and a great customer service amongst other things has made it extremely successful. This is a prime example of using design thinking to “reimagine the entire flying experience” [11] according to Haley Hodgen. Hodgen depicts this example in a useful visual representation.
Implications for Design

Don Norman argues about the role technologies play in determining human activities [12]. Should we design products that dictate activities or should the activity dictate the design of a product? This is a very interesting question and looking from a Native-American (NA) perspective carries some design implications. Native-American tribal elders tend to live by their cultural roots and heritage while the younger generation is more open to adaptation and are usually fond of using the latest gadgetry available commercially. The problem is to decide whether to introduce technologies that would fit within NA traditional activities that might lead to a fast-paced preservation and revitalization of languages or to create products using modern technology that would inform and potentially affect these activities in a standardized way. In my opinion, it seems to me that latter is their only option at present.

Is documenting languages the only way forward?

A traditional linguistic approach involves going on-site and documenting languages themselves. The solution involves a lot of user research for developing language dictionaries. This method has undoubtedly taken a step forward towards language preservation and revitalization. Many tribes in the United States, Canada, and abroad have adopted a similar approach. However, the current technology in itself is very restrictive. It cannot replace a physical interaction with a tribal elder for example. It cannot capture the various nuances that are lost in translation, which according to me are extremely important part of cultural knowledge. Such an approach cannot communicate the
context in the way it is supposed to be and adds a bit of bias. It can be presumed that endurance of a language depends upon the capability of the youth to carry it forward.

Revitalization of a language should include increasing the usage of the language itself while maintaining the status quo. In my own culture, I have had the opportunity to learn my own mother-tongue (Hindi) and English that allows me to converse in English in a business/social context and in Hindi with my family that has been a blessing.

In my opinion, this process of documenting languages may not be worth the return for the amount of investment. It is an expensive and laborious process, and requires a significant amount of time, effort, and money. I do not think this process alone can be used for revitalization of Native-American languages and especially the ones that are the most at-risk of becoming extinct. My main argument calls for a change in thinking about revitalization efforts that may entail new and creative pedagogies for learning that may already exist but have failed to become part of the mainstream language learning technology. I also believe that empowering people to save their own language via use of technology would yield better outcomes. Only in one’s own language can we preserve our own customs and traditions. For example, I cannot think about performing a traditional Indian ceremony in English for that matter. Of course, having access to the videos of how to do it is great but it does not have the same meaning attached.

**Native American Demographics**

A Nielsen report of social media shows that almost 44% of Native-Americans / Alaskan Natives started using smartphones for accessing social networking [13]. Their total population is expected to climb from 5.2 million to 8.6 million by the year 2050 [5]. Language experts believe that somewhere around 175 Native American languages are still spoken but only 20 were spoken widely by children. This number is down from 300 languages that existed in North America [14]. Furthermore, 70 languages out of the current remaining pool can become extinct in the next 5 years [14]. The illustration below helps visualize the extremity of the situation.
My Contribution to HCI

My main goal, as part of this report, is to take a step back and look at the idea of providing cultural preservation at a holistic level and try to find ways and opportunities that could be of significant help. Many innovative technologies are currently in development and/or have been deployed over the past few decades yet the ubiquitous-ness of any particular technology has not been achieved in way that would allow it to be introduced at a mainstream level.

There is a slew of various research and proposals on technology and technology itself but what lacks these days is the vision for the culture preservation. It is important, according to me, to come up with visually appealing prototypes of the next generation of technology by doing more research so that vision can be presented to the outside world.

There has been a lot of research work being done that talk about using the next generation of technologies such as 3D mapping, 3D annotation. While these ideas are great what remains to be seen are the concepts that would evolve from such ideas. This is where I intend to fill in and provide my two cents from a design perspective.

I intend to present some design guidelines that may be considered while developing any solutions that can cross the traditional web paradigms and consider implementation of next generation of wireless or other useful technologies. I finish my report by mentioning a few design concepts that can be taken on for further development. It is my hope that many more useful insights and other concepts can be spawned by reading the report and the design strategy.
Approach and Methodology

My main approach has been very non-linear from the beginning. I started using a design process with a very subjective goal in mind i.e. to figure out a solution that could address Native-American cultural preservation in general. I found otherwise, which I will explain later. During the past one and a half years, I feel privileged to be given the opportunity to work on a Native-American cultural preservation project called “eHumanity”[3]. The goal of this project was to provide a consolidated portal access to digitized Native-American cultural items from National Museum of the American Indian (NMAI) and the Autry National Center and scale the collection to include other Native-American cultural repositories. I soon discovered post-research, at one of the sites that the web portal solution failed to meet the expectations of the intended constituent audience even though it had an overall positive response.

During that time I wanted to focus on finding a better solution that could potentially be developed within web/mobile framework that exist today, and could also fall within the realms of supporting actual cultural preservation for the Native-Americans living in the United States. I did not realize until later on that I would end up opening a can of worms that would make me want to question my own basic assumptions behind the idea of the term “Cultural Preservation”. I realized that the preservation and revitalization of the Native-American languages is much more important and needed in order for the culture to survive. Having gone through such a route, I am glad to have gone through an experience that led me to an eye-opening introspection in this topic.

Table 1: Overview of Research Methods

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**eHumanity User Research**

During the exploratory phase of the eHumanity project, I was involved with conducting online surveys and informal interviews with members of the Native-American diaspora at the Indiana University, Bloomington campus in collaboration with my team at work. Based on the insights generated from this process, developing prototypes, and after several rounds of informal usability testing we released the first iteration of the eHumanity portal in July of 2011. In the months after the release, I undertook user research that included conducting ethnographic interviews, focus groups sessions, and usability testing *in-situ* at two tribal predominant locations over the past year.

The user research phase, as part of the eHumanity project (http://e-humanity.org), consisted of my travel to visit the United Tribes Technical College (UTTC) in Bismarck, North Dakota and Northern Arizona University (NAU), Flagstaff, Arizona. The goal of these user research sessions was to collect responses from a diverse group of Native-Americans that included evaluations of the eHumanity portal design, usefulness of the resources it provides, and recommendations for design features that could make the portal a stronger resource for educational, cultural knowledge management, and cultural outreach and awareness purposes. The initial hope was to define a vision for the future of cultural preservation of knowledge in this age of globalization.

There were a total of 17 participants at UTTC, and 8 participants at NAU that took part in this phase of user research. My original plan, at each location, included conducting one-on-one ethnographic interviews with at least one faculty member, one student, and (ideally) one tribal member who is neither a faculty member nor a student. All participants were also required to fill up a demographic form to fulfill their participation requirements and receive the incentive [15]. A dollar amount ranging from $50 - $75 was offered as an incentive to each participant.

At UTTC, I ended up conducting two ethnographic interviews, three focus group sessions, and a few usability sessions. One focus group session was also conducted at NAU that was also followed by some usability testing sessions. For the purpose of this report, the insights generated from the usability testing that pertain to portal features are not mentioned and hence are out of scope.

**Ethnographic Interview Setup**

The purpose of my ethnographic interview was to place the user’s response to the e-Humanity portal within the context of the user’s cultural background, approach to education (particularly the faculty), and level of comfort with technology. The interviews ideally would last about an hour or two at most in an informal setting and can be extended if the volunteer participants agreed. It would provide an opportunity to get to know the user/participant on a more personal level to better understand how the portal design can meet his or her needs and generate new insights in general. Ethnography was conducted *in-situ* at a location of the participant’s choosing. I chose to do informal ethnography at the location of participant’s preference in order to allow them to talk in a comfortable environment and to establish a feeling of trust.

**Focus Group Session Setup**

I asked my point of contacts at the UTTC and NAU to organize focus group sessions that included a good diversity of faculty members, students, and tribal members and elders from different tribes. Representation from multiple tribes was emphasized. I hoped to generate as many ideas and
opinions in the time allotted for these sessions. To make the most out of the focus group session, I also consulted some guidelines on conducting focus groups [16]. Focus group sessions were held in a communal way and I was initially not well received. They were conducted to gather an overall understanding of the target audience that allowed me to capture their emotions, cultural nuances, and connect with them with a hope to increase the quality of the subjective feedback that could be analyzed at a later stage.

**Usability Sessions Setup**

Participants included individual faculty members and students who worked with me and use the eHumanity portal. Each usability session took an average of 30 minutes. The purpose of these sessions was to collect direct feedback while user is navigating through the e-Humanity portal and to have a one-on-one informal interview with participants if they wish. I was able to gain a good understanding about the context. Each participant spent a minimum of 30 minutes and upwards of 90 minutes taking part in the testing. All eventually determined how to search the site’s image collection, while a few opted to investigate the ‘Add Collection’ feature. Afterwards they answered questions regarding how the site might be improved. The Usability Testing was conducted in a closed environment using the Silverback usability testing software [17] that allows an audio and video capture of user screen interactions with a picture-in-picture (PIP) view of the video and audio of their facial structure as well, while they perform open or closed ended tasks.

**Blog Research with webinar**

Another user research project was conducted in parallel at Indian Institute of American Indian Arts (IAIA) in collaboration with a faculty member. The plan involved creation of individual blogs as part of an assignment for each of the participating students that allowed them to offer their own opinions on the eHumanity portal that also included their reflections in general. Three choices were given for the assignment. One was a poster creation assignment that involved creating a poster representing student’s tribal/cultural history using images from the eHumanity portal. Another assignment was to make an infographic about a ‘map’ that would be a self-representation of yourself. The third was an open ‘create your own project’ assignment.

All assignments involved writing three blog entries as part of the project requirements. The idea behind this innovative approach was to capture user experiences, frustrations, and candid opinions of the students while allowing them to share their insights in an explicit manner. The final plan included conducting a webinar using Google Hangout with the entire class, my portal team, and myself. We ended up asking probatory questions about general use of their portal and sought to extract any important information that could be used for develop some useful design concepts without giving much thought about the current technology at hand. Another reason was to review any major points of discussion me and my team had about their blog posts and to get something more significant that may have missed the blog posts or our analysis. There were a total of six students who took part in this user research exercise.
Other User Research Activities

In the months following these research sessions and since May 2012, I conducted several brainstorming sessions with different stakeholders of the eHumanity project and my peers in HCID program at Indiana University (http://www.soic.indiana.edu/graduate/programs/hcid/). These sessions were conducted before and after user research phases and the conversation revolved around a wide range of topics that sometimes included discussing findings from user research for example to discussing a holistic strategy about the role of technology. Other efforts included conducting an online survey and follow-up phone interviews and textual conversations with some tribal members.

