Integrated Web Tools for Innu Language Maintenance

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How can we create a strong presence on the web for Aboriginal languages and make use of Information and Communication Technologies to support language maintenance? The goal of this paper is to report on a series of projects aimed at bilingual speakers (Innu-French, based in Quebec) who wish to preserve their Innu mother tongue and become literate in their language. Additional users are bilingual Innu-English speakers from Labrador, second-language learners, and the general public. Using a collaborative (participatory action) research framework with partners involved in language teaching, we have been developing the following modules:

- online language lessons and games that include basic literacy skills, vocabulary enrichment, the teaching of grammatical concepts, and the discovery of language structure (jeux.tshakapesh.ca)
- online oral stories database, categorized and searchable, with audio and video files download (histoires.tshakapesh.ca)
- online catalogue, categorized and searchable, to help the dissemination of educational and cultural resources in the Innu language (catalogue.tshakapesh.ca)
- a blog in Innu to discuss language-related issues (innu-aimun.ca/blog)

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grammatical web pages to support the online Innu dictionary (www.innu-aimun/dictionnaire) and the grammatical modules of the games (inну-aimun.ca/blog)

- an interactive integrated Verb Conjugation applet (verbe.innu-aimun.ca) and a Media Manager for upload and management of sound files, videos, and images shared across modules

- a Facebook page to promote Innu language activities (Innu-Aimun Facebook page)

For the language games, different interfaces allow ongoing creation of new lessons and exercises. Features include: sound and image, computer generated random variation, trackable results and progress. Similarly, different interfaces allow further development of the oral stories, book catalogue and grammatical pages. Our design emphasizes the integrated aspect of such tools to create an enriched learning environment, as well as easy resource transfer from one language group to another. Archiving of the language data is facilitated by the common infrastructure and database design, but for lack of space, will not be discussed here.

In the rest of this paper, we will discuss successes and challenges in developing those tools, starting with the framework adopted.

**Participatory Action Research**

The framework of this research is participatory action research, as defined by Manoukian (1989) for international development. This means that the research process as important as the goal, which is defined right from the start in a collaborative framework (Leonard & Haynes, 2010). In our context of language maintenance, all partners are therefore
involved in language documentation and teaching. In the context of information and communication technologies allowing us to build collective intelligence, we are open to feedback and contribution from the general population: we view learning as an emergent phenomenon (Mitra, 2011), and we work with open-source programs (http://opensource.org).

ON-LINE LANGUAGE LESSONS AND GAMES

Innu people do speak their language but do not know how to write in the recently standardized orthography. Of the 10,000 Innu speakers targeted in these projects, 200 at most have had training in the standard orthography, and fewer than 50 have really mastered it. Some people over 60 years old are still monolingual speakers of Innu, while the others are bilingual speakers of Innu-French or Innu-English in Labrador. All Innu communities in Quebec have a primary school, but only two have a secondary school. There is no course offered in Innu at an advanced level (beyond primary school), and no Innu language is spoken in schools outside the Innu communities. Innu has never been the language of instruction in schools. There is a tendency, once the colonial language orthography has been mastered, to use this orthography to write the language phonetically. This is ineffective and does not allow for communication across dialects and across idiosyncratic speakers. The main objective is thus to promote the standard orthography through online games. Literacy in the Aboriginal language is seen as a desirable goal in terms of Aboriginal language and culture preservation (Drapeau, 1992, Burnaby, 2005). As many Innu live in large Canadian cities outside of their community, language maintenance is an issue for them and can be assisted by the use of online language games. The same is true for one Innu community that has lost the language and
wishes to regain it; for them, the language has to be taught as a second language and our site can be a good complement.

While the main objective is to promote the use of standard orthography through these online games, there is also a desire to slow down, or reverse as much as possible, language attrition. We therefore identified areas of vocabulary ignored by young people. Promoting knowledge of grammar in general, not only for grammatical orthography but also for language retention and accuracy, was also identified as another goal of the games. Finally, support for language teachers was another desirable outcome. In addition to managing each learner's profile, we added a class management module so that teachers may use the games as a part of a language course, to track their students' progress.

Another function of the class management module is to allow teachers to create their own sets of lessons and exercises progression, by combining different existing lessons and exercises to fix their goal.

