Journal of Learning and Teaching in Digital Age, 2021, **6**(2),117-126
https://dergipark.org.tr/en/pub/joltida
ISSN: 2458-8350 (online)

Review

A Critical Review on the Mobile Assisted Language Learning with a Focus on Empirical Studies

Nur Sürüç Şen*[a]

[a](ORCID ID: 0000-0003-3866-6994), Anadolu University, Turkey, nssuruc@anadolu.edu.tr
*Corresponding author

ARTICLE INFO
Received: 08 August 2020
Revised: 29 September 2020
Accepted: 19 January 2021

Keywords:
Mobile assisted language learning
M-learning
Vocabulary development
Computer assisted language learning
Individualized learning
Informal learning

ABSTRACT

The present article provides a review of 48 studies related to mobile assisted language learning, published mostly in the last decade with the aim of demonstrating a mind map of how mobile devices have been put into learning experience among learners with diverse backgrounds and learning settings such as formal, informal, blended, etc. In this way, it is attempted to compare the concepts such as CALL and MALL; to present the theoretical underpinnings that have been focused on the empirical studies; to revise the opportunities and the obstacles related to the MALL implementations identified in the reviewed studies; and to provide further research guidelines for the researchers interested in the field. The results yield that the feature of being independent from time and place limitations is regarded as standing out characteristic of MALL. On the other hand, being distractive and addictive is listed among the obstacles in the reviewed studies. A positive link between vocabulary development and MALL tools is scrutinized with some considerations. Through this review, the footsteps of the most recent researchers are targeted to be made visible for the eyes of the researchers and the practitioners to a great extent.

INTRODUCTION

Upon keeping up with the pace of the modern times, the advancement of the technology has made it possible to have tailored alternatives for the ways of teaching and learning. Considering its potential towards an efficient, authentic, and motivating language learning experience (Kessler, 2018), language teachers and learners have grown a tendency to use digital technologies more and more (Healey, 2018). In this vein, there seems to be an increase in the ownership and utilization of mobile devices in the last 15 years, resulting in the replacement of the traditional devices by the modern mobile counterparts (Pegrum, 2014). Accordingly, the enthusiasm in research related to mobile learning (henceforth, m-learning) has led to the incorporation in diverse teaching and learning settings. A subset of m-learning has been identified as mobile assisted language learning (i.e.; MALL), which might foster language learning experience (Burston, 2015; Duman, Orhon, & Gedik, 2015; Shadiev, Hwang & Huang, 2017). Furthermore, it has the potential to enable language learners to study the target language autonomously and without time and place limitations (Kukulska-Hulme, Lee & Norris, 2017; Reinders & Benson, 2017).

Incorporation of mobile devices into learning settings has been on the rise considering the fostering features that have role in improving the quality of the education (Attewell & Savill-Smith, 2004; El-Hussein, Osman, & Cronje, 2010). Some affordances such as conduciveness to individual learning styles and preferences, interactive learning, multimedia capabilities, ubiquitous Internet connectivity, enhanced understanding of learning materials, communication and motivation, cost-effectiveness, easy access, student-friendliness, and effective feedback (Kukulska-Hulme & Shield, 2008; Stockwell, 2010; Walker, 2013) have been identified. These opportunities have become the reasons for the change of implementations from e-learning to m-learning in educational settings. As a subset of m-learning, Mobile Assisted Language Learning (i.e.; MALL) is reported to be different from Computer Assisted Language Learning (i.e.; CALL) in some ways. These include portability and personalization, which might be used as an advantage over certain situations (Kukulska-Hulme& Shield, 2008). These two aspects of MALL tools might not necessarily be available in CALL contexts.

Theoretical Milestones: Building Blocks of MALL Studies

Proposed by Mishra and Koehler (2006), TPACK model entails as a framework delving into educators' comprehension of the relationships among pedagogy, curriculum, and technology. It incorporates some fundamental categories such as content knowledge, pedagogical knowledge, technological knowledge, pedagogical content knowledge, technological pedagogical knowledge, technological content knowledge, TPACK (Koh & Sing, 2011). This is especially crucial for gathering the educational affordances provided by information and communication technologies. Technology acceptance models (TAM) focus on the eagerness to incorporate technology in order to reinforce the teaching practices (Teo, 2011). The past research showed that the beliefs, attitudes, and intentions of the users might have role in affecting their technology incorporation. (Venkatesh, Morris, & Davis, 2003). In this vein, technology acceptance research might involve the multidimensional nature of the teaching act proposed by the TPACK model. Furthermore, same as the extrinsic motivational factors such as perceived usefulness and perceived ease of

use, intrinsic motivation factors are needed to be included in the TAM research (Davis, Bagozzi, & Warshaw, (1992). Likewise, Cognitive Absorption Theory emphasizes an in-depth engagement with the digital task through five dimensions such as temporal dissociation, focused immersion, heightened enjoyment, control, and curiosity (Tourinho & Oliveira, 2019). In the literature, there seems to be several models of TAM. Thus, a synthesis of eight models of TAM was developed as the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh, Morris, Davis, and Davis (2003). By combining different TAM models, it aims to broaden the technology acceptance behavior by taking several perspectives. It integrates several theories such as the theory of reasoned action, the motivational model, the model of personal computer utilization, the innovation diffusion theory and the social cognitive theory.

In a similar vein, the model of task technology fit (TTF) aims to attract attention to the extent of technology support during an actualization of a task (Goodhue & Thompson, 1995). The effect of the task and the technology on the implementation is scrutinized (Wu, Yen, & Marek, 2011). The difference lies in the focus on the task characteristics compared to the TAM models. It has been hypothesized as the perceived task technology fit and utilization might be increased by the feasibility of a technology implementation into a specific task (Goodhue, Klein, & March, 2000; Lee & Lehto 2013).

