

A Game Palette and Guidelines for Game Development for Minority Languages - Case Karelian Language

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ABSTRACT

Games can enhance language learning. Especially vocabulary learning can be targeted with simple games, that are affective and affordable to create. Opportunities are scarce for learning a minority language as a second language; however, teaching can be augmented with distance learning provided by learning games. One game or a narrow selection of games can provide an over simplistic base vocabulary that does not fully reflect the richness of the underlying culture. In this paper we present a palette of simple vocabulary games, that have been designed and implemented to teach Karelian language to native Finnish speakers. As a solution for teaching vocabulary for non-native speakers we propose guidelines creating a selection of variable and accessible language games in situations where accessibility to guided learning is low and unintentional learning using existing games is not possible.

Keywords

Karelian language, serious games, simple games, minority languages, Viena Karelian dialect, vocabulary learning

INTRODUCTION

Teaching minority languages preserves cultural diversity, but it can also enhance our collective memory of habitats and history as these languages have evolved to describe their context (Kendall et al., 2008). Therefore, preservation of minority languages should not be only of interest for the minorities, but also more than just a responsibility of ethnic majorities. Games have been proven to enhance both intentional and unintentional learning (Boyle et al., 2016; Cheng & Yang, 2013; Piirainen-Marsh & Tainio, 2009; Reinhardt & Thorne, 2016). For intentional learning simple vocabulary building exercises can be targeted for learning games as there are many shared mental models for these games: crosswords, memory games, combining images and words etc. These models can be targeted for creating simple affordable vocabulary learning games that enhance learning and provide an opportunity for the learners to study outside the traditional context of learning.

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Vocabulary learning games can be considered the first generation of learning games (Egenfeldt-Nielsen, 2007). There are differing opinions on how structured the vocabulary teaching needs to be for good learning outcome (Ghanbaran & Ketabi, 2014; Nation & Waring, 1997), however vocabulary learning is traditionally considered to be the first step in learning mother's tongue for children, but also when learning a secondary language.

In this article we combine what we have learned from the process of designing and developing a selection of simple vocabulary learning games. We combine this knowledge into a palette of game features. This palette is complemented with design guidelines. In the games presented in this article the target has been specifically teaching vocabulary of a minority languages for nonnative speakers. The case used is teaching Finnish speakers the vocabulary of Karelian language (specifically Viena Karelian), a minority language especially in Finland and western Russia (the Republic of Karelia). The target for this work is to provide a game palette for teaching vocabulary, that realistically represents the complexity and richness of minority cultures. In addition, we propose guidelines creating a selection of variable and accessible language games.

BACKGROUND

Documentation and revival of minority languages does not just have relevance for building identities and empowering minority groups. Languages are connected to the habitats they have evolved to describe. Their preservation is also a measure against the loss of cultural diversity. The loss of linguistic and cultural diversity also impairs our collective memory (Kendall et al. 2008).

Specifics of Minority Languages and Learning

Learning minority languages can pose obvious challenges even for a motivated student. Accessibility to guided learning is low and there are only very few or no advanced classes. In addition, there are only few opportunities to practice through discussion or be surrounded by influences for unintentional learning. Still there is a need to acquire the basic vocabulary to open the path to more advanced learning (Ghanbaran & Ketabi, 2014). Much of current research on teaching minority languages is focused on documentation, maintenance of mother's tongue for sustaining identity and empowering minority groups. Speakers of Karelian language are dwindling both in Finland and Russia, where majority of the speakers of the language live (Laakso et al., 2016; Sarhimaa, 2016). According to European Language Vitality Barometer (Spiliopoulou-Åkermark et al., 2013) from 2016 the vitality of the language is slightly lower in Finland where the two languages close resemblance and loss of the generation of refugees who speak the language have led to the loss of vitality. In addition, in Finland and Russia it has taken awhile to admit the language's status as an independent Finnic language (Sarhimaa, 2016).

Learning Language with Games

According to Reinhardt and Thorne (2016) language and language related affordance are intrinsic in any game, regardless of how saturated the games are with narrative, rules, or player-player -interaction. One can learn a language from the game inventory or simply by mocking the dialogue (Pirainen-Marsh & Tainio, 2009; Suh et al., 2010; Yuditseva, 2015). Games can also be untiring tutors. Game mediated language learning can benefit from what they call: "the ability of the computer to provide repetitive input and targeted feedback, especially for grammar and vocabulary learning". Metaphors for computer assisted language learning include metaphors of tutor, tool (Levy, 1997) and ecology (Lam & Kramersch, 2002). According to Reinhardt and Thorne (2016) these metaphors are applicable to game mediated language learning. The most recent metaphor, ecology, encompasses the technology facilitated removal of

boundaries for place and time for learning. In addition, it describes the user/player as a student and a content creator, as well as blurs the distinction between learning as work and learning as play (Lam & Kramersch, 2002; Reinhardt and Thorne, 2016). In other words, it describes how games take learning outside the formal context of learning. Despite the recent advances in artificial intelligence in learning applications (Frutos-Pascual & Zapirain, 2015), for problem-based learning open ended games are not necessarily the best choice as increasing understanding of problems and solutions may require expert guidance from a human mentor. However, games can unintentionally increase attention capacity and problem-solving skills (Boyle et al., 2016) and for unintentional language training they appear to be more than appropriate (Cheng & Yang, 2013; Piirainen-Marsh & Tainio, 2009). Tutorials, simple games, and simulations can also be used to augment intentional learning (Boyle et al., 2016; Lam & Kramersch, 2002; Reinhardt & Thorne, 2016; Yuditseva. 2015).