The current games consist of three major sets of lessons and exercises, built on two different programs. The first set is aimed at teaching basic literacy skills to people who have already mastered the colonial language orthography. A lesson, available in three different dialects to choose from, presents some roman letters used in the standard Innu orthography, with words to which sound and images are attached (offering both a phonic and a global reading approach). The user is then asked to proceed with 5 to 15 different types of exercises that use sound, image, and spelling matching in different ways: missing letter(s), word searches, crossword puzzles, and so on. The order of items in the exercises is randomly generated, so they are never the same if a user plays again. Written instructions are available in French and oral instructions in Innu. Thematic vocabulary
lessons using the same software include weather expressions, plants, animals, days of the week, months, etc. An example for Innu is given in Figure 1.

**Figure 1.** Thematic vocabulary for Innu lesson on the body

The exercises are automatically generated from a defined vocabulary list. Each vocabulary item (in text form) is expected to have at least two media items (audio and image). To create a series of lessons and exercises, the content provider has to first set up the variables of the exercise possibilities (whether words will be sourced from this lesson only or from previous lessons as well), then upload images and sounds for a particular lesson, choose the words and letters of this lesson, and select between 13 different types of exercises (Figure 2). On the public user end, this generates dynamic exercises based on selected options (Figures 3 & 4).
Figure 2. Content provider interface for a thematic vocabulary lesson
Figures 3 & 4. General user interface with two exercises/games for a thematic vocabulary lesson on the body

A second type of software was developed for advanced levels of Innu to feature text-oriented games such as:

- Dictation exercises: single words or sentences. After listening, the user types in the correct answer.

- Dictation in cloze texts: the user hears an entire sentence and has to type in the missing written parts.

- Cloze texts: The user has to fill in the missing words in a text by choosing from a selection of words, which can all be correct but need to go in specific places, or can include incorrect or incorrectly-inflected words.

Other types of activities for advanced users consist of categorization games such as:

- Simple categorization: the user has to match the given word or expression with one of the categories provided by clicking on it.

- Word-to-word matching: the user establishes a relationship between words shown in different columns, for example, antonyms or synonyms.
• Theme-word matching: the user has to group words that do not belong to a given category by dragging and dropping them in the appropriate area of the screen.

This module requires markup language to generate lessons. A markup language is a set of symbols that determine the way text is presented. Each type of activity has a special markup language. The creation of the lessons and games happens in a special 'content developer' interface. For example, the family of words related to caribou can be identified by the morpheme atikw. The activity illustrated in Figures 5 & 6 below is created by indicating in brackets words that do belong to the given category, and in curly brackets, some words that do not. The markup language has the following form:\[\text{atikw [atikuss, atiku-uiash, nauatikuan] \{atikamekw, atimunish, ushakapishu}\}.\] This form has proven easy to learn and use for our content developers.

![Theme-word matching activity](image)

Figs. 5 & 6. A theme-word matching activity (caribou words) with its markup language

\[\text{1 The final <w> is used to generate the Innu raised <u> character.}\]
The content provider has total control over each activity. For example in cloze text activities, the content provider can specify the missing parts of the sentence and the options made available to the player. The program, guided by markup language, generates the activity as specified. Figures 7 & 8 show data with markup and the generated activity:

Figures 7 & 8. Creating a cloze text exercise: markup by the content provider and corresponding activity

Such tools allow the content provider to add or update game content with very little training and no technical support.

To summarize, there are several levels of users in our games, as shown in Figure 9. The General user plays the games, and when registered, can keep track of his or her scores, compare them with the top scores, and be registered to a class with an Instructor. The
Content provider inputs data for the creation of all the various lessons, games and exercises. The Instructor is able to see scores of specific registered users, manage a classroom and create lesson plans. The system contains two programs, one program for teaching vocabulary and basic reading and writing of standard orthography and the other program for teaching grammar and advanced reading and writing.

