

WPLC

Working Papers of the Linguistics Circle
of the University of Victoria

Vol. 29

Issue 1 (September 2019)

**Working Papers of the Linguistics Circle
of the University of Victoria**

– Vol. 29 (1) –

Published by the graduate students
of the University of Victoria Linguistics Department

Department of Linguistics
University of Victoria
P.O. Box 1700 STN CSC
Victoria, B.C., V8W 2Y2
Canada

ISSN 1200-3344 (print)
ISSN 1920-440X (digital)

<http://journals.uvic.ca/index.php/WPLC/index> | wplc@uvic.ca

© 2019 All rights retained by contributing authors.

WPLC is licensed under the Creative Commons Attribution-Non Commercial 4.0
International (CC BY-NC 4.0).

Table of Contents

Acknowledgements	iii
Preface	iii
Editorial Committee	iv
Morgan Cassels & Chloë Farr	1
Mobile applications for Indigenous language learning: Literature review and app survey	
Morgan Cassels	25
Indigenous languages in new media: Opportunities and challenges for language revitalization	

Acknowledgments

We would like to acknowledge and thank the authors for their contributions. This volume would not have been possible without the ongoing support of UVic Linguistics faculty, staff, and students. We would also like to thank Alex D'Arcy, who has supported and mentored us in this year's journey. In addition, we would like to thank our committee: Tess Nolan, Caroline JH Allen, and Emmanuelle Buailon. WPLC would not be possible without their dedicated work. A special thanks is in order to our dedicated copy editor Isabel Churton. We would also like to thank the UVic Work Study program for their continued support of WPLC, which allows us to hire an undergraduate student, Isabel Churton, to aid with the production of the journal. The digital form of WPLC is supported by Inba Kehoe and UVic Libraries Office of Scholarly Communications.

Preface to the 29th volume

Welcome to the 29th volume of the Working Papers of the Linguistics Circle!

This current volume of WPLC is a continuation of the tradition at the University of Victoria to provide opportunities for linguistics students to publish their research, both from UVic and other universities. For the past few years, WPLC has been dedicated not only to the publication of specialized volumes, such as our volume on minority languages but also to general submissions such as our volume 28 which presented a wide range of research areas that linguistics students pursue.

This year, we have decided to open submissions on Indigenous languages, and as a result we are proud to present a collection of current papers that exhibit research areas that might have applied benefits to scholars and Indigenous language communities. We open this year's volume with a study on mobile applications for Indigenous language learning, and continue with an investigation into opportunities and challenges for language revitalization through new media.

We hope that this variety of topics can not only benefit our readers in their specific areas of interest, but that it also serves as an invitation to current and future students to publish their research and exchange ideas with a community of graduate students.

Editorial Committee,
WPLC 29

Editorial committee

Marziyeh Yousefi
Editor

Oluwabukola O. Ariyo
Editor

Dr. Alex D’Arcy
Faculty Supervisor

Isabel Churton
Copy Editor

Committee

Tess Nolan,
Caroline JH Allen,
Emmanuell Buailon

Mobile applications for Indigenous language learning: Literature review and app survey

Morgan Cassels & Chloë Farr

University of Victoria

casselsm@uvic.ca; chloefarr@uvic.ca

This paper investigates mobile applications (apps) intended to support Indigenous language revitalization efforts in Canada and the mainland United States. It examines the role that apps may play in language revitalization movements beginning with a literature review which focuses on the benefits and drawbacks of apps as a medium for Indigenous language learning. This paper continues with a review of 32 apps, discussing examples of different pedagogical strategies and trends seen across Indigenous language apps. The community-driven app development process is examined, including funding sources, the role of development companies, and the level of input and recognition of community members. This paper concludes with a discussion synthesizing the findings of the app review in the context of the best practices and challenges identified during the literature review process. The original research conducted during the app review, and the analysis of these findings in light of the literature review, aims to make a contribution to the currently small body of literature focussed specifically on apps for Indigenous language learning.

Keywords: Indigenous; mobile applications; language revitalization

1 Introduction

Mobile applications (apps) are an increasingly mainstream tool for language learning. As smartphones become the go-to internet-capable device, new apps are emerging to support a wide range of daily activities, including educational and cultural learning. Despite the recent proliferation of apps for Indigenous language learning, literature on the topic is scarce. Literature on adjacent topics, such as mobile devices as sites for language learning, and the implications of making Indigenous cultural content available online, offer some background when examining the specific topic of apps for Indigenous language learning. Both the literature review and the app review found that pedagogical effects of apps are difficult to assess, but the enthusiasm and linguistic pride generated around these apps have highly positive implications for language revitalization movements. Delivering Indigenous language learning content through the app format presents technological and social challenges; however, based on user reviews and comments, apps bring many benefits. Apps are emerging as a promising tool for language revitalization and maintenance movements that are encouraging Indigenous language use in daily life.

2 Methodology

This paper is a synthesis of a literature review and original research regarding the nature, use and creation of mobile applications for Indigenous languages in Canada and the mainland United States.

2.1 Concurrent literature review and app review

The literature review surveyed existing studies on mobile apps for language learning and mobile apps in Indigenous contexts. The app review involved a primary source investigation of available apps, intended to contribute to the currently small body of literature focused specifically on mobile apps for learning Indigenous languages. The goal was to illustrate the landscape of mobile apps, recognize trends, and identify the strengths and shortcomings of these resources in terms of app content and approaches to app development.

Apps were investigated first hand for content and design. In order to analyse the user experience, various features of the apps, such as games and quizzes, were used as intended for learners. Customer reviews of the apps on the Apple and Google Play stores were also examined. Research was conducted regarding prominent Indigenous language app developers, profiled in section 4. The process of discovering and selecting apps for inclusion in the app review was multifaceted. Apps mentioned in the literature were included, as were apps associated with each of the Indigenous app developers. Apps were also discovered through news stories and in the Apple and Google Play stores' "more by this developer" and "you may also like" feeds. It is worth noting that all apps examined in this study are referenced with their current version number since apps are often updated and may change in the future.

These two phases, the literature review and the app review, were conducted concurrently and informed each other. The advantages and challenges of using mobile apps for Indigenous language learning identified during the literature review were considered when examining the apps, and the trends noticed during the app review prompted further investigations into the literature. The findings from these two phases are synthesized in the discussion section.

2.2 Inclusion/exclusion criteria for app review

The app review considered apps that include Indigenous language content, either written or spoken, and that were created by or in partnership with Indigenous communities in North America. The app review was limited to apps available from the Apple App store for iPhone or Google Play store for Android devices. Apps solely available for tablets, web-browsers or TVs were excluded from this review. As such, educational apps for tablets, often intended for use in schools, are outside the scope of this paper. Web-apps are also outside the scope as they present advantages and challenges which are distinct from those offered by mobile apps. For example, web apps require a constant high-speed internet connection, unlike mobile apps which can be downloaded once and then used offline.

The app review specifically targeted apps that include some level of user engagement. For example, *Ojibway TV*, an app created by Ogoki Learning

Systems, consists of original content in the Ojibway language and is marketed as ‘Netflix for Ojibway’ (Pauls, 2017). As this app is not available for mobile devices and does not have an interactive element, it was outside the scope of this study.

This app review was limited to publicly available apps and therefore did not consider apps which have been made private to a community. Additionally, the app review considered only apps that are available for download for free. Some Indigenous language learning apps charge a small fee for download and such apps were excluded from the review.

3 Literature Review

There is a lack of literature focused specifically on mobile applications for Indigenous language learning; most of the literature concerns the use of mobile devices for language learning of majority languages. Some of the factors affecting majority language learning are relevant to Indigenous language learning while others, such as learner’s motivations and issues of cultural context, may not be. Accordingly, literature related to majority language learning will be discussed here for its relevant points but will not be assumed to be entirely applicable to the Indigenous language learning context.

Additionally, much of the literature is focused on the learner’s perceptions of mobile-based learning, rather than on measurable learning outcomes. For example, a study on the use of mobile augmented reality tools for Indigenous language learning in Mexico relied on surveys asking participants about the tools’ perceived usefulness and ease of use, and their intention to use similar tools in the future (Bojórquez, Villegas, Sánchez, García-Alcaraz, & Vara, 2016). This method of assessment does not provide clear data regarding the pedagogical effectiveness of the app in terms of improving linguistic proficiency, unlike assessment using standard language tests. However, results of a qualitative nature are relevant to Indigenous language revitalization initiatives because a large component of revitalization involves generating enthusiasm and prestige around language use rather than achieving purely pedagogical outcomes (Lo Bianco, 2018).

3.1 General findings

The literature describes many unique advantages that mobile apps offer for language learning in general, and for Indigenous language learning in particular. Mobile apps for language learning are portable, economically accessible, suited to independent study, customizable, and fun for the learner. According to the literature, these characteristics provide unique learning benefits that may be particularly well suited to Indigenous language learning contexts. Section 3.2 describes these unique benefits.

The literature regarding using mobile apps and other technological tools for Indigenous language learning in particular identifies some specific concerns and challenges surrounding the use of mobile apps within Indigenous language revitalization contexts. Some challenges, such as rapid technological obsolescence, is an issue for mobile apps in general but may be particularly difficult for Indigenous communities due to funding reliant on one-time grants.

Other concerns identified in the literature, such as issues regarding maintaining cultural ownership when linguistic and cultural content is incorporated into a commercially produced software product, specifically affect mobile apps within the Indigenous language revitalization context. These challenges and concerns are described in sections 3.3 and 3.4.

In general, the literature identifies a unique role that mobile apps can play in Indigenous language revitalization movements: they allow self-directed learning in the absence of a teacher or proficient speaker and they can be used however and whenever the learner chooses, which allows them to be easily integrated into a busy learner's life.

3.2 Advantages of mobile apps for language learning

Mobile devices are uniquely positioned as a language learning tool. They offer portability, context sensitivity in that mobile tools can adapt to the user's current location and time, and individuality in that devices are customizable to a user's needs (Miangah & Nezarat, 2012). These attributes allow mobile apps to help "fill in the gaps" left by traditional teaching methods such as language classes and textbooks. The unique traits of mobile apps can offer economic accessibility, a reduction of language anxiety, self-determination and language prestige for Indigenous languages.

3.2.1 Portability

One of the most prominent benefits of mobile apps is portability, which facilitates the exploitation of the users' free time (Miangah & Nezarat, 2012). Mobile devices "[increase] learners' capability to physically move their own learning environment with them" (Ogata & Yano, 2003, p. 2). Mobile devices afford ubiquitous learning (Park, 2011). Learning on a mobile app is not confined to a classroom; it may take place on transit, in waiting rooms, and during other gaps in the learner's day. The main challenge for adult language learners is the lack of time for dedicated language learning (McIvor, 2012). Since Indigenous languages are generally being learned for personal reasons, as opposed to academic or professional reasons, learners of Indigenous languages may have more difficulty than other language learners in finding time to devote to their learning (McIvor, 2012). Miangah and Nezarat (2012) consider mobile-assisted language learning to be an "ideal solution to language learning barriers in terms of time and place" (p. 315).

In many parts of the world, members of Indigenous communities whose traditional way of life has been disturbed by the dominant culture are forced to emigrate from their traditional territories in search of economic opportunities (Ovide, 2013). This trend is reflected in Canada where Indigenous peoples are increasingly moving off reserve and into urban centres (McIvor, 2012). Urban shift poses challenges for language revitalization efforts, due to a lack of access to other speakers and therefore decreased opportunities for creating domains of use (McIvor 2012). Mobile device-based language learning offers advantages for these Indigenous language communities with diasporas (Koole, 2018). Unlike many traditional language learning strategies, the use of mobile apps is

not restricted to those who live in close proximity to other members of their Indigenous language speech community.

3.2.2 *Reduction of Language Anxiety*

Grimshaw and Cardoso (2018) found that using mobile apps collaboratively can reduce language-related anxiety regarding pronunciation or fear of being “wrong”. Their study looked at the pedagogical benefits of a mobile game which prompted computer-mediated oral exchanges between players in the target language. One learner reported “It’s more easy to speak to other people when I see the screen” (p. 167).

Many language learning apps offer a quiz component (see Yamózhó Kúé Society, 2015, Binasii Inc., 2018, and Gabriel Dumont Institute, 2015, for examples). Feedback tools of this nature allow learners to make mistakes in private, rather than being corrected by a teacher or an Elder. This feedback can increase a learner’s comfort level and allow them to eventually speak in conversation with greater confidence (Begay, 2013).

Mobile apps can also foster linguistic connections within the home and family. Begay (2013) describes how *Navajo Toddler*, an app designed to teach Navajo to young children, allows the whole family to get involved in language learning. Using the app, parents who themselves do not speak Navajo are able to introduce their children to the language and learn it together (Begay, 2013). Learning together builds linguistic confidence by giving learners the space to make mistakes together, and relieving learners of the pressure to produce “correct” speech.

3.2.3 *Economic Accessibility*

Unlike language classes or traditional study materials, mobile apps offer the advantage of economic accessibility in that learners often already own the learning tool (Stockwell, 2010). Mobile devices are increasingly becoming users’ primary or sole technological device: in 2018, 77% of American adults owned a smartphone while 73% owned a laptop or desktop computer (Pew Research Center, 2018). Since most learners already own a smartphone, there is usually no cost to the learner in acquiring and using a language app with the exception of some apps that require a small purchase fee.

