Arabic Speakers as Croatian Language Learners
Electronic Educational Games as a Support for Learning

Maja Matijević
Institute of Croatian Language and Linguistics, Zagreb, Croatia
mmatijevic@ihjj.hr

Josip Mihaljević
Institute of Croatian Language and Linguistics, Zagreb, Croatia
jmihalj@ihjj.hr

Summary

In the last decade, Croatia has been the transit or receiving country for many refugees who come from the Middle East and Africa and who mostly speak Arabic as their mother tongue. Native speakers of Arabic are faced with many difficulties in the process of learning Croatian. Croatian is written from left to right, and Arabic from right to left. Phonological inventories of Croatian and Arabic are very different, vowels are generally not written in Arabic (or more precisely they are not written with graphemes), grammar is very different, etc. All this demotivates students at the initial stage of learning. Based on the experience of one of the authors with teaching Croatian to asylees and asylum seekers who mostly came to Croatia from the war-ridden Middle East and African countries in the last few years and who are mainly speakers of Arabic, the authors started developing educational games which could facilitate their initial steps in learning Croatian. Games focus on the acquisition of the Latin script and the Croatian phonological inventory (games in which the player writes the pronounced sound, hangman with or without the picture of the required word, etc.). As the difference between capital and small letters does not exist in Arabic, games that tackle certain orthographic issues are also developed. All games have explanations in Arabic that prevent ambiguity and show differences between Croatian and Arabic. The learning material also emphasizes the difference between the phonemes p and b and introduces as many vowel games as possible. The goal is to reduce the beginner's fear of language learning and motivate the learners.

Key words: Arabic language, Croatian as a foreign language, refugees, educational games, game development, language learning, SLA

Introduction

For the great majority of people who live in Croatia, Croatian is their mother tongue, the common language, and the language which is being studied in schools. However, many people who come to Croatia do not speak Croatian and they want to stay in Croatia for many reasons. One of the reasons for immigration is war in the refugee's homeland and their fear of persecution because of their race, religion, nationality, etc.[1] The situation in Europe has significantly changed in the last decade. Because of the war in the Middle East and African countries, Europe has become a safe place for refugees. The migration crisis also affected Croatia, primarily as a part of the 'Balkan route' which has opened in 2015 when many refugees passed through Balkan countries on their way to Western European countries. However, Croatia was not only a transit but also a receiving country for many refugees who decided to stay in it (especially after 2013 when Croatia became a European Union member). According to the latest official data (MUP, 2019) in March 2019, there were 767 asylees in Croatia, the number of asylum seekers is not known.

---

[1] Based on the definition of refugee in *Convention Relating to the Status of Refugees* from 1951 (UNHCR, 1951), all migrants who have 'well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion' are called *refugees*. In this work, term *refugee* will be used as a hyperonym to *asylum seeker* and *asylee*, which will be distinguished to avoid terminological confusion. The term *asylum seeker* will refer to a refugee requesting asylum in another country and it will differ from term *asylee* which will be used for a person who officially has asylum.

When a person gets asylum in Croatia, he has the right to stay in the country, move and express his religion freely, have medical insurance, attend school, learn the language and have access to information. To have all these rights, he has to respect the Constitution of the Republic of Croatia, cooperate with institutions and try to integrate into the Croatian society (Zakon o međunarodnoj i privremenoj zaštiti, 2015). One of the first steps in the integration process is learning the language, which is both the right and the obligation of an asylee. Users on popular language learning platforms such as Memrise[2] and DuoLingo[3] have created separate quizzes for Arabic students learning English. Qian and Clark (2016) conducted a research using the Academic Search Complete Database. They analyzed 137 studies on game-based learning material. Their research shows that the influence of games on the success of learning is mostly dependent on the way they combine educational content with certain game mechanics which are successful in the entertainment game industry as well. They think that specifically designed games for learning different subjects and aiming at different groups defined by age and gender mostly work better than typical commercial and educational games. The problem is how to develop specific games for specific groups of students (e.g. native speakers of Arabic learning Croatian) because that requires programming and finding or creating appropriate graphical resources. The hypothesis of this paper is that efficient interactive content can and should be made for the native speakers of Arabic learning Croatian. The main goal is to present electronic educational games for learning Croatian specially developed to meet the needs of Arabic refugees. Games like this might be a good stimulus for all Arabic speakers in their initial stages of learning Croatian.

