

# Mobile Learning as a Tool for Indigenous Language Revitalization and Sustainability in Canada: Framing the Challenge

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## ABSTRACT

In this article, the authors explore how mobile learning can complement the Certificate of Indigenous Languages program at the University of Saskatchewan in Western Canada. Through the FRAME model analysis, the authors extract salient cultural, pedagogical, environmental, and technological characteristics that should be considered in the development of mobile learning tools and approaches for Cree language teachers. It is hoped that this article will stimulate a dialogue amongst designers and Indigenous groups regarding language sustainability through mobile learning. The article concludes with key findings: the need to follow protocols, to establish good relationships, and to design for areas of low/no bandwidth. Finally, the examination of current Indigenous language learning methods provides ideas for the development of much needed “apps” appropriate for Cree learners and teachers.

## KEYWORDS

Cree, FRAME Model, Indigenous Languages, Mobile Learning, Nêhiyawêwin

## INTRODUCTION

In this paper, we view sustainability as the management of knowledge and resources so as to preserve natural and cultural ecosystems thereby ensuring quality of life for future generations. In the case of the Cree and other Indigenous groups in Canada, linguistic revitalization is a key to cultural sustainability. The development of mobile learning technologies aimed at language revitalization is a challenging task as there is currently little research on the use of mobile learning in Indigenous education - and even less on mobile learning targeted at Indigenous *language* learning (Pulla, 2015), yet there is strong potential (Pulla, 2017). In examining research literature from around the world, Pulla (2015) argues that “the data from the global context indicates that, when used innovatively, mobile learning can be integrated successfully into a context of existing practices, beliefs, experiences, and values related to Indigenous epistemologies and pedagogies” (p. 4). Yet, in the Canadian context, one cannot overgeneralize amongst cultural groups. Within a single Canadian province such as Saskatchewan, communities might have very different practices even though they might only be 50 to 100 kilometers away from each other. Within Saskatchewan alone, there are three main Cree dialects: Plains, Woodlands, and Swampy. Pronunciation, vocabulary, and accents vary across the dialects. The ceremonies also differ from community to community. In this way, learning resources, technological applications, or pedagogical solutions that work for one Indigenous group will not

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necessarily appeal to or achieve the goals of another group. So, before embarking upon development of mobile language tools for specific Indigenous communities, it is important to consider how to design pedagogical activities and tools in ways that are respectful of the people's needs, worldviews, protocols, and physical environments.

Patterns of relations within any culture shape and are shaped by epistemologies and ontologies. Much of the mobile technology available has been developed primarily from Western, European scientific traditions. Western traditions often privilege knowledge derived from reason and individualism over knowledge derived from tradition and community (Pegrum 2014). Furthermore, technology can allow people to reconfigure their relationships to each other and the world. Reconfigurations of relationships can both empower and endanger cultural practices. As Deer and Hakansson (2005) note, "Indigenous Peoples have their own concepts of knowledge, information and communication and have developed their own forms of information communication" (p. 237). Such knowledge should be integral to the development of mobile learning applications. While acknowledging the uniqueness of a particular group's worldview and practices, Western technological knowledge and tools - particularly mobile technologies - can still be useful.

In 2015, the Certificate in Indigenous Languages (CIL) program at the University of Saskatchewan was introduced in support of Indigenous-language revitalization and sustainability. In this paper, we use the Framework for the Rational Analysis of Mobile Learning (FRAME) model (Koole, 2009) as a needs analysis tool to explore how mobile tools can be designed to complement this particular program within the context of Saskatchewan Cree Nations.

## **FRAME ANALYSIS**

The FRAME model is depicted as a Venn diagram comprising three intersecting circles representing social, device, and learner aspects (Figure 1).