Mobile apps are also well-suited to Indigenous language learning by virtue of their offline usability (Koole, 2018). Many Indigenous communities in Canada are geographically remote, and homes in these areas may not have high speed internet connections or may experience slow service or frequent service interruptions. Internet connectivity fees in Canada are among the world’s most expensive (Koole, 2018). Mobile apps circumvent this economic barrier by allowing learners to update their applications and data when they have sufficient internet access and continue learning offline without an internet connection (Koole, 2018).

3.2.4 *Self-Determination*

Creation of a mobile app allows a community to independently develop a language curriculum, without the governmental constraints which would be

imposed on curricula taught in schools. The contents of an app, the methodology of the app's development, and the participation in the app, such as who contributes to its creation and who can use it after its creation, can all be autonomously decided by the community (Ovide & García-Peñalvo, 2016). Learning resources that work for one Indigenous group may not necessarily be effective for another group (Koole, 2018). Mobile apps are a way for a community to develop pedagogical tools appropriate to their own cultural context (Koole, 2018).

Mobile apps also empower individuals to take charge of their learning by making the shift from teacher-led to student-led learning (Miangah & Nezarat, 2012). Language apps are often the only tool available to an individual who wants to learn a language but does not have access to traditional learning resources, such as language classes or textbooks (Begay, 2013).

3.2.5 *Fun and Language Prestige*

Another advantage of mobile apps is the novelty and “fun” associated with them. The development of new Indigenous language learning apps is often publicized in the media (see Karstens-Smith, 2018, Maratos, 2018, and Patton, 2018) which increases awareness about language revitalization efforts. Attitudes towards mobile-based learning is generally highly positive: 82% of participants in Viberg and Grönlund's 2013 study agreed or strongly agreed that they “will, or already do, benefit from the use of mobiles in their [language] learning” (p. 175). Grimshaw and Cardoso (2018) found that students who used a mobile game to practice English, the target language, reported that the game was “more fun than English class” (p. 170). Regardless of whether the “fun” component actually translates into increased learning outcomes, the visibility and enthusiasm generated by a mobile app can increase the prestige of learning the language.

3.3 **Disadvantages of mobile apps for language learning**

Mobile apps are not the solution to reversing language shift; rather, they can serve as one tool among many in a language revitalization effort. According to Mark Turin, former chair of the First Nations and Endangered Languages Program at the University of British Columbia (University of British Columbia, n.d.), “tools and technology don't save language — speakers do” (Turin, as cited by Karstens-Smith, 2018). Like any tool, mobile apps have their drawbacks, specifically rapid obsolescence, intra-community conflict, and pedagogical limitations.

3.3.1 *Rapid Obsolescence*

The rapid pace of technological change is a major challenge for any technology-based community initiative. This challenge was apparent during the literature review process; since the nature of mobile apps has evolved so rapidly, literature from as little as ten years ago may now be out of date.

Apps, like other software products, are published in periodically updated versions. For this reason, the app version numbers and publication dates for the apps examined in this paper are included in the references. In order

to use an app, users must have a device whose version is compatible with the current version of the app. This compatibility issue puts pressure on individuals, who may face economic challenges in maintaining an up-to-date device (Koole, 2018), and puts pressure on communities to continually update their app so that it is compatible with new devices.

Developers of Indigenous language apps use this continual update process to fix bugs, respond to user criticism and requests, expand existing features, and add new features (e.g. see the version history for *Ojibway* (Ogoki Learning Systems Inc., 2017a)). This process can allow the app developer to respond to the needs of the community and tailor the learning tool to the requirements of the users. However, continual updating can prove unfeasible for apps funded by one-time grants or other non-renewable funding sources.

If the required maintenance is not done, apps may eventually be removed from the Apple and Google Play stores. Apple reviews apps on an ongoing basis and removes outdated apps (Apple, 2019). The removal of an app from the app store signifies a major loss, as the development of a language app requires considerable effort, labour, and funding from a community. Challenges of maintenance are compounded by the need to support apps on two platforms: both Android and iPhone. Resource and code maintenance can become expensive and time-consuming when two divergent projects must be managed simultaneously (Rivera, Tesoriero, & Gallud, 2018).

3.3.2 *Intra-community Conflict*

Begay (2013) analysed the public comments left on Indigenous language learning apps in the Apple app store and found that reception of the apps by members of the community was mixed. One comment on the *Speak Navajo* app questioned its value, stating “real Navajos teach their kids Navajo, not some stupid app” (Begay, 2013, p. 73). Creation of an app also necessitates decisions regarding spelling, orthography, pronunciation, and the nature of the app’s content. Begay found that many users were critical of the pronunciation and spelling used by the apps. Thornton Media, the largest Indigenous language app developer, tries to mitigate these issues through a thorough proofreading process with community members (Thornton Media, n.d.a), however many of these spelling and pronunciation conflicts may arise not from “mistakes” but from dialectal differences. Begay also stresses the importance of thorough community review of app content during the development process, as several users of the *Speak Navajo* app commented their disapproval that the app included content that was inappropriate for children, such as translations for “alcohol” and “cigarette” (Begay, 2013, p. 71).

3.3.3 *Pedagogical Limitations*

Mobile apps can be seamlessly integrated into the learner’s life, using a device they already own. This offers the benefit of convenience, though the disadvantage of possible lack of focus. Stockwell (2008) found that learners may be more easily distracted from their language learning tasks when using a mobile device. The learners reported that they “couldn’t get into study mode” while using a mobile device (Stockwell, 2008, p. 260). Notifications and other interruptions on a smartphone could disrupt a language learning activity. This

“noise” characteristic of mobile learning — its entanglement with personal activities — makes evaluation of its pedagogical outcomes difficult (Park, 2011).

Ahmed (2016) found that Duolingo, a popular mobile language learning app, is more effective for beginners than for advanced learners and this finding may generalize to Indigenous language learning apps. Grimshaw and Cardoso (2018) also found that while mobile gameplay helped learners to speak the target language together by reducing their linguistic anxiety, it was not clear whether this benefit extended to the classroom environment after use of the mobile game was completed.

3.4 Cultural considerations

Mobile apps facilitate access to learning materials on an as-needed basis (Koole, 2009). For example, in an Indigenous context, learners can use an app to look up relevant words during cultural activities. Koole (2009) suggests that learning in response to authentic cultural and environmental cues in this way may enhance encoding and recall of the material.

Mobile apps have the advantage of context sensitivity in that their use can be determined by the current location and time (Miangah, 2012). This offers the potential for communities to develop apps that are geographically rooted to reflect the connection between Indigenous languages and the land. For example, mobile augmented reality systems can use GPS features to deliver content based on the user’s location (Bojorquez et al., 2016). Ogato and Yano (2003) describe a computer-supported ubiquitous learning system for English and Japanese language learning which delivers vocabulary relevant to the users’ current GPS location.

Bojorquez et al. (2016) found that cultural relevance was of high importance when developing a mobile tool for Indigenous language learning. Effective Indigenous language learning apps combine cultural themes with language acquisition (Begay, 2013). However, inclusion of cultural material in mobile apps must be done in a conscientious way. Koole (2018) suggests that a committee of Elders should determine processes for recording, storage, and distribution of cultural information. Elders and other community members must be involved in the mobile app development process to ensure that the nature of the material shared is culturally appropriate (Koole, 2018).

App development initiatives must also take care to ensure that the community does not inadvertently cede ownership of cultural property. As defined by the United Nation’s Principles and Guidelines for the Protection and Heritage of the Rights of Indigenous Peoples, cultural property includes stories, prayers, and audio recordings of linguistic material such as speech and songs (Daes, 1995), all of which are often included in language apps. Thornton Media (n.d.b) warns that when a software company produces an app containing such material, the company may argue that the recordings are “part of the software” and therefore are owned by the company. Ownership of cultural property must be safeguarded during the app development process; Belarde-Lewis (2011) stresses that loss of ownership of cultural property is a violation of tribal sovereignty.

3.5 The role of a successful indigenous language learning mobile app

Mobile apps are not the solution to language shift and will not on their own create proficient speakers (Ahmed, 2016). However, mobile app projects developed through thorough community consultation can form one part of a successful language revitalization effort.

The unique technological attributes of mobile devices provide certain pedagogical affordances (Park, 2011); the learning that takes place on mobile apps is spontaneous, informal, personalized, and ubiquitous (Miagah & Nazarat, 2012). These characteristics make mobile apps well-suited to the family home as a site of learning, which may be particularly appropriate to the Indigenous language revitalization context. A user of *Navajo Toddler* reported “My kids use it just about every day. It warms my heart to hear my daughter describe something like an apple in her native tongue” (Begay, 2013, p. 76). Mobile apps allow spontaneous, independently motivated learning without access to a language teacher or native speaker, which can bring the language into a home even when the parents are not speakers. Mobile apps also generate enthusiasm and interest in the language. Learners consider apps more “fun” than traditional language homework (Ahmed, 2016; Grimshaw & Cardoso, 2018).

The general consensus from the literature is that the purpose of mobile apps is not to replace traditional language teaching. Rather, they serve as a convenient supplement for independent and motivated learners. Mobile apps provide a learning opportunity free from geographic, temporal, and economic constraints. They offer a judgement-free experience to increase learner confidence. A learner in Grimshaw and Cardoso’s (2018) study found that the language learning mobile game helped to “open their mouths” to the language.

4 App review

The main goal of the app review is to summarize the current landscape of apps and app development in Indigenous Language movements. The goal is not to create criteria for assessing Indigenous language apps, but to survey available apps. This review examines a wide range of language apps from a number of different communities and developers to identify trends in terms of app type, app content, and approaches to app development.

4.1 General findings

Many different styles of apps are available, reflecting a variety of goals and approaches. Some apps focus on one specific goal or learning strategy, while others offer a wide range of different activities, including stories and games. Most Indigenous language apps offer a combination of dictionary functionality, common phrases, vocabulary practice, games, quizzes, and cultural content. Table 1 shows the distribution of different components across the 32 apps reviewed in this study.

Table 1: Components in reviewed apps

Component	Count of total reviewed	Total reviewed
Total Apps Reviewed	32	100
Credits	28	88
Audio	26	81
Vocabulary Categories	19	59
Phrases	18	56
Dictionary	13	41
Vocabulary Search	13	41
Games	11	34
Quiz	11	34
Pronunciation	9	28
Story	8	25
Voice Playback	5	16
Bookmark Function	4	13
Prayer	2	6

Story apps often feature one or more traditional Indigenous stories accompanied by illustrations. These apps may show an English translation alongside Indigenous text (e.g. *First Nations Storybook - Bush Cree* (Aglaia Software Inc., 2018)), and may include a read-along feature with an accompanying Indigenous language audio track (e.g. *Puktewit* (Mi'kmaw Kina'matnewey, 2015)). Story apps seem to be developed with the twofold goal of teaching traditional stories and strengthening language skills. Since these apps do not teach vocabulary or grammar, they appear to be intended for an audience with an existing level of linguistic proficiency.

While many apps include a game as a subcomponent, there are some apps that solely consist of a game. Some game apps interactively introduce vocabulary while delivering cultural content (e.g. *Nitap* (Ni'gweg Collective, 2018)), while others gamify more traditional language learning strategies such as flashcards (e.g. *Opaskwayak Cree Match Game* (Binasii Inc., 2017a)).

Most apps offer a wider range of language learning resources. Often, they include a vocabulary section organized by category, such as animals or body parts (e.g. *Th̄chq Intro* (Yamózhó Kúé Society, 2015)). There is variety in how the meaning of the Indigenous words are explained: some apps have accompanying illustrations only (e.g. *Long Plain Word Quest* (Binasii Inc., 2018a)), while most include the English translation as text, often in addition to an illustration. Many apps also offer a vocabulary quiz feature or a dictionary component. The former quizzes the users on vocabulary items taught by the app, while the latter is characterized by a search feature to facilitate dictionary lookup. These dictionaries may be fully bilingual in that they can be searched in both English and the Indigenous language (e.g. *SENCOTEN* (First People's Heritage Language and Culture Council, 2017)), while others are one-directional, allowing search in English only (e.g. *L'nui'suti* (Mi'kmaw Kina'matnewey, 2017a)).

Many language apps also include varying degrees of cultural content. Some apps incorporate cultural content into the language learning activities by including prayer (e.g. *Long Plain Word Quest* (Binasii Inc., 2018a)), songs (e.g. *Navajo Toddler* (Shortman, 2015)) and traditional stories (e.g. *Wowkwis aq Ka'qaquj* (Mi'kmaw Kina'matnewey, 2018)). Other apps feature a distinct section with English text describing the culture and history of the peoples who speak that language (e.g. *L'nui'suti* (Mi'kmaw Kina'matnewey, 2017a)).

A common feature of many apps is a credits section acknowledging the Elders and other contributors to the app, including those whose voices appear in the recordings. These credits vary in detail: some apps list every contributing individual including Elders and members of the technical development team (e.g. *Opaskwayak Cree Language Dictionary* (Binasii Inc., 2017a)); some include a culturally relevant dedication (e.g. *Tlichō Intro* (Yamózhō Kúé Society, 2015)); some include information about the Indigenous organizations involved (e.g. *Long Plain Ojibway Dictionary* (Binasii Inc., 2017b)); some include biographical details about the speakers whose voices appear on the app (e.g. *Ojibway* (Ogoki Learning Systems Inc., 2017a)); and others contain no credits at all (e.g. *Secwepemc* (First People's Cultural Council, 2018)).

