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<https://dergipark.org.tr/eltrj/>
*International Association of Research
in Foreign Language Education and
Applied Linguistics*
ELT Research Journal
2024, 13(1), 71-84
e- ISSN: 2146-9814

A Systematic Review of Language Learning Applications in Language Education

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Review Article

Received: 24/05/2024 Accepted: 04/07/2024

To cite: Sari, Ö. & Eranlı, C. (2024). A systematic review of language learning applications in language education. *ELT Research Journal*, 13(1), 71-84.

Abstract

This study covers MALL studies based on the use of a mobile application to teach or learn English. Based on the inclusion criteria, 26 studies from three different journals have been included in this study. The primary objective of this systematic analysis is to synthesize findings from quasi-experimental studies carried out between 2017 and 2022 in terms of the connection between the use of mobile language learning applications and language learning outcomes. The journals that have been selected to conduct the review are CALL Journal, Language Learning and Technology Journal, and ReCALL Journal. The preferred journals, due to their nature, aim at publishing articles only related to technology and language teaching.

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Keywords: Language learning apps; Mobile learning; Systematic review

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Introduction

Due to the ever-growing number of studies that have been conducted on the use of technology and mobile devices in educational settings, a multitude of fields have been suggested by the literature to investigate technology and language teaching; among these fields, researchers have primarily focused on Mobile Assisted Language Learning (MALL). However, given that MALL has been the subject of so many other studies, there is also a need for a systematic review of MALL studies in various contexts.

Khan et al., (2003) explain systematic review as follows:

“A review earns the adjective systematic if it is based on a clearly formulated question, identifies relevant studies, appraises their quality and summarizes the evidence by use of explicit methodology. It is the explicit and systematic approach that distinguishes systematic reviews from traditional reviews and commentaries” (Khan et al., 2003).

Regarding the motives provided above, this systematic literature review (SLR) aims to evaluate and combine research articles on mobile applications in ESL and EFL environments between the years 2017 to 2022 and synthesize their findings. Three research questions have been outlined as follows:

1. What are trends and methodologies in terms of language learning applications and language teaching and learning environments?
2. What language skills and sub-skills are focused on in the use of mobile learning applications?
3. To what extent are mobile learning apps effective in learning?

Methodology

This literature review provides the results of a systematic analysis of three large-scale journals based on language learning and technology, which are CALL, Language Learning and Technology, and ReCALL, published between 2017 and 2022. The review has been conducted within the framework offered by Khan et al. (2003); following the five steps as presented below:

“Step 1: Framing questions for the review” (Khan et al., 2003).

As previously mentioned, the research questions were formed prior to the study in order to conduct the review. Prior to forming the questions, the review sought to determine the use of mobile applications in language learning and teaching environments and state their effectiveness in language teaching and learning. This indicates why it is important to emphasize that "The problems to be addressed by the review should be specified as clear, unambiguous and structured questions before beginning the review work" (Khan et al., 2003).

“Step 2: Identifying relevant work” (Khan et al., 2003).

In order to find pertinent work, three journals have been selected since, according to Kartal (2020), "They are indexed in the Social Science Citation Index (SSCI) and they solely publish articles on the use of technology in language learning." The databases of the three journals have been searched using the keywords "mobile applications," "app," and "applications." After carefully combining and analyzing the articles included in each journal—CALL, ReCALL, and Language Learning and Technology—26 articles were identified as relevant work for this systematic review. The distribution of the articles in each journal is provided in Table 1 below.

Table 1. Number of studies conducted based on years and journals

	CALL	ReCALL	LLT	f
2017	2	0	1	4
2018	3	0	0	3
2019	2	2	0	4
2020	3	1	2	6
2021	2	1	0	3
2022	6	0	1	7
Total	18	4	4	26

“Step 3: Assessing the quality of studies” (Khan et al.2003).

In order to assess the quality of the studies, the inclusion and exclusion criteria have been set by adopting and adapting from the reviews done by (Rajendran & Yunus, 2021) and Kartal (2020). Articles have been included or excluded based on the inclusion and exclusion criteria as in Table 2 below.

Table 2. Inclusion and exclusion criteria for the systematic review

Criterion	Inclusion Criterion	Exclusion Criterion
Context	Educational Context	Non-educational context, personal use of apps mainly for joy
Focus of study	The use of mobile language learning applications	The use of computers, websites, mobile communication such as text messages or calls
Devices	Mobile, iPads, tablets	Computers, laptops
Field of study	Quantitative, experimental studies on language learning applications	Literature reviews, theoretical frameworks, non-experimental studies, or discussion papers
Publishers	CALL, ReCALL and Language Learning Technology journals	Other journals and databases
Year of publication	From 2017 to the end of 2022	Before 2017 and after 2022

“Step 4: Summarizing the evidence” (Khan et al., 2003).

Following the inclusion and exclusion criteria, 26 articles have been selected from the three journals as is above. After analyzing the articles, they are tabularized based on publication years, scopes, skills and results as in the Table 3 below.