I also tried to communicate again with people I met during my previous research visits. The goal was to share my ideas and express my self-reflections about the problem in general with an open mind for criticism and/or positive feedback. The continuation of this process on a regular basis allowed me to ground my arguments and generate several useful insights that I would proudly attribute to the process of Distributed Cognition [18]. I also ended up doing some sketching exercises to generate some insights.

In the end, after discussing my arguments with my thesis advisor, Erik Stolterman, I found myself questioning my basic assumptions about the kind of role technology should play in cultural preservation. I started questioning the culture of capturing data in form of images, videos, and other relevant cultural information in database silos. I questioned about the kind of role I as a technologist am trying to accomplish by designing information access portals across the web and mobile platforms. I concluded my user research by collecting responses from an online survey about the meaning of “Cultural Preservation”.

Online Survey

An online survey was undertaken to understand the meaning of the term “Cultural Preservation” from the perspective of people who responded. I want testing my hypothesis that the meaning of the term has different meaning for different people. The survey results are attached in the Appendix. I asked them the following two questions:

- What does ‘Cultural Preservation’ mean to you?
- What do you do for a living?

In the following sections, I will present the findings and insights of such activities in this report that will also include some arguments that I derived from literature review and exemplar research.
User Research

This section contains findings and insights from important discussions using the user research phase. User research allowed me to change certain assumptions I had about the target audiences and the process of language preservation and revitalization in general.

eHumanity Findings

Focus Group and Usability Sessions

Most participants expressed interest in what eHumanity offered as a portal. They were appreciative that a resource like eHumanity was being developed. A loss of culture and heritage in the tribes over the years was mentioned on several occasions. Half of those questioned felt that visual images and even audio recordings would be more useful than text. The overall impression given in terms of visual appeal and usefulness was positive. However, several people expressed concern about unlimited access being offered to images of items that held strong cultural significance and proposed measures be taken to curtail viewing. For the most part, the participants were glad to know a site like this existed and willingly offered suggestions regarding how it might be improved.

One member of the Blackfeet Native-American (NA) tribe was very concerned about her tradition being lost. She loves making art and regalia and finds it very “therapeutic”. According to her, it is an interesting idea to share the audio recordings but the problem is that due to the Native-American persecution, many tribal elders do not want to talk about their history. Therefore, even if people want to know more about the cultural history of the Native-Americans, there are not many opportunities that open up.

People from the focus group did acknowledge the need to fast-paced sharing of this information and indigenous knowledge before it gets lost. Storytelling as a tradition is kind of getting lost since the younger generation does not actually get the time to spend with their grandparents since they get busy with going to schools, work, and colleges. In another focus group, I found out something more interesting. It began with the topic of preserving genealogical records that Bureau of Indian Affairs (BIA) has about NA genealogy. All of them agreed that “culture/language is slowly fading” away and it is very important to preserve the culture and language. There was a talk about Native-American dictionaries that would contain pronunciation of words in the tribal vocabulary. A large number of languages are not taught and neither was written. Most of language consists of symbols.

One participant who was concerned about the loss of language said that it is important to share their culture in non-traditional ways even if it means letting go of protocols with a greater goal of preservation in mind. Cultural misappropriations were also on their mind. Many talked about accuracy of information on the internet and tribal citizenship. The rules to get the tribal citizenship are different in different states.

Most participants agreed that the tribal communities have to take initiative in recording language from the elders. According to them, strength of a culture is language that is the spirit of several Native-American communities. Cultural schools or officers can and do validate some cultural
information. BIA still has a process of recognizing a tribe. However, the federal government does not want to recognize more tribes since it (presumably) adds to their administrative burden unless there is an incentive. This affects many young students who want genealogy proven in order to get financial aid to college.

There was one member talking about using phone to re-learn a language. His quote “if you are going to die and there is a cure for it, are you not going to try it?” was very powerful. It encompasses the feelings and emotions that run deep in many tribal people. This is how tribes perceive of themselves and especially the ones that only have a few members alive. They also mentioned that kids are not going to stay for an hour listening to an audio recording or a video of dancing. There needs to be a better way of engaging younger generation that usually is attention deficit. It is important to keep the technology simple and stay focused. Kids are doing multi-tasking and it adds to their cognitive load.

It is important to share cultural knowledge with your friends and family if not the entire community. Concept of “one-stop shop” was discussed, which was interesting. Many young men/women do have access to smartphones. Once you are between 20 – 30 years of age is when they start to realize their culture. The problem is that the older generation is figuring out how to convey information to the younger generation.

However, one of the participants’ parents thought that it is more important to learn how to survive and fit in with the American society. Most importantly participants mentioned that they wanted to bring the language back so they could communicate their own culture, traditions, and values. Young people are trying to adapt to the mainstream society. More than 70% of Native-Americans live outside the reservations [5]. Therefore, it is important to make youth realize the importance of their culture. There should be different mediums of communication involved and videos are an interesting option. Story-telling is very important part of the NA way of living where wisdom is passed orally from elders to younger generation.

It is also important to preserve privacy and respect it. Some people do not have a problem in sharing knowledge with others. Therefore, it is complicated to determine privacy issues and that I think is a common faced issue within the mainstream society that should to be dealt with appropriately. Native-Americans are very visual in nature. Hence, it is important to develop technology that is very intuitive and engaging. This reminds me of one of the Marty Siegel’s seven themes of good design i.e. transparency [19]. Technology should be ubiquitous in ways it solves the problem.

“If we could just open up the door to just some of the things we were taught....encourage to learn who you are and where you came from…and how are we going to get to them….through technology” - quote from a participant

One participant mentioned that younger generation is not receiving open communication from the elder generation about the importance about their culture and language via different modes of communication. Participants are genuinely interested in wanting to connect with people who have a common ground.

Diversity of languages allows for a different vision or perspective [20]. Sometimes you need a local language to communicate certain nuances that cannot be translated. Kids in this video are speaking the language within the context of performing it in arts or music so there has to be a goal attached. You cannot just wake up and start learning a language without having motivation for that activity. Intent of learning is a good motivator for me. If I want to become an astronomer, that doesn’t immediately translate into me studying physics and astronomy. I can, however, accomplish this activity in at least a couple of years using different online resources that I find comfortable using.
would perhaps follow a structure. Similarly, in order to revive a language you need a path laid down, social interactions with other people etc. Accessibility concerns are also important to be considered while designing technology.

**Ethnography**

I conducted two ethnographic interviews that lasted from couple to several hours. One of the participants that I spent time with discussed a lot about the Native-American history. He is a tribal elder who is not proficient in using computers, smartphones, or technology in general. His main communication device is a handheld cell phone that he uses only for placing or receiving calls and does not appear interested in using a smartphone. He is from Arikara tribe and commands a high level of respect within the tribe. He does all the ceremonies and act as a consultant to a lot of people. He does not seem too optimistic of preserving different Native-American languages.

Most of the elders have a vast expanse of knowledge that younger generations want. He talks about the distrust between the tribes and the federal government. Another participant talks about the problems of mismanagement of Indian Health Service (HIS) and the BIA and their consequences of incompetent policies. In both interviews, there seemed to be a cultural code of conduct that emphasizes respect for elders. Efforts by the younger generation need to be visible to the elders. It seems to me that without the culture of respect and visible efforts, it would be implausible to think about oral transmission of any cultural information or language to the youth.

**Importance of Language**

The major topic of my second focus group session at UTTC was on language, which was very interesting. Languages are very important for Native-Americans and guilt is a really good motivator for learning language. People want to contribute in their own ways but they do not have many options. Many people mentioned that learning language is extremely endeared to them. Language is the key to communicate. How does one really preserve native language?

One participant gave me a good idea of Native-American history and their current situation. This is useful in understanding the point of view of many tribal members. Younger population is particularly fond of smartphones and tablets, and learns better with pictures rather than text. We need to think of a medium for them that will make it easy to share information. Somebody also mentioned that elders do not want to share information so easily. Native-Americans are financially in a bad place. While the larger tribes are not in immediate risk of losing their language, smaller tribes that are at the most risk do not have resources for helping them.
Participants think that technology development should focus on the young tribal members. The user research sort of concludes that tribal elders would always struggle learning or using a new technology. Every individual’s view of culture includes several things namely language, artifacts, stories, legends. A lot of this knowledge is private and personal and that individual may only want to share only some part of that knowledge with the outside world.

Focus group session at NAU found out that culture/language is “slowly fading” away and that it is extremely important to preserve it. There was a discussion around creating new Native American dictionaries. Many tribes also do not have a written language and rely on oral ways.

During UT, participants want to provide information and connect with other people of their own tribe; also oral traditions lost in translation; losing identity coz of American way of living; many young people in survival mode; how do you motivate younger generation to learn languages and culture?

**eHumanity Insights**

It was surprising that there was no mention about any successful tool, technology that they would love to implement. There was a feeling of pessimism in that it was almost as if they are waiting for their culture to perish. Therefore, it is important to make youth realize the importance of their
Motivation is important. There should be different mediums of communication involved and videos are an interesting option. Story-telling is very important part of the NA way of living where wisdom is passed orally from elders to younger generation. The elder generation is struggling to figure out a way to convey information to the younger generation.

At NAU, participants thought that audio recordings are a good way to preserve their language. Technology proficiency is a big issue, which means that the current design of technologies does not meet the needs of their culture. According to them, collaboration is the only way to help them. Younger generation is not going to spend an hour in this age of distractions. The design should also be simple and focused.

Language is very important to preserve. How can you make somebody learn a language in small parts? Having no written language in many cases makes it more complicated to preserve it. At UTTC, loss of language is a major problem and denotes a significant destruction of culture. Universal aspects of culture: religion, language, lore, geography, clothing, military, ancient artifacts, interaction w/ other cultures, contemporary artifacts. There should be focus on saving languages, improving accuracy of artifacts, interaction with other cultures, and ability to add and share contemporary artifacts. Loss of NA culture is a phenomenon that should be addressed. Writing is already being phased out in many schools and kids would not be able to write in 20 years.