While developing language apps, app developers and community partners strive to maintain cultural sensitivity (Exchange District Biz, 2017). The wide variety of Indigenous language learning apps available reflect the variety of goals within language revitalization and language maintenance movements, from building linguistic proficiency to strengthening cultural connection. Each group that creates their own app includes components, such as a reference dictionary, story, quiz or prayer, as they feel is relevant or important to their community.

4.2 Software development

A variety of different groups, including small cultural organizations (e.g. Wikwemikong Heritage Organization, 2017), larger Indigenous organizations (e.g. Mi'kmaw Kina'matnewey, 2015), educational institutes (e.g. Gabriel Dumont Institute, 2015), and Indigenous nations (e.g. Galton, 2016) have created Indigenous language learning apps. Many apps include a credits section acknowledging individuals who were involved. This sometimes includes recognition of granting organizations, however not all apps make their funding information available so there is not a clear picture of all funding sources. Those that make funding information available tend to have been funded by a combination of government grants.

Much of the funding comes from government agencies which include the federal government (Mi'kmaw Kina'matnewey, 2015; Gabriel Dumont Institute, 2015), the provincial government (e.g. Government of the Northwest Territories contributed to *Tł̄chq Intro* (Yamózhō Kúé Society, 2015)) and Indigenous bands (e.g. Timiskaming First Nation contributed to *Anishinabe Translator V2* (Galton, 2016)). Other sources include post-secondary institutions (e.g. University of Saskatchewan contributed to *Michif Lessons* (Gabriel Dumont Institute, 2015)), and the Canada Council for the Arts (e.g. *Nitap* (Ni'gweg Collective, 2018)).

Indigenous language apps incorporate a variety of tools that are useful for a learner and maintain cultural sensitivities (Exchange District Biz, 2017).

Communities may make their own app or utilize a company which specializes in such processes. There are three prominent companies that specialize in Indigenous language apps: Thornton Media, Ogoki Learning Systems, and Binasii. Combined, these companies have published a majority of the popular Indigenous Language apps available in the Android and Apple app stores. Each of them has developed or expanded the way that Indigenous language apps are being used, developed, and recognized by communities, language learners and academics.

As shown in Table 2, the majority of the 32 apps reviewed in this study were made in partnership with one of these three specialized companies.

Table 2: Developers of reviewed apps

Developer Category	Count of total reviewed	Total reviewed
Binasii	9	28
Ogoki Learning Systems	6	19
Thornton Media	6	19
Community member(s)	3	9
Other	7	22

4.2.1 Thornton Media

Thornton Media’s president, Don Thornton, is Cherokee (Thornton Media Inc., n.d.b). Thornton states in a *Native Gaming* article “... Thornton Media, [is] the only language tool company in the world devoted to indigenous people” (Thornton, 2009, p. 29). This suggests that they paved the way for the Indigenous Language app format to be increasingly utilized as a learning tool.

Most Thornton Media language apps follow a defined template. Their apps seem to focus on improving linguistic proficiency, consisting of both reference and vocabulary learning components. The visual layout and design are similar across apps using their code. Some examples are *Tł̄ch̄ Intro* (Yamózhō Kúé Society, 2015), *Denesųł̄iné* (Thornton Media Inc., 2018d) and *Speak Cayuga* (Thornton Media Inc., 2018e). The company ensures that communities retain ownership of their language and cultural property. They also allow communities to use their own Apple developers accounts if they wish, and allow limited distribution if requested (Thornton Media Inc., n.d.b).

4.2.2 Ogoki Learning Systems

Ogoki Learning Systems (Ogoki) is a Canadian Indigenous-run company (Ogoki Learning Systems, n.d.). Since 2011, they have developed language learning apps for various Indigenous communities and their respective languages (Dadigan, 2013). The company was founded by Ojibwe father, Darrick Baxter, who designed an app, *Ojibway* (Ogoki Learning Systems Inc., 2017a), to support his 12-year old daughter in learning her language (Baxter, 2014).

Baxter says, “I wanted every parent to experience that magical moment when their child is speaking their native language” (Baxter, as cited in Halstead, 2015, para. 7). To this end, Baxter made the impactful decision to release

Ojibway's modifiable source code for public download (Milburn & Baxter, 2012).

Community groups creating their own apps have thus had the benefit of the source code being an accessible resource to use as a template. Open source sharing of this app's code is of benefit in many ways. Baxter hopes to remove financial barriers to app development and inspire members of Indigenous communities to learn how to code (Vega & Walter, 2016). Ogoki estimates that they have created 150 apps in the App Store (Ogoki Learning, 2018). However, as of January 2019, significantly fewer apps by Ogoki Learning Systems and Ogoki Learning Inc. are publicly available for download in the Apple App Store and Google Play Store. These are not limited to language apps but extend to wider community initiatives (see *Mille Lacs Tribal Police* (Ogoki Learning Inc., 2016)). Many of the 150 apps the Ogoki website refers to may have been published under another developer's license, may no longer be available, or may be private to community members.

Publicly available language learning apps created by and posted under Ogoki include but are not limited to *Garden Hill* (Ogoki Learning Systems Inc., 2017c), *Hupa Language App* (Ogoki Learning Systems Inc., 2018b) and *Sandy Bay Ojibway* (Ogoki Learning Systems Inc., 2017b).

4.2.3 *Binasii*

Binasii is a Canadian Indigenous owned and run company (Binasii Inc., n.d.a). Beginning as an organization focused on training community members to use computer software, they branched out and began app development in 2017 (Daniels, 2017). Now, Binasii conducts media work ranging from branding to web design to virtual reality (Daniels, 2017).

Binasii, like Ogoki, built themselves into a recognized company specializing in Indigenous language app development based on a single request for a language reference tool (Exchange District Biz, 2017). After being asked for a Cree-English dictionary app, Binasii produced *Opaskwayak Cree Dictionary* and an accompanying language game app, *Opaskwayak Cree Match Game* (Daniels, 2017). Binasii often produces two or more apps for single languages, such as Saysi Dene (Binasii Inc., 2017d; Binasii, 2018b), Long Plain Ojibway (Binasii Inc., 2017b; Binasii Inc., 2017c) and Dakota (Binasii Inc., 2018c; Binasii Inc., 2018d). This format allows for increased usability, as it delivers manageable amounts of information to the learner at a time. This also enables the apps to span a wide range of linguistic and cultural contexts.

4.3 *Three exemplary apps*

In this section, three apps will be described in detail. These are just three of many high-quality Indigenous language apps and are by no means the only apps worthy of special attention. However, they each have unique qualities that make them strong examples in terms of their contributions to language revitalization and language maintenance. *Long Plain Ojibway Dictionary* is an example of a strong reference app due to its advanced search features and structure. *Speak Oneida - Part 1* is distinguished by its comprehensive learning modules organized according to grammatical function. *L'nui'suti* is notable for its

inclusion of thorough and relevant information about cultural and linguistic history.

4.3.1 *Long Plain Ojibway Dictionary*

While some language apps include focused lessons, *Long Plain Ojibway Dictionary* (Binasii Inc., 2017b) is primarily a reference tool. The app contains a bilingual Ojibway-English dictionary, wherein users can search for translations by typing either the English or the Ojibway text. It also offers vocabulary in a category format, allowing users to discover words pertaining to a certain context. Each word entry is viewable in its own ‘page’ with the Ojibway text, English gloss, and Ojibway audio. Some of the categories place words within various contexts, such as questions, greetings, statements and commands. As a reference app, it supports users in utilizing Oneida vocabulary to varying degrees, either providing them with words or full sentences.

One user commented “Perfect app to teach not only myself the language but my child will benefit” (Myran, 2018). *Long Plain Ojibway Dictionary* is beneficial both as a reference material for speakers and as a self-study tool for language learners.

4.3.2 *Speak Oneida - Part 1*

Speak Oneida - Part 1 (Thornton Media Inc., 2018b), published by Thornton Media, is the first in a two-part series of quality pedagogical language apps. It is a multifaceted app with a reference component, cultural stories, vocabulary, and grammar modules. *Part 2* is an extension of *Part 1* and offers a more advanced level of linguistic content for learners. *Part 1* is available through both the Apple and Google play stores, making it more accessible than *Part 2*, which is only available through the Apple App store. This profile describes *Part 1* only.

The cultural section includes images, video and audio with the latter accompanied by Oneida language subtitles. The *Images* section displays photos of crafts, historical events, and newly built schools. The video featured in the *Cultural Notes* section is ‘A Brief History’ narrated by Loretta Metoxen, an Oneida Tribal historian. Cultural audio features songs such as ;lahłéshu (‘leader dance’). These are each accompanied by Oneida lyrics and the English translation.

The *Reference* section includes a searchable dictionary of words. Each word is matched with their grammatical components, Oneida text and English gloss, along with their respective audio.

The language learning resources in this app are grammatically focused. The first module in the *Categories* section is titled *Vowels & Consonants*. This module teaches users how to make the sounds represented in the Oneida orthography by using references to similar English words. This is followed by a module about the use of diacritics and unfamiliar consonant clusters which include /tsy/, /tsi/ and /tshy/, /sy/. The second set of modules focuses on identifiers such as pronouns, greetings and clan references. Once the learner has been taught how to make sounds in the language and some basic morphology, they are introduced to basic nouns and verbs. Modules build on each other adding various person and plural markers.

There are three sections within the modules. One section is for learning the new vocabulary, the second is a game to reinforce learning, and the third is a quiz. The *Learning* section consists of a set list of words linked to their entries in the reference section. The tools available include audio recording for the users, audio playback, an audio replay button, and the option to hide the English glosses. The *Games* section offers a 4-square game, where the user listens to an audio clip of a word or phonetic description and chooses the best photo to match. The *Quizzes* section includes listening, reading, view a picture, and self-assessing your own recorded speech. Each quiz has easy, medium and hard levels.

Speak Oneida's modules dedicated to phonetics and grammar give users a strong foundation for learning their language. The inclusion of morphological structure and the focus on verbs and inflected nouns make this app a valuable pedagogical tool well suited to the structure of the language it teaches.

4.3.3 *L'nui'suti*

L'nui'suti (Mi'kmaw Kina'matnewey, 2017a) is a Mik'maw language app intended as an introduction for beginners (Mi'kmaw Kina'matnewey, 2017c). It was made by Mi'kmaw Kina'matnewey, an organization which advocates for educational and language rights and for Mi'kmaw people (Mi'kmaw Kina'matnewey, n.d.). It includes vocabulary items organized by category and a search function for these words, which is searchable only by their English gloss. It also includes a pronunciation guide for the Mi'kmaw alphabet. As noted in its description on the app store, the words and phrases included in *L'nui'suti* appear only in the first-person conjugation.

L'nui'suti is notable for its *People* section which includes English-language information about the history and language of the Mi'kmaw people. It explains the history of language loss and the effects of residential schools and describes current revitalization efforts. The *People* section also includes a section, *Written*, explaining the process of developing an orthography for Mi'kmaw. Including such information provides useful context to the learner. For example, understanding how the orthography was developed may be useful for a new learner comparing the unfamiliar orthography with English. Additionally, information regarding current revitalization efforts for the language can connect the learner with other helpful resources.

5 Discussion of findings

The authors have experience with pedagogical language learning, field documentation, and language technologies. Our backgrounds allow us to take on the unique perspective of both app users and researchers in this emerging field. We are Euro-Canadian peoples engaging with these resources for academic purposes. We are not Indigenous peoples and we acknowledge that we are not in a position to speak to the values or views of Indigenous communities. Our goal in the following discussion is to offer one picture of possible options for Indigenous app development and the furthering of this research. The absence of the perspective and input of Indigenous communities

in this research is discussed in this section as a factor to include in future research.

5.1 Assessment

Empirical assessment of apps based on outcomes related to linguistic proficiency poses challenges. App user reviews can offer some insight into the impact of apps for Indigenous language learners.

5.1.1 Empirical Assessment

Success is an ambiguous term and there is currently no standard for what constitutes a successful app for Indigenous language learning. An app could be considered successful if it is popular or widely used. Alternatively, it may be successful only if it achieves clearly defined pedagogical goals regarding increasing linguistic proficiency. Success may also be based on the emotional impact the app has on the user, such as increasing cultural or linguistic pride. In order to assess an app, the app creator's goals must be known and clearly defined. If the criteria used for assessment are not aligned with the app's goals, the assessed level of success will be misleading. The goals that motivate app design choices are not publicly available, and interviews of companies or communities regarding their intentions for each app have not been conducted as part of this research. Without this information, empirical assessment of app success could not be performed in a meaningful way.

5.1.2 Consideration of User Reviews

Without an evaluative framework based on pedagogical outcomes, apps may be evaluated in terms of their reception by the community. One method of gauging this reception is through public user reviews on the Apple App Store and Google Play store. Public user reviews are not a reliable tool for measuring the pedagogical quality of an app, since reviews rarely contain detailed information about a user's learning experience. However, reviews do offer some insight into the role and reception of these apps. Many apps have reviews claiming that the app had been very helpful for language learning, as well as reviews suggesting additions or changes to the app. One review of *Ojibway* states "Love it... Very great app. My 7 year old daughter enjoys it as much as i do. Wish for there to be an updated version.however.. More words &Phrases" (Google User, 2015). Reviews containing requests for expansion for app content can be seen as evidence of an app's pedagogical effectiveness since the user seems to have learned all the existing content and is ready for more.