Although the FRAME model was originally designed from a social constructivist perspective (and more recently is being considered from a socio-material perspective), we hope that it can also complement the Indigenous ways of thinking. Kovach (2009) suggests that "even with their inherent bias, Western research frameworks can be adapted as structural forms that are helpful to the Indigenous researcher for allowing the entrance of visual, symbolic, and metaphorical representations of a research design that mitigates the linearity of words alone" (p. 41). Further to Kovach's argument, Mi'kmaw Elder, Alberta Marshall's principle of "two-eyed seeing" suggests that seeing from an Indigenous eye and a Western eye can work to the benefit of everyone (Hatcher & Bartlett, 2010; Bartlett, 2012).

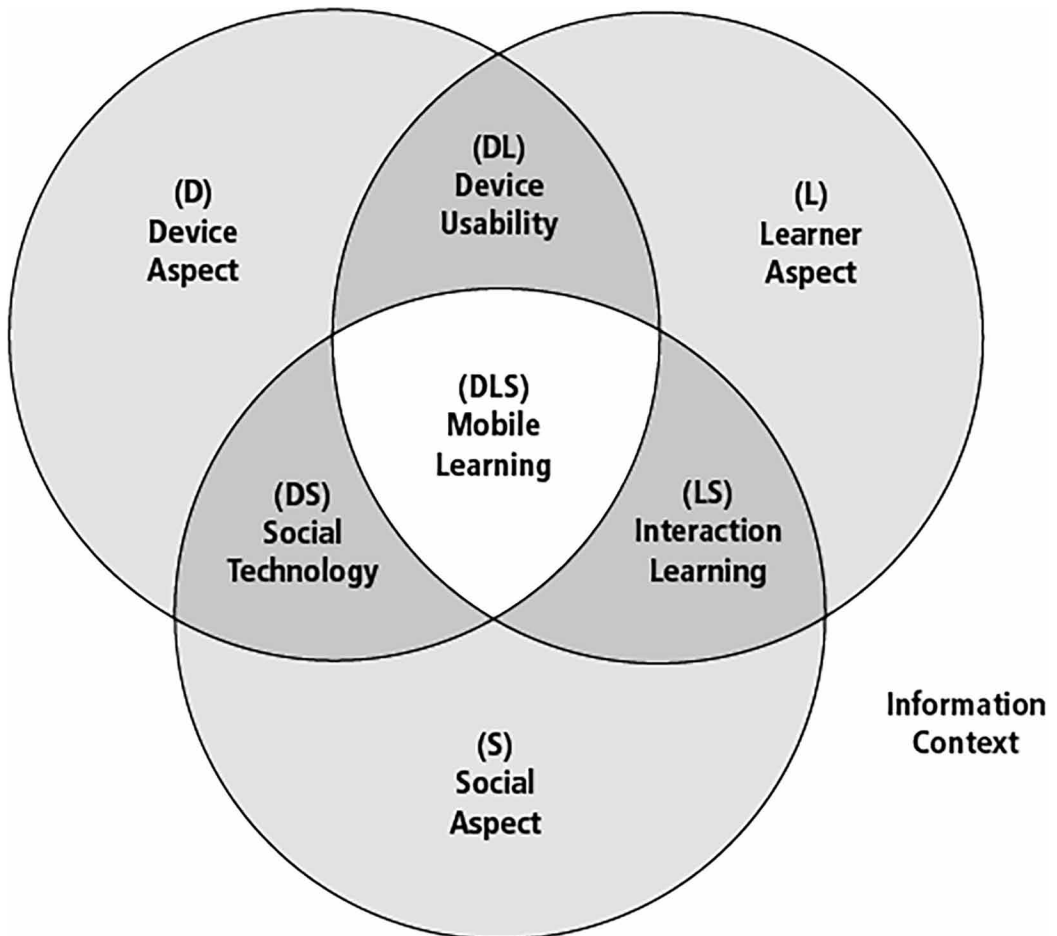
### **The CIL Context**

In order to use the FRAME model as a tool of analysis, it is necessary to carefully delineate scope. In this case, the CIL program is the focus. The program exists within a larger socio-economic context. This section will briefly describe the language, the writing systems, and the current state of language use in the province of Saskatchewan.

