

Learning on Country: A Game-Based approach towards preserving an Australian Aboriginal Language.

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Abstract: Nginya naaa-da banga-mari dalang wingaru-dane. Ngyina diya-ma murri dalan-wa dalang-ra¹. This paper presents the design of a prototype 360 degree, interactive, Indigenous language learning game to support the reclamation of Indigenous languages through immersion in community oral traditions expressed through visual and audio effects and the choreography of the characters within the game. The project is underpinned by a foundational acknowledgement that Aboriginal culture is held within the country specific to the language and embodied in that country's landscape. Learning within the game is based around themes of country, weather, local environment and kinship. Animation and design principles were applied from an embodied communication perspective to increase engagement and to reinforce language learning principles, with Indigenous animation and design students bringing an Indigenous perspective to the gestural and design content of the game.

Keywords: Game design, Design Process, Social design, Language in context

1. Introduction

You can have words written on a page all day but they don't make any sense until people speak them. And once people pronounce...it lives, it breathes. Green (2018)

This paper presents a prototype game for the Learning on Country project, an interactive Indigenous learning game for the reclamation of languages. The project frames innovation as a holistic system that balances cultural, social and technological perspectives to provide embodied communication for learning. The language is Dharug of Sydney and the country depicted is the land which the university occupies. This was motivated by discussions with Dharug speaker and language teacher, Richard Green, who wished to hear his language spoken around the streets of Sydney and builds on previous work on using technology to support community knowledge sharing (Kutay & Green, 2013).

Languages are an essential part of the knowledge system of human culture and frame people's way of seeing and understanding the world. As Nettle and Romaine (2000) have shown, the loss of diversity in languages and the knowledge and practices contained within a language has accelerated the loss of diversity in the environment where these languages developed. Lewis and Simons (2016) state that language use in the community, outside formal institutions, is critical for reclamation to be successful. The valuing of the knowledge that is spoken through a language keeps a language alive, and the ongoing practice of language in community reclaims the knowledge that lost since colonization.

2. Supporting community knowledge sharing spaces through the use of technology

The project was developed with community members to share information about their cultural values and environmental knowledge as a way of restoring their identity and traditional language use. Game-based learning has shown to be effective in teaching for modern languages (Klimova, 2015) and younger generations have grown up with game culture, bringing a shared code of meaning when approaching a game interface. Online oral recordings and text worksheets provided the material for

¹ We look to make material to teach language to all. We do this in a way that all languages can talk this way.

creating a multimodal, immersive and interactive context for learning language, that incorporates community traditions through location on country and visual choreography of the characters.

When teaching Aboriginal languages there are some required components that can be achieved in games. Firstly, the language needs to be embedded in the culture (Furstenberg, 2010) as this understanding is necessary to engage with the language. Secondly, there is fun and enjoyment. The approaches of action-based learning and student agency in their own learning are finding a place for these languages (Fang, n.d.). Thirdly is a need for repetition for reinforcement. We use a set wordlist, keeping the changes to a minimal, with a restricted vocabulary and set grammar components per lesson (Sharpe, 2019). The Aboriginal language phrases are based around themes that are important for sharing cultural knowledge and are part of everyday conversations that can be repeated with other speakers.

The game is multi-platform, animated in both 2.5D and 3D and developed in Unity. A large screen 360-degree format allows for full immersion, while community access to the game on an ordinary PC is possible through a WebGL export. The game is designed as a developing conversation which supports players and is able to expand on themes in new levels to emulate cultural knowledge sharing practices.

3. Related Work

An important aspect in the design was future re-use of the system for different local languages. The lack of linguistic analysis to provide rules for reclaimed languages would make any process of script generation difficult to verify for such languages, so the generation of the script was an important area in which to involve speakers (cf Jaschek et al, 2019). Similarly, auto-generating levels (Gaisbauer et al 2019) or generating maps in terms of the geometry and the density of content within that geometry (Raffe et al, 2014) would remove the authenticity of the location to the Aboriginal traditional environment which is important in this work. This means the reusable aspects are the gaming aspects, how the player interacts with the landscape and the language, and how that language is communicated to the player. The increased use of animated characters in TV shows (Little J & Big Cuz) and machinima techniques to generate scenes for games from existing animated characters and scripts (Anjos et al 2013) may be useful in future with more resources developed in this area.

Language teaching on mobile apps, in stop-motion animations (McKnight et al, 2010) and in CMS learning systems (Bow, 2019) are all bringing language to life online. Apps usually provide wordlist and sometimes example phrases which are used to create exercises such as ‘select the meaning of a word’, ‘listen to this word and select the written form’ and ‘fill in the word’ (Yawuru, n.d.). Stop-motion animations have been popular with languages which have more speakers and resources in central and northern Australia to create a knowledge repository of the language. Language centres in Australia have started to provide online structures for teachers to develop material in class with their students, based around thematic issues that focus learning-limited word lists each day (Sharpe, 2019). Virtual reality in non-first language learning has often been successful due to its immersive nature and ability to authentically represent the culture of the language environment (Lan, 2020; Yeh and Lan, 2018).