Status of Karelian Language in Finland and Russia

In Finland, Karelian has been spoken for as long as Finnish, despite this it has only had the status of an indigenous minority language since 2009. From linguistic perspective, there are three different varieties of the Karelian language: Olonets Karelian (Livvi Karelian), South Karelian (the southern dialects of Karelian Proper) and Viena Karelian (the northern dialects of Karelian Proper) (Kunnas, 2009; Sarhimaa, 2016; Kotus, 2019.) By estimate in 2013 in Finland there were 11, 000 speakers of Karelian who could speak the language well or fluently, and 20,000 who were able to speak some Karelian or understand it to some extent (Sarhimaa, 2016). The estimated number of Viena Karelian speakers in the Republic of Karelia, Russia, was approximately 8 000 in the early 2000. There Viena Karelian is also considered endangered and has a similar status as an indigenous minority language.

Karelian Language Games

There are few existing games for learning Karelian language or some of its dialects. *Kielimestari* (Northern Sociolinguistic Encounters, 2019) is a mobile game available for Android that aims at increasing awareness of Scandinavian minority languages including Swedish, Northern Sami and Karelian language. *Uuši vuoši* (Aleksejeva & Ruuskanen, 2018) is a browser game targeted mainly for children and beginners, it teaches Viena Karelian vocabulary and pronunciation. *Riputandupačas* (“Opastajat.” n.d.) is a simple adaptation of hangman game created under a website containing also other material for learning Livvi Karelian. These games are singular examples of language learning games, that are not connected under any single source. Some such as *Uuši vuoši* (Aleksejeva & Ruuskanen, 2018) and *Riputandupačas* (“Opastajat.” n.d.; Penttonen, n.d.) can be said to have a pedagogical grounding as the development has been initiated by language teachers as an additional learning media for their students. In addition to digital games, there is a recent boardgame *Karjalaini kylä - Karjalaine kylä - Karjalaine hieru* (Turunen et al., 2019) that, includes three Karelian dialects: Viena (north), Suvi (south) and Livvi Karelian in addition to Finnish translation, with many of the same collaborators, who have been responsible of the previously mentioned digital games. This shows that there is an interest in teaching language through games and gamification in the community.

Importance of Teaching Vocabulary

Serious games enhance language learning regardless of native language or individual differences such as age (Cheng et al., 2018). Not just serious games, but video games in general have been established as facilitators of unintentional language learning (Piirainen-Marsh & Tainio, 2009). However, learning minority languages through this approach has obvious challenges: many of the existing video games are not translated to small language groups. In addition, the communities involved in language and culture teaching do not have the resources to develop the kind of games that would rival

in popularity with the games created by big game studios (Loban & Apperley, 2019). Mechanism of learning a foreign language has traditionally been considered to follow similar path to children's, where a child first acquires individual words and impression unintentionally. As a result, it has been assumed that vocabulary learning is efficient when one learns new words in context, despite having to then tolerate some unclarity of understanding the learning material (Egenfeldt-Nielsen, 2007; Ghanbaran & Ketabi, 2014; Nation & Waring, 1997). This assumption has resulted into low appreciation of explicit focused vocabulary learning, despite it being the first challenge in language learning (Ghanbaran & Ketabi, 2014; Lewis & Conzett, 2000). Many existing models for language learning describe the whole learning process very broadly, whereas vocabulary learning can have its own characteristics (Ghanbaran & Ketabi, 2014; Khine, 2011).

Cheng, Tsen and Hsiao's (2018) model of integrated game design features and flow theory targets vocabulary learning in slightly more complex games, with narrative elements. Specifically, it divides digital vocabulary learning games into adventure and nonadventure games. It is based on meta-analysis of ten previous studies on digital vocabulary learning games. The model in addition is based on games aimed at teaching English vocabulary to non-native English speakers. Triando and Arhippainen (2019) provide a language learning model, where challenge increases as the abilities of the players advance. The increased abilities provide a basis for reading, listening, and writing. In the following chapters we utilize this simple model for categorizing a selection of vocabulary games, and then extend it to a more detailed palette of games. The analysis and learnings we summarize as guidelines.

DESIGN AND EVALUATION

Several simple word games were developed during this study (Figure 1). Each game addressed an aspect in learning, but the focus was extending the vocabulary of non-native speakers of Karelian Proper, Viena Karelian (north) (Kotus, 2019). In addition, few games addressed elementary grammar. The game designs were informed by teacher and learner interviews, existing dictionaries, study books, and user identification (Zaikov, 2013; Karlova, 2013; Karakin, 2017; Ruppigeva, 2017; Kähäri, 2019; Omamua n.d.; Dictionary of Karelian n.d.). The process reported in this article span from June 2018 to November 2019. The games were developed under several courses and projects, with multiple collaborators and user experience results have been published (Damiri Burlian et al., 2019; Triando & Arhippainen, 2019; Koski & Arhippainen, 2019).