The CIL program is intended to help teachers acquire skills for teaching local Indigenous languages. Students come from a variety of backgrounds besides Cree including Dene and Nakota. For this analysis, we will focus mainly on Cree.

Unlike English, in which there is a strong emphasis on nouns, Cree is based on verbs. Cree is a polysynthetic language that belongs to the larger Algonquian language family. In a polysynthetic language, there are word-sentences; that is, a single written word is composed of morphemes (indivisible parts). Each morpheme holds meaning. The morphemes can represent subjects, objects, verbs, and other parts of speech. The morphemes can be thought of as roots/stems, prefixes, suffixes, and infixes. When strung together properly, the morphemes will produce a very descriptive word sentence. Okimāsis and Wolvengrey (2008) provide an example of a 3-word sentence in Cree using standard Roman orthography (SRO); in English it is written in 13 words:

Figure 1. The FRAME model



*Cree: nikt-wī-nitawi-kiyokawānānak / nitāniskocāpānisinānak / kihici-kisinwahamātowikamikohk.*  
*English: We were going to go visit / our great great grandchildren / at the university. (p. 14)*

In addition to SRO, the Cree have their own syllabic script (Figure 2). Some authors suggest that Cree syllabics arose in the mid-19th century (Burford-Mason, 1996), but the traditional stories indicate that the writing system is older. Regardless of when syllabics emerged, this new way of writing spread rapidly when the Cree people acquired it. Dickason and McNab (2009) pointed out that the Cree were the most literate nation in the world at that time. They also had an extensive trading system that included new technologies, goods, and services (Mandelbaum, 1979; Milloy, 1988). According to an Elder named Saddleback (personal communication, June 15, 2006) the emergence of syllabics around the early to mid-1700s enabled communication over time and distance.

There are a number of stories associated with the origins cahkipīhikana (syllabics). According to Saddleback, syllabics were given to the Cree through the spirit world. As the story goes, omistinahkowew, who lived to very old age, had an apprentice, as many people of his status did, a tradition that continues today. He taught his knowledge, songs, ceremonies, medicines, and syllabics. On his deathbed, the apprentice, mistikowiyiniw, left the scrolls to Reverend James Evans. For many years other priests and historians incorrectly attributed Evans to be the founder of Cree syllabics. It is

Figure 2. Cree syllabics: êmihkwânis (“spoon”)



now believed that Evans only acquired the scrolls on the deathbed of mistikowiyiniw. Again, songs, ceremonies, and prayers are associated with the story about the origins of syllabics.

In Saskatchewan, there are 3 dialects of Cree: the Plains, Woodlands (Woods), and Swampy (Figure 3).

Some consider Plains Cree, spoken in central and northern Alberta and southern and central Saskatchewan, to be the main or classic dialect (Van Essen, 2012). For the most part, Plains, Woodlands, and Swampy dialects are mutually intelligible, but certain linguistic markers will betray a speaker's region of origin. For example, the phrase “it is good” is miywâsin (Plains), mithwâsin (Woodlands), minwâsin (Swampy). Other words can vary slightly such as the word for spoon: êmihkwânis vs. îmihkwânis. Other words can be dramatically different from one dialect to another. For example, the word for “bear” is maskwa in Plains Cree and wâkayôis in Woodlands Cree.

The Government of Saskatchewan (2012) reports that there are 24,045 people who speak Cree as a mother tongue, but only 13,130 people indicate using Cree as the main language at home. Statistics indicate a drop of 2,110 Cree speakers from 2006 to 2011 (ibid.). At the same time, it is projected that by 2026, 36% of the Saskatchewan population aged 15 to 29 will be Indigenous (Townsend & Wernick 2008). In Saskatchewan, Indigenous people consistently have lower levels of formal education than non-Indigenous. Berryman, Carr-Stewart, Kovach et. al. (2014) compiled data showing that 30.2% of the non-Indigenous population people do not have certificate, diploma, or degree. While 49.4% of the Indigenous population do not have certificate, diploma, or degree. Fewer opportunities to access quality education can contribute to economic exclusion and social inequities. Socially and economically, therefore, it is important to ensure that young Indigenous people have educational opportunities. For these reasons, educators in Canada are beginning to see the potential of mobile learning as a means to enhance academic achievement and digital literacy. Fritschi and Wolf (2012) suggest that mobile learning requires a “paradigm shift” (p. 7) in learning strategies. We argue that such a shift might be more challenging when addressing the needs of specific groups of learners with unique ways of knowing. Furthermore, to avoid cognitively imperialistic education, Indigenous knowledges and languages need to be incorporated into school curricula (Battiste, 2013). It is within this complex context that the CIL program is being developed.

