M-Learning Applications as Language Teaching Tools: Study Cases and Comparisons

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Abstract. This work tries to comprehend and analyze the usability of mlearning and e-learning applications to provide Foreign Language (FL) content as a competitive advantage and support to the internationalization of companies. It presents these applications as a possible competitive advantage and support to facilitate access to communication abroad. The study departs from the general – the usability of m-learning and e-learning applications and the teaching-learning approach of FL, to the specific – the competitive advantage and support to the internationalization of companies

1. Introduction

The evolution of Information and Communication Technologies (ICT) has transformed the relationships between education, society and technology, which are increasingly dynamic and are shaping a new paradigm in education. For Martha Gabriel (2013) two important aspects profoundly affect traditional education. The first are the changings caused by the dissemination and perception of digital platforms and technologies in our society. The second is the impact of these changings on education and the possibilities presented by them. This scenario of possibilities, connections and expansion of human potentialities brings also transformations and new challenges.

In this context, technological tools such as mobile internet, touchscreen, wireless and cloud computing make the interaction of technology-mediated devices increasingly intuitive, requiring no technical skills from the users. There are already several multiplatform mobile apps with educational content (for iOS, Android and Windows Phone) that are specially developed to relate these apps to the web, thus allowing a constant exchange of information between them.

Mobility solutions in education, according to Faccioni Filho (2016, p.4) "have unusual characteristics in the formation of people's culture, whether related to the professional or private environments."

Here we highlight the development of mobile technology solutions in the teaching of a language, because it broadens and enhances the contexts of learning in practical situations of language use. In our view this is the most realistic approach, by offering for the users of e-learning and m-learning platforms the possibility of real-time, constant and on the go communication, consolidating the learning of foreign language (FL) among peers in a collaborative and interactive manner.

2. Usability: the Human-Computer Interaction

Software usability determines how practical and easy is to use interfaces, because it refers to the methods of the design process and the final quality of use as a product attribute. In the same way, the features refer to what the product can do. Therefore, testing the functionalities means making sure the product works accordingly to previous specifications. In turn, usability testing refers to making sure that people recognize and interact with the product functions to meet their needs.

Since the mid-1980s, interface developers have employed usability methods and functionalities to design and test software and systems aiming ease of use, ease of learning, memorization, user satisfaction and errors exemption. This is an important indicative of the developers' attention on the final user needs when creating technological products, which have come to consider the human being as the central focus. Because of this, it is necessary to know who the users are, what are their specific needs and the expected results.

As technology evolved, usability has become not only a requirement but also a competitive edge. Thus, more and more the tools have adopted dynamic capabilities in multimedia, including hypertexts, animations, games, graphics, videos and sounds, taking into consideration the aspects of usability in the digital convergence and in human-machine relations, with appropriated interfaces to each device, target audience, user situations and specific tasks.

3. From E-Learning to M-Learning

In general, e-learning is understood as the acquisition of knowledge and skills through the use of ICT – Information and Communication Technologies, usually interconnected through internet networks, from where learning materials are distributed and individual/group didactic activities are carried out, including tutorial and evaluation learning features (COLL; MONEREO, 2010). Moreover, according to Faccioni Filho (2016, p.22) e-learning is the "teaching with the support of electronic tools and the internet, associated to the concepts of distance education".

Beyond the e-learning, or just besides it, mobile learning, or simply "m-learning", means mobile learning (CROMPTON, 2013). Brown (2010) conceptualized m-learning as the use of technologies like wireless telephony networks to facilitate, support, improve and extend the reach of teaching and learning. According to this author, m-learning teaching consists of short-term, instantly usable mobile learning that allows users to customize content, enter data and even generate content when on the go. In this

way, the mobile concept can refer to both mobile technologies, user mobility and even the mobility of content and context. This methodology has as fundamental characteristic the physical and temporal mobility of the users (KURTZ et al., 2015).

Faccioni Filho, Moraes Neto and Klein (2010) understands that "m-learning can be considered as a deployment of distance education via web, or e-learning. However, while e-learning uses the internet as a base, m-learning goes beyond it because it allows the user to access virtually from anywhere and at any time because it uses the personal mobile device as the basis for information repository and learning communications."

