

O5 App development REPORT (Karaton CZ development)

There is no need to say that translating an app doesn't mean just translation of the content of the app/ game.

Our task in the project was to adopt the reading fluency app chosen as a result of comparative study implemented by our colleagues from Belgium and Holland. Based on certain criteria of availability, quality and specificity toward the reading fluency the Karaton app was nominated. Throughout the Transnational meeting in Prague in September 2019 the first steps to get to know Karaton were taken. For the rest of the project time, Karaton was translated, filled with the original Czech content, adopted, implemented and tested in Czech school to show its advantages toward the reading fluency and applicability in the context of Czech primary schools background.

Karaton is a game presented as a online application. Karaton basically contains two main parts: Karaton game for children to help them master reading fluency, and Karaton Academy for teachers or parents to set the game, monitor and evaluate children's game behaviour and results.

To make the flow of O5 comprehensible for the purpose of this report, we divide the O5 into 3 parts: 1) preparation 2) implementation 3) evaluation.

Preparation of Karaton CZ

September – December 2019

Throughout the autumn 2019 Charles University (CHU) with the support of Leuven University (LU) started to prepare the agreement with the Happs development represented by Hannes Huawert (the owner and the author of Karaton) to specify terms and conditions to adopt original Dutch Karaton into Czech language. Karaton became a choice for the O5 activity. The agreement was prepared as a three side agreement between Charles University- Faculty of Humanities (CHU-FH, Primary school Zelenec (PCZ) and Happs Development. Zelenec used project (AisforApp) money to cover the costs related to this agreement. CHU-FH invested money from its own research resources (not related to AisforApp). The agreement was finally signed by all parts in January 2020 and opened a room for a work towards the creation of Karaton Czech.

January – June 2020

Throughout the first half of the 2020 researchers at CHU-FH started to cooperate with Happs development to agree on specific steps to translate Karaton and create Czech content for it. Two researchers were working on the context of Karaton app at CHU-FH: Seidlova Malkova and Draberova.

Dutch Karaton was studied and criteria for a the creation of a words database were agreed. The final Czech word database contains approx. 2360 words. Seidlova Malkova created an excel **matrice with a set of words** needed for all the games included in Karaton. 2365 Czech words were chosen for this word database according to various linguistic and orthography related criteria. Aprox. 600 target words (100 1-syllable, 260 2-syllable, 190 3-syllable and 40 4and more syllable words) were chosen as a target words and 3 related distractors were added for each of the target words. Distractors had to be related to the target word in a specific way (mainly phonological cues). All the words included in the database had to be implemented in a sharable excel file and accompanied by various cues enabling programmers of Happs Development to use them.

Draberova was mainly working on finalisation of a word database for the use of Happs development programmers (implementing cues for programmers or **formatting the database** in a structure preferred from programmers). Jana Draberova was also intensively working on **translation of Karaton manual** that was prepared for teachers for the purpose of enabling teachers (or other possible users of Karaton) to get familiar with Karaton game and Karaton Academy. assisting in a approx.

July- August 2020

Gabriela Seidlova Malkova designed an evaluation study to assess Karaton in Czech schools or partners (primary school Zelenec, non-profit organisation for children with dyslexia and specific learning difficulties – Dyscentrum and primary school Poznavani). Test and tools to be used as a part of the study were prepared, research assistant was hired and trained to use all the research tools for the evaluation study.

September – December 2020

Throughout the autumn 2020 G. Seidlova Malkova was supervising a work on creation of **audio parts of Karaton**. All the words included in the Karaton database had to be recorded and manually edited and formatted to be used by programmers of Karaton. As the Karaton Czech database is huge, the preparation of all necessary audio files took hours to be done. Brychova together with Seidlova Malkova recorded all database words. Seidl edited all the recording and formatted them into a set of individual structured audio files for each word from the Karaton Czech word database.

Seidlova Malkova together with Czech partner intuitions (primary school Zelenec and Dyscentrum) prepared informed consents and distributed them to all the children nominated to participate in the study. Approx. 60 children in primary school Zelenec and 11 children from Dyscentrum (reps, its partner school) were nominated to participate in the study. The study was planned in a format of intervention study with the use of a rotation of experimental and control groups throughout the study to enable the maximum impact of the tested app. Children from 2 classrooms from the partner primary school Zelenec were divided into 4 various groups that were to be gradually testing Karaton (Each group working with Karaton in a specific time period). Children from Dyscentrum partner school (primary school Poznavani) we divided into two groups.