## Social Aspect (SA)

Social rules, ceremonies, worldview, and protocols are integral for sustaining cultural and linguistic practices. A Cree Elder once related his concern regarding the ceremonies. He was worried about who the pipe holders were going to be. He asked about who would lead the feasts, round dances, and ghost dances in which the ancestors are fed and cared for. The worldview of the Cree requires understanding the interconnectedness of everything; the Earth, the sun, the four-legged creatures, and the flyers are family. They are addressed as grandfathers and grandmothers. The people also have relationships with deities such as rocks and the wind. If the language were lost, the ancestors and spirits would possibly misunderstand the prayers, which would negatively affect the connection to the ancestors. The roles, significance, and protocols related to certain materials and practices such as tobacco and gifting must be respected and preserved.

Figure 3. A Map of the Cree language in Canada (Image adapted from E Pluribus Anthony, transferred to Wikimedia Commons by Kaveh (log), optimized by Andrew pmk. (Own work) [Public domain], via Wikimedia Commons)



A large amount of cultural information is specific to families, leaders of ceremonial lodges, and particularly Elders. The Elders, the knowledge holders, are aging and have limited funding. Young people must often travel in order to learn the traditions from them. Reciprocity, respect, and a spirit of appreciation are a part of knowledge sharing. It takes a lifetime to develop relationships and acquire the epistemological competence necessary to become trusted and to be seen as a rightful knowledge holder.

### Learner Aspect (LA)

The first cohort in the CIL have a breadth of goals, fluency, and learning preferences, but all share the desire to regain their cultural and linguistic identities. The students enrolled in the CIL program fit within the 51% of Saskatchewan Indigenous people who already have a level of formal education (as per above). The majority of the seventeen Students are teachers. They range in age from 20 to 65. Some of the teachers are employed on-reserves in northwestern Saskatchewan; others work at an urban, bilingual school. Two participants are not yet teachers, but still university students. There are also some non-Cree teachers enrolled. Those with adequate fluency can visit Elders and can verify the nuances of the knowledge shared in class. Few of the students, regardless of oral fluency, are literate in either SRO or Cree syllabics.

## Device Aspect (DA)

Approximately half of the Indigenous people in Canada live in rural and remote communities (Indigenous and Northern Affairs Canada, 2010) in which there is little or no reliable mobile or Internet connectivity (Canadian Radio-Television and Telecommunications Commission, 2014). To exacerbate access, the OECD reports that connectivity fees in Canada are amongst the most expensive in the world (OECD, 2013).

Personal observations by one of the authors of this article, who currently lives on a reserve in Saskatchewan, suggest that smartphones, iPads, and other tablets are steadily diffusing into Indigenous communities throughout the province. However, there is a dearth of statistics or other published information on the communications infrastructure and/or device ownership for Indigenous communities in Northern Canada. Furthermore, Kawalilak, Wells, Connell and Beamer (2012) note that individuals within these communities may not have access to a personal computer in their own homes; others might have access to computers at community schools or community centres.

## Interaction Learning Intersection (ILI)

In any society, formal and informal practices strongly affect how knowledge is passed along to subsequent generations. Cree is a living language that is traditionally situated in relationships with family, community, and the environment. In addition to conjugations and grammar, languages must be heard, practiced, and used. In Cree culture, songs and prayers are significant for giving thanks and healing. These modes of knowledge trans-mission play an important role in community sharing, relationship development, and reciprocity. Learners require a sense of safety and approval from knowledge holders.