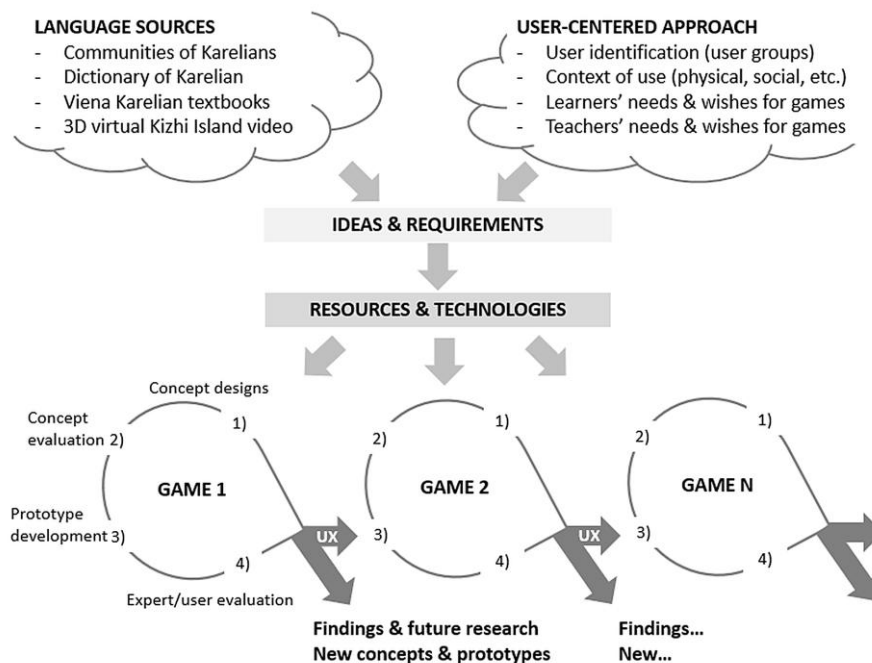


Figure 1: Development of concepts and games.

As a result, 18 games (Figure 2: G1-G18) out of over 40 concepts were developed (Damiri Burlian et al. 2019; Triando & Arhippainen, 2019; Koski & Arhippainen, 2019; “opivienankarjalaa.” n.d.). In addition, most games had adjustable difficulty levels or altering themes. Two games still at a concept level were also added to this analysis due to their importance as examples and since their design was informed of the previously developed games. These games were *Vocabulary Creation (G4)* and *Karelian Village (G1)* games (Koski & Arhippainen, 2019). The first game (G4) provides the players a possibility to expand the inventory of taught words and the second (G1) expands the contexts where the vocabulary items can be found. Different in-game contexts as illustrated in video of Kizhi Island Virtual 3D Model (2014) can provide a valuable learning environment for studying for instance, about habits, living, religion, architecture, in past and modern days.

In the games (G1-G18) we provided over 20 themes in total starting with the basic vocabulary relating to numbers, weekdays, months, colors, body parts, clothes, furniture, etc. During the game tests (Koski & Arhippainen, 2019) we asked from the players opinions, which themes they would like to play and learn. Participants invented over 30 themes, which related to understanding the living and culture in past and modern days. In addition, players were interested in learning words and sentences relating to social interaction and communication skills, for instance, when traveling in the Republic of Karelia (hotels, shops, health care). One main motivation for Finns to learn Viena Karelian is a need to interact and communicate with Viena Karelians and vice versa. This is important especially for those who do not have Russian language skills. Another motivation to learn and use Karelian language is the maintenance of endangered language. People who have learned Karelian from their parents or grandparents are aging and thus it is critical enable younger generations to learn and practice Karelian language skills and cultural knowledge.

Categorization of Vocabulary Learning Games for Minority Languages

The purpose of this work is to provide a closer inspection into vocabulary learning by categorizing the games created throughout the process previously described. In Figure 2 the implemented games are organized in relation to the language learning model (Triando & Arhippainen, 2019). Players can use these games as they progress towards more difficult levels in vocabulary learning. Games categorized at the easy level can be used without prior skills in Viena Karelian. For instance, the memory game (G11) provides card-pairs with the same image and Viena Karelian or Finnish word. Overall, the implemented games are categorized based on how they advance the vocabulary towards facilitating reading and speaking. In four games (G7, G10, G15, G17) the Viena Karelian word is provided, and the player combines it with an image or a word. A level of difficulty is increased in the games (G3, G12, G14, G15, G17), where a picture is shown, and a player needs to connect it with the correct word or sentence. Only in two games (G2, G3) the player can listen to the words. Native speakers are required in implementation for this type of games. Spelling words correctly was targeted with crosswords (G8), hangman (G5) and word search (G9) games. Early stages of grammatical inflection were taught with some games (G3, G13).