Since there was a sense of acknowledgement that before their language is lost so they would have to adapt and let go of protocols, I find that there is some willingness to compromise. Community has to take the initiatives. So far there been several initiatives that involve teaching languages in a traditional schooling environment. Somebody also mentioned that Rosetta Stone is doing some great work as part of their endangered language program. First Nations of Canada have been successful in language preservation; how can we learn from them? Can phones be used to re-learn a language?

**IAIA Findings**

Multimedia is an important way of communication and writing comments on a particular artifact was not that interesting. Cultural sensitivity should be respected and there should be different ways to preserving culture which is extremely important. They would like to have access to training videos about making regalia of some kind for example.

One thing that was mentioned again was the ability to access NA resources from one location or a one-stop shop for everything native and by people that are experts. There was concern about finding something information that is unreliable and ways to determine reliable and publishable content. But nothing gained more traction than the idea of language preservation itself. Some ideas that were discussed included recording audio and uploading it. Couple of students in the boat were from smaller tribes and realized that their “language is dying”. It would be nice to have something reliable and intuitive they can use. Most of the students see cultural preservation as an extension of their own identity.

A quote from a student’s blog post upon asking about the idea of marketing their own regalia items or selling them:

“In my research paper (mentioned in the above paragraph), I asked two of my elders if we, the Chippewa Cree tribe, should demand compensation if we were to actually share 2-D animated versions of our tribal stories with the world. One stated, “Absolutely not. Our language is from the Creator. He didn’t sell it to us. So we should not sell it. It was a gift to us,” and another elder commented, “I do not believe that
marketing the stories are within our beliefs. To provide the stories as a teaching tool for our people, along with their language and culture is positive. This will be good Karma.” So, I stand by what my elders have stated. I don’t believe in marketing knowledge or selling anything from this website, for it’s a learning environment.”

One student was very excited about documenting her stories, pictures, and anything related to her tribe and sharing/uploading it but also brings up the concern about accuracy and legitimacy of documents. She is willing to accept and acknowledge the consequences of such concerns but feels like sharing and uploading documents should take precedence.

**Insights from IAIA**

In general there are not many resources that allow students to share their research or facilitate documentation. They realize the importance of documenting. Moreover younger generations studying in schools and colleges are open to browsing cultural items. They are also willing to experiment with new technologies. The webinar led to the discussion of the loss of a lot of native languages and the importance of preserving language as a means for preserving their own identity.

People really want to document their experiences such as places, events, objects, or other folks or techniques like weaving or beading. Preservation is key component for sharing their own history in a sustainable way so that the documents can be accessed by the future generations for times to come.

**Demographic Findings**

Below are my analyses of the demographic forms that were filled as part of my user research at UTTC and NAU. I found that more than 75% were very interested in preserving their own cultural heritage. Also, the technological proficiency level for ages 18-35 fall between 5 and 10 on a scale of 10 with 7 as an average.
Figure 5: Age of Participants during user research

Figure 6: Interest level in learning cultural heritage
Survey Results

The results of the survey did not entirely confirm my hypothesis about varying perceptions about meaning of the term “Cultural Preservation”. My analysis reveals that the answers seemingly were more or less similar in explaining the basic meaning but it seems to be that they vary in details. According to me there was a common theme in the answers provided. I seem to believe that ‘Cultural Preservation’ entails preserving the language, traditions, unique ways of living, and values associated within a group of individuals in a social group. However, there were several interesting opinions.

According to one participant, “there is a difference between cultural preservation of a thriving cultural group and a disappearing cultural group; the first is a subconscious preservation of culture and the second is a conscious choice to preserve the believed culture of a group”.

Another interesting quote offers a rather complex argument. “It can mean taking care to keep cultural traditions alive. It can also mean defending outmoded practices that keep people trapped in unequal relationships”.

The idea of maintaining one’s cultural identity could not then be more important. Everybody seems to have similar yet unique way of thinking about cultural preservation. For the scope of this project, my main take from this survey is that since idea of cultural preservation varies individually, the technology should also address the needs of a particular social group in unique ways. The question about the definition of a cultural or a social group still remains to be answered. Is the cultural group based on speaking the same language and living together?
Brainstorming Sessions Insights

Language Learning Opportunity

When asked about how one would save a dying language, I got this response as quoted below:

“You need to instill the desire to know it and the importance of it in your children when they are born. Give them native names that are meaningful. Put them in native speaking situations with elders or other kids who use it. Make it be a bigger part of everyday life. At the end of the day though its about their choice to actively carry on the legacy.” – Quote from a student at NAU via Facebook Messaging.

Focus on the Younger Generation

A language learning solution should be built for the youth population as our main target audience. However, the languages and the cultural information that tribal elders possess also require us to think of ways that would include tribal elders. The main problem is to bridge the technological gap between the youth and the elders. It is necessary to create an environment that motivates people to learn their language with use of appropriate technology. No idea will be successful without the time and efforts of the actual users who can collaborate with technologists to develop a solution that is better suited for them.

Methodology of Cultural Transmission

During one brainstorming session, one person mentioned that the younger members of the Inuit people in the north of Canada are changing the way they create art. During the 70s and 80s artists went to the north and taught print making skills to the Inuit’s. They are finding that their children are not interested in print making but are more interested in making movies. Elders are making stories in print that now it is happening through movies. This is a break in the methodology of cultural transmission where younger people are using new media for doing similar activities.

Social Media strategy

Seeing successful use of social media has attracted imaginations of its role for other meaningful purposes including language preservation. Social media allows people to engage with each other and communicate. Can social media effectively be used to learn a dying language? Can it become part of a wider array of language learning solution? How can we leverage different social networking platforms and develop technologies in a sustainable way?

Also, most of the exemplar research I have conducted have yielded mobile and web solutions that are mainly focusing on capturing information and providing basic access. There are efforts being made to leverage social media for language learning but so far have not been very successful. Language preservation definitely can slow down the rate of cultural loss since cultural transmission usually happen using native languages.

Different Approaches

It is important to customize solutions according to the tribes. One size would not fit all. However, it is impractical to develop an entirely different solution for every tribe. Preserving culture and language is a slow change problem.
**An ecosystem of devices**

Microsoft’s gaming system, Xbox360, with its Kinect body controller is a fantastic technology that has led to many creative concepts. The next generation of Kinect is supposed to be of a much higher resolution and could possibly even detect finger movements with precision for example. Microsoft wants to build an ecosystem of devices that includes an Xbox, Windows 8 Desktop and Mobile devices. There have been efforts in capturing 3D using Kinect for Windows sensor [21].

**Language Translators**

Google Translate works on a statistical model. It processes language and compares against millions of other translated documents by several agencies such as UN, dictionaries, and humans to find the most accurate translation. Its accuracy depends upon the amount of translated documents available for a particular language. Microsoft also has a similar language translator technology [22]. Is it possible to come up with an interaction design concept that would allow Native-Americans to translate languages at their own pace and comfort?

![Bing Translator Screenshot](image)

**Overall Insights from User Research**

In my opinion, the Native-Americans are accepting the use of current technology not because of choice but it is the only way they can think about preserving aspects of their own language and culture even if it is not the best way. The technology in itself enforces a set of behavior changes that in interfere with quality of the indigenous knowledge and language that is captured. The obvious solution is to design tools that can fit within a living context. It would be less intimidating to use technology that ways. At the same time, one usually has to adapt to the changing ways of society. Technology should let them decide how much they want to be adapted to. There is always going to be acculturation. The next generation will have its own personality.

The best strategy would be to develop solutions that are more targeted towards the younger audience. There are several other approaches that can be explored. It seems to me that there is a strong interest in using technology but so far nothing has been very effective that has the power to reduce make language-learning process more efficient. Partnering with private language software companies such as Rosetta Stone might yield better results.
Literature Review

In this section, I will present the literature review about several interesting topics that are related to the topic of language revitalization.

Focus on documenting technologies

Jane Hunter et al proposed a set of software tools that allowed indigenous people to document their cultural knowledge and materials [23]. I think the approach was based on an assumption of using documenting technologies for preserving culture but I find otherwise. The authors themselves acknowledge that the software was untested within real world application and real communities. It seems to me that the human centeredness of the application design has not been much attention. As a result, HCI has been not been paid enough attention in this paper.

In my opinion, development of a technology should consider using usability evaluation, using participatory design methodologies to perhaps come with a design solution that may be innovative in even small amounts.

Revitalization of Myaamia Language

Obonyo et al acknowledge the development of technological tools that could be part of “home learning kits” that would allow tribal communities such as Miami Tribe of Oklahoma to revitalize their language [24]. After conducting usability testing on the Smart pen technology they developed, they found that ‘most participating families especially enjoyed use of smart pens and interactive booklets for language learning over the website’ [24]. They also mention the importance of cost effective and portable solutions for such programs. However, it is important to mention that the tribal language software benefitted from the linguistics research and continued support from the community in terms of salaried positions that were involved in language and linguistic materials development.

Revitalization in this case benefitted from years of linguistics research that usually requires tremendous amount of funding. The Native-American tribal languages that are most at risk do not have access to such pool of resources nor the time.

One Language Disappears Every 14 Days

National Geographic recent article on vanishing voices highlighted this dire situation about a language that dies every 14 days. But cities such as New York is one of the most linguistically diverse city in the world with more than eight hundred languages being spoken [25]. The article by Alyssa Fleck mentions that there has been a counter intuitive effort to preserve these diverse languages.

Language Dictionaries
It takes many years of efforts by linguists, researchers to create one language dictionary. Therefore, rather than relying on funding level and especially for languages that only have a few members surviving what can be done to mitigate this situation?

**Motivational Strategies**

Chuan and Dornyei discuss the importance of using motivational strategies in foreign/second language learning [26]. They are of a firm opinion that language proficiency cannot be achieved without sufficient motivation. They also acknowledge that strategies should be culturally-sensitive or even culture-dependent within a language learning context. Heath and Heath also present a three-part framework in their book “Switch” that serves as a guide in any situation that requires a change in behavior [27]:

- Direct the Rider: This basically calls for providing a description of clear path or goals that are needed to be achieved
- Motivate the Elephant: They call for engaging the emotional side of people in order to motivate them
- Shape the Path: The last point entails providing a way or a vision of accomplishing those goals. And is one of the most important.

**Case of the Hopi Language**

According to a 1998 survey, the Hopi tribe found out that only 50% of the Hopi’s between the ages of 20 and 39 speak the Hopi language fluently [28]. Hopi is a language that is spoken by the Hopi tribes in the Hopi nation that is located a few miles north of Flagstaff, AZ. In addition to a decision made by the concerned authorities to adopt a Hopi language curriculum in some school systems, coordinator Dawa Taylor acknowledge that getting the students to incorporate their local languages into their lives is a sure way to save their language [28].