Learners develop their Indigenous voices in the classroom, out on the land, and in ceremony in both urban and reserve locations. To accommodate working teachers travelling from distant communities, the CIL classes are taught on weekends and during the summer vacation. Not only do the students discuss the possible application of mobile learning in their own teaching practice, but there is also a realization that mobile learning can also become a part of CIL delivery itself.

While many Indigenous language acquisition projects place emphasis on speaking, the CIL also encourages reading and writing. The less fluent students (second-language learners) appear to pick up the writing systems quickly. As a result, the first language speakers depend on the second language speakers in terms of writing, and the second language speakers depend on the first language speakers for translations and transcribing. In-class discussions occur in Cree, English and in Cree-English (mixture).

The CIL comprises ten courses targeting speaking, writing, and second language teaching methodologies. So far, a variety of pedagogical methods have been working well: songs, total physical response (TPR), the picture-word-inductive-model (PWIM), and writing in both SRO and Cree syllabics (Lewis, 2013; Lewis, Shirt & Jackson, 2012). As part of their training, the students practice the methodologies with their own students. It is important to examine these methodologies in more depth - not only because they are methods preferred and/or developed by North American Indigenous language teachers, but also because they can be significant in helping in the design of culturally and linguistically appropriate mobile learning applications.

## Music and Song

Music and songs are proving effective in the CIL classroom. Cree musicians such as Bryan McDonald, Laura Burnof, Delores Sand, Wayne Jackson and Carl Quinn have written songs that are freely available for all to use. Some musicians have translated songs from English and written their own songs in Cree. These songs, ranging from “Old MacDonald Had a Farm” to Elvis classics, appeal to a variety of ages and tastes. The Gift of Language and Culture Project (Venne, n.d.) offers many traditional and contemporary songs on its website. Interestingly, some songs are selected for specific

cultural-pedagogical purposes. Square-dance songs, for example, have been translated and used for their action-oriented nature. The square-dancing instructions can help learners acquire not only the dance terminology, but also words for concepts such as left and right, forward, backward, step, fast, slow, etc. Because of the verb-focused nature of Cree, action songs can be very helpful in language acquisition.

Songs are one of the traditional ways of passing down information to the younger generation. Drums and rattles often accompany ceremonial songs. Morning songs, songs for community feasts, and other celebrations of life convey and preserve cultural ideas. Family songs, for example, teach people about roles, responsibilities, and practices in such activities as child rearing. Male teachers must go through a protocol to obtain these songs for ceremonies. But if there are no male Cree teachers, female Cree teachers can also learn the songs and protocols.

It is important to stress that songs and ceremonies embody and sustain Cree axiology, ontology, pedagogy, and epistemology. This traditional way of knowing through song links ceremonies to history and to the future. Songs and ceremonies remind the people of ethics, values, and morals in relation to all other creatures, animate and inanimate. The ontology expressed in the songs helps people understand their position within the surrounding environment. The songs teach about how to maintain and/or restore balance through respectful practice on the great island: *kihci ministik*. Song is, perhaps, the earliest and most traditional form of pedagogy of the Cree people. It is a significant way to come to know the world. One of the authors of this paper has participated in approximately 10 ceremonies that validate the cultural significance of song.

### *Total Physical Response (TPR)*

James Asher (1969, 1977) developed the methodology of TPR in English as a second language teaching in the 1960s and 1970s. Students physically enact new ideas and terms. Theoretically, learners can acquire a large amount of spoken vocabulary in a short period of time (Cantoni, 1999). TPR works well with verbs in particular. Because Cree is a verb-based language, linguist Solomon Ratt (1996) suggested that it is a commensurable technique for Cree. Further, Hinton (2001) proposes that kinaesthetic activities related to vocabulary help to make second language learning more interesting and maintain the attention of all ages of learners. As a testament to TPR's popularity in Indigenous language teaching, Solomon Ratt created a booklet, "Teaching Cree through action and pictures." The booklet is now being used at numerous locations in Saskatchewan and British Columbia to help familiarize second language instructors with the TPR process.