While reviews may not be a clear indicator of quality, our investigation of user comments on the Apple and Google Play stores support the suggestion from the literature that mobile apps cultivate enthusiasm around Indigenous languages. Overwhelmingly, user comments on the Apple and Google Play stores were highly positive and emotionally charged, reflecting strong linguistic and cultural pride. One user of *Tal-Thuen?*, a Mi'kmaw phrase building app, commented "Deadliest app ever / This app has changed my life! ...you need to tell all your friends about this app and call your band office tomorrow and get them to put this in your [sic] communities newsletter cause it's that deadly"

(TrevG23, 2016). Equally superlative reviews were found for many other language apps, reflecting the contribution apps can make to increasing the prestige of Indigenous languages. As one user of *Ojibway* commented, “Ojibway language is where it’s at” (Jarvis, 2015).

Additionally, online comments support the suggestion by Koole (2018) that mobile apps are significant for a community’s diaspora. Public reviews on *Anishinaabemowin*, *Ojibway* give evidence for the power of apps to connect diaspora to their homeland and heritage. One user commented “I love this app. I am a 23 year old Ojibwe who was raised outside the tribe, the language and culture are inseparable. I want to embrace my Native heritage and this app allows me to do just that” (King, 2017).

5.2 The app creation process

Our app review revealed a wide and varied landscape of Indigenous language mobile apps, and many possible avenues for app development.

5.2.1 Options for App Content and Design

Many different app styles exist, and each app reflects the unique values and goals of its development team. Although vocabulary games might be what first come to mind when one envisions a language learning app, beautifully designed apps exist which focus on prayer, song, and other cultural content. Apps can tell traditional stories in engaging and culturally appropriate ways, or they can deliver relevant cultural and historical information. With endless options for how to use the app format, the most impactful apps we have experienced as users seem to have been created with a clear goal.

Many quality all-inclusive apps exist which provide learners with a full view of the language and a number of tools for their learning. Alternatively, Binasii’s practice of developing a pair or suite of apps appears very beneficial for learners. Each component, such as reference materials, games, and stories, is separated into its own individually downloadable app. This strategy allows a separation of concerns, which may be less intimidating for a learner.

Apps with grammatical modules and an explanation of the language’s morphology may be especially useful to language learners. Currently, most language apps focus on noun and verb vocabulary and offer relatively little grammatical material, with the notable exceptions of *Speak Oneida - Part 1* and *Anishinabe V2*.

5.2.2 Technological and Cultural Considerations in App Development

App development involves a wide range of contributors which may include Elders, language and culture experts, school and band officials, and software developers. Software development may be done by a self-assembled team or by an outside developer such as Thornton Media, Binasii, or Ogoki. These companies are familiar with the context of Indigenous language revitalization and have ready-made templates which can streamline the app development process. They also guarantee that ownership of audio recordings and other cultural property will be protected.

An alternative and exciting avenue for app development is the use of open source software templates, such as the one released by Ogoki intended specifically for the development of apps for Indigenous language learning. Access to an open source template makes it easier to develop an app in-house by involving community members with an interest in programming.

Most apps include credits to recognize the time and emotional labour of Elders and other community contributors. In addition to showing respect, crediting contributors prevents future researchers from attempting to have speakers unnecessarily repeat completed work.

Another important consideration for an app development team is whether to release their app publicly or make it private to community members. Publicly available apps are easily accessible to members of the diaspora, for whom the apps may be significantly beneficial. However, cultural practices may dictate that certain content be restricted to community members. In such cases, those involved in the app's development may decide to restrict their app accordingly.

A challenge encountered throughout the app review process, which is indicative of a challenge faced by Indigenous app developers and users, is the issue of compatibility between iPhone and Android. One author had an iPhone and the other had an Android phone, and this affected which apps each author could review. For example, *Speak Oneida - Part 1* is currently available for both iPhone and Android, but *Speak Oneida - Part 2* is available on iPhone only. Supporting two distinct operating systems increases the time and cost of app development and maintenance. As a result, communities sometimes decide to release their app on a single platform only and in the process, the app becomes inaccessible to a large portion of potential language learners.

Publishers of mobile apps must release updates relatively frequently in order to keep up with new device requirements. When a community does not have the resources for such maintenance, apps quickly become inaccessible to many users. For example, users of *Saulteaux* have left emotional reviews requesting an updated version and expressing disappointment that the app is no longer compatible with their devices. One user commented "Please please update the app so I can use again I was so happy when I found it!" (SaulteauxMama, 2017).

5.3 Future work

This study is only scratching the surface of what information can be considered in researching the field of Indigenous Language Apps. No previous comprehensive review of apps for Indigenous language learning exists and literature on the topic of mobile apps for Indigenous language learning is generally scarce. To find sufficient information to build on, short of directly communicating with communities and developers, we cautiously referenced research conducted up to 16 years ago (Ogata & Yano, 2003). Using possibly out of date research requires a strong disclaimer to the reader and future researchers. Considering this, a suggested next step is to do a first-hand study. This study could be of a sociolinguistic nature, looking into the variation of language use and values communities have of their respective languages. This study could be applied to the pedagogical benefits of individual app components, or varying combinations of these components. This paper would

then be revisited, considering the findings of these new and relevant studies.

A barrier to analysing the development, success and effectiveness of apps is obsolescence. As mobile device operating systems are updated and new device models are released, functional obsolescence (when a device is no longer capable of running specific tasks) largely prevents researcher and user access to old apps. Therefore, we and future researchers cannot view old apps for analysis of design trends or developments. Papers such as this are a valuable resource as it documents a number of apps at the current moment in time, many of which could become obsolete in the future.

6 Conclusion

Indigenous communities and community groups are looking for the best ways to distribute language learning materials. As language revitalization, maintenance, and preservation efforts build, an increasing number of people are using technological tools to support the integration of language learning into their daily lives. This report surveyed the published literature on Indigenous language apps and discussed their possible role in a learner's journey.

The literature review discussed intentions and benefits of apps such as cultural knowledge, portability and accessibility of information for a learner. Rapid obsolescence, dialectal differences, and the practical limitations of mobile devices were explored as potential challenges for apps as a learning tool. With reference to the literature review, we as users carried out the app review through direct interaction with apps.

The app review surveyed 32 different apps built for a wide range of different Indigenous languages. Three prominent companies were profiled to illustrate the creation of language apps as an increasingly popular tool for language revitalization movements. As users, we engaged with each app for either pedagogical, cultural or referential purposes. Three apps, one for each respective category, were profiled to highlight the qualities we appreciated as users.

Language apps are a productive and flexible tool that can make a valuable contribution to language revitalization movements. In our discussion, we explore considerations for app development projects and future work in the field. Much more research can be done in the area of Indigenous language app development and use as this exciting field continues to grow.

Acknowledgements

We would like to acknowledge our supervisor, Dr. Jasmine Spencer, for the time and encouragement she provided us with. This paper was developed from a community project carried out at the University of Victoria as partial course requirement for *LING 431: Community-based Initiatives in Language Revitalization*, taught by Dr. Leslie Saxon. Her guidance and teaching gave us a foundational understanding of the landscape of language revitalization movements. This project would not have been possible without the support of Rosa Mantla, Tłıchq Language Culture Coordinator. We would like to acknowledge the contribution of Rosa Mantla's time and support to our research. We would also like to acknowledge Linsey Hope, Tłıchq Community Services Agency Director of Education, for her support.

References

- Aglaia Software Inc. (2018). First Nations Storybook: Bush Cree (1.8). [Mobile application software].
- Apple. (2019). *App Store Improvement*. Retrieved from <https://developer.apple.com/support/app-store-improvements/>.
- Begay, W. R. (2013). *Mobile Apps and Indigenous Language Learning: New Developments in the Field of Indigenous Language Revitalization* (master's thesis). University of Arizona, Tuscan, Arizona.
- Belarde-Lewis, M. (2011). *Sharing the Private in Public: Indigenous Cultural Property and online media*. Paper presented at iConference 2011, Seattle, WA, USA, February 8-11.
- Baxter, D. [douglasrthomas]. (2014, March 4). Ogoki Learning Systems - CEO Darrick Baxter - App Developer [Video file]. Retrieved from <https://www.youtube.com/watch?v=JKNa0BOJdIM>.
- Binasii Inc. (2017a). Opaskwayak Cree Language Dictionary (1.15). [Mobile application software].
- Binasii Inc. (2017b). Long Plain Ojibway Dictionary (1.6). [Mobile application software].
- Binasii Inc. (2017c). Opaskwayak Cree Match Game (1.5). [Mobile application software].
- Binasii Inc. (2017d). Sayisi Dene Dictionary (2.7). [Mobile application software].
- Binasii Inc. (2017e). Opaskwayak Cree Nation Elder Stories (1.0). [Mobile application software].
- Binasii Inc. (2018a). Long Plain Word Quest (1.0). [Mobile application software].
- Binasii Inc. (2018b). Saysi Dene Match Game (2.9). [Mobile application software].
- Binasii Inc. (2018c). The Dakota Trail - Sioux Valley Dakota Nation Game (1.2). [Mobile application software].
- Binasii Inc. (2018d). Dakota Dictionary (0.1). [Mobile application software].
- Binasii Inc. (n.d.-a). Home Page. Retrieved from <http://binasii.ca/>.
- Binasii Inc. (n.d.-b). App Development. Retrieved from <http://binasii.ca/app-development/>.
- Bojórquez, E. M., Villegas, O. O. V., Sánchez, V. G. C., García-Alcaraz, J. L., & Vara, J. F. (2016). Study on Mobile Augmented Reality Adoption for Mayo Language Learning. *Mobile Information Systems, 2016*. <http://dx.doi.org/10.1155/2016/1069581>.
- Dadigan, M. (2013, April 20). Learning a Native Language? Ojibway Programmer Has an App For That. *Indian Country Today*. Retrieved from https://newsmaven.io/indiancountrytoday/archive/learning-a-native-language-ojibway-programmer-has-an-app-for-that-uvzgnzfKkkqIeo4e2_MPdg/.
- Daes, E. I. (1995). *Protection of the heritage of indigenous peoples*. Final Report of the Special Rapporteur, Mrs. Erica-Irene Daes, in Conformity with Subcommission Resolution 1993/44 and Decision 1994/105 of the Commission on Human Rights. E/C.N.4/Sub.2/1995/26

- Daniels, J. (2017, August 28). Cutting the Ribbon [Blog post]. Retrieved from <http://binasii.ca/blog/>.
- Exchange District Biz. (2017). Exchanging Words with Binasii Inc. [Blog post]. Retrieved from <https://www.exchangedistrict.org/2017/11/29/exchanging-words-binasii-inc/>.
- First People's Cultural Council. (2018). Secwepemc (1.1.1). [Mobile application software].
- First People's Heritage Language and Culture Council. (2017). SENCOTEN (1.1.2). [Mobile application software].
- Gabriel Dumont Institute. (2015). Michif Lessons (2.0). [Mobile application software].
- Galton, I. (2016). Anishinabe Translator V2 iPad (2.6). [Mobile application software].
- Google User. (2015, October 4). [Review of *Ojibway*]. *Google Play Store*. Retrieved from https://play.google.com/store/apps/details?id=com.ogoki.ojibway&hl=en_CA&showAllReviews=true.
- Grimshaw, J., & Cardoso, W. (2018). Activate space rats! Fluency development in a mobile game-assisted environment. *Language Learning & Technology*, 22(3), 159-175.
- Halstead, J. (2015, June 10). App Helps Preserve Aboriginal Languages. *Bell MTS Business Hub*. Retrieved from <https://businesshub.bellmts.ca/all-posts/app-helps-preserve-aboriginal-languages/>.
- Jarvis, S. (2015, October 19). [Review of *Ojibway*]. *Google Play Store*. Retrieved from https://play.google.com/store/apps/details?id=com.ogoki.ojibway&hl=en_CA&showAllReviews=true.
- Karstens-Smith, G. (2018, January 7). B.C. teen creates app to help revive fading Indigenous language. *Toronto Star*, Retrieved from <https://www.thestar.com/news/canada/2018/01/07/bc-teen-creates-app-to-help-revive-fading-indigenous-language.html>.
- King, B. (2017, March 29). [Review of Anishinaabemowin, Ojibway app by Wikwemikong Heritage Organization]. Retrieved from: <https://play.google.com/store/apps/details?id=com.languagepal.androidanishinaabemowin&hl=en>.
- Koole, M. (2009). A Model for Framing Mobile Learning. In M. Ally (Ed.), *Mobile Learning: Transforming the Delivery of Education and Training* (pp. 25-47). AU Press.
- Koole, M. (2018). Mobile Learning as a Tool for Indigenous Language Revitalization and Sustainability in Canada: Framing the Challenge. *International Journal of Mobile and Blended Learning*, 10(4). doi:10.4018/IJMBL.2018100101.
- Lo Bianco, J. (2018). Reinvigorating Language Policy and Planning for Intergenerational Language Revitalization. In L. Hinton, L. Huss, & G. Roche (Eds.), *The Routledge Handbook of Language Revitalization* (pp. 36-48). New York, NY: Routledge.
- Maratos, G. (2018, December 2). Looking to learn a Yukon First Nations language? There's an app for that. *CBC News*, Retrieved from <https://www.cbc.ca/news/canada/north/yukon-first-nations-are-turning-to-technology-to-preserve-language-1.4928611>.