“Hopi elders, who are fluent Hopi speakers, say that the language is the root of perpetuating Hopi culture (Mesa Media, 2005). Hopi fluency began to decline during the era when children were forced into local mission and Bureau of Indian Affairs (BIA) boarding schools. With language decline, Hopi people also experienced a loss of cultural identity. Many Hopi people who attended boarding schools in the 1940s-60s now find it difficult to teach their children and grandchildren to speak Hopi because they do not speak the language themselves. [29]”

**Lost Generation of Native American**

Native Americans have had to learn English through no fault of their own mainly due to the consequences of the Federal Government policies that aimed to eradicate the Native-American languages in the recent history [30]. There is a stolen generation of Native Americans that was a consequence of the federal government policies that mandated forced education of that generation to get the “indian” out of them. The Bureau of Indian Affairs (BIA) mandated younger tribal members to attend boarding schools and forced them to learn English as their primary language [31]. Furthermore, there is a quote that provides a good view of the context:
“The result was a death spiral for tribal languages, one still circling over most reservations. While many languages still have active speakers, most of the languages themselves are zombies, missing the new generation of speakers needed to keep them going.” - [31]

**Funding Problems**

There has been reduction in the amount of funding provided by the US government into various programs directed for different purposes. The funding for off-reservation schools has been in decline in the recent years due to cuts in the budget [32]. A large amount of funding is required in order to begin the process of revitalizing endangered Native-American languages [33]. Below is an illustration of the total amount of funding I compiled based on the data provided by the Administration for Native Americans (ANA) website [34]. A language preservation funding total of around $11 - $13 million was shared amongst an average of 65 different grant proposals per year in the last two years. The average dollar amount per grant during the year 2011 was $213,919.92. Most of the grant efforts seem to be duplicated by different tribes in a hope to make a difference within their own community. However, I am not that optimistic about the success rate of the grant programs. It may be a better idea to provide a higher and a significant amount of funding that can make a difference in developing a common platform that tribes can build upon.

In 2006, the United States Congress passed the “Esther Martinez Native American Languages Preservation Act of 2006” [35]. The main goal of this act was the revitalization of the Native American languages. The law allows this secretary to award a grant to an agency are an organization for ensuring survival and continuing vitality of Native-American languages. While I’m not an expert in comprehending the laws, it is hard for me to find out information about the total appropriated amount. Further search yield a bleak picture about the total funding available for Native American language preservation and maintenance programs. I was able to find only one grant program that offers an estimated total funding of $3 million that is divided into 12 awards with an average of $250,000 per budget period. The amount may seem significant but does not seem to be enough for the amount of funding needed for a language project. In my opinion, a successful language project would have to involve a significant amount of sustainable resources. Whether the funding is too low or the funding is not being spent appropriately is a question I am unable to prove empirically.
How Languages Die

Mufwene presents a discourse about how languages die and argue that a loss of language is more complex than the usually presented arguments in linguistics literature [36]. He questions whether the solutions have addressed language as a tool that will enable the speakers to adapt to the “ever-changing ecologies” rather than just preserving it.

Archives of Sleeping Languages

“Many of the American Indian languages represented in the archives at Berkeley no longer have any living speakers. It is the communities whose languages no longer have speakers that the Breath of Life Workshop is designed to serve. Many of the descendents of the speakers of these sleeping languages yearn deeply for them, and the documents and recordings held at Berkeley and elsewhere are now their only resources for regaining knowledge of their languages. [33]”

Language & Culture

Here is a quote from one of the elder’s as part of a survey conducted by Wesley et. al:

“Our language embodies a value system about how we live and relate to each other. It gives a name to relationships among kin, to roles and responsibilities among family members, to ties with broader groups. There are no English words for these relationships because, in general, social and family lives are
different from ours. If our language is destroyed, these relationships break down and will inevitably destroy other aspects of our way of life and culture, especially those that describe man’s connection with nature, the Great Spirit, and the order of things. Without our language, we will cease to exist as a unique people (Leon 1988:7-8). [33]"

This is a powerful quote that implies the significance of revitalizing languages as one of the most important steps that Native Americans want in order to preserve their culture.

**Revitalizing Indigenous Languages in the 21st Century**

Jon Reyner talks about the importance of revitalizing languages for the indigenous people [37]. He believes that there has been a continuous degradation of the cultural roots due to the pressures of the modern society, its materialistic culture, and its “hedonistic technological culture”. He more importantly mentions “Fishman’s Eight Stages of Language Loss” in this article. Fishman summarized eight stages of language loss in his book ‘Can threatened languages be saved?: Reversing Language Shift’ that also mentions suggested intervention with stage eight being the most endangered and closest to extinction while stage one languages belonging to thriving sub-cultures that are closest to survival. These suggestions involve promoting school literacy programs to implementing a “Language Apprentice” model to establishing other literacy programs within the school and communal environment.

Candace Galla indicates that there is a lack of self-assessment in learning environments for students that would allow them to track their own progress and become responsible for their own learning [38]. She advocates for game-based learning approaches to engage youth in learning their indigenous language. She sounds extremely optimistic about using the technology in an immersive way within the educational environment that would allow the students to be multi-lingual in their Native languages and English having had the privilege of being born in the 21st century or the age of technology [39].

Patrick Eisenlohr treats new technologies as “enabling practices of electronic mediation” [40]. According to him, such mediation that results in creation of new artifacts becomes valuable as well. Language Revitalization depends on both discourse mediation and the new technological culture. In other words, language preservation using new technology from a linguistic approach should be carefully considered.

Implementing such suggestions would require a significant amount of funding.

**Rethinking Role of Technology**

Mark Warschauer examines the role of technology in culture and analyzes characteristics of design and use of online technologies [41]. He agrees with Feenberg’s critical theory of technology.

“Feenberg sees technology as neither completely deterministic nor completely neutral, but rather ‘ambivalent’ (p. 14). The ambivalence of technology is distinguished from neutrality ‘by the role it attributes to value in the design, not merely the use, of technical systems’ (p. 14; italics added). Yet the values inherent in particular technologies do not mean that their impact is pre-determined; technology is ‘not a destiny but a scene of struggle’ (p. 14).” [41].
He also presents the results of his two year ethnographic research on the use of Internet for Hawaiian revitalization. Hawaiian community initially faced a lot of problems when developing software solutions but managed to design and implement solutions that were built on the “social and cultural strengths of the Hawaiian community, emphasizing Hawaiian cultural traditions such as ‘talking story’ and encouraging students to develop multimedia on-line content which critically interpreted the Hawaiian experience.” Mark sees it as a success story of how Hawaiian community was able to make the best use of the Internet and take important steps towards creating a Hawaiian experience on the internet for their community. There are many lessons to be learned that could be beneficial for other language revitalization efforts. The Hawaiian approach was trying to find and implement a multitude of solutions for a common goal of achieving full operation in Hawaiian.

Warner et. al emphasizes the importance of evaluating the return a language community receives for investing their time, money, and effort into revitalization efforts [42]. They developed some technologies for revitalizing dormant languages. They also acknowledge the importance of immersion language programs both in school and outside the classroom environment, and that the long-term goal of self-sustaining communities that are bi-lingual may or may not be achieved.

Computers in general have made our lives more efficient and at an extent more productive. People are living in an information age where they are empowered to communicate with each other using different modes of communication. But the interaction between anybody and a computer regardless of the type of device is done using natural languages that are the most popular. Pretorius and Bosch mention that due to this reason the local languages risk being marginalized [43]. According to them,

“Therefore, languages for which no adequate computer processing is being developed run the risk of being marginalized in the global information society, “or even disappearing, together with the cultures they embody, to the detriment of one of humanity’s great assets: its cultural diversity."[10]"

Language Learning Platform

Byki is a language learning platform that allows teaching declarative phrases in any language [44]. College of Menominee Nation is considering using this platform to extend their efforts in developing Menominee language learning lessons [45]. Their language program is also receiving funding as part of the Administration for Native Americans (ANA) grant. New methods are being developed that includes language material being upgraded to iPod touch and the college is making several efforts in increasing the language fluency in this community of 8700 members [46] and have been achieved some limited success.

Influence of Culture on Technological Innovation

Technological innovation in the current day and age has largely come from the United States, Japan, and other westernized countries. It would be safe to assume that the latest technology we use currently has largely been influenced by the American and other westernized cultures. According to Don Hammer,

“culture is able to guide the technological innovations that are borne from it”. [47]
It comes as no surprise that U.S. is home to the three-fourths of the largest technology companies in the world [48]. Microsoft and Apple are the key operating system distributors around the world. In other words, we are using a useful technology designed mainly by people working in American firms who are part of the mainstream westernized society. Therefore, it is safe to assume that there is a heavy influence of American culture in the present technology.

**Innovating News in Native Communities**

Native Americans have jumped on the mobile and smartphone bandwagon since most of them live in areas that have very limited broadband connectivity [49]. Furthermore, Native-Americans population reached 5.2 million in 2010 [49]. There is a tendency for a lot of young Natives to buy smartphones available in the market and get immediate information access. This can be confirmed with the user research that I had conducted on site at UTTC when I asked about the penetration rate of such devices. “More than 50%” is the usual reply I got.

In addition the average age of Native American population 29 [49]. The penetration rate of broadband to the tribal population is less than 43% and on tribal lands and reservations is less than 10% according to the federal trade commission.

“One effect of lower broadband usage rates is greater use of mobile devices to access online content. “Especially [for] young people,” Jeff Harjo, the executive director of the Native American Journalists Association, said, “they’re on the internet. They’re on their cellphones. And this is the best way to reach them.” Research from Native Public Media conducted in 2009 confirmed the reliance on wireless access. “We found that many young Native Americans gravitate toward mobile handhelds,” said Taylor, “They use their handhelds to get information about the world…. The handheld is really the future.” Even so, mobile coverage can be poor on tribal lands as well. [49]”

The article also talks about increasing use of social media amongst the tribal younger population using handheld devices.

**Assessing E-Readiness in a Native American Nation**

Ramnarine et. al collaborated with Native Americans and conducted several focus group sessions in a hope to assess the technological readiness of such tribes for preserving Indigenous Knowledge (IK) [50]. They also report on the urgency of cultural preservation that can be facilitated by information and communications technology [ICT]. Their main motivation was get a good understanding of the opportunities and challenges that would come with preserving cultural knowledge using wireless grids technologies such as WiGiT [51].