### *Picture-Word-Inductive-Model (PWIM)*

Dr. Dorothy Lazore, has successfully introduced the picture-word-inductive-model to Mohawk language programming. The method is used to introduce reading and writing in a second language (Calhoun, 1999). In this technique, the teacher selects a photo and then picks out objects, actions, nouns, and other features in the picture. The students then take turns pointing out what they see in the photo. Once they have exhausted the items in the photo, the teacher creates lists of verbs, nouns, and prepositions, and the students construct sentences from them. In choosing photos, it is important that the teacher decide in advance whether the language learners will be able to answer who, where, when, why, what, and how questions based on these pictures. Language teachers must also consider how they can use the photos to promote dialogue. This process promotes literacy and is best followed when the students begin to develop some vocabulary.

### *Syllabics and Standard Roman Orthography*

As the population of Cree speakers declines, it is increasingly important to start teaching syllabics and sharing the story of the origin of syllabics. In addition to the syllabics, standard Roman orthographic (SRO) systems are also commonly being used all across the Prairie Provinces to represent the Cree language. Through SRO and syllabics, materials can be made for teachers in the various Cree regions.

The standardization of orthographies and curriculum resources can be shared on desktop and mobile devices. For example, the Online Cree Dictionary (n.d.) website (and associated mobile application) contains a huge database of Cree words. Standardization of the writing system is important to lessen variation in spellings and symbols, so that there will be less confusion for the students. In addition, when spelling is standardized, switching back and forth between syllabics and SRO is easier. SRO makes Cree easier to study for those who speak English as a first language. But, to study morphemes and the language structure, syllabics is by far a better method.

### **Social Technology Intersection (STI)**

Clearly colonialism has not been kind to Indigenous peoples around the world. In Saskatchewan, some communities were impacted more negatively than others by the residential-school era. As a result, the introduction of new technologies and Western practices can sometimes be met with mistrust (Pulla, 2015). Nonetheless, many Cree communities are generally willing and eager to adopt and adapt technologies to fit their needs. In practice, community members may need to request permission from Elders to implement technology and/or transmit cultural knowledge. There are still Elders, for example, who do not want to be recorded with audio or video technology. In cases such as sharing on YouTube and/or Facebook, a committee of Elders normally outlines processes for recording, storage, representation, and distribution of cultural information such as spiritual, medicinal, and ceremonial knowledge.

New technologies bring new concerns. The idea of ownership and copyright is a new topic for the Cree people. This can be a problem when working with developers and vendors who might take “ownership” over cultural content. Commercially produced software can also lead learners to inadvertently share personal information on servers located in distant lands. And, depending on the terms and conditions of the respective site, participation in social media may result in loss of privacy and loss of ownership of personal and cultural data. These issues strongly suggest the need for careful control over the development of electronic resources so as to ensure that the transmission and use of cultural knowledge is done in a “good way” - that is, respectfully and appropriately (Kovach, 2009, p. 35).

### **Device Usability Intersection (DUI)**

Device-usability characteristics include portability, quick access to information, usability, learnability, and aesthetics. In current practice, it is increasingly common for the people to record, edit, and share videos of Elder interviews, powwows, round dances, and other cultural practices. The Cree Dictionary app is an example of a highly used tool for just-in-time information. Fluent speakers text in Cree; less fluent speakers will sometimes text a few words in Cree. Even fewer are able to text using Cree syllabics. Ease-of-use and learnability is significant for Elders learning how to connect to the Internet. Finally, portability remains of great importance as community members who move away from home for extended periods of time still desire access to linguistic and cultural information. Out-of-date phones with limited memory and functionality as well as the lack of connectivity, impacting the ability to update apps and transfer information, hamper use of mobile technologies by members of Northern communities.