This project expands on this work by using computing methods to enable gaming and repetition techniques in a template interface. The gaming system and interactions are generic to a language learning environment and can be applied to specific Aboriginal languages by inserting local imagery of country while using the spoken and written teaching examples available on websites like <http://darag.dalang.com.au>. In this way, we are able to emulate the classroom learning strategy used in language centres, where only Aboriginal language is used, in a context that emulates aspects of everyday life for the students, placing them in a ‘virtual’ on-country context.

4. Methodology

As discussed, the project frames technological innovation as a holistic system which works with a balance of cultural, social and technological elements in equal consideration. It uses an Indigenous methodology that ensures research pertaining to Indigenous issues is always underpinned by an Indigenous perspective (Smith, 1999). The project employed three Indigenous student animators in developing the resources to express the language and knowledge in an authentic way. It is an integral

aspect of the methodology and one that should be considered to ensure engagement and agency in the co-creation of all cultural games and in particular in language teaching material by Indigenous community members as it maintains culture and supports reduced reliance on external developers.

Community speakers produced phrases that would be in common use in an oral language community. In keeping with Richard Green's philosophy of learning phrases, not just words, the game avoids starting with wordlists and building up to phrases. This encourages the person learning to understand the words in context. The player who is starting their learning can pick out common words that reoccur in relation to different aspects of the gaming environment.

Gamification is based on navigating the landscape to hear the language and select places in the virtual world, as well as the ability to select the mode of learning, i.e. immersion; language with Aboriginal subtitles; and language with English subtitles. Features added to help convey the context and topic of the conversation such as short animations for each audio segment provide gestural cues for what is being said. Using the interactivity of the game, players can repeat phrases or select to move on.

A 2.5D environment was designed to situate the language in its specific country of origin. The current environment is based on the Sydney region as the language we are working with is of this area, although the environment can be re-used for coastal languages ranging from Newcastle to Wollongong. This environment includes land, water, plants and animals and animation of significant features.

5. Design and Animation

The aesthetics are designed to bring an Indigenous perspective to language learning. As country is important to Indigenous languages, we looked to create an environment that spoke to the area of the language, which was Sydney. This is shown as a Google extract in the first scene. However, to be on the land and talking about it was difficult as there were no images for pre-colonised Sydney.

The background for the localised scene was constructed using the work of painter Joseph Lycett who was one of the first artists to paint the Australian landscape without overlaying an English scene. He is notable for his documentation of Aboriginal people in his work, which forms some of the first figurative observation of Aboriginal culture. This both anchored the game in country and also brought a shared code of meaning to the game as anyone from the Sydney area would recognise and relate to aspects of the landscape yet also see what has been lost with European development.

Animation, choreography and imagery was designed from an embodied communication perspective so that participants can understand the meaning of phrases from the body language of the speaker. Three Indigenous UTS Bachelor of Design in Animation students were employed to design characters (Joshua Yasserie), 2D animation (Genevieve Stewart and Jalamara Towney) and 3D elements (Jalamara Towney). Stewart directed the majority of the gestural content of the characters to bring a deeper level of understanding of the language phrases through the characters' body movements.

5.1 Language Themes

The phrases were recorded by Dharug speakers who have some proficiency in the language. The script of the game was designed to practice specific features of the language under themes. Sentences were structured for gradual development of language around the themes of each location. The scenes are:

1. **Welcome:** A welcome to country is highly personalised but has some standard components. We use this to open the game and credit the makers of the language resources and animations.
2. **Country:** We use an overview of the landscape to talk about country. This scene discusses language for naming country; simple verbs for movement; pronouns and locatives
3. **Weather:** As a common topic of conversation a short prototype on cloudy weather was included. This introduces some nouns, adjectives and continuous tense.
4. **Local environment:** When the bird lands the words are of the immediate world around us, part of which is a bora ground or place to educate community about caring for country. This scene is to develop directions and imperatives.
5. **Kinship:** In an introduction to any language or community we put the player in a relationship to the others in the game. This introduces names of family and asking questions

5.2 User experience

The animations and choice of interactions aim to reduce dependency on text. The first time the game is played through there are no subtitles with the audio. As most speakers will not know the language, on repeated play we provide Dharug then English subtitles.