Another characteristic established by Sharples (2009, p. 37) is that "mobility should not be understood only in terms of geographical movement, but also in terms of temporal transformations and decreasing borders, increasing the horizons of learning and access to information". In this sense, m-learning is a modality of contextual teaching that favors new types of behaviorism. Interaction between people and the convergence of the usability aspects allow a flow of contents, which enables a real continuous learning, either formal or informal. Therefore, a teaching approach that uses m-learning should think of the learning process as a collaborative construction.

Moreover, m-learning has a set of opportunities and challenges, described by Faccioni Filho (2008) as:

- Learn anywhere, anytime;
- Learn by interacting in real time with other people, from different places;
- Storing all files and documents on the mobile device;
- Create locally, in the mobile device, relevant information (pictures, videos, texts);
- Synchronous collaboration with fellows;
- Up to date information through the mobile network.

The challenge then is to develop new design paradigms to support education on mobile platforms. These new paradigms, which affect the design of mobile applications, according to Faccioni Filho (2008) are:

- Collaborative education: people are connected all the time and can collaborate in real time by asking, responding, discussing and participating in a democratic and open way;
- Corporate education: as more and more workers are out the desk office, on the go and even at home office, corporate education will get advantage of mobile devices;
- Generating collective knowledge: as devices have powerful features and continually new functionalities are added (such as pictures, videos, texts, among others), content can be generated anytime, anywhere, and distributed in real time either for closed groups or open environments, especially within social networks that are already ubiquitous.

Thus, what characterizes m-learning is the integration and convergence of digital technologies (available anytime and anywhere on the hands of any user) as an evolution of the e-learning features and capabilities. In addition, due to the mobility resulting from device portability and connectivity coupled with strong computing functions, it is easy to see the great potential of these devices for innovative learning applications, not only in its institutional version, but as informal learning through mobile communication applications, in order to produce foreign language teaching experiences anywhere, anytime.

Finally, m-learning promotes changes in the traditional process of foreign language teaching, because it places the user as an active and autonomous subject, both in planning and in the execution of learning activities. Mobile communication is a ubiquitous system that develops in any place and time, consisting of a new way for learning activities that allows portability, interactivity and connectivity, which reduces the interactional limitations. This is a new paradigm interfering in the traditional linear model of education.

4. The Foreign Language learning approach: social-interaction

Cognitivist and socio-interactionist learning approaches are among the theoretical basis of foreign language teaching. According to Foster and Ohta (2005), in the cognitivist approach the foreign language learning can be taken as an essentially mental process, involving the acquisition of morphosyntactic, phonological and lexical structures of the language. This approach values the way that the brain processes, retains and rescues the information, with emphasis on the cognition that goes through the process of memorization, attention and automation of the linguistic structures use. The process of language acquisition is evaluated by indicators such as level of fluency, accuracy and automation of these structures.

However, it is important to emphasize that language development is also related to the language interaction between speakers. Individuals involved in the process of language acquisition construct their knowledge mutually, through the socio-interaction with peers in their social and cultural environment (FOSTER and OHTA, 2005).

According to socio-interactionist theory, the knowledge belongs neither to the subject who knows it nor to the known object, but it is constructed through the interaction established between the subject and the object in the social and cultural environment where they are inserted. Linguistic development, therefore, is closely connected to the use of language during interaction.

Specifically, in the socio-interactionist approach of foreign language teaching and learning, Krashen (1987), a linguist and specialist in Communicative Approach theory, explains that the development of language skills (speaking, listening, reading and writing) is the result of the interaction between the individual and the social and cultural environment. Hence, the social environment conducive to language learning is one with multicultural and contextualized learning.

Thus, both socio-interaction and linguistic structure are fundamental for human development. Vygotsky (2005), in his work "Pensamento e Linguagem", identifies that

there are at least two levels of human development: the real one, already acquired or formed, that determines what the individual is already capable of doing for himself; and the potential one, which is the ability to learn from another person. This possibility of altering a person's performance by the interference of another is fundamental in his theory.

