

Mobile Language Learning

Providing tools that allow the asynchronous, casual and sometimes gameified learning of languages on mobile devices.

Keith Vassallo

Department of Computer Information Systems.
University of Malta
Msida, Malta

keith.vassallo.11@um.edu.mt

Lalit Garg

Department of Computer Information Systems.
University of Malta
Msida, Malta

Lalit.garg@um.edu.mt

Colin Layfield

Department of Computer Information Systems.
University of Malta
Msida, Malta

colin.layfield@um.edu.mt

Abstract— This paper provides an overview of progress being made within the field of mobile language learning. A brief discussion of leading mobile language learning applications ensues, together with a gap analysis providing scope for further research.

Keywords— Mobile Language Learning, e-Learning, m-Learning, Language Learning.

I. INTRODUCTION

As the popularity of mobile devices, particularly smartphones and tablets, rises so does the array of available applications in all categories, including e-learning, or m-learning. Current trends showing rapid development and proliferation of mobile device technology gives rise to an environment which enables learners to learn any time and anywhere, as part of everyday practices [1]

Teachers and learners can now integrate mobile technologies into everyday practices, and this is also created new scenarios for both learning and mobile device usage. There are many topics that can benefit from mobile learning (m-learning), however one of the disciplines that looks set to benefit most from these developments is language learning [3].

A. Mobile Learning

According to Kukulska-Hulme [3], ‘Mobile learning’ is a useful umbrella term but it also obscures the various strands within the field and the diversity of projects and initiatives, not all of which have a focus on mobility. Mobile devices may be used for learning at home, in a classroom, in a social

space, on field trips, in museums and art galleries, in work contexts or as part of everyday learning.”

With the rich development tools available to Mobile App creators nowadays, applications can be created that not only match the richness of their desktop counterparts, but that specifically leverage the mobility, sensors and personality of mobile devices.

B. Mobile Language Learning

With the field, language learning on mobile devices is termed MALL: Mobile Assisted Language Learning. Kukulska-Hulme & Shield [2] comment “MALL differs from computer-assisted language learning in its use of personal, portable devices that enable new ways of learning, emphasizing continuity or spontaneity of access and interaction across different contexts of use”.

II. MOBILE ASSISTED LANGUAGE LEARNING & PEDAGOGY

A. General Pedagogy

Literature shows that the majority of MALL activities make use of mobile phones [2]. Such activities are normally not instructor-led, instead content is provided that the learner can access asynchronously. Similarly, such content seems to be focused on self-assessment and improvement, rather than formal assessment. Several applications use an Intelligent Tutor System, which creates learner profiles by assessing learner interaction with the system, and thus uses this profile to deliver activities to further strengthen knowledge in areas the learner finds most difficult [2]. For example, if a learner

has difficulty with a certain sub-set of vocabulary, then words in this set will feature more frequently in self-assessments delivered via the application.

In designing MALL activities, one has to acknowledge the different pedagogical requirements of the learner. Whereas with a traditional learning approach, or indeed a traditional e-learning approach, the instructor can assume that the learner has set-aside time for study, with m-learning system the learner may have accessed the application in between other activities. One can imagine a learner accessing the application on a bus, whilst waiting in a waiting room or in other intervals. Hence, designers of MALL activities have to take into account the “highly fragmented” [2] attention of m-learners by providing “short (from 30 seconds to 10 minutes)” [2] learning activities.

The language being learnt is also a pedagogical issue. Whilst it is one thing to learn a language relatively similar to the learner’s native language (such as an English-speaking native learning French), it is much harder to learn a significantly different language (such as the same learner learning Mandarin) – According to Edge et al [4] “Even for skilled linguists, it takes around 2200 hours (88 weeks) of dedicated classroom instruction to reach general proficiency in languages dissimilar to their native language”.

Another issue, as with any learning, is to maintain the motivation of the learners, especially those who are pursuing a new language as an intellectual challenge or out of interest. In such cases, “microlearning” may help language learners to better use the many times of the day where other distractions are halted, and attention can be diverted to a short activity to teach a small part of a language set. The portability and connectedness of mobile devices makes them ideally suited for microlearning, which is not possible or inconvenient on traditional computer systems [4].

B. Lessons from Cognitive Psychology

Several authors [5¹] refer to three important findings which further outline how m-learning can support the natural way in which humans learn.

