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# Human-computer interaction in foreign language learning applications: Applied linguistics viewpoint of mobile learning

Marcel Pikhart\*

*Faculty of Informatics and Management, University of Hradec Kralove, Hradec Kralove 50003, Czech Republic*

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## Abstract

The current development in mobile learning has seen an unprecedented rise in the last decade and, moreover, the present pandemic situation has speeded up the process of eLearning implementation even in areas that were still rather reluctant in this respect. The paper attempts to provide the results and analysis of the subjective satisfaction of the users of these foreign language learning apps. Qualitative research was conducted at the Faculty of Informatics and Management of the University of Hradec Kralove, the Czech Republic, as a qualitative study through a set of guided interviews with students/users. The respondents (n=18) were the students of information science and data science of the university; therefore, their opinion can prove to be very useful as they are well informed and they also represented the youngest generation, i.e. Millennials, who may have rather different needs from the previous generations, and these needs are, naturally, reflected in their use of technology. The tested apps belong to the most popular and most downloaded free apps for foreign language learning currently available in the iOS and Android markets. The findings of the research clearly show that the main concern of the users of the apps was the lack of AI utilization and old-fashioned interface of the apps despite the fact that they are relatively new. Another major concern was the old-fashioned design, and regarding human-computer interaction in these apps, the lack of machine learning and deep learning strategies.

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*Keywords:* mobile apps, language learning apps, second language learning, foreign language learning, applied linguistics, mobile learning, eLearning, blended learning, foreign languages

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\* Corresponding author. Tel.: 420 774 374 374

*E-mail address:* [marcel.pikhart@uhk.cz](mailto:marcel.pikhart@uhk.cz)

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## 1. Introduction

The recent development of information and communication technologies (ICT) and the massive implementation of various mobile learning platforms through human-computer interaction (HCI) into the formal and informal learning processes have brought many advantages and disadvantages connected to both technical and educational issues [1-6]. This paper attempts to analyse these pros and cons related to foreign language learning (FLL) or second language (L2) acquisition when utilizing a mobile learning environment as a supplement to regular classroom activities. This analysis is conducted by a qualitative study on the subjective satisfaction of users with foreign language learning apps. The findings of the paper could be useful for further analysis and research into the effectiveness of these mobile platforms used in university language education and could also be an impetus for further studies that are desperately needed.

The current literature on the effectiveness of various forms of eLearning, hybrid learning, blended learning and the utilization of technology in the educational process is on one hand very positive as the technology brings various new means and possibilities of transferring information from the teacher to the students [7-12]. On the other hand, there are also voices – and recently not only isolated ones – that call for the reconsideration of the implementation of various kinds of technologies into the learning process [13-17]. The reasons behind this idea are numerous and meaningful. It is an urgent task for ICT specialists to take them into consideration when preparing various technological tools used for FLL because if they were not taken into account seriously, it could only lead to a certain failure of them in the near future as they would not represent the needs of the current users as research proves [18-20]. The focus of the developers should be focused on the new needs of the youngest generation, i.e., Millennials.

Considering the opinion of the users, which is the most important in this respect, the research was conducted into the subjective satisfaction of the users of various widely-used FLL apps. These users are students of information science and data science at the Faculty of Informatics and Management at the University of Hradec Kralove, the Czech Republic, therefore, their voice represents a very educated opinion as they themselves are, or soon will be, the designers of similar apps.

Human-computer interaction has recently seen increased interest as it connects technology and cognitive aspects of human reasoning and perception [21-24]. Therefore, HCI must not be neglected and more attention should be paid to this technology-human enhanced interaction, also for the reason that the youngest generation of users are used to AI implementation in basically all aspects of their lives. The vast majority of the young generation in the so-called western world has a mobile device, i.e., a smartphone or a tablet, or even both, and they spend the major proportion of their free time using these devices. This could be a great opportunity (but also a threat) not only for businesses (and they have already grasped the opportunity very quickly) but also for educational institutions, such as high schools and universities. FLL is one of the areas where the use of ICT has recently seen a dramatic rise, however, it still lags behind the unprecedented rise of the utilization of smartphones in business and social media. The implementation of AI in these areas, i.e., social media and communication and businesses, is wildly exploiting the users and must be reflected by academia and various pressure groups as well. Furthermore, it must be noted that education is the foundation the future of the society is based on, and despite the fact that it may sound like a cliché, it is a fact that must not be neglected.

