

VR Learning Experiences for an Indigenous Language

Peggy Hartwick¹, Anastacia Gorbenko¹, Anthony Daynes, Esther Winter², Mike Murphy¹, Teresa Samson², Anthony Scavarelli¹, Ali Arya¹

¹ Carleton University, Ottawa, ON K1S5B6, Canada

² The First Nation of Na-cho Nyäk Dun, Mayo, YT Y0B 1M0, Canada

Corresponding author: Ali Arya, arya@carleton.ca

Abstract. We present initial results of a series of virtual reality (VR) learning experiences for an Indigenous language in Canada. Aiming to make language and culture more accessible for community members, our design ideas are community-driven, ensuring that language revitalization, preservation, and learning are rooted in the land and the community. Our primary challenges are the limited native speakers (fewer than a dozen, mainly Elders), the less-engaging nature of existing language material, and a lack of direct connection between language learning and community lifestyle. To address these, our process incorporated unique characteristics such as community-driven design, 3D content, 360-degree videos, a theoretical framework that integrates experiential learning and task-based methodologies, and recorded conversations by native speakers. This paper describes the design process of several language and cultural experiences in a VR context. These experiences are community-driven and emphasize the lifestyle, culture, and traditions of an Indigenous community. Our work is part of a language revitalization project that uses artificial intelligence, holographic displays, and VR, to create a multi-platform educational record of an Indigenous culture.

Keywords: Indigenous, Language, Community, Virtual Reality.

1 Introduction

We present initial results of a series of virtual reality (VR) learning experiences for an Indigenous language in Canada. The First Nation of Na-Cho Nyäk Dun (FN-NND) is a self-governing First Nation living in and around Mayo, Yukon, Canada, and speaking the Northern Tutchone language. Aiming to make language and culture more accessible for community members, our design ideas are community-driven, ensuring that language revitalization, preservation, and learning are rooted in the land and the community.

Our primary challenges are the limited native speakers (fewer than a dozen, mainly Elders), the less-engaging nature of existing language material, and a lack of direct connection between language learning and community lifestyle. To address these, our process incorporated unique characteristics:

- Community-driven design, which includes community members in all aspects of the design process (Yong et al, 2024). The design decisions involve ongoing collaboration and input from community members and citizens around user experiences to ensure culturally relevant activities, like writing a shopping list for making Bannock with an Elder (Fig. 1a). All experiences are typical day-to-day experiences, which help to ensure language learning is done in a natural, relevant way.
- 3D content and 360-degree videos are used to create visually rich, realistic, immersive, and relatable experiences, such as taking a walk in the nearby forest and shopping at the local grocery store (Fig. 1b and 1c).
- The theoretical framework aims to integrate experiential learning (Kolb, 2014) and task-based methodologies (Ellis, 2003).
- Recorded conversations are spoken by native speakers and have subtitles in English and Northern Tutchone in addition to a speaker icon enabling the learner to hear the correct pronunciation (Reynolds et al., 2022).

This paper describes the design process of several language and cultural experiences in a VR context. These experiences are community-driven and emphasize the lifestyle, culture, and traditions of an Indigenous community. Our work is part of a language revitalization project by the FN-NND that uses artificial intelligence, holographic displays, and VR to create a multi-platform educational record of an Indigenous culture (<https://kwandekando.ca>). The project is in partnership with Carleton University (Ottawa, Canada) and the Office of the Commissioner of Indigenous Languages.

2 Background and Related Work

2.1 Community-Driven Design

Four guiding principles animate community life in the First Nation of Na-cho Nyäk Dun: Nálats'intra (respect), Łek'ats'ete (caring), Łeyátsele (sharing), and Häts'edän (teaching). These principles, along with the community-driven, empowerment frameworks, guided this project's design (Czaykowska-Higgins, 2009; Yong et al, 2024).

2.2 Guiding Theoretical Framework

Several pedagogical theories and methodologies have helped inform the design of these VR experiences.

Two-Eyed Seeing

Two-Eyed Seeing bridges together the theoretical frameworks of Western and Indigenous teachings and knowledge (Bardwell & Woller-Skar, 2023). The main purpose of this framework is to honour the Indigenous ways of knowing when working with the community. It is often difficult for communities to identify the resources needed to revitalize their language, but by doing so, they can reclaim the power to teach and learn it. This approach ensures that neither knowledge system is privileged over the other; instead, the two are used complementarily.