Research assistant B. Krauseova pretested all the children from Zelenec primary school throughout the November and December to start the intervention design and to open a room to implement Karaton Czech. Preparation of a all audio files and its implementation into a Karaton by Happs Development programmers however got into delay and intervention study and to be postponed. CHU-FH team however used the collected data to specify the division of all the children from both partners school into a experimental and control groups and to prepare teacher from the use of Karaton. It became obvious that the task of adopting and translating Karaton is far more complex than anticipated. The game itself was complex and completely new to the CZ teachers, users of the Karaton game and Karaton academy. The decision of our teams was taken to implement a pre-pilot study at the beginning of 2021 to give the partner schools more time to get familiar with the Czech Karaton game/academy and to prepare the schedule of the intervention study to start in February 2021.

Multiplier event for the Teachers from the primary school Zelenec and parents of the children nominated for the study was organized by primary school Zelenec, CU-FH (Seidlova Malkova) and Dyscentrum (Krejцова) helped to prepare a programme by introducing Karaton, preparing a lecture of the development of reading and possible interventions on beginning reading,

principles and advantages of gamification . Multiplier event was used as a starting point of the intervention study- Karaton Czech implementation.

Implementation of Karaton CZ

February – June 2021

It is important to mention that the intervention study (app testing) that was meant as a primarily testing the first format of Czech Karaton ended up being also a part of improving, tuning and correction various aspects of the game. The task to create Czech Karaton became way more complex than anticipated by Happs Development and our project team. Many “minor”, but for the game flow important or necessary, issues waited to be solved and revealed to be important only through the Czech Karaton implementation (when the game was actually used in our partners school). The whole task to have Karaton ready to be used in partner schools took much more energy and time of all the members of the Czech team than planned. Much more resources were needed, more time and personal allocations than planned were necessary to bring waited outputs. We integrated a technician, D. Jelinek, into our team.

As mentioned above, the actual complexity of Czech Karaton game/academy led our team to a decision to implement **pre-pilot phase of app testing**. We took one teacher and one pupil in both Zelenec and Dyscentrum and tested the whole process of implementing Karaton and using Karaton in a small scale format- for two weeks. This decision appeared to be wise and brought us to a decision to use as much project resources as possible to integrate technician into our team to both help teachers, pupils and team member with various issues related to the use of Czech Karaton in our partner institutions. The technical support also enabled our project team to effectively communicate with Happs Development on all necessary improvements or corrections. The complexity of the whole process of implementation of Czech Karaton and the size of all the difficulties this process brought led us to prepare a special report on technical aspects of Karaton implementation – see this part below under a name (Technical issues in implementing Karaton).

The Czech Karaton (app) testing study (planned as intervention study) started in February 2021 and unfortunately was hugely affected by the covid -19 consequences.

Despite the many difficulties brought by lock downs or restriction related to the covid -19 in Czech schools, our team succeeded to run the testing study. From February 2021 – June 2021 altogether 9 children in primary school Poznavani and 15 children in Zelenec tested Karaton app. 3 groups of children (2 in Zelenec and 1 in Poznavani) were gradually working with Karaton, for the period of 2 months with the intensity of 3 sessions per week, each session for the duration of 20 minutes. We also collected the data from approx. 20 children allocated to a control group. All the children in our study were pre and posttested on measures of reading fluency, rapid naming and phoneme awareness. Teachers were monitoring the flow of each Karaton session by filling in structured questionnaire assessing children’s behaviour throughout the game session, issues appearing throughout the game sessions and issues appearing in Karaton game. We planned to use Karaton academy to collect detailed data on each child gaming behaviour and flow throughout the Karaton app, however Karaton Academy was not working reliably providing only episodic information in some cases (for some children the Karaton Academy was functioning well, for majority of the children in our study, however not.).

Final report Karaton CZ

To be the key and the most important Output of the A is for app project for the Czech partners we consider the IO5 output.

Based on the agreement between A is for App project Czech partners (Charles University and Primary school Zelenec) and producer and owner of the Karaton app Happs Development, the Karaton game in original was step by step transformed into the new, CZ Karaton mutation. Throughout the project, this mutation was prepared to be tested in 2 primary schools, Primary school Zelenec and primary school Poznávani with approx. 40 children divided into comparable groups. Our project team implemented throughout the year 2020 and 2021 three interconnected studies to test Karaton: in concrete technical functionality of the Czech mutation, Karaton applicability into the Czech primary school's system (included so called gaming) and functionality of Karaton's game as a tool to help reading fluency development.