## **DISCUSSION: THE NEXT STEPS**

In this analysis, we have used the FRAME model to examine the context of the CIL program as well as the characteristics of the learners, the technology and the culture of the Cree people. This analysis has led us to a better determination of what kinds of mobile activities and applications would be feasible and appropriate not only for participants in the CIL, but also for revitalizing and sustaining the Cree language. Mobile learning can help extend access to teacher training and language training, perhaps



alleviating the need to schedule courses on weekends and requiring students to travel. Mobility might also facilitate access to Elders who live in remote locations. The analysis presented in this paper provides guidance from the perspectives of social technology, device usability, and interaction learning.

### **Social Technology Intersection**

A key message garnered from the social technology intersection is that prior to planning or designing mobile learning applications and activities, it is important to observe and respect cultural values such as trust, respect, reciprocity, and responsibility. What this means in practice is that educators must establish relationships with the communities and Elders. In this way, educators can learn about their needs and how needs are traditionally met. For the Cree, the importance of community and relationship cannot be overstated. This stage of any project is essential and cannot be rushed. Any mobile application or activity should be designed so as to facilitate ongoing interaction amongst learners, Elders, family, community members, and the surrounding environment.

Language is highly interwoven into axiology, ontology, pedagogy, and epistemology. It is essential to sustaining the culture and must be managed with appropriate care. In the development of any technology for the purposes of language learning or the transmission of cultural knowledge, it is important to maintain Indigenous ownership. If working with external organizations that might be designing and/or programming mobile tools, the communities should be very careful in drafting contracts. Communities should also discuss with the mobile learning designers any potential impact upon privacy and the storage of personal data.

### **Device Usability Intersection (DUI)**

In remote locations of Saskatchewan, the communications infrastructure is improving. However, the landscape remains dotted with pockets of low bandwidth and dead zones. Therefore, mobile learning applications should be designed in order to permit ongoing learning in areas where connectivity may be slow or periodically out of service. For this reason, the apps approach makes sense: when learners are in locations with sufficient connectivity, they can update their applications and data; when they are in areas of low/no connectivity, they can still interact with already downloaded data and apps. In this way, learners can continue to study using their devices even when lacking Internet access.

Specific application/software design recommendations that have emerged from this analysis include the need to facilitate switching or translating between Cree dialects. There is also a desire and pedagogical need for apps that will enable translation between SRO and syllabics. Because Cree uses special characters and diacritics in SRO as well as its own unique syllabic fonts, such apps may require unique font development. Apps that facilitate texting in syllabics are also needed.

### **Interaction Learning Intersection**

This FRAME assessment has reinforced the need to incorporate traditional ways of learning in the design of language learning apps. Currently there are some established websites such as the Gift of Language (Venne, n.d.). There are also some dictionary-style apps. But, generally, Cree language-acquisition apps are rare. There are even fewer for other Algonquian languages. For mobile learning, we recommend designing apps that incorporate music, songs, prayer, and spiritual views. Apps that combine auditory and visual elements along with syllabics and SRO can help to facilitate connections between hearing, seeing, reading, and writing. Being a verb-focused language, apps that address total physical response (TPR) techniques can encourage kinesthetic or physical embodiment of language. Such apps might use accelerometers to detect directional movement, for example. Finally, a multitude of apps can target the picture-word-inductive model in which images can stimulate vocabulary building, sentence formation, and discussion.

## **CONCLUSION**

Language is intrinsically connected to the survival of cultural practices, worldview, and identities. Although mobile learning has emerged primarily from a Western scientific tradition, it holds great promise for the revitalization and maintenance of Indigenous languages and worldviews. Mobile learning can provide enhanced access to cultural and community resources dispersed across vast territories and throughout a learner's lifetime. However, it is necessary to develop and shape mobile tools in ways that reflect Indigenous epistemologies and cultural backgrounds. In this way, innovative pedagogical tools, enabling two-eye seeing, can help the new generation of pipe-holders sustain their language, culture, and communities.

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