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Mlearning in a mobile world: an analysis of the scientific production of mlearning in the context of language education

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ABSTRACT. Mobile learning (mlearning) has been emerging as an innovation with incredible potential to transform the educational practice. However, limited research has focused on how mlearning has been investigated in the context of language teaching and learning around the world. This paper presents a survey on the educational scenario that pervades the teaching and learning English as a second or foreign language mediated by technology. This study conducted an analysis of publications (N = 18) involving mlearning in the context of teaching or learning English as a foreign or second language and published from 2010 to March 2019. The aims were to verify in what perspective mlearning has been investigated in the context of teaching and/or learning a foreign or second language, what critical success factors (CSFs) have influenced the implementation of mlearning and identify possible gaps of study that need to be fulfilled in future researches. The results indicate that: i) mlearning has been most investigated in the tertiary educational level, ii) the learners' perspective has been the focus of most publications, iii) English is the target language in all studies, and iv) the dominant topic concerning this theme is mlearning technologies, apps and uses. In addition, the findings also report that 19 CSFs were pointed out in 14 publications and assimilation of curriculum (50%) was the most cited CSF. Moreover, the results indicate that there has been a recent increase of interest in mlearning related to foreign language teaching and learning. Further topics of investigation concerning mlearning in language education are suggested.

Keywords: mobile learning; foreign language education; english learning; digital technologies; CSF.

El aprendizaje móvil en un mundo móvil: un análisis de la producción científica del aprendizaje móvil en el contexto de la educación de lenguas

RESUMEN. El aprendizaje móvil (mlearning) se ha convertido en una innovación con un potencial increíble para transformar la práctica educativa. Sin embargo, la investigación limitada se ha centrado en cómo se ha investigado el aprendizaje en el contexto de la enseñanza y el aprendizaje de idiomas en todo el mundo. Este artículo presenta una encuesta sobre el escenario educativo que impregna la enseñanza y el aprendizaje del inglés como segunda lengua o lengua extranjera mediada por la tecnología. Este estudio realizó un análisis de publicaciones (N = 18) relacionadas con el aprendizaje en línea en el contexto de la enseñanza o el aprendizaje del inglés como lengua extranjera o segunda y se publicó entre 2010 y marzo de 2019. Los objetivos fueron verificar en qué perspectiva se ha investigado el aprendizaje en móvil en el contexto de enseñanza y/o aprendizaje de un idioma extranjero o segundo idioma, qué factores críticos de éxito (FCE) han influido en la implementación del aprendizaje e identificar posibles brechas de estudio que deben cumplirse en futuras investigaciones. Los resultados indican que: i) el aprendizaje móvil ha sido más investigado en el nivel educativo terciario, ii) la perspectiva de los alumnos ha sido el foco de la mayoría de las publicaciones, iii) el inglés es el idioma objetivo en todos los estudios, y iv) el tema dominante sobre este tema es aprender tecnologías, aplicaciones y usos. Además, los resultados también informan que se señalaron 19 FCE en 14 publicaciones y la asimilación del currículo (50%) fue el FCE más citado. Por añadidura, los resultados indican que ha habido un aumento reciente en el interés en el aprendizaje móvil relacionado con la enseñanza y el aprendizaje de lenguas extranjeras. Se sugieren otros temas de investigación sobre el aprendizaje en la enseñanza de idiomas.

Palabras-clave: aprendizaje móvil; educación en idiomas extranjeros; aprendizaje de inglés; tecnologías digitales; FCE.