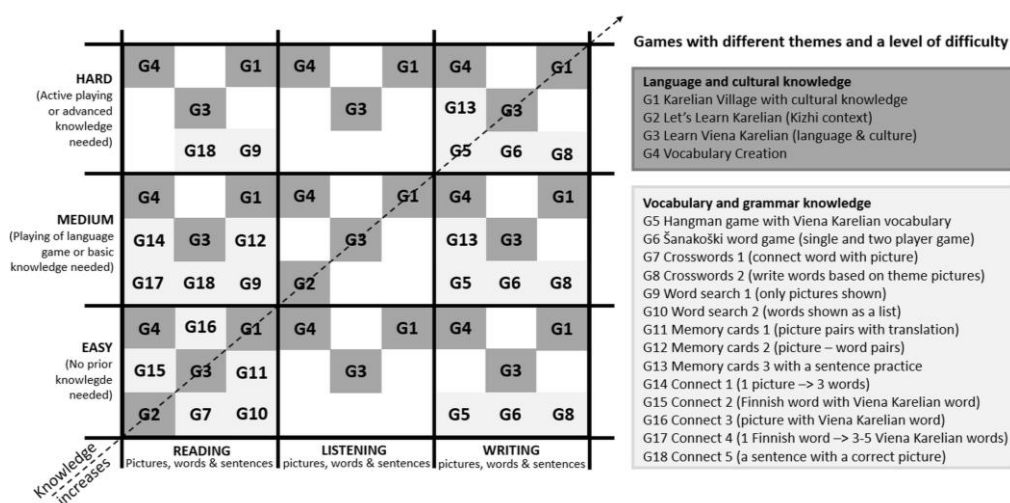


Figure 2: Developed first-generation language learning games categorized using a language learning model by Triando and Arhippainen (2019).

In Figure 2, some of the implemented games are situated in all levels since they have different themes and difficulty levels the player can choose. It is notable that the games in this case example were targeted for native Finnish speakers, however the image-based games at the easy level are suitable for all learners. When developing games for Finnish players for learning Viena Karelian, it is important to consider that Viena Karelian is the closest cognate language of Finnish and most Finns can easily understand Viena Karelian dialects (Kunnas, 2009). However, when a learner continues playing the game, it should be challenging enough to maintain motivation and increase learning. We noticed this development challenge especially with the Šanakoški word game (G6), where a long Viena Karelian word is shown, and a player's task is to form new words by using only once each letter in the given word. The player gets points from each created words and proceeds levels when enough points are earned. A level of difficulty is increased in the higher levels by proving shorter main words than in the beginning. The given words where shown randomly from the game database including approximately 19200 Viena Karelian words tailored from Dictionary of Karelian (n.d.) and about 600 words collected from Viena Karelian textbooks (Karakin, 2017; Karlova,

2013). (Koski & Arhippainen, 2019). The player can reach higher levels just by forming Finnish words, which are similar in Viena Karelian, without prior knowledge of the Karelian language. This design challenge proves a need to involve native Finnish and Karelian teachers and speakers into design and development process along with game designers and professionals.

Design Challenges: Similarities in Languages

In Viena Karelian, some words are completely similar with Finnish, for instance, dog (koira), chicken (kana), girl (tyttö). Some words are remarkably close to Finnish, for instance, an ant is muurahainen (Finnish) and muurahaini (Viena Karelian). In Figure 3, the example A) shows how the game (G14) can easily teach Viena Karelian words by asking a player to connect one word with the given image. Without Karelian language knowledge, a player cannot know the correct answer, but can easily practice and learn it. ‘Perhoni’ is close to Finnish translation for butterfly (perhonen) and a player can try to form Viena version from Finnish word, but in this type of case it will not work, because Perhoni is not Finnish nor Viena word. Also, ‘liipukkaine’ and ‘liipukkaini’ are not Finnish words and thus a player needs to learn if a word ends with ‘e’ or ‘i’ letter. For Finnish learners, it is challenging to learn which words are similar with Finnish, close to Finnish, or totally different than in Finnish. Typically, totally different words are close to Russian, and Finns who can understand Russian are able to know or learn easier. One important aspect for game design in Karelian context, is to take Russian speakers into account as well, and thus provide learning games for a wider audience and especially Russians who are interested in Karelian culture and people who live in the Republic of Karelia or have lineage there. In the other game (G17) example (Figure 3, B), a player is asked to select the correct translation for the word Perjantai (Friday). This is difficult for new Finnish speaking learners to learn and remember because it is totally different from the Finnish language and the pronunciation in all examples are quite or totally similar. For instance, the game asks a player to select the correct translation from the randomly given variations such as piätäntšä, piätintšä, piätinkkä, piätinccä, piätintčä, päätinččä, while the correct one is piätinččä. The number of words (e.g. 3-5) depends on the level of difficulty players select when beginning to play.



Figure 3: Examples of the games (G14 & G17) where a player needs to connect right word with an image (A) and a word (B). (Image source for butterfly: <http://clipart-library.com>)

Three different types of memory card games were implemented. The easiest memory game (G11) included card pair with the image and Finnish or Viena word. This enable a player to start to learn Viena Karelian without prior Karelian language knowledge.