Based on the finding that these two levels of development exist, Vygotsky (2005) defines the Zone of Proximal Development (ZPZ) as the distance between the level of real development, determined by the independent solution of problems, and the level of potential development, determined by problem solving in collaboration with more able peers.

According to Schlatter et al. (2004), one of the key concepts in the Vygotskian sociointeractionist perspective of language acquisition is scaffolding, which was proposed by Wood, Bruner and Ross (1976). It is defined as a collaborative process through individuals giving assistance to each other, in a sense that one participant can do something they could not do otherwise. However, for the development and growing autonomy of the participants, it is necessary that this assistance be gradually withdrawn.

The notion of Zone of Proximal Development (ZPD) also suggests that people learn through reflective practice and collaboration with one another. The characteristics of the expanded notion of the ZPD can be applied to any situation where participants are developing mastery of a practice, or understanding a theme while participating in any activity. This implies that mediation is not limited only to the help offered by other individuals, but may come in the form of social tools, such as m-learning apps with socio-interaction functions.

This is one of the great advantages of the m-learning apps, since users can access the content available in the m-learning environment at different times and places. However, when this occurs at the same time for several users, there is a strengthening of communicative practice relationships established by its resources. Pairs of the communicative socio-interaction can establish real time relations in the virtual environment, favoring a sense of common goal.

Unlike the acquiring of the mother tongue, learning a foreign language is a conscious and intentional process. It is therefore necessary to gradually develop the ability to think "the language". This is a prerequisite for progress towards higher levels of proficiency, which can be accomplished in a dynamic of internalization through activities mediated by mobile devices.

On the other hand, Gibson (1979) in his work "The Ecological Approach to Visual Perception" explains the concept of affordance referring to the characteristics of a given object or environment to provide an action. For Gibson and Pick (2000), affordances are not the same for everyone, because depending on people's goals and intentions, perceptions of potentialities may be different. In this context, mobile devices must be perceived by what is beyond the tool, by what are their action potentialities and how they can be used to define certain behaviors of their users.

Relevant learning mediated by technology comes from the interaction between the user and the environment. Environment means here the applications in the m-learning

modality. User behavior will depend on the perception of the potential, i.e., the affordance propitiated by the m-learning app usability and functionality.

Therefore, as the perspective of using new technologies grows, the term *affordance* refers to the mediation of learning by the use of Information and Communication Technologies inserted in the teaching process. The inclusion of mobile devices and their tools is a possibility to support and promote relevant foreign language learning for m-learning users.

In addition to the main features that the applications can offer for the development of the language skills, it is worth mentioning the ease of publishing didactic content, even for the ones with no technical expertise. Mobile apps can support foreign language learning in a decentralized way, stimulating users' production capabilities and further empowering the development of oral and written communication skills.

5. Data Analysis

For this research, we selected ten mobile-learning applications to analyze and compare to each other, considering our previous discussions. They are available for foreign language teaching and learning in m-learning (mobile) and e-learning (web responsive) modalities. The apps are free to use and free of charge, and have been chosen up to this date among the most sought and quoted by users in discussion and download web forums. Sure, the "ranking" variation of such apps can occur continuously. This article therefore does not propose or advocate such apps, and only uses them as a basis of study on this date.

The applications analyzed are:

- Duolingo: its proposal is to make multilingual teaching a fun activity. The method resembles a game, offering points to rank the participant in the dispute with the others. Available at https://en.duolingo.com.
- Babbel: aims to do language studies using pronunciations, sample phrases and videos to facilitate learning. Website: https://en.babbel.com
- Bussu: online community where the user can learn aided by a team of education experts, designers and developers who interact through the app. Website: https://busuu.com.
- Memrise: app that uses modules created by reference universities and users. As the user improves, he or she gains points in an evolutionary process. Website: www.memrise.com.
- Mindsnack: App geared towards those who already have some knowledge in English, because the contents are available in this language. Games are meant to improve vocabulary. Website: https://www.mindsnacks.com.
- Lingualeo: the app allows choosing the level of study, and trains the language playing. The proposal is based on the study of vocabulary to add words and

create a glossary, adopting the concept of gamification and training for memorization. Website: https://lingualeo.com.