Croatian language courses and asylees

Refugees who come to Croatia are mostly exposed to Croatian for the first time in collective reception centers in Zagreb and Kutina where they listen to people who speak Croatian. Taking into account that language courses are expensive and generally not available to refugees, it is very common that their first steps usually depend on civil society organizations and volunteers. These volunteers are rarely educated teachers of Croatian as a foreign language, and even if they are, they are mostly not educated to meet the specific needs of a particularly vulnerable group of students such as refugees (Đurđević, Podboj, 2016: 246). Refugees could also start learning Croatian using the Croatian language Moodle course[4] or mobile applications such as Learn Croatian. Speak Croatian[5], Learn Croatian Language with Master Ling[6], Jednostavno naučite hrvatski[7], etc. Unfortunately, some Moodle courses do not use the capabilities of the system in its full extent. Some lecturers only upload Word, PDF or PowerPoint files as learning materials, which are not much different from the books as they mostly contain static texts and images. Moodle does have integrated options for creating quizzes, crosswords, hangman games, class scenarios and other interactive contents (Birkić et al., 2019: 49-54). There is even an option to implement interactive content from the H5P platform which includes creating web responsive quizzes, timelines, virtual tours, word pronunciations, tests, essays, etc. (Ibid.: 28). Organized obligatory language courses for asylees are not held regularly and they are available only to asylees and not to asylum seekers (Đurđević, Podboj, 2016: 248). The first free Croatian language course led by experienced teachers, performed by student volunteers and held not only for asylees but also for asylum seekers started in 2017 and was performed at the Faculty of Humanities and Social Sciences in Zagreb[8]. The main condition for entering the course was knowing the Latin script and basics of Croatian. After the course, students would get a B1.1. certificate if they

---

[2] English for Arabic speakers: www.memrise.com/course/276681/english-for-arabic-speakers-2/ (20.10.2019)

[3] Free Language Courses for Arabic Speakers: www.duolingo.com/courses/ar (20.10.2019)

[4] Moodle courses *Free Online Croatian Courses – A1.HR and A2.HR* are created by Croaticum – Centre for Croatian as a Second and Foreign Language and Centre State Office for Croats Abroad and can be accessed at page https://croaticum.ffzg.unizg.hr/?page_id=5024 since December 2018.

[5] Learn Croatian. Speak Croatian: https://play.google.com/store/apps/details?id=com.atistudios.mondly.hr&hl=en_US (26.10.2019)

[6] Learn Croatian Language with Master Ling:
https://play.google.com/store/apps/details?id=com.simyasolutions.ling.hr&hl=hr (26.10.2019)

[7] Jednostavno naučite hrvatski: https://play.google.com/store/apps/details?id=simply.learn.croatian&hl=hr (26.10.2019)

[8] Until now, three B1.1. courses for asylees and asylum seekers were held at Croaticum – Centre for Croatian as Foreign and Second Language. Teachers Jelena Cvitanušić Tvico and Ranka Đurđević mentored students Ivana Đerke, Ivana Bauk, and Maja Matijević who performed classes for 45 students (15 per a one-semester course).

passed the final test with the score of at least 61% correct answers. Even if they knew the Latin script, there were a lot of students who had problems with distinguishing some Croatian phonemes, such as u and o, p and b, etc. and with Croatian orthography (Matijević, 2018: 5-6). In 2018 the same faculty launched a course Croatian as a foreign language and service-learning for graduate students. Within that course free classes Latin literacy for asylees and asylum seekers[9] were held. The classes were designed for asylees and asylum seekers who are illiterate in the Latin script and the main goals were that after the class students recognize and distinguish Croatian sounds (heard or written), can pronounce and write Croatian sounds, know the Croatian alphabet and can hold a basic conversation in Croatian (Ocvirk, Radošević, Sammartino, 2019: 29). Teacher experiences from these courses were a starting point for creating electronic games for that group of users. Both courses also have students who had traumatic experiences which affect their learning motivation and sometimes cognitive abilities. The stressful and traumatic experience can be manifested as fatigue, lack of concentration, difficulties in remembering, somatic disorders, missing classes, etc. Moreover, the teacher should take into account the level of student's previous education and possible cultural differences that affect the learning process, like not understanding the atmosphere in the class typical for western societies (Đurđević, Podboj, 2016: 250). In addition to traumatic and stressful experience, asylees and asylum seekers might, as all students of foreign languages, have the fear of language. The fear of language is defined as a fear we feel in situations that require the use of a non-mother tongue in which we feel incompetent (Mihaljević Djigunović, 1998: 52). The fear of language might be even greater for asylum seekers because their possibility of permanent stay in Croatia depends on having a B1.1. certificate. If in addition to all this, the difference between Croatian and Arabic is taken into account, it is understandable that learning Croatian might be very challenging for Arabic native speaking refugees.