The aims (and the rationale) of the paper are primarily as follows:

- First, to bring attention to the topic of utilization of mobile apps in FLL,
- Second, to analyze the opinion of the respondents connected to these FLL apps,
- And finally, to be an impetus for further research into this essential area, i.e., how to optimize any HCI in FLL apps, and create a general awareness of the importance of the issue.

The aim of the paper was reached by conducting qualitative research into the subjective satisfaction of the users of various FLL apps currently in massive use with the highest number of downloads.

## 2. Research Methods

### 2.1 Research background

The research was conducted at the Faculty of Informatics and Management in the spring 2020. All respondents were asked to download five globally most popular and downloaded FLL apps from the list provided to them (available both for iOS and Android platforms). The list of these apps was created based on the number of downloads, i.e., the five most downloaded apps were evaluated by the respondents. The respondents downloaded the apps, used them for a month for their language improvement, and then they were interviewed about their satisfaction and reflections about the apps.

The rationale behind the research was not to test the quality of the apps regarding their efficiency in language FLL, but the research focused on how the users, who are well-trained in ICT, would evaluate the apps from a professional perspective as educated users. The research was conducted as qualitative with guided interviews with these respondents just after the testing period that lasted for four weeks. The interviews were not recorded, but the interviewer was making notes during the process of the interview with all the participants.

All participants expressed their will to take part in the research and all GDPR regulations were followed regarding the data protection, i.e. no personal information was collected or stored about the researched group and the participants.

### 2.2 Research sample

The research sample of the respondents (n=18) consisted of students of data science and information science, therefore, their opinions can be considered as very reliable and educated because all of them are well-informed about the current developments in ICT and many of them are also active programmers and designers as their part-time job. Moreover, all of them study another foreign language as their obligatory part of the curriculum, therefore, they have some language learning experience, which can also be helpful in their evaluation of the apps. No specific language was required from the users to choose, however, all of them picked English as their most familiar language to be used in the app while testing. English is L2 for all participants of the research and this was the major reason for this choice. The age of the research sample varied between 20 and 23 years, i.e., they all represented Millennials with all the needs and requirements this group has. There were both male and female respondents (male n=11, female n=7). The discrepancy in the gender numbers is caused by the fact that the majority of the ICT students are generally male rather than female.

### 2.3 Tested apps

The interview was based on a set of ten predefined questions that tested the satisfaction of the users with the apps they used in their FLL. The questions concentrated on the general satisfaction with the platform, specific features, such as aesthetics, look, design, colors, user-friendliness, specific aspects of the implementation of AI, deep learning and machine learning that could be discoverable by an educated user. The respondents could also express their specific opinions and ideas about the improvement of an app in the open question that provided a space for a discussion about the technical parameters of the tested apps.

The tested apps are listed in Table 1. All apps are intended to be used for various major languages, such as English, German, French, Russian, Spanish, Italian and Portuguese. All respondents used them for English only, but the use in other languages is identical regarding the look and utilization of all functionalities of the given app. Therefore, it does not present any limitation if the respondents used these apps only for English as an L2. The tested apps were for free and did not require any registration. These apps can be used as a benchmark of FLL apps currently in use as they are the most downloaded apps, therefore, also the most used apps by non-professional users, i.e., used daily by those who want to improve their foreign language skills and are not willing to pay for any professional service.

Table 1. The review of tested apps.

Anonymized name of the app	Review (max. 5 points)	Number of downloads (in millions)
A	4.7	100+
B	4.6	10+
C	4.7	10+
D	4.7	1+
E	4.7	1+

### 3. Findings

The research has found very interesting and important issues that cannot be neglected when designing various, not only FLL, platforms. In summary, the respondents clearly expressed, within their educated opinion, their major concerns connected to the technical design of the apps, but the most crucial are the three as follows:

- First, the obvious lack of any AI utilization in the given apps,
- Second, the old-fashioned design of the apps
- And lastly, the lack of any HCI in the apps, i.e., there is no machine learning or deep learning strategy applied.

There were many other concerns but these three occurred repeatedly and in all respondents, therefore they may potentially pose a big risk for further design and development, and they must be seriously considered by the ICT specialists who are responsible for such design. The users belong to the generation of Millennials [25-27] for whom the modern technology must be connected to a smart environment, therefore, neglecting or even ignoring the modern trends of deep learning, machine learning, cognitive science and artificial intelligence can be a problem and a signal for them that the app is old-fashioned and not appropriate to be further used. This is the biggest concern expressed by the respondents.