- McIvor, O. (2012). *Îkakiwiy nihiyawiyân: I am learning [to be] Cree* (doctoral thesis). University of British Columbia (Okanagan), Vancouver, Canada.
- Miangah, T. M., & Nezarat, A. (2012). Mobile-Assisted Language Learning. *International Journal of Distributed and Parallel Systems*, 3(1). doi:10.5121/ijdps.2012.3126.
- Mi'kmaw Kina'matnewey. (2015). Puktewit (1.0). [Mobile application software].
- Mi'kmaw Kina'matnewey. (2017a). L'nui'suti (3.0.4). [Mobile application software].
- Mi'kmaw Kina'matnewey. (2017b). Kapie'l Naji-e'sue'ket (1.0). [Mobile application software].
- Mi'kmaw Kina'matnewey. (2017c). L'nui'suti. *Apple App Store*. Retrieved from <https://itunes.apple.com/ca/app/l'nuisuti/id918629700/?platform=iphone>.
- Mi'kmaw Kina'matnewey. (2018). Wowkwis aq Ka'qaquj (2.0.1). [Mobile application software].
- Mi'kmaw Kina'matnewey. (n.d.) Introducing Mi'kmaw Kina'matnewey. Retrieved from <http://kinu.ca/introducing-mikmaw-kinamatnewey>.
- Milburn, L., & Baxter, D. (2012, May 16). Ogoki Learning Systems Inc. - The Ojibway Language App. *First Mile*. Retrieved from <http://firstmile.ca/ogoki-learning-systems-inc-the-ogibway-language-app/>.
- Myran, A. (2018, July 13). [Review of *Long Plains Ojibway Dictionary*]. *Google Play Store*. Retrieved from <https://play.google.com/store/apps/details?id=com.binasii.LongPlainsDictionary&showAllReviews=true>.
- Ni'gweg Collective. (2018). Nitap (4.0). [Mobile application software].
- Ogata, H., & Yano, Y. (2003). How ubiquitous computing can support language learning. In *Proceedings of Knowledge, Economy, and Development of Science and Technology* (pp. 1–6). Honjo, Japan: Advanced Information Systems Engineering Laboratory.
- Ogoki Learning. [ogoki]. (2018, November 6). Pretty astounding by the numbers: 150 apps in the App Store, 9 featured on iTunes Canada front page, 280 tribal members trained. 1 million downloads, signed agreements: OLPC and the US Department of Corrections to license our Android software. <http://www.OgokiLearning.com>. [Tweet]. Retrieved from <https://twitter.com/ogoki/status/106004702838062848>.
- Ogoki Learning Systems Inc. (2016). Mille Lacs Tribal Police (1.0). [Mobile application software].
- Ogoki Learning Systems Inc. (2017a). Ojibway (4.0.3). [Mobile application software].
- Ogoki Learning Systems Inc. (2017b). Sandy Bay Ojibway (4.0.3). [Mobile application software].
- Ogoki Learning Systems Inc. (2017c). Garden Hill (1.0). [Mobile application software].
- Ogoki Learning Systems Inc. (2018a). Omushkego Cree (1.6). [Mobile application software].

- Ogoki Learning Systems Inc. (2018b). Hupa Language App (1.4). [Mobile application software].
- Ogoki Learning Systems. (n.d.). Home Page. Retrieved from <http://www.ogokilearning.com/>.
- Ovide, E. (2013). Intercultural Education with Indigenous Peoples and the Potential of Digital Technologies to Make it Happen. In F. J. García-Peñalvo (Ed.), *Multiculturalism in Technology-Based Education: Case Studies on ICT-Supported Approaches* (pp. 59-78). IGI Global.
- Ovide, E., & García-Peñalvo, F. J. (2016). Internet technologies as a tool in indigenous education: the case of the Wichi People in “The Impenetrable” area in Argentina. In *Proceedings of the Fourth International Conference on Technological Ecosystems for Enhancing Multiculturality* (pp. 441-445). Salamanca, Spain: Association for Computing Machinery.
- Park, Y. (2011). A pedagogical framework for mobile learning: categorizing educational applications of mobile technologies into four types. *The International Review of Research in Open and Distributed Learning*, 12(2) 78-102. doi:<http://dx.doi.org/10.19173/irrodl.v12i2.791>
- Patton, J. (2018, June 21). New app hopes to revitalize, teach Indigenous languages. *Global News*. Retrieved from <https://globalnews.ca/news/4288160/indigenous-language-app-wikwemikong-first-nation/>.
- Pauls, K. (2017). Ojibway ‘Netflix’ launches on Apple store. *CBC News*. Retrieved from <https://www.cbc.ca/news/canada/manitoba/ojibway-netflix-launches-on-apple-store-1.4444337>.
- Pew Research Center. (2018). Demographics of Mobile Device Ownership and Adoption in the United States. Retrieved from <http://www.pewinternet.org/fact-sheet/mobile/>.
- Rendell, L. (2015, May 7). Sage against the machine. *The Coast*. Retrieved from <https://www.thecoast.ca/halifax/sage-against-the-machine/Content?oid=4635528>.
- Rivera, G. S., Tesoriero, R., & Gallud, J. A. (2018). Model-based approach to develop learning exercises in language-learning applications. *Institute of Engineering and Technology Software*, 12(3), 206-214. doi:10.1049/iet-sen.2017.0085.
- Shortman, I. (2015). Navajo Toddler (1.8). [Mobile application software]
- Stockwell, G. (2008). Investigating learner preparedness for and usage patterns of mobile learning. *ReCALL*, 20(3), 253–270.
- Stockwell, G. (2010). Using mobile phones for vocabulary activities: examining the effect of the platform. *Language Learning and Technology*, 14(2), 95-110.
- Thornton, D. (2009). The Link Between Language and Sovereignty. *Indian Gaming*, 19(10), 28-29. Retrieved from http://www.indiangaming.com/istore/Oct09_Thornton.pdf.
- Thornton Media Inc. (2018a). Crow Apsaalooké (1.420). [Mobile application software].
- Thornton Media Inc. (2018b). Speak Oneida - Part 1 (0.20). [Mobile application software].

- Thornton Media Inc. (2018c). Speak Oneida - Part 1. Retrieved from <https://play.google.com/store/apps/details?id=com.languagepal.androidoneidawisconsin>.
- Thornton Media Inc. (2018d). Denesųłíné (0.7). [Mobile application software].
- Thornton Media Inc. (2018e). Speak Cayuga (1.18). [Mobile application software].
- Thornton Media Inc. (n.d.-a). A Guide to Working with Thornton Media on YOUR Language App. Retrieved from <http://www.ndnlanguage.com/>.
- Thornton Media Inc. (n.d.-b). About. Retrieved from <http://www.ndnlanguage.com/about.html>.
- TrevG23. (2016, February 9). [Review of *Tal-Tluen?*]. *Apple App Store*. Retrieved from <https://itunes.apple.com/ca/app/tal-tluen/id1081105385>.
- University of British Columbia. (n.d.). First Nations and Endangered Languages Program Faculty Profiles. Retrieved from <https://fnel.arts.ubc.ca/group/full-time-faculty/>.
- Vega, T., & Walter, A. (2016, October 10). Need to Preserve a Native Language? There's an App for for That. *The Takeaway* [Radio broadcast]. New York, NY: Public Radio International and WGBH and WNYC Studios. Retrieved from <https://www.wnycstudios.org/story/need-preserve-native-language-theres-app>.
- Viberg, O., & Grönlund, Å. (2013). Cross-cultural analysis of users' attitudes toward the use of mobile devices in second and foreign language learning in higher education: a case from Sweden and China. *Computers and Education*, 69, 169–180.
- Wikwemikong Heritage Organization. (2017). Anishinaabemowin, Ojibway (1.1). [Mobile application software].
- Yamózhó Kúé Society. (2015). Tlichó Intro (1.2). [Mobile application software].

Indigenous languages in new media: Opportunities and challenges for language revitalization

Morgan Cassels
University of Victoria
casselsm@uvic.ca

This paper looks at the use of Indigenous languages in new media and explores how these platforms empower Indigenous language speakers as grassroots language activists. Selected examples of Indigenous language use on social media will be analyzed, both through an examination of contemporary social media accounts and through literature review. These primary source examples coupled with examples from the literature will inform a discussion of the opportunities and challenges of Indigenous language use in these online spaces. New media will be discussed as productive sites for spontaneous literacy production and ultimately Indigenous self-determination.

Keywords: Language revitalization; Indigenous; Twitter; Instagram; Youtube; new media; social media

1 Introduction

“New media” refers to interactive computer-native media in which users are active content producers (Logan, 2010). New media platforms such as Twitter, Instagram, and Youtube create new domains for language use. As sites of potential Indigenous language use, they offer opportunities for language revitalization movements, however Keegan, Mato, and Ruru (2015, p. 60) caution that “new media provide new opportunities for dominant languages to be even more dominant”. Keegan et al. (2015) point out that Indigenous and minority language speakers often use a majority language online in order to reach a wider audience. Therefore, the high saturation of these media in daily life may contribute to language shift by encouraging majority language use. I will explore how speakers and learners of Indigenous languages are challenging the homogeneity of the linguistic landscape of new media and using these media to increase the visibility and prestige of Indigenous languages and Indigenous language revitalization movements.

In this paper I have left aside Facebook to focus on Twitter, Instagram, and YouTube because their public nature offers a distinctive line of inquiry into Indigenous language use. Facebook stands apart from Twitter, Instagram, and YouTube in that Facebook is typically bidirectional and involves connections between people who already know each other offline (Lillehaugen, 2016). Generally online networks tend to replicate offline networks and do so to a greater extent for minority groups which are concentrated geographically in a specific location (Cocq, 2015). However, this effect is less pronounced on Twitter,

Instagram, and YouTube than on Facebook since Facebook accounts and groups are often closed, while on Twitter, Instagram, and YouTube privacy settings are more rarely used (Keegan et al., 2015).

I will focus on how individual users and user interactions can make grassroots contributions to Indigenous language revitalization movements. I will begin by highlighting selected examples of Indigenous language use in new media. Drawing from these examples and other literature, I will discuss how new media can contribute to the valorization of Indigenous languages, both within the Indigenous community and among outsiders, and empower individuals as language activists. The challenges and limitations of new media in the language revitalization context will be explored, including the practical limitations of the medium and the risks involved in bringing personal and cultural content into the public sphere. I will also discuss the challenges of maintaining a relevant new media presence and the opportunities new media platforms offer as a living archive.

2 Examples of Indigenous language use in new media

The following selected examples draw on both a review of the literature and a direct exploration of Twitter and Instagram using Indigenous language related hashtags. These examples are by no means exhaustive in terms of how Indigenous languages are currently being used on new media; rather, they are intended to illustrate the diverse landscape of Indigenous language use online. I found the examples from Twitter and Instagram directly from those platforms, while the YouTube examples (section 2.3) come from the literature. I will also describe *IndigenousTweets.com*, which is a valuable resource for exploring the role of Twitter in Indigenous language revitalization movements.

2.1 The #SpeakMikmaq campaign

Savannah “Savvy” Simon is a 31 year-old Mi’kmaq first language speaker and language and culture advocate (Rendell, 2015). Simon started the #speakmikmaq hashtag, which now has inspired other language communities to adopt sister hashtags, such as #speakmaliseet and #speakcree on Instagram and other platforms (Rendell, 2015). Under #speakmikmaq, she shares short videos featuring humorous demonstrations of Mi’kmaq phrases, as well as cultural activities (Carmichael, 2014).

Simon’s Instagram and other social media accounts have a light touch and youthful energy, exemplified by her catchphrase which she prints on t-shirts and features in her posts and videos: *L’nuisi, it’s that easy! Speak Mi’kmaq!* (*L’nuisi* means ‘speak Mi’kmaq’ in Mi’kmaq) (Carmichael, 2014). Minority and Indigenous languages are often viewed as “old-fashioned and unglamorous” (Dlaske, 2017). Simon’s fun, youthful tone and choice of platforms — in particular Instagram — works to subvert this perception.

Simon wants to show young Indigenous people that “you can be native anywhere” (Simon as cited in Rendell, 2015, para. 14). She demonstrates by example that Instagram specifically, and the internet in general, can be a domain of use for Indigenous languages. Additionally, like other popular Instagram posters, her videos take place in a variety of settings from her daily life, including grocery stores, church, and vacations (Rendell, 2015). One video shows Simon and a friend in a parking lot enthusiastically teaching the phrase *pekhamuksin* ‘it’s nice to see you’ (Simon, 2015). The message is clear: wherever you are, online or off, you can be proudly, visibly Indigenous and speak your language.