Croatian vs. Arabic

Croatian is a Slavic flective language written in the Latin script which is very different from Arabic and also from English or French, the languages that might be more familiar to some Arabic speakers[10]. The Arabic script is written from right to left, and the Latin script from left to right. The Arabic script does not differentiate between capital and small letters and uses punctuation differently from most Indo-European languages. In addition to that, Arabic speakers who write in a language that uses the Latin script tend to use a comma instead of a period (Pučko otvoreno učilište, 2018: 18). Arabic script also does not record vowels as graphemes, but adds small marks above, under or around consonants which are the root of the word (Matijević, 2018: 6). On the grammatical level, the Arabic language does not have the verb to be ('She is happy' or 'He is a teacher' would be 'She happy' or 'He teacher'). A descriptive adjective usually comes after the noun it describes ('nice girl' would be 'girl nice') and there is no neutral gender in Arabic. Also, some nouns do not have the same gender as in Croatian, so the word for table (stol) which is of male gender in Croatian, is of female gender in Arabic (Pučko otvoreno učilište, 2018: 18).

Designing learner's material

Thinking about all factors that make learning Croatian hard (experienced traumas, fear of language, unavailability of professional courses, and the difference between Arabic and Croatian), electronic educational games seem to be a good means to facilitate learning Croatian on the first level.

Freely available online games would be educational material that allows a student to have privacy, make mistakes without fear, and repeat lessons as many times as necessary. The first idea was to represent the Croatian phonological system using the pronunciation of sounds and using animation for writing letters (that would be especially useful because looking at animation would bring to mind the

---

[9] The head of that faculty course was prof. Zrinka Jelaska, mentoring teachers were Jelena Cvitanušić Tvico and Ranka Đurđević, and students were Đurđica Ocvirk, Lovro Radošević, and Francesca Sammartino who performed classes for 12 students.

[10] To some students English is known as a *lingua franca* and French is known because it is used in Arabic countries such as Lebanon, Algeria, Tunis, and Morocco. The Latin script might be easier for students who know English or French, but on the other hand, students might have problems in learning Croatian if they rely only on their knowledge of English or French because their phonological inventory differs from Croatian.

different direction of writing). This interactive content is inspired by content present on site Russian For Everyone[11] where there are animations for handwriting of each letter and audio files for the pronunciation. There are also images and audio pronunciations for words and quizzes for each lesson. Another idea was that a completely new writing system might be intimidating for learners, so games will have explanations in Croatian and in Arabic[12]. Translation to the learner's mother tongue should reduce the fear of language and make learning quicker. In the initial stage (animation of writing, pronunciation) there are Croatian sounds divided into groups based on similar sound formation or similar shape in the Latin script. Sounds are divided into these groups: (1) A, E, I; (2) O, U; (3) K, G, H, (4) T, D; (5) L, J, Lj; (6) M, N, Nj; (7) B, P; (8) V, F, R; (9) S, Š; (10) Z, Ž; (11) C, Č, Ć; (12) Đ, Dž. Each sound in each group can be listened to and the animation can be seen. After that, every sound is presented in all positions, in the beginning, in the middle, and in the end of the word. Frequent Croatian words are chosen as well as internationalisms or names of Arabic countries or cities. Every word can also be pronounced by clicking on it and every word has a simple illustration or picture which represents its meaning. With 5 examples of words that have a certain sound in all positions, every group of sounds has few simple sentences which are useful for basic communication. Looking at a picture, the written word under it and clicking on it has the goal to increase phonological awareness. Phonological awareness is the learner's ability to divide words into sounds and to integrate sounds into words. It is also the ability to associate the sound with the letter and to understand the written word (Kolić-Vehovec, 2011: 17). After lessons on sounds, the learner should be able to establish a relation between phonemes and graphemes and, for example, be able to divide nebo (sky) into n-e-b-o and understand the question What is n-e-b-o? After these lessons, the learner will have games that implicitly increase phonological awareness: games in which the player recognizes the pronounced sound in the written word, memory games (connect the Croatian word with the picture), games in which the player recognizes the pronounced word, anagram games, hangman, bingo, etc. Words used in these games consist of sounds which appear in the lessons. In addition to this, words that have a semantic relation with those words occur in the games. So if in the lesson in which the learner learns the letter d the word dječak (boy) appears, in games after the lesson the antonym djevojčica (girl) would also appear; if in the lesson the learner learns star (old), mlad (young) would be added; kava (coffee) would be associated with co-hiponyms sok (juice), čaj (tea), vino (wine), pivo (beer), etc. After playing these games, learners should achieve these two goals:

    1. Gain phonological awareness of Croatian phonemes and graphemes;
    2. Acquire vocabulary which is necessary for learning Croatian on a higher language level.