Mlearning dans un monde mobile: une analyse de la production scientifique du mlearning dans le contexte de l'éducation aux langues

RÉSUMÉ. L'apprentissage mobile (mlearning) est en train de devenir une innovation avec un potentiel incroyable pour transformer la pratique éducative. Cependant, peu de recherches ont été consacrées à la manière dont l'apprentissage multi-apprentissage a eu lieu dans le contexte de l'enseignement et de l'apprentissage des langues à travers le monde. Cet article présente une enquête sur le scénario éducatif qui imprègne l'enseignement et l'apprentissage de l'anglais en tant que langue seconde ou langue étrangère transmise par la technologie. Cette étude a mené une analyse des publications (N = 18) impliquant l'apprentissage multiple dans le contexte de l'enseignement ou de l'apprentissage de l'anglais en tant que langue étrangère ou seconde et publiées de 2010 à mars 2019. L'objectif était de vérifier dans quelle perspective l'approfondissement de l'apprentissage a été effectué au cours des années. contexte d'enseignement et/ou d'apprentissage d'une langue étrangère ou d'une langue seconde, facteurs déterminants du succès (FDS) ayant influencé la mise en œuvre du mlearning et recensant les éventuelles lacunes en matière d'études à combler lors de futures recherches. Les résultats indiquent que: i) la plupart des publications ont pour thème l'apprentissage multimédia, ii) le point de vue des apprenants a été l'objet de la plupart des publications, iii) la langue cible de toutes les études, et iv) le sujet principal concernant Ce thème concerne les technologies, les applications et les utilisations multiples. En outre, les résultats indiquent également que 19 FDE ont été mentionnés dans 14 publications et que l'assimilation du curriculum (50%) était le FDS le plus cité. De plus, les résultats indiquent qu'il y a eu une augmentation récente de l'intérêt pour l'apprentissage multiple lié à l'enseignement et à l'apprentissage des langues étrangères. D'autres sujets d'investigation concernant l'apprentissage dans l'apprentissage des langues sont suggérés.

Mots-clés: apprentissage mobile; enseignement des langues étrangères; apprentissage de l'anglais; technologies numériques; FDS.

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Introduction

The impact provoked by social and technological advances in recent decades has generated unprecedented growth of the amount of information and the speed in which technology reaches each individual. In this scenario of changes and many demands, the educational context has witnessed profound transformations in society and, as a consequence, it has been increasingly challenging and diversified, which requires the student a differentiated positioning. This demand, however, is not always followed by opportunities that lead the student to develop his/her cognitive and metacognitive abilities. Rather, the educational context has been slow to move students into an environment that enables them to develop skills that will be central to their professional future, such as the ability to solve problems, to work in interaction and collaboration, initiative, creativity, thought knowledge and familiarity with new technologies.

Information and Communication Digital Technologies (ICDTs) revolutionize society by becoming inherent to everyday life in the workplace, in entertainment settings, in informal learning, in consumer habits, in the way we think, interact and make decisions. Upon the development and popularization of new technologies, much research has been recently done on how people use technological innovations. In this context, there has emerged a concern to investigate how technologies can be used as learning tools (Traxler, 2005; Costa, 2013) and how their development and characteristics can influence language teaching and learning (Moura, 2010; Stefanello & Faccioni Filho, 2017).

Some authors suggest that wireless technologies will revolutionize academic and informal education in the near future because, throughout history, there has never been any other technology that is as readily available and accessible as mobile technologies (Keegan, 2005; Haag, 2011; Mezzetti, Poce, & Pellegrini, 2014). In this sense, data from United Nations Educational, Scientific and Cultural Organization (Unesco, 2013) show that it is useless to prevent mobile devices from being used in formal educational environments because, despite prohibitions and even punishments, mobile devices will remain within reach. On the contrary, educational institutions should invest in instruction regarding the adequate and advantageous use of this technology, as well as warn about using it safely to avoid the dangers inherent in accessing the internet (Costa, 2013).

Mobile devices are tools that facilitate mobile learning, also referred to as mlearning (Figaro-Henry & James, 2015). More specifically, Jacob and Issac (2008, p. 1) defined mobile devices as "[...] small and portable wireless computing and communication devices [...]" that can be used in multiple places. Examples of mobile devices include mobile phones, portable media devices, electronic devices, ipods, palmtops, tablets,

smartphones, smart watches, among other technologies. Mlearning is often characterized as a ubiquitous process, carried out at any place or time through educational resources mediated by mobile technology (Martin, Pastore, & Snider, 2012).