Considering the design of digital tasks, some theories such as Dual Coding Theory (DCT) (Paivio, 1990) and Generative Theory of Multimedia Learning (Mayer, 2001) were based on in the technology implementation studies. Dual Coding Theory promotes the channels processing visual and verbal information; whereas Generative Theory of Multimedia Learning hypothesizes as both types of information are processed in working memory, triggering a more thorough conceptualization. Taking a social perspective, Activity Theory delves into examining human acts influenced and evolved by its own context (Kaptelinin & Nardi, 2006). It promotes the idea of the technological devices holding a cultural and historical print, which eventually are processed by the users during the performing of the act. Thus, the researchers might take a more holistic view of what motivates for learner involvement via scrutinizing the external elements like individual roles brought by some activity, certain rules of the task, cultural regulations, etc.

Based on Vygotsky's cultural-historical psychology theories, technology-based Funds of Knowledge was utilized as a conceptualization about the importance of learners' knowledge and prior experiences for promoting new learning experiences embedded in diverse sociocultural backgrounds such as family-based, center-based, and community-based settings (González, Moll, & Amanti, 2005). In this light, the appropriation theory (van Dijk, 2012) might shed light to the disparity in society, access to technological devices, and digital-based participation in community. In addition, theories such as social presence theory were beneficial in examining learner behavior in technology-enhanced collaborative contexts (Jiang & Zhang, 2020). In line with the social perspectives to the implementation studies, concepts such as self-regulation were put forward to emphasize their positive effect on the technology-enhanced activities in individualized learning. Learners' training on self-regulation awareness by focusing on social learning theories was highlighted, as well (García Botero, Botero Restrepo, Zhu, & Questier, 2019). Alongside, self-directed learning, which was coined as the ability of learning with self-produced activities (Hiemstra, 1994; Knowles, 1975; Long, 1989), was extended on with some sub dimensions as individual autonomy, self-management, the pursuit of learning, and the learners' control of instruction.

Mobile learning was intertwined with several learning theories categorized by Naismith, Lonsdale, Vavoula, and Sharples (2004) as behavioral learning, constructivist learning, situational learning, cooperative learning, and lifelong learning. On the other hand, mobile seamless learning emphasized learning without time and place boundaries brought about by the traditional learning contexts. With this concept, the division between informal and formal learning settings, and individualized and collaborative learning seemed to fade away (Chan, Roschelle, Hsi, Kinshuk, Sharples, Brown, … Soloway, 2006).

Shift from CALL to MALL

With regards to technology-based language learning, Computer Assisted Language Learning seems to be one of the most common fields of interest. CALL usually covers for the language teaching and learning activities that are performed on a computer (Levy, 1997). Its ability to present learning activities in a way that the learners could be engaged to the learning experience made it a great option for language learning (Huang, Huang, Huang, & Lin, 2012). In the earlier days of CALL, programmed learning boosted with behaviorist premises starred in accordance with its zeitgeist. On the other hand, diverse education theories and technological affordances seem to be intertwined in todays' CALL implementations (Jarvis, & Achilleos, 2013). Especially for EFL contexts, incorporation of CALL has been often utilized for bringing instruction and authentic communication side to side (Bottino, 2004). In line with its very own nature, CALL has a need for keeping up with the updated needs and problems come across by the learners and teachers. Therefore, MALL has stood out with its features such as flexibility of use, fostering ubiquitous learning by fitting into the needs. According to Kukulska-Hulme and Shield (2008), MALL is characterized as its utilization of personal and portable devices, facilitating "continuity or spontaneity of access and interaction across different contexts of use" (p. 273). The range of mobile devices were identified as phones, Personal Data Assistants and tablets by Rodríguez-Arancón, Arús and Calle-Martínez (2013).

When we go back in time, we can observe that mobile devices and the prevalence of the internet have led the promotion of m-learning (Cui and Wang, 2008; Cavus & Ibrahim, 2009). E-learning has been replaced by m-learning in recent years due to its conduciveness to tailored and autonomous learning. In this sense, Mobile Assisted Language Learning (MALL) has been regarded

as a subdivision of Computer Assisted Language Learning (CALL) (Klimova, 2019). Owing to the fact, three categories of CALL have been listed as structural CALL, communicative CALL and integrative CALL. Accordingly, integrative CALL is found to be parallel with MALL in that the integration of learning and technology without time and place limitations is at the core of MALL implementations (Sarıçoban & Özturan, 2013). It was defined by O'Malley, Vavoula, Glew, Taylor and Sharples (2005) as "any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies" (p. 6). However, MALL has not only the potential to transfer the CALL content, but also has administered a novelty in the pedagogical approach (Kukulska-Hulme, Norris, & Donohue, 2015). Owing to its feature of ubiquity, MALL fosters contributing and boosting formal and informal learning involvement (Foomani & Hedayati, 2016). Due to its perception of being enjoyable and reciprocal, it has the opportunity to make the learning experience more reflective and purposeful (Alvarado, Coelho, & Dougherty, 2016; Demouy, Jones, Kan, Kukulska-Hulme, & Eardley, 2016). Moreover, it might foster the awareness of different contexts, generating the practice of the language eventually (Demouy et al., 2016; Böhm & Constantine, 2016).

MALL has been regarded as a child of digital technology and language learning. There are several definitions of the term MALL proposed by the pioneers in the field. In the definitions; extending the limits of time and place of learning, easy transition among mobile devices, easy access to the mass of information, conduciveness to individualized learning were highlighted (Duman et al., 2015; Kukulska-Hulme, 2012; Pegrum, 2014). The feature that stands out the most has been recognized as being independent from location and time-related variables (Kukulska-Hulme & Shiled, 2008). In addition, continuity of access with regards to diverse learning contexts were found to be facilitative (Kukulska-Hulme & Shield, 2008). In this light; formal, informal, blended learning contexts might be taken as examples. Hereunder is a great example of distinct characteristics across different learning contexts:

Formal learning is like riding a bus: the driver decides where the bus is going; the passengers are along for the ride. Informal learning is like riding a bike: the rider chooses the destination, the speed, and the route. (Cross, 2011, p. 315)

In this vein, research focusing on the effective ways of utilizing mobile devices towards substantial language learning has been called for (Plonsky & Zeigler, 2016). Likewise, favorable outcomes of MALL for language learning have been attempted to be unveiled (Burston, 2015; Shadiev et al., 2017). The common features of the previous research are supposed to be examined for delving further into the ways of mobile devices incorporation into different learning settings. Therefore, this study might contribute to the literature in the following ways:

- Recent implementations of MALL might be accessible for the researchers and practitioners.
- The implementations of MALL could be investigated with its potential outcomes.
- Research upon MALL implementations could be unveiled and summarized in terms of their designs.
- Research studying on vocabulary development through MALL application could be explored from a holistic perspective.