1. *Encoding Specificity* – recall is best when the context of learning and what is being learnt share cues. This will help the learner to recall the language needed where it is needed (ex: learning about ordering food at a restaurant).
2. *Spaced Repetition* – learning is best presented over time rather than in quick succession. This suits the nature of “fragmented interaction” as with mobile devices.
3. *Situated Cognition* – Learning is enhanced by using it in context, rather than via exclusively explicit study. For example, language cannot be abstracted away from the context within which it is used (location/audience).

¹ See [37], [12] and [5]

This research seems to indicate that not only can mobile-learning of language be a convenient learning method, but it may actually enhance existing e-learning or traditional/blended learning environments.

Sung, Chang & Yang [13] carried out a meta-analysis on the use of mobile devices in learning from very early learning through college level, and find that the mobile device features of portability, connectedness and social interaction alone are not sufficient for positive language learning effects. New pedagogy must be developed to embed teaching scenarios within the learning material to maximize the function of the features offered by the device [13].

III. CURRENT APPLICATIONS

Certain MALL applications make use of the specific nature of mobile devices. Edge et. al. argue that language is best delivered on mobile via *contextual microlearning*, where learning activities are delivered during breaks in activity through the learner’s day, and also take into account the location of the user during the breaks [4].



Figure 1: Contextual Learning with MicroMandarin [4]

A. MicroMandarin

In the MicroMandarin project, the location-based service Foursquare² is used to provide location-relevant information for learning the Chinese language.

The content of MicroMandarin is delivered as a series of *flashcards*. The flashcards are granular in that they focus on the very simplest language constructs (learning new words). These flashcards then measure the learner’s ability to provide the correct response. These cards could, for example, present a word in English and require a choice of a correct Mandarin translation from a list of alternatives. In order to further enhance the learning process, cards are presented according the Leitner system. In this system, cards are displayed in order of increasing degrees of knowledge and then solved by the learner. Correctly solved cards promote the card to the next pile, whilst an incorrect response to a card relegates it to the first pile [4]. Cards are reviewed on a schedule, and techniques such as presenting

² <https://foursquare.com>

more incorrect answers for known cards are used to enforce retention of information already learnt.

The application was presented in two versions – a contextual version based on location, and a frequency version based on the Leitner system. Edge et al. found that studying was substantial in both versions and that the application of the Leitner algorithm made it possible for learners to “learn” a flashcard in a single microlearning break, even though such “cramming” is not usually conducive to retention [4].

B. Duolingo

Duolingo is available both as a website and a mobile application, and focuses on the gamification of learning content. Courses are available for Spanish, French, German, Italian, Portuguese, Dutch, Swedish, Irish, Danish, Turkish, Norwegian, Ukrainian, Esperanto and Russian.

Activities are presented using a number of formats. These may include filling in blanks, speaking words for pronunciation tests, word matching and multiple-choice answers.

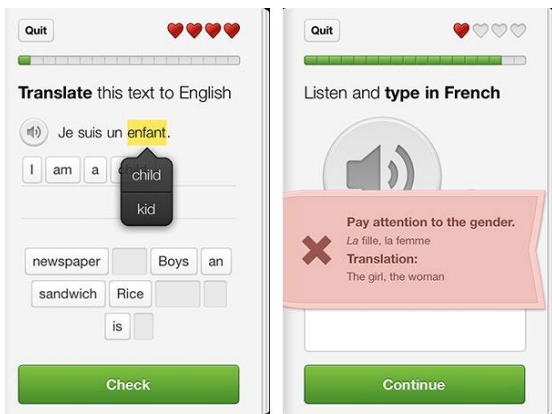


Figure 2: Duolingo Activity

Duolingo presents a series of activities pegged to levels. A certain number of activities have to be correctly completed from each level for the next level to be unlocked. This is called ‘levelling up’. Moreover, badges may be earned for completing certain tasks, such as getting an entire exercise correct or completing an exercise in an amount of time. Hence, Duolingo takes the game approach to language learning, presenting a series of short activities that ‘reward’ the user with further activities and badges.

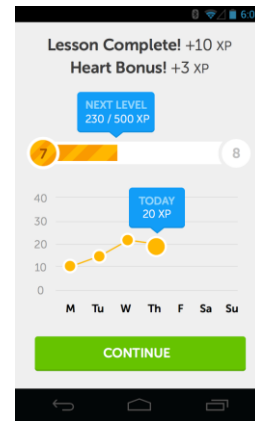


Figure 3: Duolingo Gamification Example

Vessilinov and Grego [6] conducted a study on the effectiveness of Duolingo in teaching Spanish to non-native speakers from the USA and found an overall statistically significant improvement of 91.4 points in language abilities, leading to an estimation that it would take a learner with no knowledge of Spanish between 26 and 49 hours (average 34 hours) to cover the material for the first semester of a college-level Spanish module [6].