The concept of mlearning still does not find a consistent and consolidated theoretical framework in the literature in regard the analysis of the teaching and learning processes (Traxler, 2005; Costa, 2013). The first definitions of mlearning were likely to define it as a tool used to facilitate and support student learning due to its portability and accessibility (Traxler, 2007).

On the other hand, the most recent definitions tend to focus their understanding on the learning process and associate their use with the role that mobile devices play in facilitating learning. Authors such as Brown (2005), El-Hussein and Cronje (2010) and Stefanello and Faccioni Filho (2017) conceptualize mlearning as the use of wireless technologies, for example cellular mobile telephone networks, which facilitate, support, refine and extend the scope of teaching and learning. According to these authors, teaching through mlearning consists of the instant use of mobile learning to customize content, add information and even generate content wherever the user is.

Nevertheless, the authors accede to the fact that questions may still abound and that no clear and precise definition can be obtained (Toperesu & Belle, 2018). What is agreed to unanimously is that the definitions presented converge to highlight the characteristics of mlearning in transcending geographical boundaries and in promoting the occurrence of learning. In this perspective, and in the context of higher education, El-Hussein and Cronje (2010, p. 12) extend this understanding and argue that mlearning has three main components: technology mobility, learner mobility, and add “[...] the mobility and dynamism of learning processes and the flow of information [...]”. In this sense, mlearning is a modality of contextual teaching that favors new types of behavior. The interaction between people and the convergence of usability aspects allow for a continuous flow of content, which grants formal or informal learning to be continuous as well (Moura, 2010; Haag, 2011; Costa, 2013).

According to Wang, Shen, Novak, and Pan (2009), mlearning has gradually been recognized for its effectiveness in focusing the student on his/her own educational process, as it promotes a more flexible, personalized and collaborative learning. Cheung (2012, p. 90) explains that the success of mlearning depends essentially on three factors, namely, “[...] the technological feasibility of the mobile learning, the learners’ needs of flexible learning and pedagogical benefits [...]”.

Thus, as Faccioni Filho (2008) synthesizes, mlearning offers a range of opportunities and challenges, such as: i) learning anywhere and anytime; ii) learning through real-time interaction with other people from different places; iii) the possibility of storing files and documents on mobile devices; iv) receive updated information through the work network; v) create locally relevant information, such as photos, videos and texts; vi) experiment with synchronous collaboration with peers.

In the meantime, the emerging paradigms impel education professionals to identify and recognize the promising potential of adopting mlearning for innovative learning applications in the academic environment. More specifically, to provide a learning experience in a foreign language that goes beyond institutional limits and advance the routine of learners in a ubiquitous way. In other words, mlearning promotes significant changes in the traditional process of foreign or second language teaching, since it makes the user an active and autonomous subject both in terms of planning and in what concerns the execution of learning activities (Stefanello & Faccioni Filho, 2017).

In fact, in order to conceive mlearning effectively, it is crucial to consider the dynamic relationship that occurs between the individuals, the environment in which he/she is inserted and his/her behavior. In order for such a relationship to be established in an increasingly unbounded context, it is imperative to present new educational practices that enable learners to acquire mobility in globalized communicative contexts and to cross linguistic borderlines.

In order to shed light on this prosperous educational trend, this study aimed to verify in what perspective mlearning has been investigated in the context of teaching and/or learning a foreign or a second language, what critical factors of success have influenced the implementation of mlearning and identify possible gaps of study that need to be fulfilled in future researches. In addition, some other variables, including participants’ profile, target language, level of education, critical success factors, among others, were analyzed as well. Three research questions (RQs) were addressed in this study:

RQ1. In what perspectives has mlearning been studied in the context of teaching and/or learning a foreign or a second language?

RQ2. What critical factors of success influence the implementation of mlearning?

RQ3. Has mlearning been arising more attention and, therefore, more interest of investigation?