The respondents tested the apps only from the position of the users, not the designers, therefore their subjective opinion could have been biased as they did not have access to the code of the app itself, however, their opinion is necessary as it expressed their subjective satisfaction, which is the major drive and motive to use or not to use the app. The concern that the apps do not use any AI or only on a very low (mostly undetectable) level was connected to all five tested apps and expressed by the vast majority of the respondents.

The idea that the apps use old-fashioned design was only expressed in two of the five apps, therefore, it was not a general issue, however, many respondents clearly expressed their need to see apps with better design and more attractive interface that would be more user-friendly and catchy. The reason behind this is the fact that the young generation spends a lot of time with their devices, therefore, anything that is not able to attract attention, will not have any possibility to succeed. Their screen time is now very large, therefore, they will only increase it if there is a serious reason to do so.

The concerns about the HCI aspects are grave as well because many of the respondents could not identify any or much of machine learning in the apps. These apps were purely based on simple tasks without any development based on deep learning or machine learning, or at least they were undetectable. The recent findings of cognitive science were neglected and not applied at all in these apps. Almost all respondents expressed this concern because they had been expecting that these apps will use the current technology with the benefits it brings. On the other hand, they identified this issue to be essential, and its elimination could improve both the functionality and efficiency of the apps.

As the research was qualitative, the researcher could discuss with the respondents to determine more details about their satisfaction or dissatisfaction, and their answers were extremely inspiring. It was clearly visible that the needs of the younger generation were dramatically different from the previous one and that Millennials expect the

technology to be on a much higher level even if it is free of charge. Their expectations were comparable to the professionals who are responsible for the design and development of these apps, but they were not met. The general dissatisfaction of the respondents will be probably reflected in the general dissatisfaction in the general public users who have to or want to use these apps. These general public users, despite the fact that they are not professionals, will not be satisfied because these apps do not provide the user the interface and functionalities they could and should.

The implementation of deep learning, artificial intelligence, machine learning and advanced human-computer interaction models is, therefore, necessary to meet the needs of the youngest generation, i.e., who is expecting that all these FLL apps will naturally have all these benefits.

#### **4. Conclusions**

There is not much research into the technical aspects of FLL apps available. The majority of the research concentrated on learning pedagogy of FLL, i.e., the aspect of applied linguistics, or on purely ICT aspects, i.e., how to optimize the design of these apps [28-32]. These two areas are however, intertwined and cannot ignore each other, therefore, this research paper is trying to bring these issues to the attention of ICT professionals.

It should be an impetus for further research into the area, and should also motivate ICT professionals and educators to cooperate together. This is the only possibility how to create a successful and impactful FLL app that would be interesting and would also bring desired learning outcomes.

The paper attempts to bring the attention of the designers to the topic and stimulate further discussion about education and ICT – the topic that is nowadays more urgent than ever before, also due to the current limitations in the educational area caused by the massive implementation of eLearning caused by the current pandemic situation in the global world.

##### *4.1 Research limitations*

The limitations of the research are based on the fact that the research was conducted with a limited sample of respondents, but still the results yielded are reliable also due to the fact that the respondents are professionals in the field of ICT and therefore their educated opinion can be considered relevant and inspiring.

These results could be an impetus for both large-scale research and could be an inspiration for designers of various learning apps. The opinion of Millennials must be taken into account very seriously as this generation differs very much compared to the previous ones in their needs and requirements regarding the use of learning apps, and this fact must not be neglected.

##### *4.2 Further research and implications*

If these results are an impetus for further investigation and development, then it will suffice and the research conducted will not be in vain. Further research could focus on the importance of various aspects of application design crucial for the new generation of Millennials. This context is urgently needed and our undivided attention paid to this topic is necessary to succeed. The new generation has different requirements that must be reflected by ICT specialists, and the designers have to bear in mind that the long-term sustainability of ICT services is very much connected to these requirements.

Further research findings will be crucial for all stakeholders and people responsible for various kinds of eLearning, hybrid learning, online learning, eLearning, etc., because the new needs of the users are dramatically different. It must be taken seriously into consideration that the new generation of the users have a significantly diverse expectation and not meeting them will necessarily lead to a failure of the whole area of ICT. The pragmatic features of ICT must be enhanced and make them more visible, also by implementing AI into areas where it is not very visible yet.

The question is how it is possible that basically all multinational corporations in ICT area (resellers, social media and search engines) have a chance to use AI in all of their products, and on the other hand, AI is still missing in

basically all educational apps. It is not only the problem of money – the reason is also the lack of knowledge and awareness. This paper is only trying to bring the need for this awareness to our attention.

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