2.2 Indigenous Words of the Day on Twitter

Indigenous words of the day appear on Twitter for a wide variety of Indigenous languages and in many different forms. Pemaptoq (2019) is a dedicated word of the day account associated with a Mi’gmaq-Mi’kmaq online dictionary which automatically posts a selected dictionary entry daily. The Qikiqtani Inuit Association, a non-profit society representing thirteen Inuit communities in Nunavut (Qikiqtani Inuit Association, 2019), posts beautifully illustrated Inuktitut words of the day alongside other tweets regarding the organization’s work (Qikiqtani Inuit, 2019). Many Indigenous individuals also include occasional Word of the Day posts as part of their personal or professional Twitter accounts. Often these words are personally relevant to users’ daily lives or popular culture. Twitter user Dallas Hunt, for example, posted “Cree word of the day: / ohcapihkêsis - ‘Spider’ / napew - ‘Man’” captioning a Spiderman gif (Hunt, 2019).

Some languages have a dedicated hashtag for word of the day posts, for example #AWOTD, which stands for Algonquin Word of the Day. Tweets featuring Algonquin words and translations appear under #AWOTD from multiple users, but most prolifically from CKWE 103.9 FM’s official Twitter account, a radio station in Kitigan Zibi (CKWE, n.d.), an Algonquin First Nations community (Kitigan Zibi Community, n.d.). The use of the hashtag makes it easy for users to find accounts which post Algonquin words of the day and identify sources of related Indigenous language learning materials, such as Algonquin word of the day wall posters.

Words of the day may serve the interconnected purposes of Indigenous language activism and Indigenous political activism. Graham Andrews, a Michif Twitter user (Andrews, 2019a), has posted Michif Words of the Day which seem directly tied to current issues affecting Indigenous peoples. For example, his January 16, 2019 post — “Today’s appropriate Michif word: / Mayitotum. / Injustice” (Andrews, 2019b) — can be understood as a response to events at the Unist’ot’en natural gas pipeline resistance camp in British Columbia.

Word of the day posts are highly accessible and generate enthusiasm around language revitalization. Embarking on a language learning journey can be intimidating. Because word of the day posts offer linguistic content one word or phrase at a time, they may serve as a welcoming ‘baby steps’ introduction for new learners or even for those who otherwise may not have considered learning their

Indigenous language. Also, because words of the day can be tied to current events, holidays, and popular culture (see CKWE, 2018 for example), they promote the use of Indigenous languages as relevant to everyday life.

2.3 Indigenous language music videos on Youtube

YouTube offers a platform for self-determined film and multi-media representation by Indigenous peoples (Johnson, 2014). Not only is YouTube video content itself a contribution to Indigenous language presence online, but Indigenous language YouTube videos provoke such salient discussions in their comments sections that Cru (2018, p. 5) sees YouTube comments as “a site for micro-level language planning” (cf. Robert & Baldauf, 1997). Through their evaluative nature, YouTube comments also offer a window into the underlying ideologies behind Indigenous language revitalization movements (Cru, 2018).

Dlaske (2017) analyzed the comments sections of two minority language music videos, an Irish language music video cover of a popular song by the late artist Avicii, and a Sami teaser for a TV comedy show. She found that the videos provoked overwhelmingly positive reactions in their comment sections (Dlaske, 2017). The comments by members of that minority language community expressed extreme enthusiasm and pride in their language and many comments included words or phrases in the minority language, for example “Is aoibheann liom ea!!!!!!!!!!!! (I love it)” (Dlaske, 2017, p. 459). There was also a pattern of commenters expressing shame and anger regarding their inability to speak their ancestral language, for example “Makes me Proud to be Irish and sickens me that I can’t understand a fu#king word” (Dlaske, 2017, p. 467).

Cru (2018) analyzed the YouTube comment sections of two Indigenous language rap music videos, one in Yucatec Maya, an Indigenous Mexican language, and one in Mapudungun, an Indigenous language spoken in Chile. He noted the growing number of South American Indigenous language rap groups and suggested that rap’s “sociolinguistic features make rap a particularly productive genre for language revitalization” (Cru, 2018, p. 3). These features include rap’s emphasis on verbal fluency and creativity, and the “coolness” and modernity associated with the genre (Cru, 2018). Like the comments analyzed by Dlaske, these comments often included replies in the Indigenous language or a mix of the Indigenous language and the majority language, Spanish, within the same sentence (Cru, 2018). One user commented “*Hach Utsil!!! Necesitamos mas maaya!*” [Well done!!! We need more Maya!] (Cru, 2018, p. 8). The italicized text is in the Indigenous language, Maya. Cru (2018) also found that the videos triggered metalinguistic reflections on the commenters’ Indigenous identities: “*jach man jats’uuts’ le bideo’ tumen ku e’esikto’on tu’ux ya’anto’on yéetel bix yaanko’on! / muy hermoso el video por que nos muestra donde y como estamos! saludos!*” [very beautiful video because it shows us where we are and how we are! greetings!] (Cru, 2018, p. 9).

2.4 IndigenousTweets.com

Kevin Scannell, a professor in the department of Computer Science at Saint Louis University (Saint Louis University, n.d.), has created *IndigenousTweets.com*, a website which scans Twitter for tweets in various Indigenous and minority languages and posts statistics about each language's presence and use (Keegan et al., 2015). *Indigenous Tweets* uses tri-grams, or sequences of three characters, to identify tweets which are similar to a database of Indigenous language corpora. A classifier based on word sequences and frequencies then identifies the most probable language for each tweet (Scannell, 2014, as cited by Keegan et al., 2015). The number of languages featured by *Indigenous Tweets* has grown steadily over the years, from 68 in 2011 (Lee, 2011), to 185 as of November 2018 (Indigenous Tweets, 2018).

For each language, *Indigenous Tweets* collects statistics per user, which means that it is immediately clear whether the total number of tweets is the result of many users occasionally using the language, or from just a small handful of very prolific accounts (Indigenous Tweets, 2018). These per user statistics are displayed along with the username (Indigenous Tweets, 2018), which allows *Indigenous Tweets* to function as a sort of index of Indigenous language material on Twitter, since Indigenous language speakers and learners can visit IndigenousTweets.com to quickly find the Twitter pages of the users who post most frequently in their language.

Since the data on *Indigenous Tweets* comes directly from Twitter account activity (users cannot sign up to be promoted on Indigenous Tweets), the website facilitates grassroots language activism: the only criterion for inclusion and ranking of users is how much a user actually posts in the language. However, these statistics can still be manipulated and may be misleading. In the case of Māori, it was found that 68% of all Māori tweets reported by *Indigenous Tweets* came from three robotic accounts posting Māori-language biblical passages on a set schedule (Mato & Keegan, 2013). However, the breakdown of the statistics per username accompanied by links to the Twitter accounts makes these robotic accounts easy to identify. Keegan et al. (2015) used *Indigenous Tweets* to analyse Māori use on Twitter and simply excluded these robotic accounts from their analysis.

In addition to helping connect speakers of the same Indigenous language, the information collected by *Indigenous Tweets* is a valuable tool for researchers investigating the use of Indigenous languages online. The statistics *Indigenous Tweets* displays can be used to measure the presence of an Indigenous language on Twitter and track the change in its presence over time. The listings of individual accounts on *Indigenous* may help learners identify potential online language champions and locate content in their language.

3 Opportunities offered through new media for Indigenous language revitalization

New media offers an opportunity for language revitalization movements to expand across geographic and socio-cultural borders. It gives speakers and learners freedom to self-determine their language usage and bring their language into contexts which are relevant to themselves and their peers. For instance, hashtags, a central component of new media platforms, empower language users to broadcast their identities and align themselves with cultural and linguistic communities. The following section describes the positive role new media platforms can play within language revitalization movements by bringing together geographically dispersed language activists, facilitating the emergence of active and self-determined writing cultures, and fostering connections between and within linguistic and cultural groups through hashtags.

3.1 The broad reach of new media

Online spaces transcend geographic differences, meaning that Indigenous language use on new media is not restricted to a particular language's traditional territory. Simon raises the issue of disconnection between urban youth and their Indigenous culture: she says that urban youth who have never lived in an Indigenous community feel that they're "losing out on experiences" (Simon as cited by Rendell, 2015, para. 13). Indigenous language use on new media helps address this issue by including and engaging Indigenous people who live far from their ancestral lands and communities. New media also connects disjunct Indigenous communities whose traditional territories are separated by national borders (Cru, 2018).

Additionally, the public nature of new media means that the Indigenous language content is not restricted to members of that community. Language revitalization activists from different Indigenous communities worldwide can easily look to each other's activities on social media for inspiration. For example, when Twitter user Cana Uluak Itchuaqiyaq tweeted an Iñupiatun word of the day, *kunik*, meaning 'faceplant' (Itchuaqiyaq, 2018a), the first reply offered the Irish translation *titim ar aghaidh* (Kathleenrmc99, 2018).

The public nature of these media also allows both individual pieces of content and language activists' broader goals to reach beyond the group of people already committed to revitalization (Lillehaugen, 2016). Both Dlaske (2017) and Cru (2018) found that Indigenous language YouTube videos are appreciated and commented on by international audiences, demonstrating that new media is an effective way for Indigenous language revitalization efforts to gain recognition by those outside the language community, which can lead to greater prestige for the language and for language revitalization in general.

3.2 Orality and non-prescriptivist language use

New media is defined by its participatory culture, where consumers are involved in the creation and distribution of content (Jenkins, 2016). This participatory environment facilitates “non-prescriptivist language usage which often reflects orality” (Cru, 2018, p. 8). The casual nature of social media interactions gives users space to experiment and adapt the language to their own contexts.

One aspect of this non-prescriptivist language usage is orthographic variation. The development of standardized orthography systems can lead to unproductive debates, or even “orthography wars” within a language community (Hinton, 2014). Lillehaugen argues that languages do not need a standardized orthography for an active writing culture and that in fact standardized orthographies often arise from active writing cultures and not the other way around (Lillehaugen, 2016). YouTube videos and other new media content in Indigenous languages trigger comments which contribute to building an active writing culture in the language (Cru, 2018).

Much of the Indigenous language content on Twitter, YouTube, and Instagram reflects the widespread practice of code-mixing, where both a majority and minority language may be used within a single utterance. For example, Twitter user Cana Uluak Itchuaqiyaq often combines one or two Iñupiatun words with English sentences: “This Iñupiaq just passed her 2nd year PhD annual review with some high praise. Thought I’d share so you can nuniaq me cuz I worked real hard” (Itchuaqiyaq, 2019a). In a follow-up tweet she explains that *nuniaq* means to show affection by praising someone in baby-talk (Itchuaqiyaq, 2019b). Another Twitter user, Graham Andrews, mixes Michif and English without necessarily providing English translations for all the Michif content. For example, before the release of a highly-anticipated episode of the TV show *Game of Thrones*, he tweeted “Li taan aen faan di Game of Thrones ... l'ivayr payamaakhun. / Winter is coming...” (Andrews, 2019c).

The greater visibility afforded to code-mixing in online contexts helps to normalize and legitimize the practice within Indigenous language revitalization movements (Cru, 2018). Normalizing code-mixing may reduce perceived barriers to participation in Indigenous language use online. New learners can immediately begin using their Indigenous language, one word at a time and interspersed with the majority language, in their posts and comments. Linguistic proficiency need not be a prerequisite to participation in bringing an Indigenous language online.

Discourse on new media is free from the traditional top-down editorial process (Srinivasan, 2006). This freedom makes new media a democratizing force. New media platforms facilitate the spontaneous production of Indigenous literacies, unimpeded in their production by any ongoing issues related to standardization or purism.

3.3 Hashtags as a tool for minority empowerment

Hashtags are a form of user-generated “social metadata” (McMonagle, Cunliffe, Jongbloed-Faber, & Jarvis, 2018, p. 1) which help users quickly find relevant posts and recommend their own posts to others with similar interests. Many Indigenous language communities have adopted hashtags specifically promoting their language, including *#speakmikmaq* (Rendell, 2015), and *#gollegiella* (North Sami for ‘golden language’) (Cocq, 2015). Other language communities simply use hashtags denoting the name of their language, such as *#algonquin* (CKWE, 2018), *#aarjel* (Cocq, 2015), and *#zapoteco* (Lillehaugen, 2016).

Cocq (2015) describes how hashtags allow users to collectively create a bottom-up classification of the content as opposed to traditional media which categorize content top-down. She proposes that this collective tagging empowers Indigenous communities by facilitating classification according to “Indigenous premises that are not possible in traditional media” (Cocq, 2015, p. 282). By developing their own classification systems, users are not confined to dominant frameworks of content organization.

Additionally, McMonagle et al. (2018) suggest that hashtags have a greater significance than just serving as a topic marker: hashtags create “ambient communities” (McMonagle et al., 2018, p. 1), where users align themselves together without necessarily directly interacting. These ambient communities facilitate bonding over shared values (Zappavigna & Martin, 2018). Indigenous language-related hashtags convoke a language’s learners, speakers, and activists. Even learners who do not know any other speakers may feel a sense of kinship when they see their language’s hashtag used “in the wild,” and using the hashtag themselves can be a proud declaration of belonging.

Vigil-Hayes, Duarte, Parkhurst, and Belding (2017) found that hashtags relating to Indigenous identity were more likely to appear together than individually, with multiple hashtags per post. A single tweet or Instagram post often includes hashtags regarding the poster’s identity, the endonym and exonyms of their language, the name of the language family, and other broader hashtags such as *#indigenous*. Hashtags allow the user to explicitly specify each of the audiences they want to reach and the communities they belong to, from a highly localized group, such as speakers of their local dialect, to international groups sharing a common interest, such as global Indigenous movements (Cocq, 2015).