Methodology

This investigation was developed through a bibliographic research of the scientific production of studies regarding mlearning in the process of teaching and/or learning a foreign or a second language. The method employed in this research consisted of three phases: the definition of the descriptors, the search for publication upon the appointed descriptors on ERIC and SciELO databases and the analyses of the selected publications using the information obtained from the full texts available online. The descriptors were used in a combined fashion as follows: 'mobile learning' or 'mlearning' and 'teaching a foreign language' or 'learning a foreign language', also the following descriptors were combined and used as indicated: 'mobile learning' or 'mlearning' and 'teaching a second language' or 'learning a second language'.

The data collection was carried out in March, 2019 according to the following criteria of inclusion:

- The studies must pertain to mlearning in the context of teaching and/or learning a foreign or second language;
- The studies must have been published between 2010 and March, 2019. Studies published prior to this year are not included in the analysis;
- The studies must offer free full text available online and must be peer reviewed;
- The studies must have been published in Portuguese, English or Spanish to assure fluent and coherent analyses, due to the authors' linguistic domain.

The search produced 34 publications on SciELO database, and 2 of them satisfied the conditions of the analyses. As far as ERIC, the search originated 38 publications, among which 18 fulfilled the criteria, nevertheless, two of them coincided with those previously selected from SciELO and were discarded. Therefore, the search produced a total of 18 selected publications. Afterwards, all the selected studies were thoroughly read and analyzed so that the information collected could reach the objective of the study, answer the research questions and then be discussed in the light of the literature.

The reason why SciELO and ERIC databases were chosen for this study is that both are online databases that cover a selected collection of scientific journals and are internationally recognized. All content is open access on SciELO. On the other hand, ERIC partially offers free access of full text publications, it is sponsored by the U.S. Department of Education and is the largest database of education research, as described previously in Fluminhan and Murgo (2017).

Data were analyzed by using Chi-Square test, since this statistic is commonly used for testing relationships between categorical variables. Calculating the Chi-Square statistic and comparing it against a critical value from the Chi-Square distribution allowed us to assess whether the observed counts are significantly different from the expected counts. Thus, Chi-Square statistic is based on the difference between what is actually observed in the data and what would be expected if there was truly no relationship between the variables.

Results

In order to make the references to these studies easier, each study has received a Roman numeral. The numerical list is arranged in increasing order by year of publication as the earliest date, as shown in Table 1. The table also informs the country where the research was carried out.

Table 1 shows that out of 18 publication, 14 indicated the country where the studies were carried out; 2 studies did not indicate the country of origin because they aimed to examine applications designed to learn English; one study, although carried out a case study with 18 participants, did not mention the country where the research was conducted and one study proposed an investigation with participants around the globe. Among the 14 studies that indicated the country where the research took place, only two studies occurred in the same country. This finding reveals that this theme has not been studied in a concentrated area, on the contrary, it has been studied in various countries and disseminated the knowledge on the subject across numerous nations.

An increase in the number of publications was observed during the period of 2013 to 2015, with eight publications, followed by the maintenance of the number of publications since then. The results indicated a rising interest in investigating mlearning in the context of teaching and/or learning a foreign or second language, as shown in Table 2.

The next data to be presented is related to the critical success factors (CSFs) that influence the use and implementation of mlearning. Table 3 shows the presence of one or more CSFs in most studies, which indicates the relevance of such information to be identified and socialized in the publications. The most cited CSFs, assimilation with curriculum (50%), content (33,3%) and motivation (33,3%), were highlighted. All these CSFs were proved to be statistically significant at 0.01 level by Chi-Square test.

Table 1. Reference list of the studies selected for analyses, year of publication and the country where the study was carried out.

Author References	Year of Publication	Country where the study was carried out	Reference Number
González	2012	Not mentioned	I
Yang	2012	Taiwan	II
Abdullah, Hussin, Asra, and Zakaria	2013	Malaysia	III
Obari and Lambacher	2014	Japan	IV
Pagel and Lambacher	2014	Japan	V
Ahmad and Farrukh	2015	Not mentioned	VI
Cig, Guvercin, Bayimbetov, and Dos	2015	Kazakhstan	VII
García and Fomona	2015	Spain	VIII
Jung	2015	Korea	IX
Zou and Li	2015	China	X
Alkhezzi and Al-Dousari	2016	Kwait	XI
Byrne	2016	Multinational	XII
Ardi	2017	Indonesia	XIII
Khodabandeh, Alian, and Soleimani	2017	Iran	XIV
Şendurur et al.	2017	Not mentioned	XV
Tayan	2017	Saudi Arabia	XVI
Ibrahim and Kadiri	2018	Nigeria	XVII
Mospan	2018	Poland and Ukraine	XVIII
Total of Studies			18

Source: The authors.