The player will learn which words are written with “s” or “š”, like, for instance, a cat in Finnish is *kissa* and *kišša* in Viena Karelian. Learning to use “the correct s-letter” is a challenge for Finns, because it varies quite much according to study books (e.g. Zaikov, 1993, Karlova, 2013), but also on how laypeople perceive and use it in different dialect or language area of White Sea Karelian (Kunnas, 2018). Variation between study books can be explained by the language development over time, because neighboring areas and countries have influenced on the development of Viena Karelian. In this game (G11) a player was able to select the theme (body parts, animals, food & drink and numbers) and the number of cards (8, 12, 16 or 20).

In the next memory game version (G12) were provided six Viena word – image -card pairs (36 cards in total). Another version of this could be to use only Viena word – Finnish word – card pairs without images to increase a level of difficulty. Moreover, the variation could be added by taking the vocabulary content from cultural and historical contexts, for instance, by utilizing Viena Karelian words from the Kalevala, the Finnish national epic (Lönnrot, 2015).

The third version of the memory card game was implemented by extending the metaphor with the word inflection task. In the memory card game (G13), the game asks a player to inflect the found word in the example sentence. Figure 4 shows an example situation, where a player has found the correct image-Viena word –pair (vačča=stomach). Vačča word is easy to understand and learn, because it is ‘vatsa’ in Finnish and a pronunciation of both words is quite similar. If the player cannot write the correct form, the game will show the correct answer. In this example (Figure 4, A), a player has first tried the similar inflection form that would be used in Finnish (vatsaa -> vaččaa), then the player has tried ‘vaččah’ because the sentence example ends with the word ‘vaččatautih’, which is also easy to understand and translate in Finnish (vastatautiin). After two incorrect answers, the game provides the correct inflection, which for vačča in this example is ‘vaččua’ (Figure 4, B). This type of memory game with sentence and grammar practice is very useful for learning minority language. The benefit of digital games is high in this type of simple game, where difficulty can be easily increased with different tasks.



Figure 4: A) An example of the memory card game (G13) where a player task is to inflect the found Viena word (e.g. *vačča* = stomach) in a correct form in a sentence. B) The right form is shown if a player does not find the solution. (Image source for body parts: <http://clipart-library.com>)

Participants and Analysis of the Games

All games in this analysis have been implemented iteratively and partly parallel by different developers (Figure 1). All the games are evaluated with the users and/or experts in concept design and prototype evaluation phases and then iteratively implemented further. The first game concepts (G1, G2) were created based on the cultural context illustrated by the video of the Kizhi Island Virtual 3D Model (2014) and needs and wishes collected from communities of Karelians (e.g. teachers, actives and natives). The game “Let’s Learn Karelian” (G2) was evaluated with five randomly selected players at University of Oulu premises (Damiri Burlian et al., 2019). These users were students from different educational fields and their nationality varied. This small study revealed that the game can awake player’s interest towards new language and culture without prior knowledge of it. In addition, especially, the tutor avatar was regarded as welcoming and guiding character, which could teach about culture, for instance, religion and costumes.

The “Learn Viena Karelian” game (G3) was developed based on user experience (UX) learnings from prior studies. The game (G3) was evaluated by 38 players during the international GamiFIN 2019 conference, and 12 of them also returned the feedback questionnaire. These participants were regarded as expert users, since their background related to game development. The half of them were researchers, one was UI/UX designer, two game design specialists, two professors and one was PhD student. These participants did not have prior language skills of Viena Karelian dialect, but they provided valuable comments for learning game development. Players’ age varied from 20 to 47 years old while average was 34 years (25% females, 75% males). This game (G3) was implemented in Finnish and English, and due to the test settings only 17 percentage of the players were native Finnish speakers. The rest of the participants were from Brazil, Greek, Indonesia, Italy, Russia, Taiwan and Ukraine. In addition to the game design aspects, participants especially commented that the game should be available also in Russian language. (Triando & Arhipainen, 2019.)

Based on the findings from previous studies the next games (G4-G6) were designed. The online Dictionary of Karelian (n.d) was tailored for the game G6, and thus the game database consists of 19200 words from dictionary and about 600 words from Viena Karelian textbooks (Karakin, 2017; Karlova, 2013). The hangman game (G5) included those 600 words relating to topics: seasons, numbers, months, days of week, verbs, animals, nature, relatives and body parts. These games (G5, G6) were tested as a part of a larger user experience evaluation, because we wanted to collect authentic users’ ideas and feedback also to other games (G1, G3, G4) in order to get a comprehensive understanding of the needs and wishes for possible future games for learning Viena Karelian. By authentic we mean persons who have interest and motivation to learn Karelian language and culture and has some Karelian language skills or background. Moreover, we wanted to involve participants from different age groups. Therefore, these five games (G1, G3-G6) were evaluated by 16 participants, whose age varied from 10 to 84 years old while average was 53 years (56% females, 44% males). According to participants’ own estimating, 63% of them were able to read, speak or write Karelian language (Livvi or Viena) based on their home language knowledge or skills what they have achieved from Karelian language courses. 19 % of users regarded themselves as beginners and 10% of participants did not have any prior skills of Karelian language. However, all participants were Finnish speakers and thus were able to play games based on Finnish language. (Koski & Arhipainen 2019.)