4 Challenges faced by Indigenous language users on new media

Access to new media depends on access to supporting technology, such as up-to-date internet capable devices and high-speed broadband. Further, language use online requires supportive language technology, such as Indigenous language keyboards and spell check. Both hardware technology and language technology are inadequately available to users of Indigenous languages. Additionally, Indigenous language users face the challenge of online criticism, which is an issue for all internet content creators but may be especially vitriolic for members of

marginalized groups. In general, the use of public platforms also necessarily raises privacy concerns. Specifically, within the context of Indigenous language revitalization, use of new media platforms raises issues regarding the sharing of cultural intellectual property online.

I will describe how the lack of supportive language technology reduces the convenience of Indigenous language use online and how inadequate internet infrastructure in rural communities limits who may participate in the positive opportunities outlined in Section 3 above. I will also discuss how sharing cultural and linguistic content online carries a level of risk due to the threat of harassment and racism and how privacy concerns regarding the sharing of cultural material online can cause conflict within communities.

4.1 Technological barriers to Indigenous language use online

The quality of technical language support, which includes everything from support of orthography and spell check to predictive text and speech recognition, varies hugely between language communities since it is dependent on the size and accessibility of data in that language (Soria, 2016). In terms of orthography, Twitter supports every Unicode scripted language (Keegan et al., 2015), including the Cherokee syllabary and Canadian Aboriginal Syllabics (Unicode, n.d.). Many Twitter and Instagram users include Inuktitut Syllabics in their posts, for example Instagram user Lori Idlout describes her photo of two children wearing toques: “The irngutaak loved that we had similar hats.” (Idlout, 2019).

However, Indigenous languages have virtually no technological support beyond basic keyboard input (Streiter, Scannell, & Stuflessner, 2006). In terms of spell check, predictive text, and other statistics-based language technologies, Indigenous languages are limited by the size of their corpora since quality statistics-based tools require huge amounts of open data on which to train. This means that many endangered languages are very poorly supported or not supported at all. However, encouragingly, this also means that users are empowered to increase the quality of their language support simply by using the language.

While discussion of language technology might typically focus on language support for personal computers, the importance of mobile-based technical language support cannot be overstated: in 2016, 88% of Canadian households owned a smartphone while 84% owned a home computer (Canadian Radio-television and Telecommunications Commission, 2018). In 2016, global internet traffic from mobile devices exceeded that from personal computers for the first time (Statcounter Global Stats, 2016) and currently in some parts of the world the market share of mobile devices is significantly greater than that of personal computers. A recent study of mobile device usage in 11 emerging economies found that a vast majority of adults in those countries have a smartphone and a median of 27% have a smartphone but not a computer or tablet (Silver et. al., 2019).

Unfortunately, mobile devices rely more heavily on more advanced language technology such as speech recognition and gesture typing (Lackaff & Moner, 2016), which have greater barriers to development than just basic keyboard

support for a language. Lackaff and Moner stress that support by these advanced language technologies massively increases the convenience of using a language (Lackaff & Moner, 2016), and so more advanced language technologies must be included in the discussion of language technology equity for Indigenous languages.

Another barrier to the quality of technical language support is that there are very few monolingual speakers for many Indigenous languages, which means that technology companies have less economic incentive to support these languages (Soria, 2016). Lackaff and Moner point to the potential of open-source software and crowdsourcing, which are not constrained by marketplace profitability (Lackaff & Moner, 2016).

A successful example of crowdsourced language technology is software localization, the process of translating a software interface into the user's preferred language. Many social media companies, such as Twitter and Facebook, allow users to contribute to localization by providing translations and voting on the accuracy of other users' translations (Hessellund, 2014). This mechanism empowers speakers of Indigenous and minority languages. When Vannina Bernard-Leoni at the Pascal Paoli University of Corsica learned about this crowdsourced translation tool, she, along with six students, began providing Corsican translations (Guynn, 2016). Her small but powerful initiative inspired hundreds of other Corsican speakers (Guynn, 2016) and now the Facebook interface is available in Corsican (Facebook, 2018).

4.2 Issues of access

Despite the democratizing effect of participatory media, it must be noted that new media are not accessible to all. New media users generally represent only select segments of the population. In the case of Twitter, the user base tends to have a higher educational background than the general population (Cocq, 2015). All major social media are used at much higher rates by young people than older people, and Instagram in particular is used overwhelmingly by people between the ages of 18 and 25 (Smith & Andersen, 2018). Those who fall outside these groups may be unlikely to engage with new media and therefore not experience the benefits these media can offer for their language community.

Another major barrier to participation in new media is the requirement for high speed internet, which can be cost prohibitive or completely unavailable in remote areas. Compounding this issue is the fact that Indigenous communities disproportionately lack broadband access. According to the American Federal Communications Commission (2015), advanced broadband is unavailable to 53% of rural Americans but that figure increases to 85% for rural Americans living on Tribal lands. A significant divide in broadband access also exists between Indigenous and non-Indigenous communities in Canada (Centre for the Study of Living Standards, 2013).

Similarly, many reserves in Canada lack broadband and therefore are completely cut off from all essential internet resources, not to mention the benefits of new media (Stollery, 2018). It is common for members of Indigenous

communities, both on and off reserve, to travel long distances to the nearest internet access point, often located in private businesses (Belding et al., 2017). This inaccessibility limits who can contribute to and benefit from the presence of Indigenous languages on new media.

4.3 Online criticism

A danger faced by anyone posting on social media and faced in particular by Indigenous people sharing their language and culture, is the level of vitriol they can experience online. According to Chief Bobby Cameron of the Federation of Sovereign Indigenous Nations, vicious attacks and racist threats “have become disturbingly regular” in comments sections and elsewhere online, leaving some Indigenous people fearing for their lives (Kassam, 2017, para. 7).

Both Dlaske (2017) and Cru (2018) found negative comments on the YouTube videos they analyzed, despite the videos’ overwhelmingly positive receptions. Negative comments can be particularly scathing online. Dlaske (2017, p. 460) noted one expletive-laden comment condemning the Irish language video, which, among other things, told the music video producers “You musn’t be Irish”.

Criticism can also come from inside Indigenous language communities. Savvy Simon, creator of *#speakmikmaq*, has been attacked and ridiculed by speakers of different Mi’kmaq dialects for speaking in her own regional dialect (Rendell, 2015). In response, Simon posted a video on YouTube entitled *Keeping Our Talk* which addresses her critics, who she refers to as her oppressors (Simon, 2014). She says “shame on you” to those who have harassed her online and explains that this sort of criticism is the very reason why Indigenous people are reluctant to speak their languages (Simon, 2014, 1:40).

Online harassment is a very real threat, and Indigenous language users on social media must be recognized for the inherent bravery of using their language in those spheres.

4.4 Cultural intellectual property and privacy

Despite the benefits of the open and accessible nature of these platforms, the fact that posts involving linguistic and cultural content are public raises issues of cultural intellectual property. Cultural intellectual property includes literary and artistic works and photographic, audio, or video documentation of Indigenous peoples’ heritage (Daes, 1995). Much Indigenous language content on new media is accompanied by images or video, and the Indigenous language content itself may constitute a literary or artistic work.

Belarde-Lewis (2011) describes how there can be conflict within Indigenous communities regarding whether content containing cultural intellectual property should be posted to publicly accessible platforms. She investigated the comments sections of videos of Hopi village dances on YouTube and found a range of sentiments, including some strong opposition such as “Omg who posted this????????????? It is not supposed to be online! Nor filmed nore (sic)

photographed, what a disrespect!” (Belarde-Lewis, 2011, p. 21). However, some videos were clearly posted by community members who felt that public sharing on YouTube was appropriate: one video entitled “Hopi Buffalo Dance at Kyotsmovi 2009 part 1” was captioned “...My little sisters dancing...sooo proud of them!...” (Belarde-Lewis, 2011, p. 22). Because attitudes within communities can be mixed, the introduction of Indigenous linguistic and cultural content to new media platforms may cause conflict within a community.

The broad reach of new media platforms allows local language revitalization movements to reach global audiences. Speakers, learners, and those not yet involved in language revitalization can more easily connect with and inspire one another. At the same time, the public nature of these platforms may mean that they are not always the appropriate platform for certain cultural material. Privacy concerns, both at an individual and at a community level, may restrict the role new media platforms play within Indigenous language revitalization movements.

5 Maintainability and findability

Due to the chronological nature of online feeds, the impact of content on new media is often tied directly to its recency. I will discuss how this focus on new content poses challenges for content creators. However, the robust infrastructure of mainstream online platforms allows chronological feeds to be preserved over time, creating a well-organized and highly accessible archive. I will describe the potential of new media platforms to serve as valuable archival tools.

5.1 Challenges of maintaining a presence on new media

The short attention span of the online media environment and resulting need to continually produce new content poses a challenge for Indigenous language content creators. The visibility and, consequently, the impact of online content is often directly related to its newness. Therefore, online resources may come to appear obsolete much faster than traditional ones. Corbett and Kulchyski (2009) describe a Hul’q’umi’num’ language blog project which elicited much initial enthusiasm but proved to be ultimately unsustainable due to the sheer work required for constant maintenance.

Some ‘Word of the Day’ initiatives may eventually face this issue if the necessary daily commitment becomes unsustainable. Once an account stops posting, it disappears from users’ news feeds and is no longer seen unless users explicitly search for it. This unfortunately means that all the work put into such an account, and the quality archive of posts still available on that account, can be quickly forgotten by the online community.

However, many Indigenous language users, such as Cana Uluak Itchuaqiyag, a PhD student at Utah State University (Utah State University, n.d.), maintain a single account and use it for a combination of personal, professional, and activism purposes. On Itchuaqiyag’s Twitter account, Canaltch, tweets from

November 2018 include family photos, English-language news stories about Indigenous issues, and Iñupiatun words of the day (Itchuaqiyag, 2018b). As described earlier in Section 3.2, many of her posts involve code-mixing: often she follows an English sentence with an Iñupiatun exclamation (Itchuaqiyag, 2018c; Itchuaqiyag, 2018d).

It seems that Itchuaqiyag maintains her account out of a personal desire to do so and that maintenance is not a burden; she has tweeted 776 times between March and November 2018 (Itchuaqiyag, 2018b). By integrating Indigenous language use into their personal online presence, Indigenous language users can reduce the burden of maintainability associated with producing language content. Since Indigenous social media users are already maintaining such accounts, the increased burden of including language content is negligible.

5.2 Archival value of new media platforms

Social media pages can function as “digital, peer-produced archive[s]” (Myland, 2017, p. 277). Content on sites like Twitter, Instagram, and YouTube is kept accessible indefinitely, requiring no maintenance by the content producer. This is a highly valuable feature; a great deal of ongoing maintenance would otherwise be required to keep content on independently produced websites accessible.

The archival quality of new media allows those interested in Indigenous language revitalization to quickly discover content, regardless of when it was posted, by searching Google or a specific social media site. Through hashtags and search functions, new media platforms offer a high degree of findability, useful for both researchers and dedicated language learners searching for more resources in their language.

6 Conclusion

Twitter, YouTube, and Instagram are productive sites for Indigenous language use and valorization. Hashtags allow emic categorization of content and create ambient communities bonded through shared linguistic pride. New media facilitate spontaneous literacy production and non-prescriptivist language use: postings and comments on these user-generated spaces can be seen as “vernacular literacies generated from below” (Cru, 2018, p. 14). New media allow the connection of geographically disjunct Indigenous groups and facilitate support and awareness between different Indigenous language revitalization movements internationally. The presence of Indigenous languages on new media sparks metalinguistic reflection among users and increases the legitimacy of Indigenous languages as relevant, modern modes of communication.

Barriers remain to participation in new media for Indigenous peoples, most notably the disproportionate lack of internet access in Indigenous communities. Additionally, technical language support of Indigenous languages must be expanded to reduce the inconvenience of using these languages online. Due to the increasing dominance of mobile devices, quality mobile support should be a

priority for those working towards language technology equity. Indigenous language speakers are empowered as data producers to contribute to the development of technical language support by choosing to use their languages online and by volunteering with crowdsourced language projects.

New media require content creators to constantly work to stay relevant in a newsfeed-based environment. However, the Indigenous language content produced online is not wasted when accounts go dormant. New media platforms serve as valuable archiving tools, allowing old content to be easily found and used by anyone willing to search for it.

The bottom-up structure of participatory media is well-suited to the goals of Indigenous language revitalization movements, which often exist in conflict with colonial institutions and power structures. New media certainly cannot single-handedly drive a language revitalization movement; however, these platforms offer an opportunity for self-determination for Indigenous language speakers, learners, and activists.

Acknowledgements

I would like to thank Dr. Leslie Saxon for her guidance and feedback on an earlier draft of this paper. This began as a research paper for her undergraduate course LING 431 “Community Initiatives in Language Revitalization” at UVic. Thank you also to Dr. Jasmine Spencer for her time, support and expertise as this paper evolved into its current form.