- Voxy: online platform and app that adapts to the user interest levels and goals. With personalized lessons according to the desired level of English, providing classes with native speakers. Website: https://voxy.com.
- Mondly: teaching based on phrases and translation. Offers a chat bot as an aid to pronunciation. Website: https://www.mondlylanguages.com.
- Tandem: it is an interactive language learning community, in which the users register and answer questions about their habits, such as topics they like to talk about, and their goals. Website: https://www.tandem.net.
- Easy Ten: based on learning vocabulary with the purpose of memorizing 10 words per day, with competition among users in a contest for whoever hits and memorizes more words. Website: http://www.easyten.ru/en

The analysis approach configures two different axis. The first one evaluates aspects of the **usability of m-learning and e-learning** applications, which are specified and described at Table 1. The second evaluates **didactic-methodological aspects** of the foreign language, through distance education approach, which are specified and analyzed at Table 2. For each axis we considered different aspects and these aspects evaluated according with a scale that varies from 1 to 5.

The scale for evaluation considers the apps adherence to each item in the tables according to the grades: 1 - little; 2 - little, in part; 3 - reasonable; 4 - totally, in part; 5 - totally. These grades were assigned according to subjective assessments and reviews of end users. The results are then tabulated and each app has its final average, as showed in the Tables 1 and 2.

Table 1, which defines aspects of the **usability of m-learning and e-learning** applications, has the following itens of measurement:

- 1. Agility: performance and response time, from loading to performing functions.
- 2. Instinctivity: interface, symbols and constructions; it means that a user who downloads the program for the first time knows how to use it with little or no instruction.
- 3. Objectivity: easy access to the functions, information easily found by the user.
- 4. Functionality: navigation that communicates in a simple way with other activities, without difficult interface or schedules that interrupt the user activity.
- 5. Reliability: security and protection against any attempts to intercept stored data, requiring password to access.

Table 2, which defines **didactic-methodological aspects** of the foreign language, through distance education approach, has the following items of measurement:

1- Content: provides a coherent framework for developing language skills (speaking, listening, reading and writing) and learning more effectively.

- 2- Texts: structures and grammatical characteristics of spoken and written texts. It makes the association of spoken and written texts to the cultural context of its use.
- 3- Tasks: activities that the users do or realize by themselves, using their existing linguistic resources.
- 4- Socio-interaction: exchanging knowledge and doubts between users, participations in partner-interactions with specific purposes.
- 5- Assessment: multimedia questions about teaching content, and feedback that users receive via email or in the application itself at the end of the lessons.

Usability aspects of m-learning and e-learning								
Арр	Agility	Instinctivity	Objectivity	Funcionality	Reliability	Average		
Duolingo	5	5	5	4	4	4,6		
Babbel	5	4	4	4	5	4,4		
Busuu	2	3	3	1	3	2,4		
Memrise	4	3	4	4	3	3,6		
Mind Snack	5	3	4	4	3	3,8		
Lingualeo	5	5	4	3	4	4,2		
Voxy	4	3	3	3	3	3,2		
Mondly	4	3	2	3	3	3		
Tandem	1	2	2	2	3	2		
Easy Ten	2	3	3	2	3	2,6		

Table 1. Applications for distance education: usability aspects.

Table 2. Applications for	or distance	education:	didactic	-methodological	aspects
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Didactic-methodological aspects								
Арр	Content	Text	Task	Socio-interaction	Assessment	Average		
Duolingo	4	4	5	4	5	4,4		
Babbel	4	4	5	4	4	4,2		
Busuu	3	3	4	5	4	3,8		
Memrise	3	2	3	4	5	3,4		
Mind Snack	2	3	4	2	4	3		
Lingualeo	4	3	4	2	4	3,4		
Voxy	3	3	3	3	4	3,2		
Mondly	2	3	3	1	3	2,4		
Tandem	3	2	3	5	3	3,2		
Easy Ten	3	3	3	1	2	2,4		

The Final Average of each app is then plotted in a "quadrant" chart type, showed in the Figure 1, where the vertical axis represents the aspects of usability and functionalities defined in the Table 1 results, and the horizontal axis represents the didactic-methodological aspects of the foreign language, through distance education approach, as defined in the Table 2.

