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DEVELOPMENT OF A MOBILE APPLICATION FOR SECOND LANGUAGE ACQUISITION

This paper focuses on the main concept of a mobile application for foreign language learning (English) for Ukrainians. The analysis of existing applications drawbacks has been carried out and ways to solve them have been offered. Different types of databases used for iOS mobile applications have been compared

Keywords: second language acquisition, mobile application, part of speech, database.

РОЗРОБЛЕННЯ МОБІЛЬНОГО ДОДАТКА ДЛЯ ВИВЧЕННЯ ІНОЗЕМНОЇ МОВИ

Запропоновано основну концепцію мобільного додатка для укрїнських користувачів з вивчення іноземної мови (англійської). Недоліки існуючих додатків та запропоновано шляхи їх усунення. Порівняно різні типи баз даних, які використовуються для додатків на платформі iOS.

Ключові слова: вивчення іноземної мови, мобільний додаток, платформа iOS, CoreData, Realm, база даних.

Introduction

In a modern word second language acquisition is a pressing issue, especially in developing countries. Ukraine is not an exception. As our country is developing fast in terms of international relationships and partnerships, English is becoming a must for ordinary Ukrainians. Thus, the problem of second language acquisition is a top issue for adults.

Second Language Acquisition

Applied linguistics is a field of linguistics that identifies, investigates, and suggests solutions to language-related problems occurring in real life to ordinary speakers. The list of academic fields related to applied linguistics is wide. It includes education, computer science, communication research, psychology, sociology etc. One of the subdisciplines of applied linguistics is second language acquisition, which is a human process of learning a second language. Of course, there are a lot of debates around the question whether the basic language skills are innate (nature) or acquired (nurture). But at this point we are more interested in the differences and difficulties of second language acquisition in adult age vs child. On account of different research, we have discovered:

- Children are more accurate in production of phonemes, whereas adults can have (and usually do have) a perceptible foreign accent. Moreover, kids are faster in acquiring phonology;
- It is easier for children to maintain bigger amount of vocabulary knowledge, which means both – words and their context-dependent compositional skills. Even if a word stock of a child is relatively small, they manage to use it more successfully for message conveying, rather than adults. This stands for the idea, that children require less vocabulary to improve their speaking skills.
- Grammar learning is harder for children in comparison to adults, as long as adults have already developed grammar structure of their native language. This helps them to identify already known grammar structures in a foreign language more easy, which means they do not have to learn them in both languages, whereas kids do. Moreover, based on gained experience and knowledge, mature learners are faster and more consistent in understanding and learning unknown foreign grammar structures**.**

Second Language Acquisition Methods and Activities

Generally, there are 4 skills needed to be developed when we are talking about second language acquisition:

- Speaking;
- Listening;
- Reading;
- Writing.

Based on this, the entire notion of a second language learning program is divided into two major components - acquisition and learning.

Acquisition incorporates intake and fluency. For the intake, a student has to perform different meaningful and communicative exercises, as well as extensive reading. Learning involves studying rules of speech and language structure. But in general, the major function of the second language acquisition is the provision of intake for acquisition.

The most common list of methods and activities of second language acquisition includes:

- Extensive listening that develops listening skills and comprehension of a foreign language;
- Extensive reading. It involves vocabulary extension and learning word meanings in a specific context. Extensive reading includes a large amount of reading;
- Intensive reading. Unlike extensive reading, student is focused more on a specific words, sentence structure and grammar. It is performed on a texts;
- Language immersion. Usage of primary language is not allowed. Basically student has to use a second language in all his/her activities;
- Vocabulary acquisition. Helps to enlarge the words in active use and extend the student's vocabulary [2].