METHODOLOGY

A comprehensive literature review has been administered to 48 journal publications (See Appendix 1) mostly from 2015 to 2020, which makes up for the 87.5% of the articles that have been analyzed. That is, only 6 publications out of 48 were published before 2015. Last five years of publication was focused on to a great extent, since the most recent implementation studies might constitute as guideline for further studies. To this end, qualitative review of MALL research with specific foci is conducted. The critical review is fueled by the following research questions:

RQ1. What are the opportunities and obstacles come across in recent research considering MALL implementations?
RQ2. What are the common research designs in recent research considering MALL implementations?
RQ3. What is the relationship between vocabulary development and MALL implementation studies in recent research?

To analyze the data gathered from the reviewed studies, content analysis is utilized to examine the core meanings out of the overall studies with the focus of the research questions.

MALL: Opportunities and Obstacles

To answer the first research question, the journal articles were examined in terms of the potential opportunities and obstacles brought about by the MALL implementations. Accordingly, it was found out that providing instant feedback was regarded as one of the affordances. In that, limitations such as class size, time, and increased burden of the teacher providing individualized feedback might be overcome with such MALL incorporations (Ada, Stansfield, & Baxter, 2017). On the other hand, it should be noted that tech-savy learners might benefit more from this type of feedback (Stockwell, 2013). With regards to the computer-based language assessments, formative or pedagogical dynamic assessment might extend the response range of the learners, eventually bringing about more tailored feedback (Heift, 2017).

The affordance of extending the limits of time and place of learning might help learners to direct their attention across different learning settings (Kukulska-Hulme, 2009) in a more flexible way, which might be utilized as an advantage for activating learners

with boosted confidence and eagerness (Tuttle, 2013). This might be coined as a potential for serving the needs of learners to practice in a stress-free setting. Other affordances were reported as the increased amount of learners' cognitive capacity, motivation for learning in diverse contexts, boosted autonomy, which fosters personalized learning towards their personal objectives eventually (Kacetl, & Klímová, 2019). Alongside, MALL has the potential for featuring tailored, seamless, authentic, and spontaneous learning (Song & Fox, 2008).

Through the escalation of the language learning effort spent outside the classroom, it might be possible that MALL can be beneficial in bringing formal and informal learning together (Burston, 2015). All in all, investigating the flexibility of time, place, and learning experience might further inform educators towards designing self-directed mobile learning experiences across time and place (Stockwell & Hubbard, 2013). Instant and flexible ways of language learning might give rise to vocabulary learning via short messages (Cavus & Ibrahim, 2009) online dictionaries (Song & Fox, 2008), or online flashcard applications (Basoglu & Akdemir, 2010). At this point, it was observed that there seemed to be a lack of the ability to track the actual usage of MALL tools (Duman, Orhon, & Gedik, 2015), indicating a gap for further research area (Stockwell, 2013).

In addition to the potential opportunities that were brought up in the previous research, there are some obstacles existing in the other side of the coin. For instance, there seemed to be a lack of independent research delving into the commercial products designed for mobile language learning in contrast to the strong assertions about learners' success (Van Deusen-Scholl, 2015). Additionally, small screen sizes, lack of human contact, increased amount of external distraction, the addictive nature of the digital devices, technical problems were listed as weaknesses of the MALL implementations in Kacetl and Klímová's (2019) study. As for threatens, the ambiguity of the place of m-learning in an educational setting was mentioned. Whether it was regarded as a primary or secondary learning medium was one of the items in the SWOT analysis articulated in the aforementioned study. In addition, the learning environment might be chaotic with lack of substantial guidance and with diverse nature of learner preferences. Similarly, it was found out that the learners did not spare much time for outside the classroom MALL tasks (Burston, 2015; Dashtestani, 2016). According to Stockwell's (2008) conceptualization, some barriers to MALL implementations might be listed as technical, pedagogical, psychological, environmental, and economical factors. Another factor that should be taken seriously was reported as anonymity of the learning settings and users embedded in those settings. Although it might trigger more collaboration in online settings (Jong, Lai, Hsia, & Lin, 2013), it might also cause a lack of group dynamic, which might eventually lower the quality of learning experience (Yu & Wu, 2011).Thus, it should be considered that mobile learning should be dealt with caution upon its appropriate design, feasibility, and incorporation so that it would not fall short in meeting learners' needs (Kacetl, & Klímová, 2019).

Implementation Studies

Mobile assisted language learning emerged at the beginning of the third millennium, when the mobile devices started to be prevalent among students (Chinnery, 2006). The prevalence escalated with the development of mobile applications worldwide (Dudeney & Hockly, 2012). To this date, MALL implementations are spreading in diverse countries gradually, yet there is a lack of mobile learning research reports summarizing the condition in the field (Hockly, 2013). In this section, research designs of the most recent implementation studies that were examined within the scope of the present study have been under investigation to provide an explanation to the second research question.

Whereas some researchers developed their own mobile applications for their aims (n=10), some others preferred to examine the phenomenon through existing applications (n=16) such as Duolingo, Instagram, NaverCafe, Rosetta Stone, Tell Me More, Memrise, ESL WOW, MMS messages, Quizlet, Vocaboly, WhatsApp, Twitter, and WeChat. The focus of some studies was on the perceptions, acceptance, and adoption (n=17) of the learners or teachers about the MALL implementations, or the focus was on examining the efficiency of the applications and systems (n=27). Low amount of research (n=5) was interested in investigating the existing studies and patterns among them (See Table 1).