Experiential Learning & Task-Based Activities

Kolb's (1984) Experiential Learning (EL) theory explains how people learn through engaging and relevant experiences (learning through doing). The VR experiences described herein help create authentic and socially interactive opportunities that expose the learner to language and cultural experiences that may otherwise not be possible. Through carefully designed activities or prompting, the learner is given the time and space to reflect on these experiences in relation to language and cultural immersion.

Methodologically, Task-Based Language Learning is a cyclical process in language classrooms that gives more autonomy to the students. Moving away from lecture-style teaching, students are introduced to a topic (Pre-task), usually in connection to a problem the students need to solve. The students are then tasked with an activity (e.g., talking with a cashier, shopping for groceries) wherein students are asked to plan out how they will approach the problem, and present it to the class or act it out for one another. The language teacher aids the students during this phase by walking around, joining in the conversations, and noting any struggles they may have that need to be addressed. The final phase of the cycle, the Review phase, gives space for students to ask questions about the language, its grammar, vocabulary, etc., to better their understanding of the language for future tasks (Ellis, 2003). Carefully designed VR spaces and activities help to create these learning opportunities.

Land-Based Learning

Land-Based Learning is similar to EL, but takes it one step further by incorporating the value of nature by doing activities on the land (e.g., telling stories, hunting, gathering). It helps to make learning the language more meaningful so that learners are able to make direct connections to new vocabulary items instead of learning them in isolation (Ingram et al. 2024). When used in conjunction with fluent speakers, it is vital for intergenerational knowledge to be passed on, not only the language, but also ties to the culture and identities of the individual within the community. Ingram et al. (2024) emphasize the use of technology in order to provide a virtual landscape using pictures, videos, and drones in order to capture the uniqueness of the ecology that can be accurately transcribed into the online space. This helps students who may have specific accessibility needs or learning styles to still participate in the land-based learning without needing to be on the land.

3 Pedagogical Approach

The pedagogical approach in designing the VR experiences to date focuses primarily on the notion of repetition and immersion for language learning. One primary objective is to move from cultural and language preservation to revitalization. Through various modes of input (audio, text, voice, and movement), the learner is exposed to the same vocabulary across multiple experiences. For example, in VR Experience 1, the learner becomes familiar with common greetings that are repeated throughout and used in subsequent Experiences. These experiences are learner-paced; users are encouraged to repeat, review, redo, and explore the built environments as often as they want.

In addition to focusing on repetition, the design team has taken care to create an authentic experience for the user. In collaboration with community members, the design team has created culturally meaningful spaces, like the Spruce Tree, the Stewart River, and the Grocery Store (Fig. 1). Careful attention was paid to the design of the avatars to attribute similar characteristics to key figures in the community, like Auntie, the cashier, and Grandma. This attention to detail helps to create a culturally authentic experience that is otherwise not possible in a traditional classroom setting. This careful attention to design helps to move learning beyond the discrete features of the language towards language in use within culturally grounded contexts, rooted in real-life interactions and authentic community settings, including land-based and community spaces, and exemplifies a symbolic form of land-based (and experiential) learning by engaging users with culturally grounded and representative activities.

Language Examples (Greetings)

The following are examples of common greetings in Northern Tutchone that are included in the Experiences and have been glossed according to Leipzig (2019):

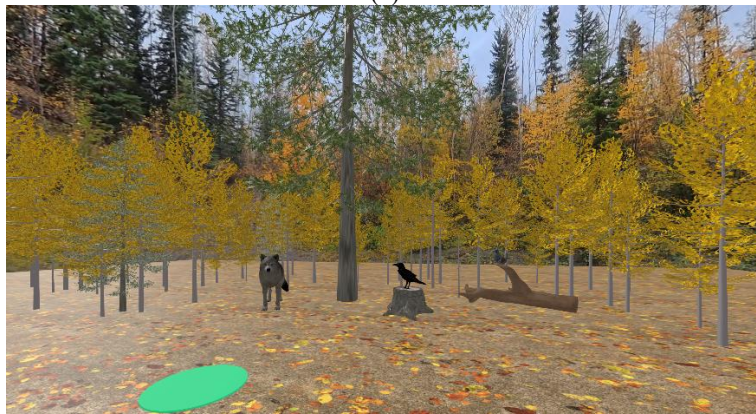
- (1) Inyę dóhóht'i?
in-yę dóhóht'i
2-NOM how.be
'How are you?'
- (2) Ihyę sóhóthän.
ih-yę sóhóthän
1-NOM be.fine
'I am fine.'
- (3) Inzí dú'úuzhi?
In-zí dú'úuzhi
2-GEN what-name
'What is your name?'
- (4) Ihzí _____ úuzhi.
Ih-zí _____ úuzhi
1-GEN _____ name
'My name is _____.'