Games are also adjusted to Arabic speakers so lessons in which the student learns the difference between o and u, p and b or f, v, and r (which are problematic for Arabic speakers) would have more examples. After this level, games dealing with orthography (practicing capital and small letters) could be implemented as well as many other games that tackle specific grammatical problems and are connected to certain lessons (verb to be, Croatian declension and verbal system, etc.).

Technology used for creating interactive educational content

The interactive educational content the authors created is still in its demo version. Most of the content still needs to be expended, tested on students and then modified for final publication. However, most of the initial ideas for interactive content are implemented on a site at the moment of writing of this paper. The site is currently published as a GitLab page[13]. GitLab service allows the creation of private online repositories which can be privately accessed, updated, and shared using Git language or Git GUI clients like GitKraken[14]. Gitlab also has an option to publish a website on their server free of charge and hide the URL for web indexing by search bars (GitLab, 2018). When the content is finished it will be published within the module for foreigners of the Croatian Web Dictionary – Mrežnik. Mrežnik is a project conducted at the Institute of Croatian Language and Linguistics that aims at creating a free, monolingual, easily searchable hypertext online dictionary of the Croatian standard language with 10,000 entries (Hudeček, Mihaljević, 2017: 172). In addition to entries for

---

[11] Russian For Everyone: www.russianforeveryone.com/ (21.10.2019)
[12] Translator to Arabic was asylee Waddah Almasri who attended the B1.1. course at Croaticum in 2019.
[13] Learn Croatian alphabet: https://borna12.gitlab.io/igre-mreznik/sadrzaji_za_strance/ (26.10.2019)
[14] GitKraken: https://www.gitkraken.com/ (26.10.2019)

adult Croatian speakers, the dictionary also includes entries for children (3,000) and entries for non-native speakers (1,000) (Hudeček, Mihaljević, 2017: 175). Interactive content for learning the Croatian alphabet was divided into letters using drop-down menus with which users can directly open and close content on the site. Each letter has animations which demonstrate the correct order of line movements with the pen to get a certain letter. Font used for these animations was Comic Sans because it is recommended that fonts which are harder to read are better for studying letter writing because it is easier to see lines of different letters at different angles, and there is little to no uniformity in the Comic Sans design. The entire point of Comic Sans is that each letter is distinct from all others. People who have dyslexia usually use this font because the irregularly-shaped letters make it easier to break words down into their components and interpret them correctly (Newton, 2018). The order of line movement was taken from the book Initial writing in the Croatian language which has a detailed study and explanation of how to learn students the Croatian handwriting (Bežen, Reberski, 2014: 124-258). This was created to visually help learners in learning the Latin alphabet. Animations were created as .gif images by using image layers in the open-source free software GIMP 2.10[15]. GIMP is usually not used for animations but by having an option to have multiple layers in an image, it was possible to select the outline for each letter in a font and through each layer precisely draw a part of the letter by filling the outline. Layers could then be used as frames in an animation. On the site, the user can start a .gif animation by clicking on it. For playing .gif files like videos gifsee.js[16] JavaScript library was used. Audio files that were used for pronouncing letters, words or sentences in Croatian were played using Soundcite.js which allows inline blending of the text and audio. With Soundcite.js the audio is not isolated from the text and can be placed inside any part of a paragraph without breaking the text (Knightlab, 2013). The user only clicks on a word, letter or sentence displayed as a text to hear the pronunciation. Demo audio files were currently recorded by a laptop microphone, using a male and a female voice, but in the future, professional recording of new audio files is planned. Above certain words and sentences, there is a picture that represents that word or sentence. Below the link for audio pronunciation, an input form for users was added where they can pronounce words themselves in the microphone and those words will be written inside the input form. If the users pronounce words or sentences correctly the input form will turn green, otherwise, it will turn red.

Figure 1. Users can hear an audio recording of a word and try to pronounce it themselves

This web speech to text API was introduced in 2012 by the W3C Community. The goal was to enable speech recognition and synthesis in modern browsers. Currently, in 2019 this API is still a working draft only supported by Chrome browsers (W3C, 2012). The API currently supports 120 different

---

[15] GNU Image Manipulation Program (GIMP): https://www.gimp.org/ (26.10.2019)
[16] gifsee.js: https://klombomb.github.io/gifsee.js/ (26.10.2019)

languages and language dialects (Google Cloud, 2019). One of these languages is Croatian. This speech to text input forms ignore uppercase letters and punctuation, since there is no way to recognize them through voice (e.g. Croatian word oprosti or sorry can be treated as one word in a multi-word sentence connected to it or as a one-word sentence and it is hard for the computer to differentiate between these and similar cases). This API works well for short sentences and single words, so it mostly translates speech to text correctly. However, one Croatian sentence Mi imamo ljubičastu ljuljačku. (We have a purple swing.) had to be removed because API would always turn word ljuljačku (swing) into ljujašku. Sometimes it also turns incorrectly pronounced word into a correct word, e.g. word krumpir (potato) can be pronounced krompir and the API will still, probably because of the autocorrect options, register it as the word krumpir. Explanations on the site are currently written in Croatian and Arabic. For Arabic, web code had to be modified since Arabic is written and read from right to left. Explanations in other foreign languages could be added in the future.