They also describe the benefits of their study as follows:

“The benefits of this study are numerous. For centuries, IK has been marginalized in the process of development planning and modernization and now much of it is under threat of being lost forever. Much of the knowledge of many indigenous communities is now held only by older people, who are concerned that the culture is not being passed on to younger generations. This problem is compounded since many indigenous communities no longer live on their traditional lands. A large percentage of indigenous languages throughout the world is threatened; with death of an estimated half of the 6000-7000 currently used languages [22]. By providing access to technologies to facilitate preserving and revitalizing IK it can ultimately offer the opportunity of not just to the indigenous people but it can help in unveiling
opportunities to better integrate conventional knowledge such as education, health sciences, arts and further a living link between institutions such as museums and indigenous people which can ultimately have benefits for all.” - [50].

Ramnarine et. al found that the people of the Seneca Nation of tribes were very concerned about losing their own identity and transmitting their culture to the next generation. There is a mention of using wireless grids technologies in creation of Seneca Language Program [50].

In addition one tribal participant remarks as follows:

“One participant remarked ‘wireless technologies would be great for teaching the Seneca language to the next generations because the elders, who are the ones who carry that knowledge, did not want the language to be opened to outsiders.”

Some other ideas included a creation of a storyteller site that can become the voice of a new generation of story tellers, live streaming of traditional dance or drumming performance that could be developed as a learning technology. The youth also expressed their frustrations over the “present state of wireless technologies”. There was also some talk about collaborative learning through wireless technologies. The authors conclude with advocating for use of wireless technologies for cultural preservation while having the ability for enhancing privacy.

The research done by Ramnarine et.al is very interesting. It supports my basic claim about the loss of culture that at a rapid rate especially amongst the Native-American populace. It is also seemed to me that the authors acknowledge a need to develop strategies that would enable them implement such technological solution.

According to Arobba et. al:

“The Lakota, like most Native Americans and aboriginal peoples, have a long history of cultural conflict and appropriation. There is a lack of knowledge about copyright and patent law in communities, and there has also been a disregard by some researchers for observing the intellectual rights of community members. Given this history, many Lakota speakers are sensitive to maintaining control over their own resources, including data. In the case of multimedia collections, it is critical that the materials remain in the control of the creators, individually and in local community organizations.” - [52]

The Lakota reservation land consists of colleges, schools, clinics, and other infrastructure that is a common occurrence in an average westernized community these days. However, the community still lacks internet access but the use of cell phones is much more prevalent. The US Department of Human and Health services say that only 175 out of 300 Native-American languages remain and only 20 are taught to the children. The paper also attributes the world wide decline in languages as being accelerated by ‘ubiquitous communication and entertainment media that are dominated by a few languages’. Moreover, the smaller reservations and cultural communities are seemingly struggling more to preserve their cultural heritage and languages. The paper also advocated the use of immersive-learning platform that can be used by younger children to learn their dying language.

However, there is a problem when scholars use labor intensive means to develop a catalog of speech samples that are high quality but requires human resources for inserting metadata that can be useful. I think that this approach of cataloging or digitizing language, cultural objects etc. done by hiring people is not sustainable as it requires a huge amount of human capital and resource. Also, the authors mention that the goal of collecting samples for immediate distribution is very important for cultural communities that are smaller in size. The authors released a website called live and tell.com that allows individuals to create collections of their own. Such content is owned by these individuals
and can vary its level of access so all items would not be public. However, it is unfortunate to discover that the website only contains a limited number of cultural items.

Amanda Stevens examines three knowledge management projects in Australia, Canada, and United States in order to make an argument about the need for developing unique solutions that meet local needs [4]. Since a lot of traditional knowledge is passed down orally through storytelling and experience, she advocates for a need to manage this information differently since every tribal needs vary [4]. Furthermore she believes that:

“This demonstrates that the preservation of indigenous knowledge should not be seen as a means of replacing traditional forms of education in indigenous communities, but rather as something that will enhance or be used as an additional tool in this process.” - [4]

Amanda mentions that some indigenous communities have used GIS to map their traditional land use.

“Languages flourish where ecologies flourish” - [53]

This was a quote from David Nathan who is the director of the Endangered Languages Archives, London, England. Endangered Language Alliance works with volunteers to capture the nuances of the language “one word at a time” but the work is tedious [54].

### Affluence of Tribes

Out of all the tribes reported, the ones that are the most susceptible are also the ones with the least number of resources. Most of the technology exemplars that I will mention later are either done by academia for a mass audience or for pilot/research purposes or by tribes itself that have the resources. The funding issue definitely has to be prioritized.

### Innovation is Important

According to John Edson, Steve Jobs talking about his approach for infusing design into a product. He distrusted focus groups and relied on his own internal team at Apple to market their own philosophy of design [55]. Apple followed the “big four” ideology of design thinking that was more liberal in its approach and wanted consumers to make decisions about purchasing a products based on aesthetics [9]. Steve Jobs in his 1998 interview to Business Week said “A lot of times, people don't know what they want until you show it to them.” - [56]

Making an incremental impact or change along the desire to achieve the ideal and using a process called “backcasting model” [57].

### Designing within Context

Geneive Bell et. al talk about designing technology for home using a technique called defamiliarization [58]. She presents an epistemological argument about HCl. Empirical research is usually yields some implications for design for a product that is designed in a particular domain. Such implications are leveraged in the new design that is subsequently evaluated. This process is repeated several times and commonly referred to as a User Centered Design process. As a result, we study the user needs and requirement and translate these requirements into design insights.
The problem is that the knowledge being generated is limited to be derived from a particular standpoint. Geneive Bell et al argue that design insights are possible from deriving new knowledge via a different perspective, which is why she advocates the use of a technique called defamiliarization. The technique will not lead to new facts but instead gives a new perspective on the same facts but there is an epistemological limitation in that when we get new facts we tend to convert into statements and if we are not reflective about our existing understandings we are going to get ourselves culturally, geographically, and historically contingent.

Geneive et al takes the example of when American designers design kitchen appliances for kitchens in India or China. It was found that the idea behind an American kitchen is not going to work in India or China because they have different needs and expectations that are defined by the activities in their own culture. So, an American kitchen is a cultural construct within its own geography. These normative notions are a problem and conservative at the same time and when we do not question our own basic assumption then it makes us design in the past rather than designing for the better future. Therefore, defamiliarization seeks to understand actual users using alternative viewpoints.

Furthermore, designing for home is both a social and a political act [58]. The main argument is about studying how people in different societies use technology in different ways and how can we as designers do justice by questioning our own basic assumptions. Language solutions have not been done from an activity of design perspective. Language as a medium of the culture is important but a tablet technology for example is used as a tool to give a false perception of things that could be accomplished using it and it may not be the right approach.

While web and mobile devices these days have standardized the use of technology, they do eliminate the influence of culture [12]. Norman goes on to questions if the product design should be informed by the culture and the activities people do as part of it. Would product design for the home be helpful when it comes to the preserving cultural knowledge? Embedding technology so that it can be introduced within mass-produced products such as smartphone may not be the smartest thing to do after all.

**Cultural Context Matters**

Huang and Deng in their study on social interaction design concluded that the ‘cultural characteristics of a society should be a key issue in developing interaction designs’ [59]. They also offer several design implications for software design within a culture and hope that their research and observations encourages consideration of cultural parameters in technology development.

**Key Trends in K-12 Learning**

The New Media Consortium (NMC) in its 2012 Horizon K-12 edition report highlighted the growing trend in the educational system to adopt different ways of learning [60]. The report mentions the following trends:

- Game-based learning has been gaining traction in recent years
- Change in educational paradigms to include online learning, hybrid learning, and collaborative models
- Many learning activities take place outside the classroom environment, and
People want access to education whenever and wherever they want to. Informal learning implications are profound and have been found to maximize learning impact.

3D Role Playing for Language Learning

Rankin et al. propose a methodology that evaluates MMORPGs as having a potential ins become a pedagogical approach in itself for language learning in a 3D environment [61]. According to their research, second language students are more likely to interact in a virtual environment that creates “non-threatening learning environments”. They also bring up a very interesting point about social interaction. People are more motivated to learning in a social environment as opposed to learning in a structured way in a class for example. After testing their MMORPG game called Ever Quest 2 as part of a pilot study, they postulate that intermediate level students in an English as a Second Language (ESL) program might benefit in having their proficiency skills improved.

Technologies to watch

NMC also mentioned six technologies or approaches that highlight emerging technologies in the domain of K-12 learning. They are:

- Mobile devices and apps
- Tablet computing
- Game-Based Learning
- Personalized Learning Environments
- Augmented Reality
- Natural User Interfaces

Overall Insights from Literature Review

I would like to advocate that in order to develop technologies for Native-American, there should be an emphasis on user experience design. Strategies for cultural preservation can both be economical and well worth the good intention it deserves. In case of Native-American languages, developing a similar solution would require creating native dictionaries in several languages. This requirement would consume a huge amount of resources and therefore, may not be the most pragmatic solution for at-risk languages. It may, however, be used for the languages that have a widely developed vocabularies.

There are many technologies that hold promise including 3D, augmented reality in developing better language learning platforms. A different pedagogical approach is important as well. It seems to me that there is a lack of appropriate funding at the federal level. The funding grants should be re-written with a common holistic goal for preserving culture and revitalizing languages. Obtaining hard funding will definitely yield a better impact.

I think that there needs to be a better understanding of how languages die and what motivational strategies can be employed. Using Heath and Heath’s three-part framework may be a great idea. Also, the cultural context should be given significance while designing a solution. Languages that are at the most risk of getting extinct should be prioritized first. It may be a good idea to start small. Whether or not social media can be effectively used in language-learning solutions is
something that can be evaluated. Language learning platform may be the best strategy going forward. There are too many languages to be saved and funding duplicate efforts may not be the best approach. A holistic model that focuses on developing a common platform upon which different tribes can build their tools upon may be an interesting idea to explore.
Exemplar Research

I have conducted a survey of a variety of exemplars in order to get inspiration about concepts that can help me devise a strategy and are vital for the language revitalization and cultural preservation programs. There is a lot of information online about how different tribal communities are using technology to revitalize their languages that I will mention. I have come across blogs, articles, comments, and opinions of a rich diverse group of internet users about the importance of preserving cultural knowledge and language. In this section I have tried to specify exemplars that are associated with the idea of preserving a language, art, dance, or other things that culture encompasses.