Table 1. Reviewed Research Focus Distribution

Research Focus Category	Frequency (n)	Percentage (%)
Acceptance/Adoption/Perception	17	35.4
Application	16	33.3
Special Design	10	20.8
Research Report	5	10.4
Total	48	100

As for the methodology, quantitative designs seemed to be opted more by the researchers (n=20), some of whom utilized a quasi-experimental designs for compensating the non-randomization. Respectively, mixed-methods designs (n=18) followed, delving into examining learner performance of different language sub skill areas such as vocabulary development, genre-based writing, pronunciation training, etc. Qualitative designs were administered at a low prevalence (n=10) compared to other methods, in the form of a case study, ethnographic case study, critical research reports summarizing the previous research to be able to see a bigger picture of the field or as a design-based research. The latter was administered so as to optimize the design and to apply invention-revision cycles iteratively (Boticki, Wong, & Looi, 2012) (See Table 2).

Table 2. Reviewed Research Method Distribution

Research Methodology	Frequency (n)	Percentage (%)
Quantitative	20	41.6
Mixed-methods	18	37.5
Qualitative	10	20.8
Total	48	100

Vocabulary Development and MALL

To answer the third research question, the studies that investigated vocabulary learning were focused on. In this section, their overall focus, methods, and concluding remarks will be scrutinized. In this respect, vocabulary learning has been regarded as a demanding task, thus the most prevalently explored area of language in MALL studies (Burston, 2015). Furthermore, their conduciveness to provide a blended, tailored to individual needs, immediate learning has stood out (Song & Fox, 2008) gradually in the recent years. Alongside the vocabulary gain potential, reading comprehension and overall language achievement seemed to be positively influenced by the integration of the mobile devices (Kieffer & Lesaux, 2012).

Out of 48 articles, 15 of them were found to be interested in the relationship of vocabulary development and MALL. Whereas 6 studies opted for special application designs for their research, other 6 research utilized existing applications such as NaverCafe, Idiomobile, MMS, Quizlet, Vocaboly. Furthermore, 3 researches built their focus on the overall perceptions on the MALL tools of the users in the educational context. As for the methodology, a big portion of the studies (n=7) based their studies on quantitative means, meanwhile some others relied on the mixed-methods designs (n=5). On the other hand, qualitative designs attracted the least amount of research (n=3) considering vocabulary development and MALL in the reviewed articles (See Table 3).

Table 3. Reviewed Research Focus Distribution – Vocabulary Development

Research Focus Category	Frequency (n)	Percentage (%)
Application	6	40
Special Design	6	40
Perception	3	20
Total	15	100

Among the studies that utilized special applications, Kohnke's (2020) research showed that learners in Hong Kong University reported using the application in their vocabulary studies with high levels of satisfaction. On the other hand, they also stated that using the application was not time-efficient, sometimes challenging to them. It was suggested that some elements such as time limitations, hints, scoring system and leaderboards should be incorporated so that more favorable conditions for learning experiences would occur (Ou-Yang & Wu, 2017; Chen, Liu, & Huang, 2019; Chen, Chen, & Yang, 2019; Kohnke, 2020). Moreover, a system that provides an e-board including learners' summative percentages in addition to the formative percentages is called for (Chen, Chen, & Yang, 2019). The qualitative data of Chen, Liu, and Huang's (2019) study demonstrated that the interface and content were paid attention by the participants with the help of the game-like properties. However, the positive effects were found to be unavailable in the long run evidenced by the retention test of Okumuş Dağdeler, Konca, and Demiröz's (2020) study. In a similar vein, Ou-Yang and Wu's (2017) study showed that exploiting mixed-modality vocabulary learning seemed to be beneficial for the EFL learners. As for the incidental vocabulary learning, it was found that having access to online glosses was reported as beneficial

(48). Owing to this, it was also suggested that visual and textual glosses should be incorporated depending on the competence background of the learners (Çakmak & Erçetin, 2018).

Considering the studies delving into the perceptions of the users, Sarıçoban and Özturan (2013) highlighted the increased motivation and confidence levels reported by the learners, indicated by their own statements and high levels of mobile device ownership. On the other hand, Gürlüyer and Han (2017) focused on the portability and accessibility of the mobile devices towards promoting vocabulary development. In a similar study conducted by Gürkan (2018), hypermedia reading was perceived as positively contributing to their performance. It was suggested that such implementations of multimedia annotations might foster their learning experience depending on their perceptual styles.

According to Kaplan-Rakowski and Loranc-Paszylk's (2017) study, some benefits and constraints of digital-based vocabulary feedback were listed. The participants reported that it fostered active learning, higher motivation rates, conduciveness for team-work and vocabulary practice; yet it was found that technical limitations, competitive atmosphere, distractive features inside and outside the application were taking down the benefits. In the study of Amer (2014), in which the aim was to develop the use of idiomatic expressions and collocations, it was demonstrated that their learning objectives, proficiency levels, attitudes towards mobile devices were predictors of their utilization of the application. Interestingly, lowest rates of mobile phone usage attracted the higher amount of the application usage, namely Idiomobile. On the other hand, in Davie and Hilber's (2015) study, Quizlet was perceived beneficial although its effects were not visible in an immediate performance test. In a similar study examining Quizlet as a MALL tool, Korlu and Mede (2018) found out that it was fruitful for autonomous, motivating vehicle for storing, practicing, and utilizing vocabulary inside and outside the classroom. In addition to higher levels of vocabulary learning and retention, Nejati, Jahangiri and Salehi's (2018) study also demonstrated that multimedia aid fostered the engagement level of the learners across individual and group-based activities especially for EFL learners. The application usage might be investigated as in a longitudinal study to examine the predictors of the mobile use behavior (Amer, 2014).

CONCLUSION

In the light of the dynamic conditions that might be leading a transition upon CALL to MALL and the theoretical underpinnings that are regarded as foundation of the MALL research; the current critical review targets at investigating the potential opportunities and drawbacks brought by the implementation, design patterns of the recent studies, and the studies investigating the relationship between vocabulary development and MALL. Results yielded that affordances were reported as mobile devices being portable, conducive for providing immediate feedback, independent from time and place limitations, increased amount of motivation and autonomy, conducive for individualized learning. On the other hand, the obstacles were listed as technical problems, distractive and addictive nature of the mobile devices, small screen sizes, anonymity feature, and the efficacy levels being dependent on the learners' profile. As for the opted research designs, quantitative and mixed-methods design studies were greater in number (n=38) than the qualitative research designs (n=10). With respect to the third research question, sufficient evidence was found for a positive effect of MALL implementations on the vocabulary development. Although some studies did not find conclusive evidence on the immediate improvement on the vocabulary competence, some studies concluded that vocabulary development and retention was improved with the use of mobile assisted language learning.