Second language acquisition tools include:

- Dictionary:
  - Mono-lingual dictionary – includes words/phrases and their definitions in a foreign language studied, possibly with some samples of usage;
  - Bilingual dictionary – includes word/phrases and their translations, equivalents and explanations on the mother tongue of a student;
  - Talking dictionary – online dictionary or a software that provides text-to-speech pronunciation;
  - Visual dictionary – in dictionary of this type pictures are used for illustration of word meanings;
- Media of the studied language:
  - Books, audio books, encyclopedias;
  - Music, lyrics;
  - Videos, movies, TV shows, soap operas;
  - Websites and software in the target language. Even changing cell phone system language to the target one has a significant impact;
- E-learning tools, that include online, desktop and mobile services and applications (e.g. Duolingo, Busuu, LinguaLeo etc.)

English learning mobile applications for Ukrainian-speaking users and grammar issue in a vocabulary learning

It goes without saying, that there are a lot of mobile applications for learning English on the market. When we start speaking about mobile applications targeted at a vocabulary learning for a specific source language e.g. East Slavic language, the choice becomes smaller, if we proceed to Ukrainian – frankly speaking, there is little choice. We did a small investigation and were quite disappointed to find out that among popular learning tools e.g. on AppStore only Duolingo has Ukrainian support. Things are better when we talk about dictionaries – there are a plenty of them and some apps even allow the user to save words s/he is interested in (e.g. English Ukrainian Dictionary Box + Wordbook). Nevertheless, none of found dictionaries allows user to train words.

We decided to get focused mostly on vocabulary enrichment, rather than grammar, as long as it poses a bigger challenge for adults. Moreover, it is also one of the top priorities for the advanced students who have already mastered language basics and aim to become more fluent in their speech [2].

Having analyzed different mobile applications, we have arrived at the conclusion that simple trainings available almost in every application (like finding the appropriate translation among a few given) may be quite easy. They may be even primitive in terms of data processed or simple probability, which causes a situation when e.g to translate a word ‘sun’ user may be given four options like ‘бігати’, ‘навпроти’, ‘сонце’, ‘ніжний’. This word may be not worth remembering given that a student may remember that ‘sun’ is supposed to be an object, i.e. a noun, whereas 3 option given are a verb, adverb and adjective. In this case most of the students will find the right answer without recalling the meaning and consequently, without memorising it. If a student was given four options with object names (nouns), the student would have to have to remember the actual meaning of the word ‘sun’ and its Ukrainian equivalent. The key point here is that on the background people first recognize the grammar structure, not the word meaning (the type of exercises with a missing word are based on this logic) [4].

Another issue is that for the most part English words are polysemantic and may have different meanings depending on the context. Furthermore, in the target language, one and the same word may correspond to words of different parts of speech. E.g. word ‘sound’ may have the following meanings in Ukrainian:

- Noun: звук, шум, тон, сенс тощо;
- Verb: звучати, подавати сигнал, створювати враження, сповіщати тощо;
- Adjective: міцний, здоровий, доброякісний, логічний, вичерпний;
- Adverb: міцно, сильно, грунтовно.

It is obvious, that in order to choose the appropriate equivalents, the one needs to be given a word immediate context. Still, providing that a person has not realized some potential meaning of the word (e.g. that the word ‘sound’ may act as an adjective), s/he will be confused when meets this word in this particular role in a sentence (e.g. Their sound friendship was the biggest treasure in John’s life).

A Suggested Solution

Due to this, we have come up with an idea to create a mobile application, where the user is given and could create dictionaries of English words and their Ukrainian equivalents with indications of Ukrainian parts of speech. As a result, almost all activities in the application will be based on this division. To start with, we opted for 3 most common and simple activities:

- Choose an appropriate Ukrainian equivalent among a few given for an English word. All the suggested variants will be selected of the one and same part of speech (e.g. nouns only);
- Choose an appropriate English equivalent among a few given for a Ukrainian word. In this case offered English words will be of the same potential target part of speech. Of course, in this practice there are probable difficulties in case some of the options are mostly used as other parts. For example, the application may ask to find the equivalent for a word ’гарний’, and one of the options will be ‘sound’, which is mostly spread as a noun or verb;
- Provide a translation for a given English word. But in this situation application will indicate which exactly part of speech should be input. It is worth mentioning that there is a widely spread problem when a user has saved in his/her custom vocabulary in its unusual usage or meaning, unknown before (e.g. ‘sound’ and its Ukrainian translation as a an adjective). But then in this training the user translates it into a word’s common meaning (e.g. as a verb ‘звучати’). In this situation application marks an answer as a wrong one, even though the translation is correct, but in database it was saved as a completely another word. By indicating a part of speech we expect to solve this issue. Also we will include logic, when the user should input at least one of the possible translations (e.g. if we translate ‘sound’ as adjective, and possible translations are ‘міцний’, ‘здоровий’, ‘доброякісний’, user’s answer ‘здоровий’ will be considered as sufficient). Possibly, in order to advance the learning aspect, we will ask the user to input one more translation if available. In this case the user will learn more potential meanings of the word.

Additionally we aim to implement one more extra grammar training in the application. This training will be available only for our dictionaries, which will be downloaded together with the application. The training will be aimed at verbs learning only and grammar rules. Basically, there will be ordinary tasks, where users will be given a sentence. One of the words (the verb from the dictionary, which the user is supposed to learn) will be in infinitive form and taken in brackets. The user will be asked to put it into the correct form. This training will be of use for advanced students who have already learned grammar basics and need to improve their skills.

Mobile Platform and Database Solutions

We have decided to develop an application for iOS platform. There are a few reasons for this:

- Amount of iOS users in Ukraine is growing rapidly in last few years;
- Android has much bigger market share in Ukraine, which means that there are more available applications for Android users, rather than for iOS.

Of course, we want our app to work offline, as it is more useful and effective for users. Moreover, most of the users will prefer offline solution. Our decision means we will work with persisting data. Bearing in mind that our future application requires a solid database, which will contain a big amount of data and of course should be fast, we have decided to investigate different types of open source databases that can be used in our project and compare them to the standard solution for iOS application – Core Data. Out of different database solutions, we opted for the most popular solution over the recent time – Realm (https://realm.io/), which is the first ever database built for mobile devices only.

In Realm data is directly exposed through objects and it can be queried by code. Additionally, it is told to be much easier in use than CoreData and much faster. [3] This last note we decided to test.

We designed a simple test for writing and reading entities with CoreData and Realm. And here are the results:

Writing Test			
Test 1			
	Start Insert	**Finish Insert**	**Delta**
CoreData	1473160640.000043	1473160640.017321	0.017278
Realm	1473160640.017501	1473160640.025810	0.008309
Test 2			
	Start Insert	**Finish Insert**	**Delta**
CoreData	1473162381.004650	1473162381.028231	0.023581
Realm	1473162381.029226	1473162381.049632	0.020406

Reading Test			
Test 1			
	Start Fetch	**Finish Fetch**	**Delta**
CoreData	1473161211.769826	1473161211.820848	0.051022
Realm	1473161211.821051	1473161211.822434	0.001383
Test 2			
	Start Fetch	**Finish Fetch**	**Delta**
CoreData	1473161909.013020	1473161909.067250	0.054230
Realm	1473161909.067789	1473161909.069776	0.001987
Test 3			
	Start Fetch	**Finish Fetch**	**Delta**
CoreData	1473162542.454855	1473162542.506541	0.051686
Realm	1473162542.507001	1473162542.508182	0.001181

Based on this small investigation, one can conclude that Realm is almost two times faster in writing and more than 40 times in reading compared to the CoreData. Due to this and other mentioned above reasons, we decided to use Realm database for our linguistic project.