Figure 1 Magpie flies over Gadigal land towards Wulumulu - place of whales

The magpie was chosen as a Dharug totem to open with talking about the country (see Fig. 1). The next scene focuses on the clouds and the area surrounding the magpie. This scene could be extended into the night, where the stars can be shown using Stellarium software, from the Sydney Observatory, to present local stories about the stars. The player stays as the magpie which moves from the 3D World to the 2.5D scene and lands. Each of the animals and human characters speak about themselves and to each other (see Fig. 2). Background sounds set the scene and draw attention to areas of the landscape.

6. Learning approach

The gamification elements provide a pleasant learning environment including the ability of the player to fly around the landscape as the bird, talking of its country. The player selects to move to the next phrase and when they come to discussion of the weather, animals in the scene or locations in the scene, these features are enacted or highlighted in the game. When the magpie passes over important locations in the Sydney landscape this is described in language. At the university, a site of an old Bora or ceremonial ground, the magpie enters the next scene. The player is able to look around the scene and follow actions by avatars and their attention is directed to aspects of the scene by sounds.



Figure 2 Magpie introduces Kangaroo by name

A cultural aspect that is included is the use of a story or short narrative at the start to position the listener in the environment. This includes some of the words of the lessons so that as they go through the game, “information” provided at the start can become “knowledge” when experienced in a simpler context (Verran, 2007). Additional resources on the language such as the original material in lesson format can

be found on the associated language website. In bringing these resources together with an immersive learning environment, we provide a format for repetition of the website worksheets, allowing the online teachers to generate the phrase sequences to be learnt, which can be represented in the game. In future other languages can use the web system to provide phrases in a new language through online worksheets on their own version of the website, with the Application Programming Interface (API) to provide in the game. We envisage that other languages would want to include discussion of other features of the landscape which the speakers are familiar with. For this work new animations would be required.

7. Discussion

7.1 *Feedback on authentic learning*

As part of the ongoing design of the interface, one participatory design workshop was run with the full 360 surroundings before the COVID-19 shut down. This involved people interested in teaching and learning Aboriginal languages, including a language speaker. Due to their advanced knowledge of the language the speakers were not able to judge how a novice would respond, but they appreciated the use of language subtitles in the game as a learning aid. The use of animations to emphasise what was spoken, and the realistic landscape presented were considered an advance in language games for the participants, although they did not indicate any explicit effect that helped communicate the sense of the language spoken, other than the entire environment. This required further research.

We exported a web-based version of the game for people to review and this will be available for display at the conference. The user testing of players has come from this version, which is less immersive but still an embedded format of the knowledge and relies on a Chrome browser. We ran a survey on the user experience of the animations, gestures, sounds and subtitles, and how they reinforced the language. We received feedback from 10 participants from linguists to young language learners.

The game is designed to reinforce lessons, so the experience was a steep learning curve. Familiar words were noted as setting the context of homecoming and location (3d scene) and greeting (2.5D scene). The beauty and immersive quality of the environment and the background sounds was found engaging, and some noted the gestures brought the language to life. Participants commented that the interplay of all the components created a sense of being there. This was a single session and it would take continued repetition and experience to gain language competency. Key feedback in both formats noted the value in seeing the language brought alive. Working with the language learners we saw a shift from the need to express realistic conversation content to one of supporting learners via a slower and more repetitive language progression. This could be strengthened by extending and adding scenes.

7.2 *Expanding the system*

The oral resources for the Dharug language used in the game were collected by a Dharug speaker as lessons on the website. Developing language teaching material is time consuming. The ability to re-use this template lends itself to reinforcement learning in other languages. The API that is present on most web systems allows us to re-use and reapply language material from a website into apps and games to improve learning. The gaming format reduces reliance on text-based formats for learning language in what are traditionally active and oral learning cultures. Much of the work has been to develop the interaction between the object in the game, which can be added to any new objects for extension of this game or for new languages. The process has provided a model for integration of future audio scripts and the components needed to represent the new contexts:

- **Background:** New scenes can be inserted into the game. This will include integration of Stellarium into the game and addition of different skyboxes;
- **Dialogue:** Will be spoken by characters with expression to match the text;
- **Animations:** The present animations are human avatars and representations of animals common to many areas. These animated resources can be expanded to accommodate additional dialogue;
- **Avatar:** Introducing an avatar for the player will allow responses to trigger from characters;
- **Sound:** Different language options may be linked to a character in the same setting.

8. Conclusion

This paper has discussed an innovative design approach that was achieved through a holistic balance of cultural, social and technological systems. It outlines the process of designing a prototype interactive Indigenous language learning game aimed at the reclamation of Indigenous languages, and a process that supports cultural and community knowledge sharing spaces through the use of technology. The holistic design and integration of each element of the game was a significant factor in the success of the project for immersion and cultural learning contexts. The game links with work produced by language teachers through adapting lessons to this new environment, in order to reinforce learning and provide a way to bring the language back to its country.

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