Ecosystem Approach

There has been an increase in design of products or services that are designed to provide ‘continuous multiscreen experience’ according to an article titled “Designing for Context on Multiple Devices” in the UX magazine [62]. The author calls for evaluation of experiences across an ecosystem of devices and optimizing cross-platform experiences in order to design for better flow of information across and within the ecosystem. The figure below gives us a good understanding of this user flow [62].

Figure 10: Example of Designing for Context for a continuous multiscreen experiences
Social Networking Language Learning

There have been many websites that have sprung up in leveraging social networking for language learning purposes but unsurprisingly all of them are focused on learning of the most popular languages for which vast dictionaries, recordings, resources are widely available. Native-American languages do not afford such luxuries. Out of all I found verbling to be a very powerful learning solution in that it allows one to connect to a native language Spanish speaker real-time and vice versa through a website and interact with them. The motivation essentially comes from the excitement of meeting a different person [63]. The image borrowed from their website gives an overview of how learning works.

Figure 11: How Verbling Works
It was an exciting experience at first but the problem comes with finding the right partner who is willing to work with you. It requires times, effort, and commitment to be able to learn a language that should be present across an ecosystem of devices. Why cannot I access a similar interface using Kinect? Extending the concept to different platform such as Smart TV, Tablets, and Smart Phones would allow me to have a convenient access to the tool whenever I want to utilize it. Other websites include Palabea (http://www.palabea.com/), which is another website startup, busuu.com (http://www.busuu.com/), and livemocha.com (http://livemocha.com/). Live Mocha does allow you receive text and audio SMS lessons in English to your phone and offer more contextual language learning option such as English for dating, transportation, health, college life etc.

**Social Language Learning Platform**

Osten Interactive is developing a social learning platform to revitalize Native-American languages that will be customized to individual tribes and conform to their specific needs [64]. Chris Alenxander, who is the CEO of Osten Interactive, talks about making the language fun and interactive in order to make it much more interesting for the youth to learn. Figure below shows a snapshot of the language platform in development [64].
Community Efforts

Potawotami Language Learning

Hannahville Indian Community imparts Potawotami language learning classes to its community that are run at elementary, middle and high school levels [65]. They are using the following tools that are available both in schools and in the community:

- Website that is meant to be used by people of all ages
- Digital Language Lab
- Pilot Online Language Course
- Video iPod Lessons on the go

One of the most relevant program is their summer language immersion programs that is run as part of the three-year language revitalization project as part of the grant where a language instructor is provided and where participants have agreed to ‘learn, speak, and teach the Potawatomi language for future generations’ [65].
Squamish Language Revitalization

According to an article by Christa Couture, only 4 fluent speakers are left within the Squamish Language indigenous community in British Columbia [66]. Dustin Rivers who is a self-proclaimed “language revitalization activist” for his own community uses Joshua Fishman’s eight-stage strategy for saving an endangered language. He has incorporated Where Are Your Keys (WAYK) as a language learning method for Squamish language. WAYK is a leaning technique developed by Evan Gardner used for reaching proficiency in a target skill but mostly has been used for acquiring languages [67].

Figure 14: Screenshot of Squamish Language Website (http://squamishlanguage.com/learn/)
The community language learning techniques differ from tribe to tribe. It is not yet known how much effective these programs are. There is obviously some benefit to teaching languages in a classroom environment especially at elementary level. The language learning techniques that Squamish language employs appear to be creative but it does require significant effort by the community itself. Also, there is a mixture of PDF and HTML documents that makes it confusing to utilize all the resources. The interaction design of the website is a big concern for me.

**Browser Tools**

**Google Chrome Language Immersion Plugin**

All Five, Inc. released a browser plugin for Google Chrome that is called ‘Language Immersion for Chrome’. It allows a user to select an immersion level that he/she wishes to apply to the browsing page. Based on the immersion level you chose, the text in the page is highlighted in the script of that language that in turn is supposed to make it easier for a user to pick up on a language.

I think that this is a very interesting idea but it will not probably work for the Native-American languages since many languages do not have grammar dictionaries that have been translated. Figure below shows the screenshot of using this plugin for Hindi language learning. Another problem is that it is based on an assumption that I can read and write the Hindi alphabets.

![Language Immersion for Google Chrome Example of using Hindi](image-url)
Mobile Language Learning

Microlearning

Edge et al. hypothesize that language learning should be contextual and introduced a mobile microlearning app for Mandarin Chinese by using a location-based service called “Foursquare” [68]. They evaluated this contextually aware application against a system that was based on word frequency and found that the contextual approach of language learning is effective and can help complement existing language learning tools. The application helps provide contextually relevant material for learning. See figure below.

Figure 16: Microlearning App for learning Mandarin Chinese
Maori – An Indigenous Language of New Zealand

Hika Group recently released an app that works on Apple and Google mobile platforms that allows users to learn common phrases in Maori language in a fun and an engaging way [69]. To me it seems very engaging and fun to use especially after watching a demo video on Hika Group’s website [70]. However, I would argue that this app fails to serve its true intended purpose of revitalization. How does it enable the Maori community to engage with each other? It is a very well-intended effort and from the user reviews is well liked by people as a beginner’s level application. I am doubtful of its impact to a far reaching audience that would see it as a useful resource for daily use.

Figure 17: Screenshot of Hika Lite App for learning Maori Language
Figure 18: Screenshot of Hika Lite App for learning Maori Language
Cherokee for iPad

‘Writing Cherokee for iPad’ is an iPad app that teaches you how to write Cherokee syllables in a fun and easy way using touch-based interaction based on audio and visual cues [71]. See figure below.

“Watch an individual character being drawn on the screen. Hear it being spoken by a fluent speaker. Then test yourself by writing the character yourself on the iPad. It’s a simple way to familiarize yourself with Sequoyah’s 85 character syllabary. App includes all 85 characters with audio, separated into 13 rows. Also included, a copy of the complete syllabary on one page and the surprising story behind Sequoyah’s great gift to the Cherokee people.” [71]

Figure 19: Writing Cherokee for iPad app
iCherokee

iCherokee is another language learning app developed for an iPhone device that allows a user to learn the syllables and words from different categories by using audio and visual cues [72]. However, this app does not allow you to draw the syllables like the app above and learn writing.

Figure 20: Screenshot of iCherokee
**Lakota Toddlers**

Lakota Toddlers HD is another iPad app that “is designed for children ages 2 to 9 to learn to speak the Lakota language through the use of interactive visual flashcards, audio, and gameplay lessons”[73]. It is supposed to be enjoyed by the children while they learn about the Lakota vocabulary via an audio and a visual game through a progressive gameplay.

![Figure 21: Lakota Toddlers iPad App](image)
**Other Examples**

Some of the exemplars I found involve learning about stories about the Native-American myths and legends. Cherokee Lore is an iPhone and iPad interactive atlas that features a collection of traditional stories from Cherokee myths [74]. Figure shows the screen shot of Cherokee Lore app.

![Cherokee Lore](image)

**Figure 22: Screenshots of Cherokee Lore Apple App**
Community-Private Partnership: Mohawk Language Software

In April of 2006, Rosetta Stone, as part of its Endangered Language Program, released a level 1 language learning software for Mohawk that is an indigenous language spoken in the Mohawk community near Montreal, Quebec[75]. The software was developed in partnership with Kahnawake community language teams and sponsored by the recognized Mohawk language and cultural center of Kahnawake. It is important to note that this project was community-based and motivated that allows them to partner with Rosetta Stone. The company provided varying degree of expertise ranging from its successful and innovative methodology used in its immersion-based language learning software to audio engineers, project managers, developers and translators. Marion mentions that the company’s pedagogical approach is both “versatile” and “adaptable”. A very important quote from the article talks about the need to focus on keeping languages alive than documenting it:

“While documenting languages is valuable,” says Ilse Ackerman, manager of the Endangered Language Program at Rosetta Stone, “more effort is desperately needed to preserve languages alive rather than on paper or electronic media. We believe the best way to preserve a language is through teaching and learning, keeping it a living language in the hands of the people to whom it belongs.[75]“.
**Game-based Learning**

Based on an empirical analysis, Sorensen and Meyer advocate for consideration of a game-based learning educational design out the school context [76]. They find such a contextualized model to be interesting as compared to a traditional drill-based educational approach as it motivates real language interaction, fruitful thinking, and engagement amongst students. They advocate for developing conceptual frameworks that “both ‘contain’ knowledge and invite learners to participate in creating knowledge and performing expertise in protected linguistic environments”. Figure below is a screen shot of the Mingoville website that allow kids to learn English.

![Mingoville - An English Language Learning Platform](image)

*Figure 24: Mingoville - An English Language Learning Platform*
Endangered Languages Program

Google in collaboration with its other partners under the umbrella of the ‘Endangered Languages Project’ recently launched a website that has a long-term goal of language revitalization and preservation [77]. It allows users to browse through partner provided content or upload their own language content in form of texts, video, and audio. I really like the technology but I am disappointed in the approach that has been undertaken. Technology can help you capture all language information there is, it still does not provide a way for a user to make a new language a part of their social life that is essential for revitalization and preservation. The website’s main focus is on capturing the information while providing very traditional videos based and a non-interactive way of learning.

According to their website:

“Humanity today is facing a massive extinction: languages are disappearing at an unprecedented pace. And when that happens, a unique vision of the world is lost. With every language that dies we lose an enormous cultural heritage; the understanding of how humans relate to the world around us; scientific, medical and botanical knowledge; and most importantly, we lose the expression of communities’ humor, love and life. In short, we lose the testimony of centuries of life.”

Another company, Rosetta Stone, is working on endangered language projects that involve preservation and revitalization of languages that are at-risk [78].
Visual Learning Example

One of the students that did the blog assignments at IAIA prepared a data visualization of things she searched for (See Below). This data visualization can also be viewed as a knowledge map of how a student from an arts school visualizes data.

Figure 26: Data Visualization Assignment
**Simple yet significant**

Liveandtell.com is an excellent example of using different ways of teaching a language vocabulary [79]. The website itself does not seem to have a lot of content. However, the pedagogy of learning is simple and unique. Most of the examples are related to the Lakota language. A user typically submits a language item in form of an audio file or an image that can then be annotated using the native language. It is extremely interactive way of learning a language vocabulary. Figure below shows an example of how it works.