The chart divides the apps in four groups, according to their relative positions corresponding to the averages obtained at Tables 1 and 2: Leaders, Followers, Education Focused and User Focused. In this model, we mean:

- Leaders the very innovative apps, both in terms of usability as in terms of didactic aspects, applying several efforts on both perspectives;
- Followers the ones that are trying to enhance their features according to an innovative vision, following the leaders innovations;
- Education Focused apps that prioritize didactic-methodological features, but not pay attention on the usability as a prime feature;
- User Focused apps that prioritize the usability but do not develop profound didactic-methodological features.



Figure 1. "Quadrant" with the apps and their relative positions according to the results from Tables 1 and 2.

Figure 1 shows the chart featuring six apps in the "Leaders" Quadrant: Duolingo, Babbel, Lingualeo, Memrise, Mindsnack and Voxy. These apps deliver good innovation and correspond on what they promise in both the usability and functionality aspects, as well in the aspects of the education approach. The most relevant and common features found in these apps are the gamification of activities to develop language skills. Speaking, listening, reading and writing in a fun way with the goal of engaging,

personalized content in sensory and everyday experiences, online chat and forum for discussion and to resolve possible doubts. Duolingo appears as the leader in this group.

In the "User Focused" Quadrant are Mondly and Easy Ten apps. They have good execution capacity, but they do not add so much to innovation in the aspects of the education of foreign language, consisting of a methodology based on the memorization and translation of words. They are indicated as a complement for the user who wants to learn a foreign language. It is not enough to know the language and the linguistic system, it is also necessary to know how to use it to create interaction between peers in each different social and cultural context. As the user and his interlocutor come to an understanding, they experiment and test new forms of oral or written communication.

The Bussu and Tandem apps are positioned in the "Education Focused" Quadrant for having extreme innovation in the educational approach, presenting a methodology aligned with the theories that support this research. However, they do not have as much capacity to deliver what they promise in the aspects of usability and functionality. These apps corroborate one of the key concepts of the vygotskian socio-interactionist perspective of language acquisition that is scaffolding (Schlatter, 2004), defined as a collaborative process through which users assist each other through peer mediation for communicative tasks of foreign language.

In this study, no apps were found in the "Followers" Quadrant (Mondly is very close to this quadrant). This category in general includes niche-market apps that do not have great expression.

6. Conclusions

The distance education of foreign language requires a multidimensional perspective, which understands and meets the challenges of globalized and technologically connected users and companies. The challenges are how to provide virtual tools that account for the complexity of this niche market. To interact communicatively in more than one language is fundamental for access to this globalized and connected society. The characteristics of the globalized world are conditioned by innumerable factors that must be perceived in the process of companies' market internationalization.

As the foreign language is seen as the language of others, unfamiliar and not as the mother tongue, the process of internationalization also resembles acting on unknown terrain. The operations of companies abroad involve crossing national borders, in a field of uncertainties. This border of uncertainty is related to the psychic distance that, the greater the difference between the country of origin and the foreign country (in terms of development, level and educational content, language, culture, political system, among others), the higher the level of business uncertainty.

The resources made available by mobile devices and their multifunctional apps can be considered tools of foreign language teaching, providing a multicultural coexistence, relevant to the learning and development of real-time language and social-interaction skills in addition to affordance. As shown in this work, these apps contextualize the coexistence between peers through the virtual environment at any time and place.

Finally, the research suggests foreign language apps as a niche market. These apps, despite their positions in the "quadrant" of Figure 2, allow the competitive advantage and support to the internationalization of companies, facilitating the access to their communications abroad.

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