Our pilot series of Karaton implementation revealed, that the development of Karaton (translation into the Czech language and creation of the Czech technical surroundings for Karaton CZ) was very difficult to realize within the project financial background. Our researchers and technicians provided much more work than originally planned and expected to be necessary. We realized that development of Karaton CZ was not only about the translation of original Dutch version, but it actually meant transformation and adaptation at various levels of Karaton content (that is why we needed to merge financial resources for IO5 and IO6 at Charles University).

Final result of IO5 in Karaton CZ is a reading app almost ready to be used in practice. Throughout this project we managed to fulfil approx. 75% of the whole content of Karaton necessary for its full independent usage in the praxis of Czech primary school education. To make Karaton fully functional for the Czech primary school praxes, more work (additional research project) would be needed.

To briefly sum up results of a pilot study of Karaton implementation we would like to mention few key points:

- Karaton proved to be functioning positively in the context of the primary school classroom settings in the Czech Republic.
- Karaton effectively joints motivational and learning aspects of the game and necessity of regular training to master fluent reading.
- Most of the children plying Karaton get better in reading fluency via the usage of Karaton
- Karaton – being used as a tool for classroom reading intervention- brings improvements at the level of social skills of children included in the study
- Karaton brings more fun in the classroom, helps to develop pupil's communication skills and raises motivation to practice reading.

As an extra part of this report we would like to present report on technical aspects of developing Czech version of a reading app Karaton. We saw IT related and technical issues of the process of Karaton development or Karaton implementation as a crucial for filling the expected outputs of this project and also for the potential success of usage of Karaton in practice. Below we demonstrate the scope and specificity of errors or "bugs" appearing in the process of Karaton CZ development.

Technical report (technical issues in implementing Karaton)

Throughout the process of implementing first format of Karaton Czech we faced many challenges from many different aspects of the game which we could divide into two main categories – bugs that prevented a player to play the game smoothly and bugs that affected just a visual appearance. During almost a year of intense communication between the development team and the translation team we managed to get rid of most of the bugs from both categories.

Problems preventing from playing

One of the very first problem we experienced was incompatibility of the Czech version with some of the most widely used internet browsers – the most problematic appeared to be Safari. The trouble with Safari was quite unexpected as the development team stated that their intention was to make Karaton available on iOS and iPadOS as well. The solution, however, was quite simple – the development team recommended to use only Mozilla Firefox or Google Chrome. After some time, another problem with browser occurred. This time the solution was to delete the cache and re-install the software.

Another problem appeared to be with creating a character in the game after logging in. There were two possible ways how to do it – from the Karaton academy and from the game itself (just like in the Belgian version of the game). Unfortunately, the characters made within the game were not working properly. This functionality had to be removed and was never added since.

The game itself usually starts with an introduction video. This video showed the background story of the main characters in a brief manner. The translation team found this video as a positive element of the game and wanted to translate it, but in the end, it was removed.

After we managed to run the game using the right browser and creating a character, another problem appeared at the Tutorial Island – the very first destination of the game. In some cases, it was impossible to leave the island after successfully fulfilling all the conditions. After some time in the tutorial island a button to skip the tutorial appears, but it was not working either.

In my opinion one of the most important things in the game are the minigames. Whenever a minigame didn't work basically the whole gaming experience was ruined. Probably the most problematic aspect of the game was (and still is) a minigame we usually call “ivy cutting”. This minigame is rather important not only for education purposes but also for the game itself (the ivy you get while playing the game is an important resource). Sometimes the audio didn't work, sometimes the whole database failed to load so the game was practically empty. Every time the development team managed to repair it another thing broke. The last difficulty we had was caused by setting a challenge in the academy.

Concerning other minigames, they were not as problematic as the “ivy cutting”. We had some problems with “mining” where the game did not display any words (probably another problem with the database) and the same problem happened with “sawmill” as well. The mining game further did not display anything at all, or displayed an unclickable object, so the player was stuck in both cases. Games containing activities with spoken word from time to time did not play any sound and the mute button was not working either. There was also a problem with “wood cutting” – when we tried to play it displayed an error in Dutch.