During the study, it was found that the major benefit from the software was from users who needed to travel to Spanish-speaking countries, whereas the least benefit was gained by users who simply wanted to study Spanish independently. Persons intending to travel to Spanish-speaking counties scored an average 17.6 point improvement over “casual” learners, by a significant factor ($p=.006$) [6]. This again shows that, like MicoMandarin, the motivation of the learner is key in ensuring the success of the learning platform.

C. Rosetta

Rosetta has been long established in language learning. Recently, mobile applications have been developed which leverage Rosetta’s large database of activities and knowledge.

Rosetta starts by exposing users to sights and sounds related to the language being studied [7]. After this phase, words are introduced, and these are collated in to sentences and finally conversational knowledge. Rosetta contains a large database of activities, so activities are never repeated; rather other exercises with the same goals are presented.

Unlike MicroMandarin and Duolingo, Rosetta also offers synchronous tuition, for example by allowing a live chat session to happen between the learner and a tutor. There is also a community called RosettaWorld, which allows interaction with other students.



Figure 4: Rosetta App

As can be seen from Figure 4, Rosetta has also gamified its content in order to try and motivate learners further.

IV. ANALYSIS OF CURRENT APPLICATIONS

In their 2008 study, Kinshuk et. al. found data that supports the hypothesis that learners with lower verbal ability and higher visual ability will benefit from learning materials incorporating pictorial annotations, against materials with no annotations [8]. Both Duolingo and Rosetta use visual annotation to aid the user to remember/retain the content being presented. On the other hand, although MicroMandarin does not use visual cues, it does present the information contextually, depending on location.

It is important, when designing e-learning material, to take into consideration both instructional strategies and the type of learner being targeted. Indeed, Kinshuk et al. took into consideration two learning dimensions: LCR³ types (written and pictorial annotations) and learner's cognitive type (STM⁴ ability: verbal and visual) [8]. The applications reviewed in this paper do present different learning styles for language acquisition, but they do not target a specific type of learner – they start activities at different levels of user knowledge in the subject.

Jones [10] studied mobile language learning for learners of Welsh, and considered implications of this learning style for endangered and minority languages. Thirteen participants studying Welsh using mobile technologies were interviewed (face-to-face or by phone) for between 40 and 90 minutes, and were asked about how they used mobile devices to support their learning in order to attempt to obtain a thematic analysis [10]. The themes obtained from this study relate to the different skillsets required to obtain language proficiency including listening skills, reading/writing skills and conversational skills. The study also found that although mobile language learning does support students of Welsh, the students did not use the technology as their sole source of learning, and

³ Learning Content Representation

⁴ Short-Term Memory

supplemented their study by interacting with others in Welsh on social media as well as listening to Welsh radio stations [10]. Learners reported that mobile language learning was most useful in listening exercises, as well as reading/writing activities for beginners, but was less suited to reading/writing for intermediate and advanced speakers and to listening for beginners [10]. The use of mobile language learning as a tool to supplement existing structured learning is also recommended by Myhre [12], in a study of students learning Norwegian.

Carroll et al. [11] also studied the learning of Welsh language, with particular focus on younger learners engaging with gamified content on iPads. Challenging learning tasks were presented via novel activities that included visual and playful interactions, and children in primary schools were observed interacting with these applications. Questionnaires were also distributed to teachers. The overall conclusion by Carroll et al. [11] found that children enjoyed interacting with the application and discussed it with their peers, and requested to use it more when the study had been concluded; a favourable result that was also confirmed by teachers in the questionnaire rating the application '4' on a Likert scale of 1-5 [11].

Rico, Agudo & Sánchez [17] also studied mobile language learning through gaming, by measuring student learning during an English language course delivered to undergraduate engineering students that incorporated a mobile learning component using Nintendo DS devices. A survey carried out by Rico et al. [17] found that students had positive experiences when using the mobile learning application, and pre-learning and post-learning exams showed a limited positive correlation between time spent using the mobile application and final grade. This is a significant quantitative effectiveness study, as many other researchers focus on the perceptions of the students rather than performance results. Further research is required in this area, on a larger sample size than used by Rico et al. [17].