The rest eleven games (G7-G18) have been evaluated by UI/UX and game researchers. In addition, these games have been introduced to the Karelian teachers, researchers, actives and game developers during different events, for instance in conferences and Karelian courses. Based on our user studies (Damiri Burlian et al., 2019; Triando & Arhippainen, 2019; Koski & Arhippainen, 2019) and our expert evaluations (experts on UI and game R&D) we have analysed all these games from the minority language challenges point of views. Table 1 presents the categories of games in this paper.

	Connection games (2, 3, 7, 10, 11, 12, 14, 15, 16, 17, 18)	Spelling games (3, 5, 8, 9, 13)	Word game (G6)	Language & Culture (G3)	Vocabulary Creation (G4)	Karelian Village (G1)
Purpose	Vocabulary learning	Vocabulary and grammar learning	Vocabulary learning	Language and culture learning	Language storage & maintenance	Language and culture learning
User group	New learners, beginners, all age groups, (Finnish)	Advanced, different age groups (not small kids), (Finnish)	New learners, beginners, different age groups (not small kids), (Finnish, Karelians)	New learners, beginners, advanced (Finnish, English)	Natives, teachers, actives, linguistics, descendants (Finnish, Karelians, Russians)	All who are interests in Karelian language and culture
Social context	Can be used together in digital or paper format	Can be used together in digital or paper format	Two-player mode, battle, co-learning	Top list sharing	Community creates and negotiate a vocabulary	Can enable location-independent collaboration learning and communication
Possibilities to utilize gamification elements	Points, levels, high score lists, game time, reward	Points, levels, high score lists, game time	Points, levels, score lists, game time	Points, levels, high score lists, game time, reward	Qualification, community acceptance, experience level	Adventure, minigames, points, levels
Main qualities	Useful, easy to use, support learning	Useful, grammar is learned while playing	Useful, can utilize big database	Versatile, easy to use, support learning	Useful and needed for revitalization. Can be utilized for game design as well	Authentic context, enable a large learning environment and a portal for other solutions, enable e-tourism

Table 1: An overall analysis of the games (G1-18).

Variations of design element in each game and sets of games were implemented, and players' opinions queried. Most of the elder participants did not see, for instance, points, high score list and rewarding particularly important for themselves. Instead, they thought that those elements could be important for younger players. Senior players commented that learning itself is the reward. Younger players were interested more in the game play from adventure and content creation points of views than language learning. In the game (G4) gamification elements can relate to qualification, community acceptance and experience level.

Main qualities of these games related to the usefulness and easiness, because the aim is to support different user groups' learning of minority language. In addition, it is important that games can provide versatile and authentic context for vocabulary learning. Our analysis reveals that game portal or platform is needed for providing a rich and easily accessible environment to learn vocabulary location and device independently. In addition, different tools for game content (e.g. vocabulary practicing) creation should be developed for teachers', linguists', and enthusiasts' use.

GAME PALETTE AND GUIDELINES

Based on the analysis of each games (G1-18) and utilizing language learning model (Figure 2) we extended the approach by creating a palette (Figure 5) for game design. The language learning skills (Figure 5) advance through levels defined by what learners

can do and skills they can practice, and test. These levels are loosely based on Common European Framework of Reference for Languages (CEFR) (Council of Europe, 2001).

The purpose of this palette is to depict how knowledge of vocabulary, language and culture increases. Revival of language and culture can increase when we have a palette of different games with various themes and context information (e.g. cultural, historical, and musical knowledge). This palette can be used as a framework for designing games for different purposes and user groups for maintaining, revival and documentation of minority languages.