The game contains a levelling system, where a player who achieve certain level gets the possibility to build new structures containing brand new games. It was problematic in the beginning, because in order to build this structure, a player needs to have a “blueprint”, and the games was giving this blueprint to player's inventory instead of sending it straight to the workshop. It was then impossible to transfer these blueprints from the inventory to the workshop. Another problem connected to the levelling system we had to deal with was that our “in-game friend”, who rewards players when they level up with a box with surprise item, did not stack these boxes. So, if player did not open his/her box and kept playing – thus achieving another level, he/she had only one box anyways.

During the testing phase the game itself crashed completely only once, which I find very impressive. When a person tried to play Karaton, it displayed only grey screen. However, it was most probably caused by general outage of servers worldwide. Other than that, Karaton is very stable.

Problems that did not prevent playing

As I mentioned in the beginning, the game was originally developed to be available both on computers and tablets. However, the developers gave up on making the Czech version available on iOS and iPadOS. In my opinion having the possibility to play on either of these devices makes the game more accessible for wider variety of players (tablets are usually cheaper to buy than computers).

While playing Karaton, the game is constantly sending Newsletters about all kind of information (e.g. licence expiration). The problem is that the Newsletters are coming in Dutch. Even though we sent our translations the situation is still the same. This might seem like a marginal problem, but it feels very unprofessional if someone pays for a licence and is still getting spam-like messages. There was a time when we were receiving our translations of these messages, but the images attached had words in Dutch inside of them.

Another issue that is connected to this problem is the written form of documents including instruction sheet. In Karaton academy there is possibility of downloading all kinds of documents. However, these were not functional most of the time because the links did not contain any files. After the developers repaired this issue, the documents were outdated because the game was changing in time quite a lot. It is essential that at least the instruction sheet is up-to-date and fully translated so that people who are new to the game can read and learn something about it.

We also had some bug affecting only the graphic aspect of the game. For example, the borderline between the beach and the sea was in a strange way fluid and when the player was standing near the sea it looked like he/she was standing in the sea and was almost drowning. Another bug is almost funny. Quite often when the game is loading after playing a minigame, the characters is sliding back to the place where the minigame started. Even the translation itself has a graphic, or rather typo-graphic aspect. To make it more pleasing to the eye the text must be consistent (get rid of all inconsistencies like capital letter and so on). I also must appreciate that the dev. team decided to give the font a little edge which made the text easier to read.

One of the last issues connected to graphics is the scrolling. I noticed that when I am scrolling up and down in the menu using the mouse-wheel, the overview of the character is moving as well. This issue is still ongoing, and the dev. team is still working on it.

Very specific problem occurred when we realised that the combination of the letters C and H make syllable CH. For some games focusing on spelling, it was necessary to deal with this problem, because it would lead the player in a wrong direction.

A separate chapter is the Karaton Academy – a webpage where the teacher can set up all the settings for his/her pupils or where parents can check the progress of their children. At first, we had some difficulties with setting a challenge for kids, because there was non-functional button to set up the challenge. After the developer team redefined this button, it was possible to specify the details of words and games that appear for the player. Also when choosing the specific words for spelling the page was not displaying all the possibilities – namely only 2 pages out of approximately 15 possible. While testing children at school we were continuously checking their progress in Karaton Academy. The system is very well designated to identify the problematic aspects of the child's skills. It is also possible to get the results in excel spreadsheet for further work. Unfortunately, sometimes the system was not showing the progress even though the child played. Apparently, it had something to do with challenges. Even the excel spreadsheets were not loading but the development team managed to repair the academy.

Covid 19-related specificities

A chapter by itself is also around the situation caused by national lockdown in Czechia. If we wanted to continue testing the game with children from home, we had to give licences and instructions to their parents. The first important thing was the licence. Unfortunately, people are very impatient and some of the parents tried to play the game before the dev. team managed

to give them licences. They somehow invented a strange way how to break into the game without the licence and spread instructions how to do it among other parents. It was then very demanding and time-consuming to convince the parents not to use the bug and log in properly. It took about two weeks and hundreds of emails to achieve at least some kind of coordination. The fact that half-finished game was tested by almost 20 people at the same time (we were not ready for this) brought many unexpected bugs and issues. In the end, we managed to get rid of most of the problems but at the same time we realised how important it is to have bugless game if we want to ever distribute it to public.