Research into MALL must take into consideration the perceptions of educators, as proposed by Oz [15], who conducted a perception study by questionnaire amongst 220 EFL teachers at a major university in Ankara, Turkey. In the study, Oz [15] finds that the majority of the EFL teachers reacted positively to MALL in EFL, however they stressed the importance of teacher supervision and counselling, which in turn raises the importance of teacher-training when MALL applications are to be implemented. Also studying teacher perceptions towards MALL in EFL, Jung [16] applied the Technology Acceptance Model (TAM) to measure perceived usefulness and perceived ease of use in 199 EFL teachers who were already using mobile language learning and were asked to answer a questionnaire. The figures collected by Jung [16] support the hypothesis that teachers perceive mobile language learning to be useful

and easy to use, but further research is needed into teacher's perceptions of MALL on a wider scope.

V. GAP ANALYSIS

Some of the applications reviewed in this paper use different learning techniques for language learning. Be it simple fill-in-the-blank exercises, picture matching, speech recognition or several language-learning games. Other applications such as MicroMandarin provide simple learning exercises, however they do so either in context (via location) or via timed updates (frequency mode).

However, the mobile applications seem to take an 'either-or' approach to the learning style. For example, either via location, or via different activity styles, or via targeting specific learner acuity. However, no application has been found that combines all of these factors together. This is supported by the meta-analysis of Frohberg, Göth and Schwabe [9] "on a meta-level, one can see the way forward to developing Mobile Learning in order to push it towards its greatest potential that is presently hidden".

Sung et al. [13] also found that although there is existing research into this field, most of it is directed at self-study, with little research into a structured learning programme that includes mobile devices for learning. Compounding these issues and highlighting the need for further research, the majority of literature surveyed by Sung et al. [13] found several deficiencies in both the methodology used for existing studies as well as assessment methods to measure learner performance and teaching material effectiveness.

There is space within this field for a new generation of applications to be developed that combine together contextual learning, different methodologies as well as the targeting of different individuals with different abilities. However, such developments must be preceded by further research into this field, especially on how existing mobile learners engage with mobile technologies from various sources to support their learning [10], as well as how these technologies can help to reduce teacher workload and innovate teaching practices [11].

One could envisage a mobile application for learning words within a context. For example, imagine an application whereby a student first completes a survey to establish their learning style and cognitive ability. Then, as the student is presented with activity types that are best suited towards their cognitive type (verbal, visual, kinesthetic etc...), the application adapts difficulty level (ideally, pace) depending on the progress of the user. This would also help to keep the students motivated. Furthermore, the application could leverage context (such as location, weather, events and so on – all available to smart devices) to present more relevant learning material based on where the user is or what the user is doing.

In essence, the mobile application would be replicating what a teacher does in a traditional classroom setting. A teacher will learn about the different character types and student abilities in the first few days of class. Examples will then be adapted depending on culture, location and learner pace. Moreover, different and/or special attention will be given to students with additional needs. All of these factors need to be taken into consideration if a mobile language learning application is to fully replace a traditional class in the context of language learning.

VI. CONCLUSION

It is important for the development of e-learning, both in general and for mobile language learning, that such platforms are able to deliver using the required pedagogical techniques that are used in a traditional classroom setting. Mobile learning should provide instruments that integrate into the learner's daily activities, but also that provoke deep reflection, communication and cooperation [9].

Challenges to the implementation of mobile language learning as part of a structured curriculum are present, and must be researched. For example, McCarty [14] reviewed a number of case-studies of mobile language learning amongst Japanese students in Japan, and state that the use of MALL is dependent cultural and institutional factors including the education system, the availability of capable mobile devices, the local community and the local infrastructure including Internet access.

Studies are showing that mobile language learning applications are indeed effective. For example, Vesselinov and Grego found with statistical significance that Duolingo users gained a little over 8 points of WebCAPE⁵ placement test per one hour of study [6]. In the case of MicroMandarin, the greatest number of participants in the study Edge et al. agree that both the contextual-based and frequency-based versions of the application encouraged them to study more often when compared to their previous study habits [4].

Such results are encouraging, and show that Mobile Assisted Language Learning (MALL) applications, or purely mobile language learning applications are effective in teaching students new languages. More development in this area could lead to applications that better target the pedagogical needs of different learners, however the present applications are already very effective and one can look towards a bright future for mobile language learning.

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⁵ WEBCAPE – provider of Language Placement Tests
(<http://www.perpetualworks.com>)

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