Table 2. Distribution of publications per period.

Period	N	Frequency
2010-2012	2	11,1%
2013-2015	8	44,4%
2016-2019	8	44,4%

N = Number of publications. Source: The authors.

Table 3. Critical Success Factors (CSFs) presented in the studies.

CSFs	Author References	Number of citations	Frequency
Affordability	XIII	1	5,5%
Assimilation with curriculum	IV, V, VI, XIII, X, XI, XIV, XV, XVII	9	50%**
Autonomy	XIII, XVI	2	10,1%
Availability	XV	1	5,5%
Collaboration	II, XIII, XVI, XVII	4	22,2%
Compatibility	IX	1	5,5%
Computer Self-Efficacy	IX	1	5,5%
Connectivity	IX	1	5,5%
Content	II, XIII, IX, VIII, XVII, IV	6	33,3%**
Convenience	XV	1	5,5%
Ease of Use	XV	1	5,5%
Elimination of Technophobia	XVII	1	5,5%
Interactive Communication	III, IX, IVX, XVI	4	22,2%
Learner Commitment	II, III	2	11,1%
Motivation	III, V, X, XI, XIV, XVI	6	33,3%**
Ownership	III, VIII, XIII	3	16,6%
Ubiquity	III, IV, II, XVII	4	22,2%
User Feedback	IV	1	5,5%
User Friendly Design Content	VIII	1	5,5%

**Significant at 0.01 level (Chi-Square test). Source: The authors.

As presented in Table 4, the vast majority of participants investigated were students (61,1%), most studies aimed to investigate the tertiary education (61,1%) and English was the target language present in all studies, besides German, Italian and Spanish that occurred in one study along with English.

As presented in Table 5, the selected publications sought to provide a discussion concerning mobile learning in the context of teaching and/or learning a foreign language as well as illustrate developments in the field. The publications aimed to explore the theme of mobile learning under various topics, such as students' perceptions and attitudes; mlearning in and across formal and informal settings; mlearning technologies, apps and uses; pedagogical approaches, models and theories for mlearning; teachers' and professors' perceptions and attitudes.

Discussion

As Information and Communication Digital Technologies as well as wireless technologies develop rapidly, mlearning has become a useful and practical engine in the education system, including in the context of foreign and second language teaching. However, the success in the implementation of mlearning depends on the view and acceptance of the mlearning platform by its own users (Alrasheedi & Capretz, 2015; Jung, 2015) among various other factors. Notwithstanding the above, there is a lack in studies that focus on investigating how mlearning has been introduced in the educational sector and what aspects have been revealed to be significant in the users perceived viewpoints towards its implementation. To fill the gap in research, the objective of this paper is to verify in what perspective mlearning has been investigated in the context of teaching and/or learning a foreign or second language, what critical factors of success have influenced the implementation of mlearning and identify possible gaps of study that need to be fulfilled in future researches.

The first research question to be addressed is:

RQ1. In what perspectives has mlearning been studied in the context of teaching and/or learning a foreign or second language?

Table 4 shows that out of 18 studies, 12 aimed to investigate students, 1 investigated professors, 1 investigated both students and teachers and 1 one investigated users of apps. The missing values correspond to three publications that had no participants for being the researcher the one who analyzed the apps. These results indicate that little attention has been paid to variables involving teachers or professors and members of the educational institutions, therefore, there is a lack of empirical evidence that points to what motivates and what is important in these professionals' perspective to make mlearning a reality.

Table 4. Participants investigated, level of education and target language present in the selected publications.