To provide a future research guidelines based on the reviewed studies, it has been found that learners' characteristics and background knowledge seems to be missing in most MALL implementation studies. Access to that kind of information might ease the way of analyzing the effects of the application under investigation and guiding the replication studies in depth. Quantitative studies might be accompanied with qualitative data focusing on the reactions of the learners. By doing this, readers might go one step further from analyzing the significance of the numbers. According to the previous studies, mobile assisted language learning has the potential to foster both individual and collaborative learning. Thus, an experimental design might be conducted to see the effects of the effects of MALL across such modes of learning. Incidental vocabulary learning might be investigated in the light of MALL applications considering their long and short time effects.

Acknowledgements: I would like to thank Professor Gül Durmuşoğlu Köse for her specialized guidelines and invaluable feedback shaping the focus of my annotations.

Ethics and Consent: Ethics committee approval is not required as it does not involve clinical researches on humans as well as it does not contain Retrospective studies in accordance with the Law on Protection of Personal Data.

REFERENCES

Ada, M. B., Stansfield, M., & Baxter, G. (2017). Using mobile learning and social media to enhance learner feedback: Some empirical evidence. *Journal of Applied Research in Higher Education, 9*(1), 70–90. doi:10.1108/JARHE-07-2015-0060

Alvarado, N. C., Coelho, D., & Dougherty, E. (2016). Mobile apps for ELLs: Supporting language learning with engaging digital tools. *Argentinian Journal of Applied Linguistics, 43*, 43–58.

Attewell, J., & Savill-Smith, C. (2004). *Learning with mobile devices.* London: Learning and Skills Network.

Başoğlu, E. & Akdemir, O. (2010). A comparison of undergraduate students' English vocabulary learning: Using mobile phones and flash cards. *TOJET, 9*(3): 1–7.

Burston, J. (2015). Twenty years of MALL project implementation: A meta-analysis of learning outcomes. *ReCALL, 27*(1), 4–20. https://doi.org/10.1017/S0958344014000159

Bottino, R. M. (2004). The evolution of ICT-based learning environments: Which perspectives for the school of the future? *British Journal of Educational Technology, 35*, 553–567.

Böhm, S., & Constantine, G. P. (2016). Impact of contextuality on mobile learning acceptance: An empirical study based on a language learning app. *Interactive Technology and Smart Education, 13*, 107–122.

Cavus, N. & Ibrahim, D. (2009). "M-learning: An Experiment in Using SMS to Support Learning New English Language Words." *British Journal of Educational Technology; 40*(1): 78-91.

Cui, G. & Wang, S. (2008). "Adopting Cell Phones in EFL Teaching and Learning". *Journal of Educational Technology Development and Exchange, 1*(1): 69-80.

Chan, T.W., Roschelle, J., Hsi, S.,Kinshuk, Sharples, M., Brown, T., Patton, C.,… Soloway, E. (2006). One-to-one technology-enhanced learning: An opportunity for global research collaboration. *Research and Practice in Technology Enhanced Learning, 1(*01), 3–29.

Chinnery, G. M. (2006). Going to the MALL: Mobile assisted language learning. *Language Learning & Technology, 10*(1), 9-16.

Cross, J. (2011). *Informal learning: Rediscovering the natural pathways that inspire innovation and performance.* New York, NY: John Wiley & Sons.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of Applied Social Psychology, 22*(14), 1111–1132.

Demouy, V., Jones, A., Kan, Q., Kukulska-Hulme, A., & Eardley, A. (2016). Why and how do distance learners use mobile devices for language learning? *The EuroCALL Review, 24*, 10–24.

van Dijk, J. A. G. M. (2012). The evolution of the digital divide: The digital divide turns to inequality of skills and usage. *Digital enlightenment yearbook 2012* (pp. 57–75). IOS Press.

Dudeney, G., & Hockly, N. (2012). ICT in ELT: How did we get here and where are we going? *ELT Journal, 66*(4), 533-542. http://dx.doi.org/10.1093/elt/ccs050

El-Hussein, M., Osman, M., & Cronje, J.C. (2010). Defining mobile learning in the higher education landscape. *Journal of Educational Technology & Society, 13*(3), 12-21.

Foomani, E. M., & Hedayati, M. (2016). A seamless learning design for mobile assisted language learning: An Iranian context. *English Language Teaching, 9*, 206–213.

González, N., Moll, L. C., & Amanti, C. (2005). *Funds of knowledge: Theorizing practices in households, communities and classrooms.* New Jersey: Lawrence Erlbaum.

Goodhue, D. L., & Thompson, R. L. (1995). Task-technology fit and individual performance. *MIS Quarterly, 19*(2), 213–236.

Goodhue, D. L., Klein, B. D., & March, S. T. (2000). User evaluations of IS as surrogates for objective performance. *Information & Management, 38*(2), 87–101.

Healey, D. (2018). Technology enhanced learning environments. In J. I. Liontas (Ed.), *The TESOL Encyclopedia of English Language Teaching.* Hoboken, NJ: Wiley. doi:10.1002/9781118784235.eelt0437

Heift, T. (2017) History and key developments in intelligent computer-assisted language learning (ICALL). In Thorne, S. L. & May, S. (eds.), *Language, education and technology: Encyclopedia of language and education* (3rd ed.). Cham: Springer. https://doi.org/10.1007/978-3-319-02237-6_23

Hiemstra, R. (1994). Self-directed learning. In W. J. Rothwell, & K. J. Sensenig (Eds.), *The sourcebook for self-directed learning* (pp. 9–20). Amherst, MA: HRD Press.