Educational games

Games for learning the Croatian alphabet and words created so far include two quizzes, a hangman game, a memory game, and a game in which letters are rearranged to get a word that corresponds to the object shown on the picture. Game types for learning were chosen based on their global popularity and familiarity. Games such as quizzes, word puzzles, and memory are very easy to play and most people know how to play them. Also, these types of games are usually present on dictionary and encyclopedia websites, e.g. word games on Merriam-Webster[17] and quizzes on encyclopedia Britannica[18]. The games are still being developed (except for memory games), so new assignments will be added and some functionalities and technical improvements will be implemented later. Some of these games use and mix popular gamification elements such as scoring, time limits, difficulty adjustments, leaderboards, and virtual awards such as medals (Table 1). The games are web-based, responsive and support touch controls so they can be played on many computer devices that have one of the modern web browsers.

Table 1. Gamification elements in each game

game	gamification elements
quiz for learning Croatian letters	- difficulty adjustments - leaderboards - scoring - time limit - virtual medals
quiz for recognizing correctly spelled words	- leaderboards - scoring - time limit - virtual medals
the hangman game	- leaderboards - scoring - time limit - virtual medals
game for rearranging letters	- leaderboards - level selection (based on content) - scoring - time limit - virtual medals
memory game for foreigners learning Croatian	- level selection (based on content) - scoring

The first quiz is for learning Croatian letters[19]. In this game, a player gets a random word represented with a picture and an audio file on which a randomly selected letter of the given word is pronounced. An audio file is played by clicking on the speaker icon and after the player hears the letter he must

---

[17] Merriam-Webster games: https://www.merriam-webster.com/word-games (20.10.2019)
[18] Encyclopedia Britannica Quizzes: https://www.britannica.com/quiz/browse (20.10.2019)
[19] Quiz is for learning Croatian letters: https://borna12.gitlab.io/igre-mreznik//sadrzaji_za_strance/kivz-prepoznaj-slovo/index.html (20.10.2019)

select all occurrences of that letter in a given word. After the selection, the player can confirm his answer and will immediately get feedback for his answer. This game is effective because players can learn how to recognize letters and see their positions in relation to other letters that form the word. The pictures were added to help players recognize the word meaning.

Figure 2. The game for recognizing letters in a pronounced word

In case of an incorrectly selected letter the player will get the correct answer, and in case of the correctly selected letter the player will get a picture of a happy face and the points earned for that question. There is also a different audio file played when submitting the correct and the wrong answers. A player can choose to play the game with the time limit switched on or off. With the time limit off there is a table of results but no virtual awards for the first, second or third place since the scores of players with the same number of points for correct answers cannot be diferentiated. With the time limit on it is easier to rank players because the time required for the response (in seconds or milliseconds) to each question can be taken into account and therefore more diverse results for each game can be obtained. The time limit can be set to 10 or 20 seconds depending on the player's choice. The leaderboards for these time limits are different. The player gets the overall score when he finishes the quiz and can submit the score under the custom username and emoticon that is displayed on the left-hand side of the name.

Most native speakers of Arabic who learn Croatian usually make mistakes in pronouncing and writing certain words. They sometimes make mistakes with only one phoneme. This is why the second quiz aims at recognizing correctly spelled words based on their pronunciation[20]. The quiz functions similarly to the previous one. The player gets a picture and presses the speaker icon to hear the pronunciation of the word. After that, the player gets four possible answers that are all similar to each other in spelling and only differentiated by one or two letters. The player has 20 seconds to choose the correct answer.

---

[20] Quiz for recognizing correctly spelled words: https://borna12.gitlab.io/igre-mreznik//sadrzaji_za_strance/kivz-prepoznaj-rijec/index.html (20.10.2019)