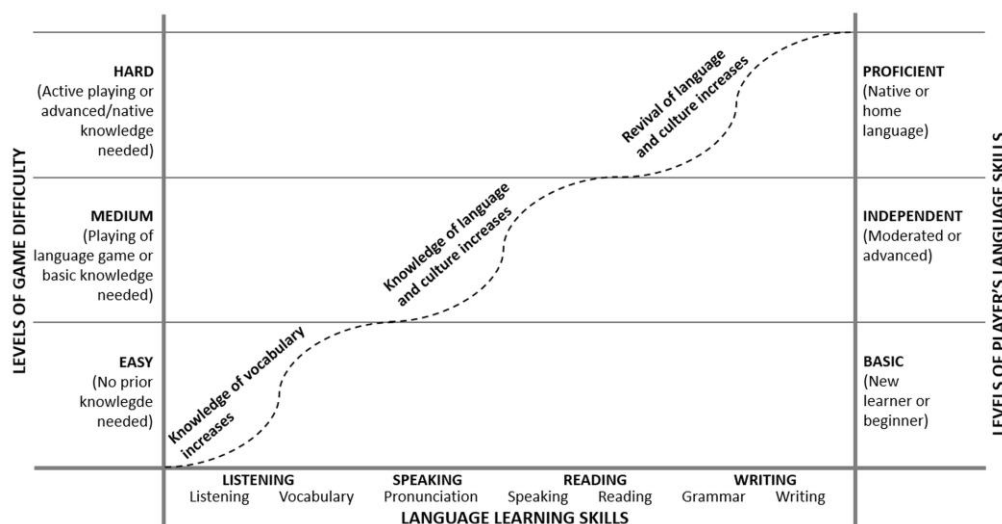


Figure 5: A game palette for game development of minority languages

Figure 6 show a populated palette illustrating how revival of minority languages can be supported by game development at different levels. At the first level it is important to provide games for learning, practicing, and testing basic vocabulary. All these activities can be provided by the same or separate small games. It is important first teach enough words with simpler vocabulary games, and then practice those by playing different types of other games. Self-assessment of learning outcome and motivation can be enhanced by providing feedback. When developing games for revitalizing minority languages, it is worthwhile to design games for different age groups from small children continuing to more mature learners, who have accumulated language knowledge throughout their lives or from early childhood. Therefore, it is also important to provide game variations with different auditive, visual and textual cues. All games should be available in easily accessible platforms.

At the next level, it is important to provide wider approach to language by developing games with different themes, levels of difficulty and cultural contexts. It is especially important to teach culture specific elements by providing musical information in games, for instance, folk music, oral poetry, rune-singing, laments (crying) and yoiks, which are typical folklore genres in the Viena area (Kallberg, 2000; 2004; Tarkka, 2016). To increase motivation and engagement, it is important to design game that also have entertainment value. Learners may appreciate adventure, content creation and battle games, where they can enjoy the flow of gameplay. Social elements are also an important addition and allow learners to practice communication or to be able to compete and compare achievements. Also, at this level, it is important to provide games or game elements for assessment for the learners to test their language skills and

teachers to test their students. When a player has achieved basic language knowledge more difficult and versatile games for leaning and maintaining cultural information are needed. From revitalization perspective, games should support practicing all dialect variations of the minority language. In addition, at this level the players become active resources for documenting language and creating new content.

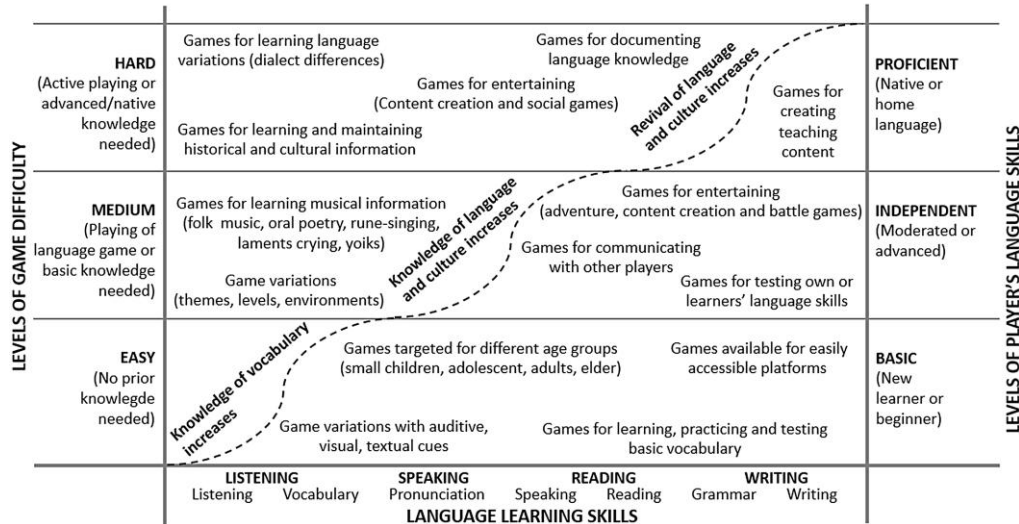


Figure 6: Populated game palette for illustrating how games can support learning, practicing, and testing at different levels. Revival of language requires games for documenting, maintaining, and testing language as well as creating teaching content.

Cheng, Tsen and Hsiao’s (2018) model of integrated game design features and flow theory targets singular games aimed at teaching English vocabulary to non-native English speakers. The model by Triando and Arhipainen (2019) is suitable to categorize simple games as it does not target the anxiety brought on by additional challenge or boredom as the players abilities increase. Simple selection of games provides an opportunity for the players to switch games, when either boredom or anxiety is experienced. When the target is first generation language learning specifically teaching vocabulary, we can suggest simple guidelines that fall under the themes of *variation* and *accessibility*.

Variation:

- *Levels:* Provide a selection of games, with consideration for both beginners and more advanced learners.
- *Cues:* Provide games with written, visual or auditory cues. This supports different learning types and learners of different ages.
- *Themes:* Provide games with variation in target vocabulary: numbers, weekdays, months, colours, anatomy, household items, weather, etc. Place the words into different contexts for extending learning experience and interest.
- *Difficulty:* Increase difficulty/challenge within games, but also between games.

Accessibility:

- *Culture:* Use existing paradigms in word games, crosswords, memory cards, combining words and images etc.

- *Availability*: Aim for high availability when selecting platform, for instance, web browser with a layout that suits also mobile interfaces or applications, which do not require good network connection.
- *Community*: Provide games with differing levels of player-player - interaction, without forgetting the single player option. People may have different restrictions (e.g. costs, time resources, health conditions, etc.) for location-dependent learning, and thus different digital solutions are needed for supporting social interaction with other learners (players) or teachers.
- *Age*: Image and audio games will take young children, who cannot yet read into consideration. In addition, elderly players may be existed about cross words, but the graphics must be high contrast and sizeable.