Hockly, N. (2013). Mobile learning. *ELT Journal, 67*(1), 80-84. http://dx.doi.org/10.1093/elt/ccs064

Huang, Y-M., Huang, Y-M., Huang, S-H. & Lin Y-T. (2012). A ubiquitous English vocabulary learning system: Evidence of active/passive attitudes vs. usefulness/ease-of-use. *Computers & Education, 58,* 273-282. https//doi.org/10.1016/j.compedu.2011.08.008

Jarvis, H., & Achilleos, M. (2013). From Computer Assisted Language Learning (CALL) to Mobile Assisted Language Use (MALU). *Tesl-ej*, *16*(4), n4.

Jong, B., Lai, C., Hsia, Y., & Lin, T. (2013). Effects on anonymity in group discussion on peer interaction and learning achievement. *IEEE Transactions on Education, 56*, 292–299.

Kaplan-Rakowski, R., & Loranc-Paszylk, B. (2017). Students' views on the helpfulness of multimediacomponents of digital flashcards in mobile-assisted vocabulary learning. In K. Borthwick, L. Bradley & S. Thouësny (Eds), *CALL in a climate of change: adapting to turbulent global conditions – short papers from EUROCALL 2017* (pp. 170-176). Research-publishing.net. https://doi.org/10.14705/rpnet.2017.eurocall2017.708

Kaptelinin, V., & Nardi, B. (2006). Acting with technology: Activity theory and interaction design. Cambridge: MIT Press.Kang, S., Hur, W-M., & Son, M. (2014). The moderating role of socio-demographics on Smartphone adoption. *International Journal of Mobile Communications, 12*(5), 532–550.

Kessler, G. (2018). Technology and the future of language teaching. *Foreign Language Annals, 51(*1), 205–218. doi:10.1111/flan.12318

Kieffer, M. J., & Lesaux, N. K. (2012). Knowledge of words, knowledge about words: Dimensions of vocabulary in first and second language learners in sixth grade. *Reading and Writing, 25*, 347-373.

Klimova, B. (2019). Impact of mobile learning on students' achievement results. *Education Sciences*, *9*(2), 90.

Knowles, M. S. (1975). *Self-directed learning.* New York, NY: Cambridge Books.

Koh, J. H. L., & Sing, C. C. (2011). *Modeling pre-service teachers' technological pedagogical content knowledge (TPACK) perceptions: The influence of demographic factors and TPACK constructs*. Paper presented at the ASCILITE 2011 Conference, Hobart, Tasmania, Australia.

Kukulska-Hulme, A., & Shield, L. (2008). An overview of mobile assisted language learning: From content delivery to supported collaboration and interaction. *ReCALL, 20*(3), 271-289.

Kukulska-Hulme, A., (2009). Will mobile learning change language learning? *ReCALL, 21*(2), 157-165. http://dx.doi.org/10.1017/S0958344009000202

Kukulska-Hulme, A. (2012) Mobile-assisted language learning. In Chapelle, C. A. (ed.), *The encyclopedia of applied linguistics.* Hoboken: Blackwell Publishing. https://doi.org/10.1002/9781405198431.wbeal0768

Kukulska-Hulme, A., Norris, L., & Donohue, J. (2015). Mobile pedagogy for English language teaching: A guide for teachers. ELT Research Papers 14.07. London: British Council.

Kukulska-Hulme, A., Lee, H. & Norris, L. (2017). Mobile learning revolution: Implications for language pedagogy. In Chapelle, C. A. & Sauro, S. (eds.), *The handbook of technology and second language teaching and learning*. Hoboken: John Wiley & Sons, 217–233.

Lee, D. Y., & Lehto, M. R. (2013). User acceptance of YouTube for procedural learning: An extension of the technology acceptance model. *Computers & Education, 61*(1), 193–208.

Levy, M. (1997). *CALL: Context and Conceptualisation.* Oxford: Oxford University Press.

Long, H. B. (1989). *Self-directed learning: Emerging theory & practice.* Norman, OK: Oklahoma Research Center for Continuing Professional and Higher Education, McCarter Hall, University of Oklahoma.

Mayer, R. E. (2001). *Multimedia learning*. New York, NY: Cambridge University Press.

Mishra, P., & Koehler, M. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *The Teachers College Record, 108*(6), 1017–1054.

Naismith, L., Lonsdale, P., Vavoula, G., & Sharples, M. (2004). *NESTA Futurelab Report 11: Literature review in mobile technologies and learning.* Bristol, UK: NESTA Futurelab.

O'Malley, C., Vavoula, G., Glew, J. P., Taylor, J., & Sharples, M. (2005). Guidelines for learning/teaching/ tutoring in a mobile environment.

Paivio, A. (1990). *Mental representations: A dual coding approach*. New York, NY: Oxford University Press.

Pegrum, M. (2014) *Mobile learning: Languages, literacies, and cultures.* Basingstoke: Palgrave Macmillan. https://doi.org/10.1057/9781137309815

Plonsky, L. & Ziegler, N. (2016) The CALL-SLA interface: Insights from a second-order synthesis. *Language Learning & Teaching, 20*(2): 17–37.

Reinders, H. & Benson, P. (2017) Research agenda: Language learning beyond the classroom. *Language Teaching, 50*(4): 561–578. https://doi.org/10.1017/S0261444817000192

Rodríguez-Arancón, P., Arús, J., & Calle-Martínez, C. (2013). The use of current mobile applications in EFL. *Procedia - Social and Behavioral Sciences, 103*, 1189-1196. https//doi.org/10.1016/j.sbspro.2013.10.446.

Saricoban, A., & Ozturan, T. (2013). Vocabulary Learning on Move: An Investigation of Mobile Assisted Vocabulary Learning Effect over Students' Success and Attitudes.

Shadiev, R., Hwang, W.-Y. & Huang, Y.-M. (2017) Review of research on mobile language learning in authentic environments. *Computer Assisted Language Learning, 30*(3–4): 284–303. https://doi.org/10.1080/09588221.2017.1308383

Song, Y. & Fox, R. (2008) Using PDA for undergraduate student incidental vocabulary testing. *ReCALL, 20*(3): 290–314. https://doi.org/10.1017/S0958344008000438

Stockwell, G. (2008). Investigating learner preparedness for and usage patterns of mobile learning. *ReCALL, 20*(3), 253-270.