Figure 3. Game for choosing correct spelling for the heard word

The hangman game[21] shows pictures and empathy fields for letters that form the word that corresponds to the picture. The player has 40 seconds to choose the right letters and can only make four mistakes. Letters can be typed with the keyboard but buttons for letters were made for touchscreens as well. Wrongly selected letters are displayed below and drawings for the part of the hangman are generated below the letter buttons. The game has the same element as quizzes with the feedback for answers, the time limit for questions and the leaderboards and virtual medals for best players. The hangman can help students practice Croatian alphabet and vocabulary. By playing the hangman game, students will think about the letter that is in the word. They will also think about what the right word is. If the hangman game is used by teachers during class, it can be one of the ways to help students practice their confidence and to express their thought (Mandasari Manan, 2016: 141).
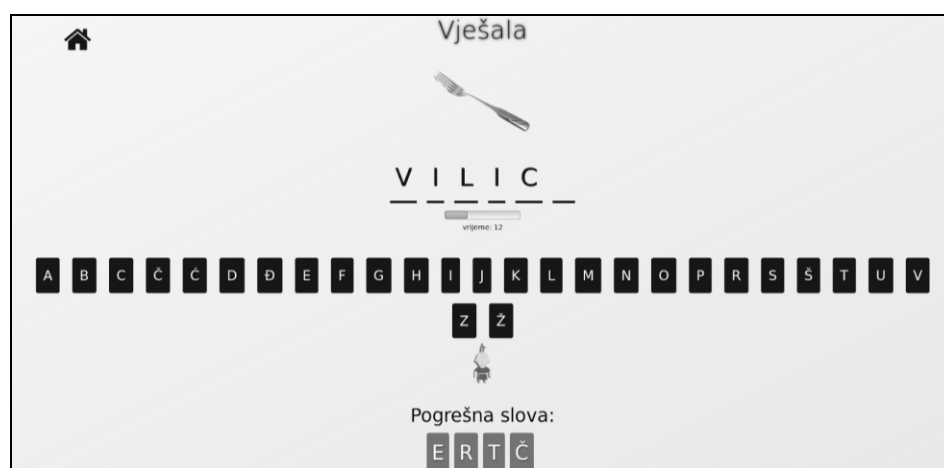

Figure 4. The hangman game for recognizing words represented by pictures

The game of rearranging letters[22] to get a word has content divided into categories. Player can choose a category, each category has its own words, e.g. colors or animals. Like in the hangman game, the player gets a picture but also randomly shuffled letters that form the word corresponding to the picture. The player has to use the letters and rearrange them to spell the word correctly.

---

[21] The hangman game: https://borna12.gitlab.io/igre-mreznik//sadrzaji_za_strance/vjesala/index.html (20.10.2019)
[22] Game for rearranging letters. https://borna12.gitlab.io/igre-mreznik//sadrzaji_za_strance/premetaljka/index.html (20.10.2019)

Memory games have proven to be adaptable for learning many different languages, which we can see through the examples of different memory games present on the site Jezične igre (Language games[23]). The site has memory for learning Latin, German and Croatian words as well as the Glagolitic alphabet. The memory game for learning the Glagolitic alphabet which was published in February 2019 currently has 758 submitted results and 559 likes on the Facebook (187 on the original post, 372 on the shared post)[24]. The memory game[25] for foreigners unlike some other games is finished and is currently publicly available online on the previously mentioned site Jezične igre. The advantage of memory games is that they can be used for matching many different elements like matching words for the same concept in different languages, matching words with other semantically related words (synonyms, antonyms, etc.), matching words with pictures, etc. In this game, the player has to pair the picture with the word. The player can choose the category for words he needs to pair, e.g. vehicles, fruit, vegetables, food, clothes, jobs, and animals. For each category, there is a different number of cards that need to be paired. There is no time limit but there is a timer which checks how long it took a player to finish the game and what was his best result. Although the game is publicly available, it can be updated with new words and pictures. Audio recordings for the pronunciation of words can also be implemented inside the game so the player can hear the pronunciation when he opens the card.
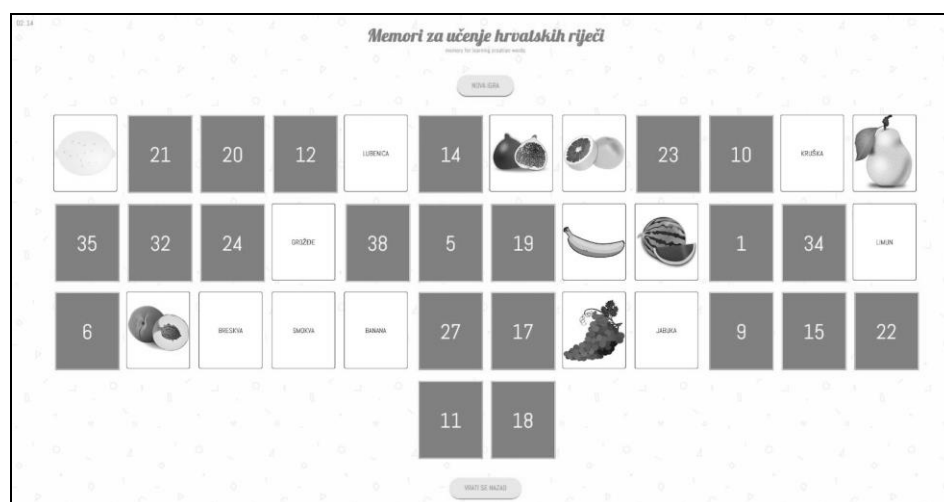