Outside these design guidelines and based on our mapping of the existing Karelian language games, we can in addition encourage collaboration with other developers and the community to provide a larger sample and better access for games.

DISCUSSION

Simple games can teach vocabulary and provide the basis for further learning of grammar and culture. In addition, they are affordable to implement. In the related work we established the connection between unintentional language learning and video games. The existing games are however translated only to big language groups and markets. In this article we describe a myriad of games, with simple design, yet there is great potential in popular video games for minority language learning. By just modding existing video games so that they would have minority language subtitles as an option we could achieve better learning outcome and, despite the aging gamer community, target, especially the youth. This would require public effort as it does not fit the profit model of many game studios. However, they could be persuaded or pressured to bring texturing tools into their games. Here however then may meet another problem of minority group being portrayed in games as “the other” and the negative impact this has on identity (Behm-Morawitz & Ta, 2014; Loban & Apperley, 2019). Although, one would assume this issue may not influence the simple vocabulary games presented in this article, there are cultural underpinnings and assumption of homogeneity of related metaphors even in simple games. The hangman game presented in the user studies evoked initial comment: “I have seen four soldiers get hanged”. On the other hand, the selected vocabulary games from cross words to memory games were well perceived in our target group. Due to proximity and cultural similarity this was not something we were particularly worried about. Our guidelines for *accessibility* for vocabulary games include encouragement for using well-known game types, such as cross words for non-native speakers.

Providing tools for vocabulary training can create more possibilities for communication across geographical borders. The focus in this article is on teaching Finnish speakers Viena Karelian dialect, but similar approach can be used to teach the speakers of different Karelian dialects the subtle differences in their neighboring dialects. Wide palette of simple yet variable games gives a rich image of the culture and provides basis for holistic understanding of both culture and history. If we only present items in the historical or religious context, the learned vocabulary will lack in neologisms i.e. modern words in addition to not giving an impression that you are learning a living language. An additional benefit of a wider selection of games is that it counters the anxiety and boredom experienced by players, as their abilities or the game challenge increase.

Limitations and Future Research Paths

Karelian has survived through culture influence and forceful assimilation as a living language. The revitalization of language has been ongoing since the 1980s (Kunnas,

2009). However, more action is still needed, especially through cost-effective and location-independent digital solutions. Additional effort is needed to support and develop Viena Karelian for enabling the communication between North Finns and North Karelians. Future work is needed to understand the role of vocabulary learning as the threshold for deeper language and cultural understanding. The case example in this research, Finnish and Viena Karelian, belong to a Finno-Ugric language group. The languages are somewhat similar and have high spelling-to-sound consistency, therefore it is easier to learn the basic vocabulary across these languages. Vocabulary learning may be easier, but there is also a chance for confusing pseudo synonyms i.e. words appearing similar and meaning something completely different.

We expanded the palette from what we have learned from simple vocabulary games and applied this to larger context of language and culture learning. When using this palette, it is important to remember the starting point of this study as it influences the applicability of the palette and guidelines. Despite Cheng, Tsen and Hsiao's (2018) work suggesting that vocabulary learning games can enhance learning for multiple age and language groups, we believe, that more work on other minority languages using these design guidelines is needed to validate our palette for learning between distant language groups or languages with inconsistencies in written and spoken form of words.

For future, it would be important also to develop games for Karelian language by considering all these three dialects: Olonets Karelian (Livvi), Karelian Proper (Viena Karelian) and Karelian Proper (Suvi = South Karelian) along with the Finnish and Russian translations (Triando & Arhipainen, 2019). This would enhance and extend the learning experience and community co-operation as well as the overall rehabilitation of the Karelian language. It is important to research and develop minority languages to encourage people to use their language with more confidence (Kunnas, 2003).

We are planning future studies on learning outcome when using games designed with our palette. In addition, we hope that this work could provide insights on how vast selection of games is needed for optimal learning outcome as this would also provide tools for planning affordable production or motivate collaboration between developers. As the games created in this study are remarkably simple, it would be possible to make a platform solution for creating simple vocabulary games which would make the model more accessible for any language group. Creating a platform solution for content creation teachers and enthusiasts would extend a tool for vocabulary learning into a tool for language revitalization. In addition, while games can work as tools for learning and revival, they also provide new tools for documentation.

CONCLUSION

Language is inherent in game rules and narratives, even simple ones. Game-based language learning can benefit learners of all ages and provide an opportunity to learn outside conventional learning contexts. This is especially important for minority languages, where there is low availability for guided learning.

In this article we combine what we have learned from developing a selection of simple vocabulary games into a palette of games. Instead of developing one game with adjustable features we propose a palette where a selection of multiple simple, easy, and affordable vocabulary games are created to provide the adjustability that traditionally is embedded to only one culturally biased learning game. We in addition provide design guidelines for games with *Variation* and *Accessibility*. The guidelines and palette form a framework for designing simple vocabulary games for minority languages.

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