	Author Reference	Number of studies	Frequency
Participants investigated			
Students	II, III, IV, V, VII, VIII, X, XI, XIII, XIV, XVII, XVIII	12	66,6%**
Teachers/Professors	IX	1	5,5%
Students and Teachers	XVI	1	5,5%
Users of app	XV	1	5,5%
Not mentioned	I, VI, XII	3	16,6%
Level of Education			
Tertiary	II, III, IV, V, VII, X, XI, XIII, XVI, XVII, XVIII	11	61,1%**
Middle and High School	IX, XIV	2	11,1%
Primary School	VIII	1	5,5%
Not mentioned	I, VI, XII, XV	4	22,2%
Target Language			
English	All studies	18	100%**
Italian	XV	1	5,5%
German	XV	1	5,5%
Spanish	XV	1	5,5%

**Significant at 0.01 level (Chi-Square test). Source: The authors.

Table 5. Mlearning topics approached in the studies.

Topics of Study	Author Reference	Number of Studies	Frequency
Students' perceptions and attitudes	II, V, X, XVI, XVII, XVIII	6	33,3%*
Mlearning in and across formal and informal settings	X	1	5,5%
Mlearning technologies, apps and uses	I, VI, VII, VIII, XI, XII, XIII, XIV, XV	9	50%**
Pedagogical approaches, models and theories for mlearning	III, IV, X	3	16,6%
Teachers'/Professors' perceptions and attitudes	IX, XVI, XVII	3	16,6%

*Significant at 0.05 level (Chi-Square test); **Significant at 0.01 level (Chi-Square test). Source: The authors.

Teachers and other professionals related to education are the first ones to accept and integrate mlearning to their own pedagogical context or simply reject it. As a result, little understanding of how these

professionals perceive mlearning may explain why it still finds barriers to be implemented (Alrasheedi & Capretz, 2015; Jung, 2015). Additional support for this approach comes from Jung (2015), who examined EFL teachers' behaviors that explain their reasons for choosing to adopt mlearning in their teaching practice. The findings reveal that all the variables studied empirically (instant connectivity, compatibility, interaction, content enrichment and computer self-efficacy) provided evidence of positive effects on teachers' perceived usefulness of mlearning. According to the author, it is crucial that researchers dedicate more studies to investigate what motivates these people to embrace technology both in formal and informal learning settings.

This research also revealed that most studies were dedicated to investigate the tertiary education (61,1%), followed by middle and high school (11,1%) and primary school (5,5%). Four studies are responsible for the missing values, for they investigated apps and, therefore, were not related to any educational level. It is noticeable that most studies are focused on the tertiary education, which is situated in a segment considered to require more autonomy and flexibility from the students (Fluminhan, 2017).

However and despite the above, scholars who investigate self-regulation of learning, such as Zimmerman (2000) and Bandura (2008), argue that young children are capable of self-regulating their own capacity of learning, and this identity process is continuous, cyclical and it does not typically happen at a certain period of their lives. In other words, this study suggests that if mlearning were introduced earlier, in the first educational years, students would benefit from developing competencies that would facilitate the exercise of autonomy and future learning.

According to the findings of this study, English was the target language in all selected publications and one of the studies also targeted, Italian, Germany and Spanish, along with English. The interest for the English language is consistent with the current globalization process, which opened new doors to international studies, travel, employment, business, among others, and, consequently, increased its concern and significance. Although it is not the most widely spoken language in the world, "English is considered a *lingua franca* or vehicular language [...]" (Toro et al., 2019, p. 57). Hence, there is an increasing amount of information in English in various areas that need to be accessed on daily basis. In this regard, Moreno (2019) affirms that 52.3% of internet content is written in English and yet, only approximately 26% of the network users are speakers of this language.