Figure 5. The memory game for matching words with pictures

Conclusion

Electronic educational games for learning Croatian tailor-made for native speakers of Arabic could be useful for all learners, but especially for asylees and asylum seekers who have many difficulties at the beginning of the learning process. Some of the presented games are still in the process of development and will be improved and modified in the future, e.g. some of them such as memory games lack leaderboards, and the hangman games lack the option to choose the level based on the content (food, animals, etc.). Also, more words can be inserted into the game. The data obtained from these games will also be used for analyzing results of players who are learning Croatian as a foreign, second or inherited language since submitted player results are automatically stored on the Google tables. From these tables and data automatically collected from Google Analytics there is an option to check how many times a certain game has been played, how good are the results based on the score, and how many recurring players there are compared to new players. Such data analysis will enable to check the interest of learners for using games in the learning progress. By comparing the results in games with the written practical exam we can also check their effectiveness as learning material. The data of this analysis can also be used in creating new or improving the existing games and interactive material for language learning.

---

[23] Language games: https://jezicneigre.com/ (20.10.2019)
[24] Games for learning Glagolitic script:
https://www.facebook.com/ihjj.hr/photos/a.687321037952455/2715935941757611/?type=3&theater (20.10.2019)
[25] Memory game for foreigners: http://jezicneigre.com/hr/memori-nazivi/ (20.10.2019)

Acknowledgments

References

ATi Studios. (2019). Learn Croatian. Speak Croatian. https://play.google.com/store/apps/details?id=com.atistudios.mondly.hr&hl=en_US (26.10.2019)

Axosoft (2016). GitKraken: Free Git GUI Client. https://www.gitkraken.com/ (26.10.2019)

Bežen, A., Reberski, S. (2014). Početno pisanje na hrvatskome jeziku. Zagreb: Institut za hrvatski jezik i jezikoslovlje

Birkić, T., Golem, K., Kučina Softić, S., Martinović, Z., Radobolja, T., Zemljak Pećina, A. (2019). Sustav za e-učenje Merlin: priručnik za studente. Zagreb: Sveučilišni računski centar

Croaticum. Free Online Croatian Courses – A1.HR and A2.HR. 19.12.2018. https://croaticum.ffzg.unizg.hr/?page_id=5024 (26.10.2019)

Duolingo. (2014). Free Language Courses for Arabic Speakers. 7.3.2014. https://www.duolingo.com/courses/ar (20.10.2019)

Đurđević, R., Podboj, M. (2016). Izbjeglice kao posebna kategorija učenika inog jezika. // Strani jezici: časopis za primijenjenu lingvistiku 45, 3-4, 245-261

Encyclopedia Britannica. Encyclopedia Britannica Quizzes. (2019). https://www.britannica.com/quiz/browse (20.10.2019)

GIMP (2012). GNU Image Manipulation Program (GIMP). 10. 2. 2012. https://www.gimp.org/ (26.10.2019)

GitLab (2017). The DevOps Lifecycle with GitLab. 28. 04. 2017. https://about.gitlab.com/stages-devops-lifecycle/ (26.8.2019)

Google Cloud (2019). Cloud Speech-to-Text: Language support. 18. 6. 2019. https://cloud.google.com/speech-to-text/docs/languages (26.8.2019)

Hudeček, L., Mihaljević, M. (2017). The Croatian Web Dictionary Project – Mrežnik. // Electronic lexicography in the 21st century: Proceedings of eLex 2017 conference / Kosem, I. et al. (eds.). Brno – Leiden: Lexical Computing CZ s.r.o., 172-192

Institut za hrvatski jezik i jezikoslovlje. (2019). Games for learning Glagolitic script. 21. 2. 2019. https://www.facebook.com/ihjj.hr/photos/a.687321037952455/2715935941757611/?type=3&theater (20.10.2019)

Klombomb, N. (2017). gifsee.js. 13.2.2017. https://klombomb.github.io/gifsee.js/ (26.10.2019)

Knightlab. (2013). SoundCite - Knight Lab Projects. 14. 5. 2013. https://projects.knightlab.com/projects/soundcite (26.8.2019)

Kolić-Vehovec, S. (2018). Razvoj fonološke svjesnosti i učenje čitanja: trogodišnje praćenje. // Hrvatska revija za rehabilitacijska istraživanja 39, 1, 17-32. https://hrcak.srce.hr/11618 (25.10.2019)