![Figure 27: liveandtell.com Screenshot](image-url)
Capturing Knowledge using Tablets

Kasper Rodil from University of Denmark in collaboration with Polytechnic of Namibia is working on developing a 3D visualization model of a village [80]. The goal is to accumulate the knowledge that the younger generation miss out on when they go for working in big cities for a few years before returning back as which as a result creates a knowledge gap. The 3D environment is being created for an Android-based tablet that shows avatars of villagers being engaged in various tasks and videos of such tasks in 2D that pop up. The villagers found the natural user intentions of swiping using finger tips to be useful in playing with the device. However, the effectiveness of such a methodology has yet to be determined and evaluated in the coming years.

Figure 28: Log in to the virtual village (Image: Kasper Rodil/Polytechnic of Namibia/Aalborg University)

[80]
3-D Technology

Qualcomm is working on a 3-D tablet technology that allows you to capture and view 3D videos without using glasses [81]. 3DSA portal allows a user to view a 3D capture of museum objects that are annotated from the comfort of your home [82].

![Figure 29: Qualcomm's 3-D Tablet Prototype](image)

Language Recordings

Technology is a great way to capture languages since younger generation is adapted to its use [83]. Online courses allow people to learn a language from home. “Technology does have its restrictions” [84]. If you put up information that is inaccurate, it is a problem.
Augmented Reality

Google’s Project Glass aims to introduce augmented reality to mass audiences through use of a wearable technology that looks like a pair of smart glasses [85]. Can this technology one day be used in revitalizing a Native-American language?

The Nokia “PhotoTranslator” app allows you to take pictures of a text and have it translated into a language of your choice. Perhaps in the future you may be able to add an audio recording to it. I think that for such technologies to be successful, within the NA context, it is necessary to create rich vocabularies and document language using a linguistic approach provided enough funding is available. Tribes that have the resources to develop it might consider such a solution.
FIGURE 31: THE NOKIA PHOTOTRANSlator APP [86]
World of Kinect Possibilities

The Microsoft Kinect body controller has been used in very creative ways since the Kinect for Windows sensor and its SDK was opened up to the public for use. The uses range from capturing 3-D video [21] to Gesture-based learning environments [87] to English-language learning tool in South Africa [88]. The technology in itself is continually challenging learning methodologies and leading to a continual paradigm shift in the 21st century [87] where the technology may be well placed for a mass adoption in the schooling system. Would it then be possible to use Kinect for developing language learning solutions within a living environment, in communal settings, or other contexts that would transform the way people really learn a language? How can Kinect be used for language and cultural preservation? What aspects of the culture can be preserved? What interactions can we imagine using Kinect? How can Kinect change the way people interact in learning a language?

Kinect for language-learning has been gaining momentum. ‘Words with Bears’ is a language learning game for Kinect that seems to provide an engaging experience [89]. However, I seem to think that the concept needs more refinement.

![Figure 32: Words with Bears Demo Example](image)
Overall Insights from Exemplars

Native Storytelling approach can be extremely powerful when combined with a learning technology that can harness it in such a way that it is enjoyable to learn a language. Kinect as a technology is pushing the limits of the current paradigms. Are there other ways of exploit new technologies for future learning paradigms while at the same time designing for the context at hand? Also, almost all tablet and mobile applications were developed by tribes that are thriving financially. I did not find any new media technology within mobile/tablet domains that was designed for smaller tribes.

After analyzing the exemplars, I find some that are very interesting but many fail to meet the basic standards for cultural preservation. Future computing paradigms should be explored. I have not been able to find any extremely successful exemplars that might be suitable for Native-American language revitalization programs. Community efforts that involve immersive language learning may be helpful in combination with providing access to technologies that people can use outside the classroom context. 3D combined with augmented reality might be the right technology that should be researched upon.
Design Guidelines

Introduction
I have compiled a list of guidelines that may be considered for a project involving language revitalization for the Native-American languages. These guidelines are based on the insights I have generated after an extensive analyses of user research, exemplars, and literature reviews. A project team should carefully consider such guidelines during exploratory phase of the project.

Funding
Funding is a major problem with several language revitalization and preservation projects. It is of utmost importance to acquire funding at a holistic level by taking a step back from individually funded projects. Getting a sustainable amount from public and private sources that would support long-term projects instead of different short-term projects is essential. Funding grants at federal level with inter-tribal collaboration can be written accordingly for a bigger amount for at least a few years. However, obtaining hard funding is going to have a better impact on the success of any similar project.

Engaging Target Audiences
Engagement at local tribal level within the Native-American context is very important for success of any project. A human-centered approach can be used. It may involve understanding the local context and lifestyle of local target audiences. At the least, it should include doing extensive user research, understanding of how a particular tribe transmits and stores knowledge, perhaps using techniques in Activity Theory. It is important to be mindful of concerns at local level and address local tribal needs and requirements. Focusing on developing technology solutions for the children would yield greater return on language revitalization. Local commitment is extremely important for any project to succeed. It may be a great idea to use the three-part framework provided by Heath and Heath.

Collaboration
Collaboration between public and private is probably a good idea. A partnership with language software companies such as Rosetta Stone is a good approach since it provides an opportunity to leverage the experience in developing such tools and understand what does or doesn't work effectively within a language learning domain. Also, collaborating with gaming studios for developing game-based language learning solutions that can be targeted for a younger audience or children is a good approach that can be considered.

Design Empowerment
Thing about making an incremental impact or change that goes along with the desire to achieve the ideal solution. Using the ‘backcasting model’ as a reference may be a good approach to consider [90]. It helps to develop a vision of the future and supports strategic design projects. This is also an opportune time for developing solutions that can empower the Native-Americans and let
them decide on how they want their language and culture to be preserved. Tribal engagement can only be achieved by handling trust issues that are extremely important to be addressed.

**Third Party Technologies and Scalability**

Think about leveraging third party technologies or solutions and customizing the language solution by building on top of it. It will reduce duplicity efforts that in turn will conserve precious time and resources. It is necessary to evaluate any third-party technology from a sustainable and a scalable point of view. There are open source platforms available for development in HTML5 and other web technologies that seem sustainable over a longer period of time. Cloud computing resources should be considered in a solution that involves ubiquitous access to data and storage.

**Training**

Training would be a necessary part of any language learning solution so that people of all age groups are successfully able to cross the learning barrier. A gradual dynamic learning curve can be introduced during training.

**New Educational Pedagogy**

Traditional language learning methods in a school environment work well enough for popular languages. This approach has limited success rates especially within the Native-American language learning context in my opinion. Any language can only be learned when spoken frequently within a social environment. However, the luxury of providing a social environment may not be available everywhere. Therefore, it is important to research various languages learning pedagogy that can be combined with a virtual learning technology.

**Language Learning Platform**

Several efforts as outlined previously involve funding individual language learning and maintenance projects. Instead of developing solutions that are developed independently, it might make more sense to develop a platform upon which different tribes can build upon and offer solutions to their own communities that are tailored to their own needs. It may also be a viable strategy to develop a language learning platform that can be scalable to a variety of devices. This platform could in fact support tribe specific solutions based on their needs. Technology solutions have to be flexible. It is a good approach to consider learning from implementation of successful language revitalization projects. Designing for an ecosystem of devices that is already available might be worth a one-time consideration. It may be necessary to challenge our most basic assumptions.

**Human Resources**

It is extremely important to recruit the right people that are highly motivated to achieve a common goal. In my opinion, a perfect team would include inter-disciplinary staff with experts from design agencies, linguistics, and technology, leadership from tribal colleges, museums, and public sector. Empathy and compassion are some of the personality traits to look for during the recruiting phase.

**Prioritization of Languages**

It may be important to consider prioritizing projects for languages that are in the last stages of endangerment. Prioritize projects based on the risk level by evaluating the languages and classifying
them according to the eight stages of language endangerment proposed by Fishman. There are several languages where only the tribal elders speak the languages. It is important to ask certain questions about the practicality of such solutions. What solutions can immediately address such a problem? How can technology help save such languages?

General Tips and Thoughts

Consider designing technology for developing language revitalization solutions that encourage daily use. Contextual design is extremely important. Think about a design solution that can offer a change in paradigm outside the web and mobile environments and offer different modes of communication. Do diligent research about other upcoming technologies that are still in research and development labs before moving forward to deciding the technology to use. Gain inspiration from tools such as Bing Translator and Google Translate. These tools are extremely technical in nature but can offer useful insights.

Language revitalization effort offers a vast opportunity for doing a significant amount of interaction design or user experience design for different concepts. It is important not to jump to a solution quickly without evaluating the research data and other technologies out there that might be more effective with the goals that are required to be met.

Smaller steps or a radical change is a designer’s dilemma that needs to be considered appropriately. Introducing a concept that is iteratively better may not be a very efficient strategy considering that many languages are in an immediate need of some kind of help apart from using traditional methods. Iterative approach may be useful for already successful solutions but an entirely new solution can be developed for tribes that are at the most risk of losing languages. Develop technologies that can be used within their living environment. Many technologies have been developed that are innovative but not that easy or convenient to use. Think about creating a design for the next generation.

Limiting scope of your target audience to younger generation just might lead to good ideas and generate better concepts since the current and next generations are going to be the actual consumers.

There is already a lot of cultural data out there online that has some value to many people. A good strategy would enable such data to be accessible in the future in a cohesive way. Outsourcing part of technology development can be a good strategy for saving costs.
Overall Insights & Reflections

I started this project with a hope to find a potential solution for facilitating cultural preservation or perhaps a design concept but after analyzing all the research work, I came to a conclusion about the problem is much wider in scale. I found that language is much more important for a culture to survive and this view was corroborated by many tribal members.

I am coming to believe that capturing data revitalization and preservation purposes is not going to ideally help the situation but would be useful for accessing this data by some people to an extent. The main challenge is about revitalizing languages. There have been some efforts that are being made but fail to meet the needs and expectations. Tribes that are actually closest to losing their language hardly have any resources and so far nobody has been able to figure out how to capture their language without following a traditional approach.

It is a problem when you try to translate some parts of the language into English and record some syllables but it fails to capture the nuances of the language itself. Unless the language is used on a daily basis it does not stand much of a chance to survive. Youngsters hardly have any time to interact with their elders and they learn English as their first language so they can become part of the mainstream American society.