4 Community-Driven Co-Design Process

Each of the VR experiences has been co-created through ongoing and regular collaboration and input from and with community members and stakeholders (e.g., Elders, Northern Tutchone Language Coordinator, Heritage Manager, Heritage and Culture Officer, Co-Design Advisory Committee, Northern Tutchone Language Teacher - JV Clark School). This community-driven process ensures the values of the First Nation of Na-Cho Nyäk Dun - Respect, Caring, Sharing, and Teaching - are maintained. And, this iterative and collaborative process ensures accurate representation of cultural artifacts, such as Grandma's house and avatar clothing.



(a)



(b)



(c)

Fig. 1. Scenes from learning experiences. (a) Elder House, (b) Nature, (c) Store

The learning experiences are listed below. All experiences were targeted at all community members, not just a particular age group.

- VR Experience 1 – Making Friends by the Spruce Tree
- VR Experience 2a - Campfire planning & writing shopping list.
- VR Experience 2b - Shopping for bannock ingredients.
- VR Experience 2c - More shopping at Mayo Foods.
- VR Experience 3 - Making bannock & packing for the Campfire.

4.1 Technical Framework

We used the WebXR-based Circles framework (Scavarelli et al., 2024), which our research team has developed earlier and used to design and develop various web-based VR learning environments (<https://uni-vr-sity.ca>). The choice of a web-based framework was in line with our inclusive and multi-platform objectives (<https://kwandekando.ca/project.html>).

Programming VR experiences was done in Javascript, and the assets were created through an extensive collection of reference material (photos) for 3D modeling, along with the use of 3D-scanned community belongings and short 360 videos used as background. Examples of such background can be seen outside the house windows in Fig. 1a and the forest and river in Fig 1b.

A VR prototyping tool is being designed and developed to facilitate community involvement in creating VR experiences. However, community members have already been actively involved in the design process as described in the next section.

4.2 Co-design Process and Community Involvement

Community involvement was at the heart of the development process for VR Learning Experiences. The design process began with an NND Elder advisor, suggesting that we create an experience based on the gifts of the spruce tree. From there, we decided on using the two clans, crow and wolf, as main characters meeting under a spruce tree on the riverbank (VR Experience 1). This evolved to going to Grandma's house to get her help in planning a campfire gathering for the new friends.

One Elder suggested that we go shopping, which was the inspiration for VR Experiences 2a, b, and c. The user first asks Grandma for help, and together they make a shopping list for the campfire gathering, including making bannock (VR Experience 2a). Then the user goes to the local grocery store and shops for everything needed for the campfire (VR Experience 2b). The user has the option of staying at the store and continuing to shop from a variety of lists to choose from, i.e., hunting gear, sleepover provisions, etc. (VR Experience 2c). Then they can go back to Grandma's house, where she teaches the user to make bannock, and they pack for the campfire.

Each VR Experience was written by a long-term community member, teacher, and curriculum developer, in collaboration with the Elders and the pedagogy team members from Carleton University. Language learning objectives were set for every experience, with learning scaffolded across the experiences. In all instances, the script was reviewed by the Northern Tutchone Language Coordinator, one of the elders, and the Heritage and Culture Officer, to ensure cultural accuracy. There were regular discussions around the design of VR Experience locations to create authentic local spaces. Further, audio

support was given by five of the Northern Tutchone-speaking Elders. The script was adjusted based on the Elders' feedback and the way one would say the lines in Northern Tutchone.

In preparation for Experience 3, the community member met with one of the Elders for a lesson in bannock making. The Elder taught the community member in Northern Tutchone in her kitchen. This was recorded, and the script was written almost word-for-word based on this natural language modelling. The only addition was adding counting spoonfuls, as this was a good way to teach numbers.