**Figure 9.** Level of users for the on-line games

**ON-LINE ORAL STORIES DATABASE**

This database contains audio and video files that are categorized by topic, storyteller, genre, Innu dialect, community, levels and teaching topics. The topics were developed by Innu teachers, based on their needs. Information about who collected the story and edited the sound or video is also available. The database can be browsed or searched, and the audio files can be freely downloaded. The caption below (Figure 10) shows the stories associated to a particular storyteller.
**Figure 10.** General user view: a storyteller with his stories

In addition to the general public's interface, there is an accessible content provider interface that allows editing of the data, for example the description of the stories in three languages: Innu, French and English. See Figures 11 & 12. There is also a link to a database of storytellers' biographies in the three languages, which can be read on line.
Figures 11 & 12. Content provider interfaces for describing and classifying stories
**ON-LINE CATALOGUE**

The on-line catalogue is categorized and searchable, much like the oral stories database, and its goal is to help the dissemination of educational and cultural resources in the Innu language. It contains an on-line ordering system that is automated to streamline and support stock management and distribution (Figure 13). The development phase and the design included consultation and feedback of the person in charge of distribution.

![Figure 13. Public interface for the catalogue of language-related materials](image-url)
The Innu blog was developed to discuss language-related issues (Figure 14). It complements the Facebook page (see below) to discuss more substantial language-related issues and it explores ways to use the Innu language as a meta-language for Innu grammar.

**Figure 14.** The Innu language blog, in Innu
The grammatical web pages in French and English were developed to support the on-line Innu dictionary and the grammatical modules of the games. They follow the model of the on-line East Cree grammar (www.eastcree.org/grammar) in providing quick reference to grammatical concepts, dictionary abbreviations, and include an interactive integrated Verb Conjugation applet, shown in Figure 15, which can be linked to from parts of speech, verb stem information or type of conjugations.

**Conjugaisons des verbes innus**

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<th>Classe de verbes:</th>
<th>vai</th>
<th>vi</th>
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<th>vt2</th>
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<tr>
<td><strong>Conjugaisons:</strong></td>
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<td>02</td>
<td>03</td>
<td>05</td>
</tr>
<tr>
<td><strong>Radical:</strong></td>
<td>l</td>
<td>m</td>
<td>t</td>
<td>u</td>
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### uapameu

<table>
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<tr>
<th></th>
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<th></th>
<th>Inverse</th>
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<td>1-2</td>
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<td>1-2p</td>
<td>tshuapamitinau</td>
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<td>1-3</td>
<td>nuapamau</td>
<td>3-1</td>
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<td>tshuapamauaaua</td>
<td>4-2p</td>
<td>tshuapamikuaaua</td>
</tr>
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</table>

### Figure 15. General user's view of a model verb selection in the Conjugation Applet
**MEDIA MANAGER**

In order to allow content providers to freely upload and manage sound files, videos and images shared across modules, without depending on a computer technician, a media manager was created (Figures 16 & 17). It is a database, not visible to the general public, which keeps meta-information. The metadata stored allows for modules to automatically connect to media based on their orthography and other related data.

![Media manager list view](image)

*Figure 16. Media manager list view*
FACEBOOK PAGE

The Facebook page (Figure 18) is used to promote Innu language activities, generate more interest in the Innu language, and for feedback and questions. Created in June 2011, it became extremely popular, totaling 1346 followers in the fall of 2012. Statistics indicate that most followers are from Canada and are from Innu communities. There are more females, with a peak in the 25-44 year age group, representing the mothers who are most likely to be transmitting the Innu language to the children. See Figure 19.
Figure 18. Innu Facebook page
Figure 19. Innu Facebook usage statistics

**WHY INTEGRATED WEB TOOLS?**

All modules described above share Media, Interfaces and Architecture. We adopted an integrated approach to the system design in two ways: via an internal data connection or an external data connection. See Figure 20.
The internal data connection uses an API (Application Programming Interface) to share and exchange data between systems. These are specifications that allow the various components to communicate with each other. The Media Manager system shares its data via an API, which the Blog, the Grammar, the Dictionary, the Verb Applet, the Lessons and the Catalogues (Books and Stories) utilize for communication.

The external data connection uses hyperlinks for data sharing. A good example is the connection between the dictionary and the verb applet: when looking up a verb entry in the dictionary you get a hyperlink to the model verb (same stem, same class) in the applet.

This general integrated approach has several advantages: First, it creates ease of use for the general public with a web environment that looks and feels familiar for all Innu language resources. It also allows ease of access for content providers and technical support people, who are in limited number. It promotes consistency of content across tools (dictionary, grammar, games, books). Finally, the use of Open Source software
gives us a better connection to and support from the Open Source software development community. This is vital in an ever-changing technological world, since it makes long-term maintenance of such tools a real possibility.

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