Stockwell, G. (2010). Using mobile phones for vocabulary activities: Examining the effect of the platform. *Language Learning & Technology, 14*(2), 95-110.

Stockwell, G. (2013). Technology and motivation in English-language teaching and learning. In E. Ushioda (Ed.), *International perspectives on motivation: Language learning and professional challenges* (pp. 156–175). Basingstoke: Palgrave Macmillan.

Teo, T. (2011). Technology acceptance research in education. In T. Teo (Ed.), *Technology acceptance in education: Research and issues* (pp. 1–5). Rotterdam, The Netherlands: Sense.

Tourinho, A., & de Oliveira, B. M. K. (2019). Time flies when you are having fun: Cognitive Absorption and Beliefs about Social Media Usage. *AIS Transactions on Replication Research, 5*(1), 4.

Tuttle, H. G. (2013). *Improving students' modern language speaking skills through mobile learning. In Z. L. Berge & L. Y. Muilenburg* (Eds.), Handbook of mobile learning (pp. 524-533). New York: Routledge.

Van Deusen-Scholl, N. (2015). Assessing outcomes in online foreign language education: What are key measures for success? *The Modern Language Journal, 99*(2): 398–400. https://doi.org/10.1111/modl.12234_2

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *Mis Quarterly, 27*(3), 425–478.

Walker, R. (2013). "I don't think I would be where I am right now". Pupil perspectives on using mobile devices for learning. *Research in Learning Technology, 21*. doi:10.3402/rlt.v21i0.22116

Wu, W. C. V., Yen, L. L., & Marek, M. (2011). Using online EFL interaction to increase confidence, motivation, and ability. *Journal of Educational Technology & Society, 14*(3), 118–129.

Yu, F., & Wu, C. (2011). Different identity revelation modes in an online peer-assessment learning environment: Effects on perceptions toward assessors, classroom climate and learning activities. *Computers & Education, 57*, 2167–2177.

Appendix 1

Reference List of the Reviewed Articles (n=48)

1. Loewen, S., Crowther, D., Isbell, D.R., Kim, K.M., Maloney, J., Miller, Z.F. & Rawal, H. (2019). Mobile-assisted language learning: A Duolingo case study. *ReCALL 31*(3): 293–311. https://doi.org/10.1017/S0958344019000065
2. Gonulal, T. (2019). The use of Instagram as a mobile-assisted language learning tool. *Contemporary Educational Technology, 10*(3), 309-323.
3. Kohnke, L. (2020). Exploring Learner Perception, Experience and Motivation of Using a Mobile App in L2 Vocabulary Acquisition. *International Journal of Computer-Assisted Language Learning and Teaching (IJCALLT), 10*(1), 15-26.
4. Mei, B., Brown, G. T., & Teo, T. (2018). Toward an understanding of preservice English as a Foreign Language teachers‘ acceptance of computer-assisted language learning 2.0 in the People‘s Republic of China. *Journal of Educational Computing Research*, *56*(1), 74-104.
5. Nicholes, J. (2016). Measuring the Impact of Language-Learning Software on Test Performance of Chinese Learners of English. *TESL-EJ*, *20*(2), n2.
6. Amer, M. (2014). Language learners‘ usage of a mobile learning application for learning idioms and collocations. *Calico Journal*, *31*(3), 285-302.
7. Basal, A., Yilmaz, S., Tanriverdi, A., & Sari, L. (2016). Effectiveness of mobile applications in vocabulary teaching. *Contemporary Educational Technology*, *7*(1), 47- 59.
8. Botero, G. G., & Questier, F. (2016). What students think and what they actually do in a mobile assisted language learning context: new insights for self-directed language learning in higher education. *CALL communities and culture–short papers from EUROCALL*, 150-154.
9. Chen, Y., Mayall, H. J., York, C. S., & Smith, T. J. (2019). Parental perception and English Learners' mobile-assisted language learning: An ethnographic case study from a technology-based Funds of Knowledge approach. *Learning, Culture and Social Interaction*, *22*, 100325.
10. Chwo, S. M. G., Marek, M. W., & Wu, W. C. V. (2016). Curriculum integration of MALL in L1/L2 pedagogy: Perspectives on research. *Journal of Educational Technology & Society, 19*(2), 340-354.
11. Duman, G., Orhon, G., & Gedik, N. (2015). Research trends in mobile assisted language learning from 2000 to 2012. *ReCALL, 27*(2), 197-216.
12. Ou-Yang, F. C., & Wu, W. C. V. (2017). Using mixed-modality vocabulary learning on mobile devices: Design and evaluation. *Journal of Educational Computing Research, 54*(8), 1043-1069.
13. Oz, H. (2015). An Investigation of Preservice English Teachers' Perceptions of Mobile Assisted Language Learning. *English Language Teaching, 8*(2), 22-34.
14. Kacetl, J., & Klímová, B. (2019). Use of Smartphone Applications in English Language Learning—A Challenge for Foreign Language Education. Education Sciences, 9(3), 179.
15. Chen, C. M., Liu, H., & Huang, H. B. (2019). Effects of a mobile game-based English vocabulary learning app on learners‘ perceptions and learning performance: A case study of Taiwanese EFL learners. *ReCALL*, *31*(2), 170-188.
16. Ko, M. H. (2019). Students‘ reactions to using smartphones and social media for vocabulary feedback. *Computer Assisted Language Learning*, *32*(8), 920-944.
17. Davie, N., & Hilber, T. (2015). Mobile-Assisted Language Learning: Student Attitudes to Using Smartphones to Learn English Vocabulary. *International Association for Development of the Information Society*.
18. Nejati, E., Jahangiri, A., & Salehi, M. R. (2018). The Effect of Using Computer- Assisted Language Learning (CALL) on Iranian EFL Learners' Vocabulary Learning: An Experimental Study. *Cypriot Journal of Educational Sciences, 13*(2), 351-362.
19. Saricoban, A., & Ozturan, T. (2013). Vocabulary Learning on Move: An Investigation of Mobile Assisted Vocabulary Learning Effect over Students‘ Success and Attitudes.
20. Gürkan, S. (2018). The effects of a mobile assisted vocabulary learning application on vocabulary learning. *Turkish Online Journal of Qualitative Inquiry, 9*(3), 288-311.
21. Talan, T. (2020). The effect of mobile learning on learning performance: A meta- analysis study. *Kuram ve Uygulamada Egitim Bilimleri*, *20*(1), 79-103.
22. Jarvis, H., & Achilleos, M. (2013). From Computer Assisted Language Learning (CALL) to Mobile Assisted Language Use (MALU). *Tesl-ej*, *16*(4), n4.
23. Gurluyer, M., & Han, T. (2017). İngilizcede Başlangıç Düzeyindeki Üniversite Öğrencilerinin İngilizce Kelime

Öğreniminde Akıllı Telefonların Kullanımına Yönelik Algılarının İncelenmesi. *Erzincan Üniversitesi Eğitim Fakültesi Dergisi*, *19*(2), 19-36.