App Architecture

Main classes of the future application will be:

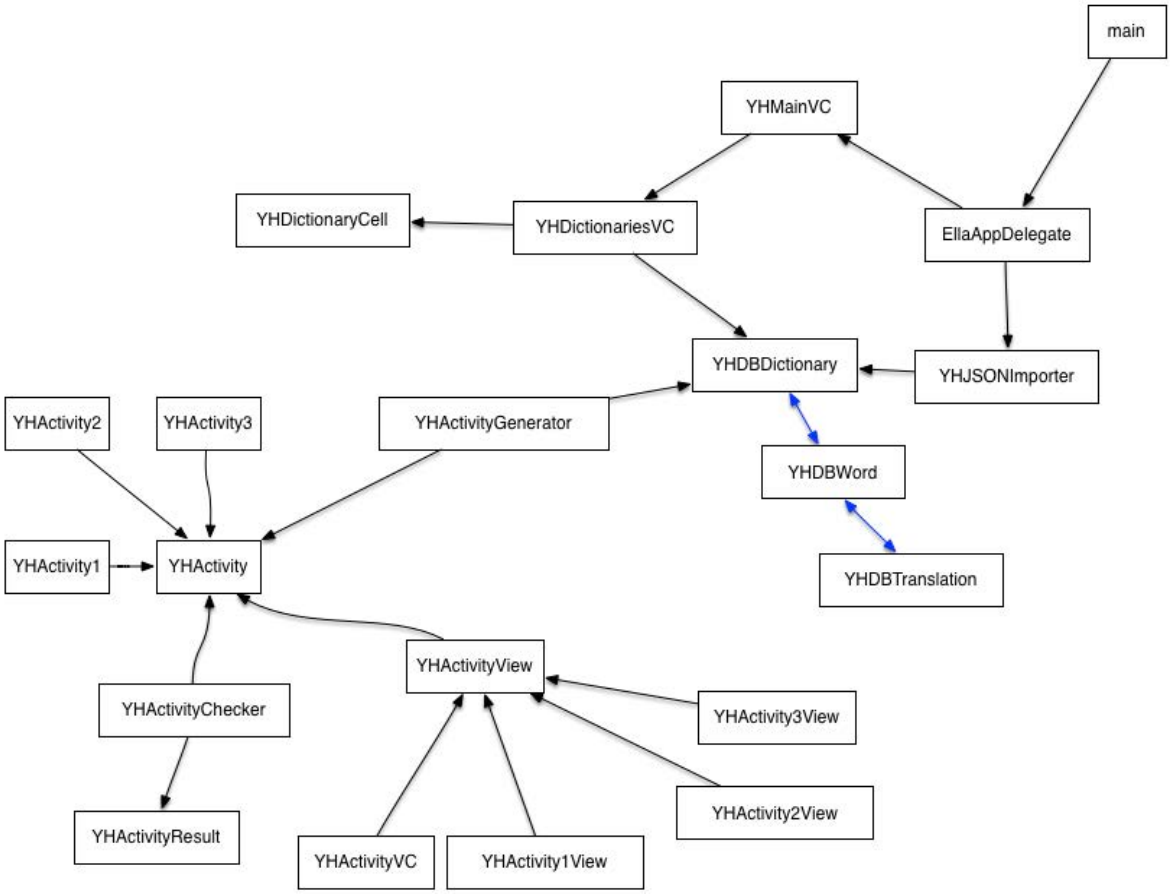
- YHDBDictionary – a dictionary object, that will contain the words. It will have a connection one-to-many with YHDBWord;

- YHDBWord – it is an object, that will work with a word. It will contain word and connection one-to-many with YHDBTranslation;
- YHDBTranslation – this class will contain a translation and its part of speech.

Class YHJSONImport will export dictionaries from JSON files to our database.

Every activity will have one base class YHActivity. For activity creation YHActivityGenerator will be used, that will create an array of activities of a particular type for a particular dictionary. When activity will be completed, it will be processed by YHTestChecker and results will be saved into YHActivityResult.

YHTesstView is an element of base visualization for every test.



Conclusion

In the modern world second language acquisition (English in particular) is a priority for all the people, including Ukrainians. Mobile applications are becoming more and more popular as a tool for vocabulary and grammar practice. Taken this into consideration, we decided to create an iOS mobile application, which will include grammar aspect into vocabulary studying. As long as application should work offline, it it is supposed to have a solid local database. Having compared 2 most popular database solutions, we opted for Realm as the one to be used in our small project.

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