With regard to the topics of study approached in the investigations, Table 5 indicates that the most frequent ones were mlearning technologies, apps and uses (50%) and students' perception and attitudes (33,3%), followed by pedagogical approaches (16,6%), teachers'/professors' perceptions and attitudes (16,6%) and mlearning in and across formal and informal settings (5,5%). These results appear to lend support to Godwin-Jones (2004) assertion that earlier investigations on mlearning have focused on descriptive and technical aspects of this new learning environment. In other words, the inaugural authors were inclined to view mlearning as a tool to facilitate and support learning due to its portability and accessibility (Traxler, 2007). Furthermore, it is a consensus at present that the success of mlearning integration into language learning context depends on factors that exceed technological knowledge (Jung, 2015; Alrasheedi & Capretz, 2015; Toperesu & Belle, 2018). It leans on the interaction and affordance of its users (Fluminhan, Murgu, & Fluminhan, 2018).

As aforementioned, these results provide support for Alrasheedi and Capretz (2017) argument that learners have been on the spotlight of most studies. In this perspective, Jung (2015) underscores that teachers have not been given due attention in current literature and there is a lack of empirical studies offering solid indication on what factors are crucial for these professionals to embrace mlearning in their pedagogical practices. On top of that, there is an urgent necessity to bridge the possible knowledge gap existing between app developers and language teachers, which constitutes an important obstruction for creating new pedagogically useful apps (Zou & Li, 2015).

In sum, mlearning has been practiced in the context of teaching and learning a foreign or a second language mostly in the tertiary level; the learners' perspective has been studied in most publications; mlearning technologies, apps and uses has been the dominant topic in literature and English was the target language in all papers, besides the presence of Italian, Germany and Spanish, which occurred in one publication.

The second research question to be discussed is:

RQ2. What critical factors of success influence the implementation of mlearning?

Many researchers tend to design their research focusing on the technical capabilities of the app and the device. Nevertheless, the acceptance and further adoption of mlearning is totally dependable on the interaction of humans and machines (Alrasheedi & Capretz, 2015). That is to say, investigating the success

factors concerning the capability of mobile devices and applications is part of the effort, but it does not cover all the necessary information to understand and, then, implement mlearning in the educational setting successfully. In this respect, this study sought to investigate which critical success factors (CSFs) in the view of teachers, learners and educational management influence the implementation mlearning.

A total of 19 CSFs were cited in 14 publications selected for this study and considered to be relevant for the success of mlearning in the context of teaching and/or learning a foreign or second language. As indicated in Table 3, not all factors were mentioned in all studies and 4 publications (22%) did not mention any CSFs in their studies. It is important to highlight that the lacking of CSFs does not indicate this matter is irrelevant or nonexistent, it simply points out that authors have not regarded it as pertinent to the objective of the research or relevant for the context approached.

CSFs, such as affordability, availability, compatibility, computer self-efficacy, connecting, convenience, ease of use and elimination of technophobia were present in a single study each. These findings show that, in spite of being pertinent and applicable, these factors are not critical for the success of the implementation of mlearning. They may indicate that learners are already familiar with technology and confident when using mobile devices, as technology has been present in ordinary activities. With regard to affordability and convenience, this result is not consistent with Toperesu and Belle's (2018) study, which indicates that these, among others, are one of the main potential benefits of mlearning adoption.

Other CSFs as autonomy (10,1%), learner commitment (10,1%), ownership (16,6), collaboration (22,2%), interactive communication (22,2%) and ubiquity (22,2%) indicate that each of these factors has a considerable influence on the users' experience with mlearning context. This resonates with Ardi (2017) argument that the implementation of a mlearning platform created ample conditions for students to self-direct and personalize their learning, promote interactive communication, collaboration and curriculum advancements in an English for Academic Purposes class in the higher education. The author's proposals imply that Asian learners would benefit from mobile and ubiquitous technologies to enhance their learning experience and foster their development of autonomy.

The CSF that most stood out in the selected publications was assimilation of curriculum (50%), followed by content (33,3%) and motivation (33,3%). These results show that these factors have a decisive influence on the perception of users' success when choosing a mlearning platform. The results obtained in this study are in line with the findings revealed by Alrasheedi and Capretz (2015). In both studies, content was evaluated as an important CSF and factors related to technical competence were considered to be critically unimportant in the users choice for deciding for a mlearning platform. By the same token, factors as ownership and learner community development were considered to be significant in both studies.