References

- Andrews, G. (2019a). Twitter account profile. Retrieved January 26, 2019 from <https://twitter.com/liimichif>.
- Andrews, G. [LiiMichif]. (2019b, January 26). Today's appropriate Michif word: / Mayitotum. / Injustice. [Tweet]. Retrieved from <https://twitter.com/LiiMichif/status/1085537248433455106>.
- Andrews, G. [LiiMichif]. (2019c, April 27). Li taan aen faan di Game of Thrones ... l'ivayr payamaakhun. Winter is coming... [Tweet]. Retrieved from <https://twitter.com/LiiMichif/status/1122298601445703680>.
- Belarde-Lewis, M. (2011). *Sharing the Private in Public: Indigenous Cultural Property and online media*. Paper presented at iConference 2011, Seattle, WA, USA, February 8-11.
- Carmichael, D. (2014, November 24). Mi'kmaq speaker uses social media to share tradition; SSDEC takes notes for educational Indigenous language programs. Northern Journal. Retrieved from <https://norj.ca/2014/11/mikmaq-speaker-uses-social-media-to-share-tradition/>.

- Centre for the Study of Living Standards. (2013). The Contribution of Broadband to the Economic Development of First Nations in Canada. Retrieved from http://www.csls.ca/res_reports.asp.
- CKWE. [CKWERADIO]. (2018, October 31). #Algonquin Word of the Day - Niba-madwesin / Halloween #AWOTD #KitiganZibi #HappyHalloween #trickortreat. [Tweet] Retrieved from <https://twitter.com/CKWERADIO/status/1057642576172462080>.
- CKWE. (n.d.). About us. Retrieved November 14, 2018 from <http://www.ckwe1039.fm/about-us/>.
- Cocq, C. (2015). Indigenous Voices on the Web: Folksonomies and Endangered Languages. *Journal of American Folklore*, 128(509), 273-285. doi:10.5406/jamerfolk.128.509.0273
- Corbett, J., & Kulchyski, T. (2009). Anti social-computing: indigenous language, digital video and intellectual property. *Participatory Learning and Action*, 59, 52-58. Retrieved from <http://pubs.iied.org/G02840/>.
- Canadian Radio-television and Telecommunications Commission. (2018). 2018 Communications Monitoring Report. Communications services in Canadian Households: subscriptions and expenditures 2012-2016. Retrieved from <https://crtc.gc.ca/eng/publications/reports/policymonitoring/2018/cmr1.htm#s10ii2>.
- Cru, J. (2018). Micro-level language planning and YouTube comments: destigmatising indigenous languages through rap music. *Current Issues in Language Planning*, 19(4), 434-452. doi:10.1080/14664208.2018.1468960.
- Daes, E. I. (1995). *Protection of the heritage of indigenous peoples*. Final Report of the Special Rapporteur, Mrs. Erica-Irene Daes, in Conformity with Subcommission Resolution 1993/44 and Decision 1994/105 of the Commission on Human Rights. E/C’N.4/Sub.2/1995/26
- Dlaske, K. (2017). Music video covers, minoritized languages, and affective investments in the space of YouTube. *Language in Society*, 46(4), 451-475. doi:10.1017/S0047404517000549.
- Facebook. (2018). Language Settings. Retrieved November 14, 2018 from <https://www.facebook.com/>.
- Federal Communications Commission. (2015). 2015 Broadband Progress Report. Retrieved from <https://www.fcc.gov/reports-research/reports/broadband-progress-reports/2015-broadband-progress-report>.
- Guynn, J. (2016, September 29). Does Facebook speak your language? USA Today. Retrieved from <https://www.usatoday.com/story/tech/news/2016/09/29/facebook-translation-new-languages-corsican-fulah-malta/91268284/>.
- Hessellund, L. T. (2014). *Crowdsourcing in the Translation Industry - An Emerging Trend in a Globalised World* (master’s thesis). Aarhus University, Aarhus, Denmark. Retrieved from http://pure.au.dk/portal/files/79510036/Crowdsourcing_in_the_Translation_Industry_An_Emerging_Trend_in_a_Globalised_World.pdf.

- Hinton, L. (2014). Orthography Wars. In M. Cahill & K. Rice (eds.), *Developing orthographies for unwritten languages*, (pp. 139-168). Dallas, TX: SIL International Publications.
- Hunt, D. [Dallas_Hunt]. (2019, January 15). Cree word of the day: / ohcapihkêsis - 'Spider' / napew - 'Man'. [Tweet]. Retrieved from https://twitter.com/Dallas_Hunt/status/1085242216640057344.
- Idlout, L. [@lidlout]. (2019, April 27). The irngutaak loved that we had similar hats. □□□□□□ □□□□□□□□□□ □□□□□□□□□□ □□□□□□□□□□. Retrieved from https://www.instagram.com/p/Bwx_cWyHKYh/.
- Indigenous Tweets. (2018). Indigenous Tweets. Retrieved November 14, 2018 from <http://indigenoustweets.com/>.
- Itchuaqiyag, C. U. [CanaItch]. (2018a, November 14). Iñupiatun word of the day: kunik- kiss / when you accidentally fall flat on your face / That's the thing with me: when I kunik, I kunik. I'm an awkward, clumsy, emotional creature; my ancestors were so funny and totally got it right. / Coon-ick / #WordOfTheDay #NativeTwitter [Tweet]. Retrieved from <https://twitter.com/CanaItch/status/1062763136036392960>.
- Itchuaqiyag, C. U. (2018b). Twitter account profile. Retrieved November 14, 2018 from <https://twitter.com/CanaItch>.
- Itchuaqiyag, C. U. [CanaItch]. (2018c, November 13). Wow. So much history that I didn't know. Taikuu. [Tweet]. Retrieved from <https://twitter.com/CanaItch/status/1062390747637268480>.
- Itchuaqiyag, C. U. [CanaItch]. (2018d, November 10). Here's my nephew Adam braving the elements. Igñiiñ! [Tweet]. Retrieved from <https://twitter.com/CanaItch/status/1061403258298654720>.
- Itchuaqiyag, C. U. [CanaItch]. (2019a, April 26). This Iñupiaq just passed her 2nd year PhD annual review with some high praise. Thought I'd share so you can nuniaq me cuz I worked real hard. @ Utah State University [Tweet]. Retrieved from <https://twitter.com/CanaItch/status/1121897645587554307>.
- Itchuaqiyag, C. U. [CanaItch]. (2019b, April 26). Just so you know, nuniaq is showing someone affection by baby-talking to them. / Like this: uh oh oh Canabones so smart girl punklink punklink gooda gooda gooda uh oh oooooohhhhhh. [Tweet]. Retrieved from <https://twitter.com/CanaItch/status/1121926637858082816>.
- Jenkins, H. (2006). *Convergence Culture: Where Old and New Media Collide*. New York, NY: New York University Press.
- Johnson, M. K. S. (2014). *Clear speech: 1,000 hours to mid-intermediate N'syilxcn proficiency* (doctoral thesis). University of British Columbia (Okanagan), Kelowna, Canada.
- Kassam, A. (2017, Jul 27). First Nations leader urges Canada to prosecute 'out of hand' hate speech. *The Guardian*. Retrieved from <https://www.theguardian.com/world/2017/jul/27/canada-first-nations-hate-speech-bobby-cameron>.

- Kathleenmc99. (2018, November 14). "Face-Plant"! In Irish: titim ar aghaidh [Tweet]. Retrieved from <https://twitter.com/kathleenmc99/status/1062766485976875008>.
- Keegan, T. T., Mato, P., & Ruru, S. (2015). Using Twitter in an Indigenous Language: An analysis of te reo Māori Tweets. *AlterNative: An International Journal of Indigenous Peoples*, 11(1), 59-75. doi:10.1177/117718011501100105.
- Kitigan Zibi Community. (n.d.). Kitigan Zibi Community Web Site Home. Retrieved from <http://kzadmin.com/Home.aspx>.
- Lackaff, D., & Moner, W. (2016). *Local languages, global networks: Mobile design for minority language users*. Paper presented at the 34th Annual International Conference on the Design of Communication, Silver Spring, MA, September 2016. doi:10.1145/2987592.2987612.
- Lee, Dave. (2011, April 8). Micro-blogging in a mother tongue on Twitter. *BBC World Service Click*. Retrieved from http://news.bbc.co.uk/2/hi/programmes/click_online/9450488.stm.
- Lillehaugen, B. D. (2016). Why write in a Language (almost) no one can read? *Language Documentation and Conservation*, 10(1), 356-393. Retrieved from <http://hdl.handle.net/10125/24702>.
- Logan, R. K. (2010). *Understanding new media: Extending marshall McLuhan*. New York: Peter Lang.
- Mato, P., & Keegan, T. T. (2013). Indigenous tweeting for language survival: The Māori-language profile. *International Journal of Technology and Inclusive Education*, 2(2), 184-191. doi:10.20533/ijtie.2047.0533.2013.0024.
- McMonagle, S., Cunliffe, D., Jongbloed-Faber, L., & Jarvis, P. (2018). What can hashtags tell us about minority languages on Twitter? A comparison of #cymraeg, #frysk, and #gaeilge. *Journal of Multilingual and Multicultural Development*, 39. doi:10.1080/01434632.2018.1465429.
- Mylanos, Y. (2017). Witnessing absences: social media as archives and public spheres. *Social Identities*, 23(3), 271-288. doi:10.1080/13504630.2016.1225495.
- Pematoq. (2019). Twitter account profile. Retrieved January 26, 2019 from <https://twitter.com/pemaptoq?lang=en>.
- Qikiqtani Inuit Association. (2019). *About Us*. Retrieved from <https://qia.ca/about-us/>.
- Qikiqtani Inuit. (2019). Twitter account. Retrieved January 26, 2019 from https://twitter.com/Qikiqtani_Inuit?ref_src=twsrc%5Egoogle%7Ctwcamp%5Eserp%7Ctwgr%5Eauthor.
- Rendell, L. (2015, May 7). Sage against the machine. *The Coast*. Retrieved from <https://www.thecoast.ca/halifax/sage-against-the-machine/Content?oid=4635528>.
- Robert, K., & Baldauf, R. (1997). *Language Planning from Practice to Theory*. Clevedon, UK: Multilingual Matters Ltd.
- Saint Louis University. (n.d.). Kevin Scannell Profile. Retrieved from <http://cs.slu.edu/people/scannell>.

- Silver, L., Smith, A., Johnson, C., Taylor, K., Jiang, J., Anderson, M., & Rainie, L. (2019, March 7). Mobile Connectivity in Emerging Economies. *Pew Research Center*. Retrieved from <https://www.pewinternet.org/2019/03/07/mobile-connectivity-in-emerging-economies/>.
- Simon, S. (Producer) (2014). *Keeping Our Talk*, [Online video]. Retrieved November 14, 2018 from <https://www.youtube.com/watch?v=w7oQzVTc3lk>.
- Simon, S. [@savvyunltd]. (2015, July 11). Pekwamuksin = it's nice to see you, it's been a long time, looking good! #SpeakMikmaq featuring @meuservey. Retrieved from <https://www.instagram.com/p/5Aal-0qG1T/>
- Smith, A., & Anderson, M. (2018, March 1). Social Media Use in 2018. *Pew Research Center*. Retrieved from <http://www.pewinternet.org/2018/03/01/social-media-use-in-2018/>.
- Soria, C. (2016). What is Digital Language Diversity and Why Should We Care? *Linguapax Review*, 4(1), 13-28. Retrieved from <http://www.linguapax.org/wp-content/uploads/2015/03/LinguapaxReview2016web.pdf>.
- Srinivasan, R. (2006). Indigenous, ethnic and cultural articulations of new media. *International Journal of Cultural Studies*, 9(4), 497-518. Doi:doi.org/10.1177/1367877906069899.
- Statcounter Global Stats. (2016). *Mobile and tablet internet usage exceeds desktop for first time worldwide* [Press release]. Retrieved from <http://gs.statcounter.com/press/mobile-and-tablet-internet-usage-exceeds-desktop-for-first-time-worldwide>.
- Streiter, O., Scannell, K., & Stuflessner, M. (2006). Implementing NLP projects for non-central languages: instructions for funding bodies, strategies for developers. *Machine Translation*, 20(4), 267-289. doi:0.1007/s10590-007-9026-x.
- Stollery, B. (2018, May 3). Canada's Digital Divide: Preserving Indigenous Communities Means Bringing Them Online. *Friends of Canadian Broadcasting*. Retrieved from <https://www.friends.ca/pub/15069>.
- Unicode. (n.d.). Supported Scripts. Retrieved November 14, 2018 from <https://www.unicode.org/standard/supported.html>.
- Utah State University. (n.d.). TCR Graduate Students: Cana Uluak Itchuaqiyaq. Retrieved from <https://techcomm.usu.edu/gradstudents/itchuaqiyaq>.
- Vigil-Hayes, M., Duarte, M., Parkhurst, N. D., Belding, E. (2017). #Indigenous: Tracking The Connective Actions of Native American Advocates on Twitter. Paper presented at the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing, Portland, Oregon, 25 February - 1 March (pp. 1387-1399). Association for Computing Machinery. doi:10.1145/2998181.2998194.

Zappavigna, M., and J. R. Martin. (2018). #Communing Affiliation: Social Tagging as a Resource for Aligning Around Values in Social Media. *Discourse, Context & Media*, 22(1), 4-12. doi: 10.1016/j.dcm.2017.08.001.