American culture also has had a tremendous influence on design. I feel that technology should in fact empower tribes to learn their languages in a different way. Federal funding usually is secured to digitize artifacts that are nice to access but it is just like similar to visiting a museum where you find out certain things and go back to living your life. Other funding goes into developing traditional language revitalization programs within a school environment. There is no proper way to determine the impact these programs have had on its constituent audiences. This makes me believe that funding should be more holistic in nature. It may be a great idea for tribes to come together and work on a common solution that could empower them.

I am calling for designing a language learning platform so that individual members from NA tribes can have an “aha” moment. “Now I can use this to learn my own language”. The solution has to be innovative but it can’t be developed if the funding is very meager. NA tribes themselves do not have resources to fund big projects. Larger tribes such as Navajo or Cherokee are exceptions. These are thriving NA cultures but the tribes that need the most resources are powerless.

There is also a need to design a solution that can fall within the context of NA lifestyle where they get motivated to learn their own language if they want to. You can’t really capture the nuances when you digitize or capture a language using recordings. I believe that language is the soul of any culture and you can’t capture it and re-use it. You have to learn it on a daily basis if you want to revitalize a dying language.

Native American audiences can be divided into the following:

- Tribal Elders,
- Middle Generation or the Lost Generation, and
- Younger Generation
As mentioned in this report, work that involved using technology dating back to the 1880s to record language for archival purposes. In this modern age of contemporary technologies, the two trends about language documentation and language teaching are still much alive [91]. This is a noble cause that, in my opinion, has failed to facilitate language learning in a social context that can be part of the daily use. Therefore, I argue for developing solutions that are creative, innovative, AND that can allow an individual to be engaged in a way that is cohesive in their dynamic learning process of language learning. Language learning solutions should be developed to be more effective in addition to the current traditional ways.

Diversity to me is very important and I believe that’s preserving languages within different contexts is important. Don Norman has presented some good arguments about Standardization. On one hand, standardization that comes in too early fails to carry the technology forward and inhibits innovation. On the other hand, too late standardization comes at a price of being too late. It might also lead to negative consequence. In my opinion, the idea of cultural preservation has to be dealt from a different perspective. Is it absolutely necessary to preserve everything you have? What does it mean for a NA family to use technology for doing cultural preservation? However, Don Normal also argue about human-centered design that may not always be the best way to approach a design since many a times looking into the future people do not know what they really want.

Metaphor of the Automobile Industry

Automobile industry has revolutionized the way people commute (insert sometime nicer). The car making industry has been through several transformations and changes. Today one can drive a car of his/her own choice. There is standardization in a sense that you have the basic functioning of the car uniform across all the cars but other features such as a comfortable ride, stereo system etc. differs for different manufacturers. Consumers do get a choice of adding their own “package”. Similarly I am of an opinion of providing a platform for people from different culture, and empowering them to create their own tools while also calling for change in design that has a cultural influence.
Conclusion

The user research I have conducted points to a major problem. A generational gap exists between the younger generation that is accustomed to using the latest digital technologies and the tribal elders. Tribal elders usually are the authority figures on tribal culture, customs, languages, traditions and much more. While they possess the most knowledge it is often difficult for them to use the current web and mobile platforms of interacting with technology. Younger generation on the other hand usually has been found to interact with mobile and smartphone technology in a higher ratio. It is this generational gap that needs to be bridged. It also presents a unique opportunity for technologists for creating innovative solutions that could be used by the current and upcoming generations for capturing this data in a useful way while allowing them to engage with each other.

Technology has increased the exposure of these languages to the children but it is not the same as having an in-person interaction with somebody. I think that there is a real potential for using the 3D technology that I predict will become mainstream in the next 4 or 6 years. There is also need to preserve languages in short term that are at the most risk. I really wonder if there is anything pragmatic that can be done for addressing their endangerment using technology.

I am skeptical about the efficacy of the current development of cultural preservation technologies these days. There is no shortage of very innovative and useful technologies but according to me most of them fail to be meet the mark or become established when they are put into pragmatic use. There seems to be an obvious well intended effort by various people in developing solutions. In addition, many big players, such as Google and Microsoft, are involved in doing a good amount of research and developing many solutions tackling the similar problem of cultural preservation, it is yet to be seen if and when such technologies would become part of the mainstream media that we could benefit from.

There is a need to look at the success stories since some Native-American languages are thriving. Good examples are Hawaiian, Languages of the First Nations of Canada. One very interesting example comes from Southern Mexico where school boys speak the Mayan language [20]. There is a collaborative effort to keep the language alive and it does require good amount of motivation.

In my opinion, design of a technology should come after a thorough understanding the problem and context at hand. I worry about the sustainability of any technology in particular. In this era of rapid technological change that can come in as short as a few months, by the time you release a version of a product, a service, or a process; it is usually already useless and/or obsolete.

The demand for revitalizing Native-American languages is not adequately supported by the current technology or practices. The ever-increasing need for revitalizing languages that are at-risk calls for developing flexible solutions. It has become clear that a one-size-fits-all solution is neither effective nor meaningful.

Technology today has not yielded positive results in carrying forward the ideology behind “Cultural Preservation”. It may be time to think about solutions that redefine this ideology or the meaning behind cultural preservation. I am not sure if the tribes know the solution they want. It is often hard to come up with innovative concepts.
Technology should be developed within the cultural confounds and should be iterated upon using activity-centered design techniques with help from people who would actually use it. Can one imagine writing everything about their culture and handing it off to the next generation? The point is that technology should help in preserving the most meaningful aspect of the culture since culture is best transmitted the conventional ways. Think about introducing a technology in a way that would allow kids to learn their own language and not just English. And let them preserve language or culture they want to. I am not going against current methods of preservation that happens at the museum level but calling for empowering the minorities to take things in their own hands.

The main consumers of this vast cultural wealth of knowledge, assuming the capture of this knowledge has happened seamless, are the current and the next generations of tribal members. With wireless computing playing a major role in the way they access the information using their handheld devices in form of smartphones or tablets. There seems to be a need to allow this access within the institutions of education, at home, and while you are mobile.

In an ideal world you would have systems tailored for use by each community but since people making these communities have a different set of opinions about how they should share or prevent access to outsiders, I think it really is not a practical idea to implement. Rather communities should be able to reach an acceptable compromise and find a common ground.

In the end, I make an argument supporting paradigm shift in technologies that can be explored within the confines of language revitalization and cultural preservation. A new approach is definitely needed. Traditional ways of learning languages may not be most effective within the Native-American context. Cultural preservation carries a different meaning for different people. This is the main reason I strongly advocate developing a language learning platform that can be integrated with learning about digitized cultural items.
### Appendix: Survey Results

<table>
<thead>
<tr>
<th>What does 'Cultural Preservation' mean to you?</th>
<th>What do you do for a living?</th>
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<tbody>
<tr>
<td>preserving the culture of a group</td>
<td>college professor</td>
</tr>
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</table>

The activity (deliberate or otherwise) of preserving the norms, values, and beliefs of a group of people.

Documenting aspects of a culture (art, stories, history, language, practices, tradition, location, etc.) and passing it down through generations, trying to keep all of the information as true to the original culture as possible.

Cultural preservation means ensuring the continuity of lifeways and traditions, language, understandings of how the world works, how people in a culture relate to their environment and their knowledge of that environment, ways of using the environment for habitat, arts, materials, tools, and resources, and medicines. I believe that preserving culture is an on-going effort to increase our understanding of what it means to be human beings.

I suppose literally speaking, cultural preservation means not forgetting who I am and where I came from. I benefited from a culture that accepts women as equals, for the most part, and values education. People are paid well for their labor, and enjoy a reasonable quality of life. As an American, I want to show reverence in some way to the founding fathers and my family’s ancestors for fighting for an ideal. Their struggles resulted in many freedoms that shaped our current culture today, such as demanding religious tolerance (though it may not perfectly executed by everyone in practice).

As someone currently living outside of their native culture, I can say that those values and ideals stated above have become increasingly important to me. While I enjoy some of the differences in my new culture, and have accepted and adopted some of these differences, I still mostly prefer my native way of doing things and interacting with people.

preserve the uniqueness of a culture, whether it’s a tradition, language, or religious/spiritual beliefs.

It means that you keep your cultural rules in everything you do. In other words, you meet your cultural rules and moral.

<table>
<thead>
<tr>
<th>college professor</th>
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</thead>
<tbody>
<tr>
<td>My mission in life is to inspire others to do more and better. My work right now is a community organizer, marketing intern, and Resource Information Architect.</td>
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</table>

<table>
<thead>
<tr>
<th>Student/Interaction Designer</th>
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<tbody>
<tr>
<td>I manage staff, resources, and activities in a museum.</td>
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<table>
<thead>
<tr>
<th>I'm a research scientist.</th>
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<tr>
<td>student</td>
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<table>
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<tr>
<th>An instructor.</th>
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When an individual that is part of a certain culture or subculture has language and customs inherently learned and passed down through generations that is cultural preservation. These actions, values, and behaviors are ingrained in a person. However, there is a difference between cultural preservation of a thriving cultural group and a disappearing cultural group; the first is a subconscious preservation of culture and the second is a conscious choice to preserve the believe[d cultural patrimony for today and for future generations.

Cultural Preservation is preserving culture through art, language, architecture, and other rich New traditions that enriches our lives and communities and preserves our state’s rich cultural patrimony for today and for future generations.

Preservation of a group’s heritage and traditions despite influences of globalisation. Rounding up and safeguarding things that are in danger of being wiped out. Kind of like a nature preserve.

preserving culture, which includes religion, language, way of living. Cultural preservation passes the wisdom, customs, and appreciation for the unique characteristics of a people connected in a social group.

Maintaining aspects and components of culture by different means such as event programming, community outreach and events, etc.

Conserving social values and customs that are no longer relevant or useful to modern society. Generally ‘small town’ lifestyles, regional dialects, and community activities.

Cultural preservation means maintaining a group or community with a common set of beliefs, activities, language, and elements of personal identity that have been developed over multiple generations and transferred intergenerationally. Although cultures undergo change continually, cultural preservation implies that there should be some continuity between current and previous cultural forms.

To me Cultural Preservation is a complex term. It can mean taking care to keep cultural traditions alive. It can also mean defending outmoded practices that keep people trapped in unequal relationships.
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