The third question to be addressed in this study is:

RQ3. Has mlearning been arising more attention and, therefore, more interest of investigation?

The development of new technologies in the last years has boosted incredible opportunities for the advancement of mlearning in the educational settings. The findings in this study confirm that the literature in this field of study has followed the tendency. There has been an increase amount of investigations observed after 2013 and maintained since then, which corroborate the current scenario, as observed in Table 2.

Authors such as Zou and Li (2015) and Tayan (2017) agree that the impressive development of portable devices equipped with WIFI technology has been paving the way for a new model of teaching and learning English across different cultures. Rau, Gao, and Wu (2008) argue that the unprecedented growth of interest of mobile devices for educational purposes may lie in the fact that computers, mostly applicable for fixed and formal domains, did not satisfy the needs of teachers and students. Consequently, as mobile and ubiquitous technologies evolve into more developed multiple functionalities, the acquisition of linguistic knowledge will be benefited with more and more learning opportunities, both in formal and informal settings (Kukulska-Hulme & Sharples, 2015).

Final considerations

This research sought to investigate in what perspective mlearning has been investigated in the context of teaching and/or learning a foreign or second language, what critical factors of success have influenced the implementation of mlearning and identify possible gaps of study that need to be fulfilled in future researches. The findings of this study offer an insight into the current status of mlearning as well as various factors influencing the adoption and implementation of mlearning in the educational context.

This study revealed that mlearning has been mostly investigated in the tertiary education, the learners' perspective has been the focus of the vast majority of the publications, English is the target language in all studies and the dominant topic concerning this theme is mlearning technologies, apps and uses. In addition, the findings also report that 19 CSFs were pointed out in 14 publications and assimilation of curriculum (50%) was the most cited CSF. Furthermore, the results indicate that there has been an increase in the interest of publications investigating mlearning relating to language learning.

An important reflection that emerged during the study was that the learners' perceived success of mlearning was investigated in most studies to the detriment of teachers and other members of the educational institutions. This means that the first people who should be heard seem to be neglected in the literature. As they are the people who will be approving or rejecting this new teaching model, it is crucial to know how these professionals perceive mlearning, how and to what extent they need to be trained and what are their expectancies towards the theme.

The analysis of the literature also demonstrated that some CSFs, such as autonomy, computer self-efficacy, user feedback (Fluminhan, Murgo, & Fluminhan, 2015; Fluminhan et al., 2018) and user friendly design content, have been present in very few studies and, therefore, need to be more deeply investigated. Likewise, themes related to models and theories concerning mlearning, as well as mlearning in and across formal and informal settings, were observed by few authors or even completely absent in the selected publications. These findings do not point out to the direction that these are unimportant issues. As a matter of fact, this information reveals that mlearning is still in its early days and there is still a vast scenario that needs to be investigated.

Due to the scarce number of publications that analyzed the teachers' perceived success factors towards the implementation of mlearning in the context of language learning, this research suggests that further investigation on the theme should be carried out in order to shed light on one of the most important aspects for the adoption this new paradigm. Moreover, this study also reveals that the tertiary level has been the object of most publications. However, the first years of school should be investigated to assess how this educational level could benefit from the integration of mlearning to its curriculum. A third implication brought by this study is that no developing countries in South America were represented by any research addressing mlearning published in the past ten years in ERIC and SieLO databases. This study suggests that future investigations be carried out in these countries considering the peculiarities of its contexts, as well as the particular challenges faced by education in these countries.

Although this study will contribute to the promotion of mlearning practices and serve as a framework to the current knowledge base, some limitations should be recognized. This is a small-scale investigation and only two databases were used. It is likely that if more databases were included, statistics would have been more robust. The results, therefore, may be used as reference data, but cannot be universally extrapolated. Additionally, this study aimed to select publications, which made full texts available online and excluded all the ones which made only the abstract available. Therefore, many other investigations would have contributed to the results aforementioned if more publications had allowed access to their full texts.

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