Mandasari Manan, R. (2016). The Use of Hangman Game in Motivating Students in Learning English. // ELT Perspective. 4, 2

Matijević, M. (2018). O sretnome vikendu i novim pogledima – nastavnička iskustva s tečaja hrvatskoga jezika za azilante i tražitelje azila. // Hrvatski jezik 5, 4, 5-8. https://hrcak.srce.hr/217536 (25.8.2019)

Matijević, M., Mihaljević, J. (2019a). Learn Croatian alphabet. 21. 10. 2019. https://borna12.gitlab.io/igre-mreznik/sadrzaji_za_strance/ (26.10.2019)

Matijević, M., Mihaljević, J. (2019b). Quiz for recognizing correctly spelled words. 21. 10. 2019. https://borna12.gitlab.io/igre-mreznik//sadrzaji_za_strance/kivz-prepoznaj-rijec/index.html (20.10.2019)

Matijević, M., Mihaljević, J. (2019c). Game for rearranging letters. 21. 10. 2019. https://borna12.gitlab.io/igre-mreznik//sadrzaji_za_strance/premetaljka/index.html (20.10.2019)

Matijević, M., Mihaljević, J. (2019d) Memory game for foreigners. 21. 10. 2019. http://jezicneigre.com/hr/memori-nazivi/ (20.10.2019)

Matijević, M., Mihaljević, J. (2019e). Quiz for learning Croatian letters. 21. 10. 2019. https://borna12.gitlab.io/igre-mreznik//sadrzaji_za_strance/kivz-prepoznaj-slovo/index.html (20.10.2019)

Matijević, M., Mihaljević, J. (2019f). The hangman game. 21. 10. 2019. https://borna12.gitlab.io/igre-mreznik//sadrzaji_za_strance/vjesala/index.html (20.10.2019)

Memrise. (2014). English for Arabic speakers. 21. 5. 2014. https://www.memrise.com/course/276681/english-for-arabic-speakers-2/ (20.10.2019)

Merriam-Webster. (2019). Merriam-Webster games. 2019. https://www.merriam-webster.com/word-games (20.10.2019)

Mihaljević Djigunović, J. (1998). Uloga afektivnih faktora u učenju stranog jezika. Zagreb: Filozofski fakultet

Mihaljević, J. (2019). Language games. 15. 10. 2019. https://jezicneigre.com/ (20.10.2019)

MUP. (2019). Statistički pokazatelji tražitelja međunarodne zaštite do 31. 3. 2019. https://mup.gov.hr/UserDocsImages/statistika/2019/Tra%C5%BEitelji%20me%C4%91unarodne%20za%C5%A1tite%20u%202019%20godini/29-04-statistika-trazitelji-1-3-2019.pdf (25.8.2019)

Newton, A. A. (2018). Get Over Yourself and Start Writing in Comic Sans. 18. 12. 2018. https://lifehacker.com/get-over-yourself-and-start-writing-in-comic-sans-1831177236 (26.8.2019)

Ocvirk, Đ., Radošević, L., Sammartino, F. (2019). Opismenjavanje na hrvatskome kao inome jeziku tražitelja azila i azilanata. Manuscript. Zagreb: Filozofski fakultet

Pučko otvoreno učilište (2018). Poučavanje djece kojoj hrvatski nije prvi jezik. Zagreb: Pučko otvoreno učilište Korak po korak

Quian, M., Clark, K. R. (2006). Game-based Learning and 21st century skills: A review of recent research. // Computers in Human Behavior 63, 50-58

Rochtchina, J. (2006). Russian for Everyone. 23.11.2006. http://www.russianforeveryone.com/ (21.10.2019)

Simya Solutions Ltd. (2019a). Jednostavno naučite hrvatski. 25. 10. 2019.
    https://play.google.com/store/apps/details?id=simply.learn.croatian&hl=hr (26.10.2019)

Simya Solutions Ltd. (2019b) Learn Croatian Language with Master Ling. 25. 10. 2019.
    https://play.google.com/store/apps/details?id=com.simyasolutions.ling.hr&hl=hr (26.10.2019)

UNHCR (1951). Convention Relating to the Status of Refugees. https://www.unhcr.org/3b66c2aa10 (25.8.2019)

W3C. (2012). Web Speech API Specification. 19.10.2012. https://w3c.github.io/speech-api/speechapi.html (26.8.2019)

Zakon o međunarodnoj i privremenoj zaštiti (2015). 17. 11. 2015. // Narodne novine 70/2015. https://mup.gov.hr/gradjani-281562/moji-dokumenti-281563/stranci-333/zakon-o-medjunarodnoj-i-privremenoj-zastiti/653 (25.8.2019)