For the avatar character modelling, a Carleton graduate student requested photos of real Northern Tutchone citizens to help create characters that would look like they could actually be local people. The avatars were built from features in those photos to make them feel authentic and believable. The citizens gave their consent for their photos to be used in FNNND Heritage Projects. For each character, there were several choices shown to the Heritage Manager and the Heritage and Culture Officer for their approval. They gave feedback on what was needed, for example, clothing choices and other style choices, and approved the final character avatar.

5 Early Findings & Design Insights

An informal feedback session for Experience 1 was held with those interested in becoming part of the Community Advisory Board in early October 2025. Further feedback sessions for Experiences 1, 2a and 2b took place in March 2026 with the Northern Tutchone Language Classes at JV Clark School (grades 7-10), with the Northern Tutchone Language Teacher, the Native Language Coordinator, the Heritage and Culture Officer, several of the Elders, and the Heritage Manager. Feedback was reviewed by the Carleton team members and integrated into the VR Experiences.

From February 28 to March 8, 2026, the Mayo-based KDD curriculum developer and one of the Carleton pedagogical team members piloted the VR language learning experiences with various community members. This began with visits to grades 7-10 Northern Tutchone language classes at J.V. Clark school, where three of the built VR experiences were presented and piloted by the students as part of a Northern Tutchone language lesson. This piloting process was repeated outside the school with two of the Elders, as well as with NND Heritage Department Lead and the NND language coordinator.

The informal feedback from community members was shared with the VR experience technical development team, which used it to modify and improve the built experiences. This helped not only to identify and fix minor problems in user experience mechanics, but also to improve higher-level aspects of the design. Specifically, a modified controller interface was introduced to allow users to listen to the Northern Tutchone dialogue at their own pace and to have characters repeat their lines as needed. Community feedback indicated that such a feature would facilitate learning by allowing users to listen to and repeat Northern Tutchone phrases multiple times. Community members also commented that some of the graphically rendered forest elements in Experience 1, which is set on the banks of the Stewart River, did not look authentic. As a

result, the visual design of the experience was changed to eliminate a milled log that looked out of place and to add authentic-looking underbrush on the periphery of the scene.

Community users particularly enjoyed experience 2b (in which the player shops for bannock ingredients at the Mayo grocery store) and suggested that additional variations of the experience be created in which users could go grocery shopping with different lists of items to collect. This has led to the development of a new version of the experience in which the user shops for (and practices the Northern Tutchone names for) items needed for a variety of themed shopping lists, for example, food for a hunting trip, gear for a hunting trip, food for a youth's sleepover party, etc. Another improvement to experience 2b was suggested by J. V. Clark students, who thought that the virtual grocery store could be made more lifelike by adding a non-player character representing a local resident who is a regular at the store and whom they expect to see when they go there.

In June 2026, the VR Experiences will be reviewed by the Community Advisory Board, and in July by the FNNND members at Ethel Lake Culture Camp and at the Annual General Assembly.

6 Conclusions and Future Work

This paper shares our experiences co-designing five VR experiences aimed at revitalizing an Indigenous language in Canada. Using 3D content, 360-degree videos, and recordings of Elders, we aimed to replicate authentic spaces and people from the community. The entire design process sought ongoing feedback from the community to ensure the spaces and language learning experiences were true to the life of the community. Pedagogically, we drew from the theoretical lenses of land-based learning, experiential learning, and task-based learning.

Looking forward, we plan to use the three designed spaces for different language and cultural experiences, such as storytelling around the campfire in the space used for VR Experience 1. Throughout, we will continue to seek feedback from all members of the community to ensure that the experiences are accessible, meaningful, and engaging, whether used from a VR headset or a laptop. Community feedback will inform the design of future experiences and modifications to existing ones. Additionally, the pedagogical approach will continue to explore the methods and theories that are best suited to Indigenous language and cultural revitalization and preservation, and in relation to a newly developed curriculum.

Acknowledgments. This work is part of a language revitalization project by the First Nation of Na-Cho Nyäk Dun, co-developed by Carleton University. The authors wish to thank the community members and Elders in Mayo, Yukon, whose participation, knowledge, and generosity made this research possible. We are grateful to all who shared their stories and time with us. The project is funded by the Office of the Commissioner of Indigenous Languages.

Disclosure of Interests. The authors have no competing interests to declare that are relevant to the content of this article.

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