24. Reychav, I., & Wu, D. (2015). Mobile collaborative learning: The role of individual learning in groups through text and video content delivery in tablets. *Computers in Human Behavior*, *50*, 520-534.
25. Lai, C., & Zheng, D. (2018). Self-directed use of mobile devices for language learning beyond the classroom. *ReCALL*, *30*(3), 299-318.
26. Wong, L. H., Chai, C. S., Zhang, X., & King, R. B. (2014). Employing the TPACK framework for researcher-teacher co-design of a mobile-assisted seamless language learning environment. *IEEE Transactions on Learning Technologies, 8*(1), 31-42.
27. Avci, H., & Adiguzel, T. (2017). A case study on mobile-blended collaborative learning in an English as a foreign language (EFL) context. *International Review of Research in Open and Distributed Learning*, *18*(7).
28. Mwanza-Simwami, D. (2017). Fostering Collaborative Learning with Mobile Web 2.0 in Semi-Formal Settings. *In Blended Learning: Concepts, Methodologies, Tools, and Applications* (pp. 97-114). IGI Global.
29. Botero, G. G., Questier, F., Cincinnato, S., He, T., & Zhu, C. (2018). Acceptance and usage of mobile assisted language learning by higher education students. *Journal of Computing in Higher Education, 30*(3), 426-451.
30. Boticki, I., Wong, L. H., & Looi, C. K. (2012). Designing technology for content- independent collaborative mobile learning. *IEEE Transactions on Learning Technologies*, *6*(1), 14-24.
31. Kukulska-Hulme, A., & Viberg, O. (2018). Mobile collaborative language learning: State of the art. *British Journal of Educational Technology, 49*(2), 207-218.
32. García Botero, G., Botero Restrepo, M. A., Zhu, C., & Questier, F. (2019). Complementing in-class language learning with voluntary out-of-class MALL. Does training in self-regulation and scaffolding make a difference?. *Computer Assisted Language Learning*, 1-27.
33. García Botero, G., Questier, F., & Zhu, C. (2019). Self-directed language learning in a mobile-assisted, out-of-class context: do students walk the talk?. *Computer Assisted Language Learning*, *32*(1-2), 71-97.
34. Sun, Y., & Gao, F. (2019). An investigation of the influence of intrinsic motivation on students‘ intention to use mobile devices in language learning. *Educational Technology Research and Development*, 1-18.
35. Fouz-González, J. (2017). Pronunciation instruction through Twitter: the case of commonly mispronounced words. *Computer Assisted Language Learning*, *30*(7), 631- 663.
36. Wrigglesworth, J., & Harvor, F. (2018). Making their own landscape: Smartphones and student designed language learning environments. *Computer Assisted Language Learning*, *31*(4), 437-458.
37. Dashtestani, R. (2016). Moving bravely towards mobile learning: Iranian students' use of mobile devices for learning English as a foreign language. *Computer Assisted Language Learning*, *29*(4), 815-832.
38. Chen, C. M., Chen, L. C., & Yang, S. M. (2019). An English vocabulary learning app with self-regulated learning mechanism to improve learning performance and motivation. *Computer Assisted Language Learning*, *32*(3), 237-260.
39. Dashtestani, R. (2013). Implementing Mobile-Assisted Language Learning (MALL) in an EFL Context: Iranian EFL Teachers' Perspectives on Challenges and Affordances. *Jalt CALL journal*, *9*(2), 149-168.
40. Andujar, A. Mobile-mediated dynamic assessment: A new perspective for second language development. *ReCALL*, 1-17.
41. Okumuş Dağdeler, K.; Konca, M. Y., & Demiröz, H. (2020). The effect of mobile- assisted language learning (MALL) on EFL learners‘ collocation learning. Journal of Language and Linguistic Studies, 16(1), 489-509.
42. Korlu, H., & Mede, E. (2018). Autonomy in Vocabulary Learning of Turkish EFL Learners. *The EuroCALL Review*, *26*(2), 58-70.
43. Jiménez, W. C. (2019). Adult Students‘ Perceptions of Mobile assisted Language learning in Oral English Courses. *Revista de Lenguas Modernas*, (31).
44. Jiang, D., & Zhang, L. J. (2020). Collaborating with _familiar‘strangers in mobile- assisted environments: The effect of socializing activities on learning EFL writing. *Computers & Education*, *150*, 103841.
45. Kim, D., Ruecker, D., & Kim, D. J. (2019). Mobile assisted language learning experiences. In *Computer-Assisted Language Learning: Concepts, Methodologies, Tools, and Applications* (pp. 1059-1077). IGI Global.
46. Çakmak, F., & Erçetin, G. (2018). Effects of gloss type on text recall and incidental vocabulary learning in mobile-assisted L2 listening. *ReCALL*, *30*(1), 24-47.
47. Hsu, L. (2016). Examining EFL teachers‘ technological pedagogical content knowledge and the adoption of mobile-assisted language learning: a partial least square approach. *Computer Assisted Language Learning*, *29*(8), 1287-1297.
48. Demouy, V., Jones, A., Kan, Q., Kukulska-Hulme, A., & Eardley, A. (2016). Why and How Do Distance Learners Use Mobile Devices for Language Learning?. *The EuroCALL Review*, *24*(1), 10-24.