Table 3. Summary of the articles included in the systematic review

	Participations& Context	Method(s)	Skill(s)	Application(s)	Results
Sun, Lin, You, Shen, Qi & Luo (2017)	72 young, first grade EFL learners in China	Quasi-experimental	Speaking	Papa (Social networking app)	Greater gains in fluency in experimental group
Liakin, Cardoso & Liakina (2017)	27 university students of French language learners	Mixed-methods	Speaking (Pronunciation)	A TTS application	Positive results in experimental groups
Chen, Carger & Smith (2017)	5 Young learners aged 9-13 in data collection/ 2 of 5 included in data analysis	Instrumental case study	Writing	Penultimate (a handwriting app)	Great improvement on the language production, support/elaboration. The focus dimension is the same
Zhou, Li & Li (2018)	84 university students taking an EAP course	Mixed-Method	All skills	An EAP app and WeChat	Provide sources connected to lessons

					-opportunities for communication as additional support
Eubanks, Yeh & Tseng (2018)	24 second-grade students enrolled in the Mandarin Chinese program	Mixed-Method	Writing	iPad recording app), the Book Creator App	Writing barriers decreased the writing ability improved.
Rachels & Rockinson-Szapkiw (2018)	187 students age ranged 7 to 10 years learning Spanish as a foreign language	Quantitative	All skills	DuoLingo	No significant difference in students' achievement or in academic self-efficacy between the use of the app and the traditional classroom
Cheng, Cheng & Yung (2019)	46 grade 5 students learning EFL in Taiwan	Quasi-experimental	Vocabulary	EVLAPP-SRLM a vocabulary learning app designed by researchers	Significantly greater learning performance and motivation
Zhonggen, Ying, Zhichun & Wentao (2019)	340 university students learning EFL in China	Mixed-methods	All skills	A mobile tool named 'College English IV' by researchers	Improved learning outcomes Lower cognitive load
Chen, Liu & Huang (2019)	20 university students learning EFL	Mixed Methods	Vocabulary	MEVLA-GF and MEVLA-GNF a vocabulary learning app designed by researchers with/without game related functions	Positive correlation between involvement and dependence on gamified functions and vocabulary learning performance
Loewen et al. (2019)	9 individuals from Michigan State University learning Turkish	Mixed-methods	All skills	DuoLingo	Improvement on L2 measures, and positive, moderate correlation between the time spent on Duolingo and learning gains.
Gonzalez (2020)	52 Spanish university students learning EFL	Quasi-experimental	Speaking (Pronunciation)	English File Pronunciation APP	Substantial improvements in the learners' perception and production of target language. No significant difference for every sound or in every task.
Yeh & Tseng (2020)	52 university students in Taiwan learning EFL	Quasi-experimental	All Skills and Multimodal Literacy	AR App	Positive effect on multimodal literacy.

Hanson & Brown (2020)	62 university students learning Spanish as a foreign language	Mixed-methods	Vocabulary	Anki	A positive relationship between the time spent on the app and performance at the end of the semester.
Lee & Park (2020)	40 university students learning EFL	Mixed-methods	All Skills	AR App	App supported language learning in the affective, cognitive, and social domains.
Fang et al. (2020)	66 university students learning EFL	Quasi-experimental	Vocabulary, Grammar and Speaking	a mobile-supported TBLT application	The mobile-supported outperformed the vocabulary and conversation comprehension tests but there was no significant difference in grammar test.
Tai & Chen (2020)	49 adolescents in Taiwan learning EFL	Quasi-experimental	Vocabulary	AR app	-The VR app contextualized vocabulary learning -enhanced learner engagement through real-time interactivity and feedback.
Botero et al. (2021)	52 university students learning French as a foreign language	Quasi-experimental	All Skills	Duolingo	Training and scaffolding for self-regulation is beneficial in a voluntary out of class MALL context.
Li et al. (2021)	291 Chinese EFL learners	Quantitative	Vocabulary	Baicizhan (a digital game-based vocabulary learning app)	Positive effect on concentration and motivation
Li & Hafner (2021)	85 Chinese EFL learners	Experimental	Vocabulary	Zhimi (a mobile app based on vocabulary learning)	The mobile app promoted greater gains than physical word cards.
Yi-chen Chen (2022)	33 Taiwanese university students	Mixed-methods	Public Speaking	Orai App VirtualSpeech App	No significant difference in Orai App / A significant decrease in anxiety level with the VR app
Zhu, Zhang & Li (2022)	55 Chinese university students	Mixed-methods	Speaking	B612 selfie app	A positive role in promoting students' segmental production and raising their articulatory awareness.

					A significant decrease in speaking anxiety.
Jao et al. (2022)	26 university students in Taiwan	Mixed-methods	Speaking	Mofunshow (a video dubbing app)	improved speaking ability, in terms of accuracy and fluency.
Shi and Tsai (2022)	80 students aged 16-17 in Taiwan	Mixed-methods	Vocabulary	Simplemind mapping app	Useful at vocabulary learning. It also improved word consciousness and word retention.
Quan et al. (2022)	18 pre-university intermediate learners	Mixed-methods	Vocabulary	APIC and AKWIC Concordance apps	Comparison of the two apps suggested that PIC is more advantageous than KWIC in learners' target language use.
Hwang et al. (2022)	43 EFL students aged 11-12 in Taiwan	Mixed-methods	Speaking	Smart UEnglish App	Learning achievement is higher. Learners reported increased motivation.
Tai (2022)	49 Taiwanese seventh grade learners	Mixed-methods	Listening	VR app	Better listening comprehension with VR app and more motivating.

“Step 5: Interpreting Findings” (Khan et al., 2003)”

As for the final step of interpreting findings, the findings of the review have been presented and discussed following the research questions and relevant comments and suggestions have been put forward in discussion and conclusions parts.

Findings and Discussion

This study has investigated 26 research articles on language learning applications and their effectiveness on language learning published in main three journals which are CALL, ReCALL and Language Learning and Technology. The findings have been presented in the flow of research questions and discussions have followed them.

Research Question 1: What are trends and methodologies in terms of language learning applications and language teaching and learning environments?

The distribution of the settings in which the research has been conducted is shown in Table 4 below. Trends and techniques have been evaluated in relation to the first research question.

Table 4. Setting of studies

Setting	<i>f</i> (%)
University (undergraduate and graduate)	13 (50%)
Primary and Elementary Schools	8 (30%)
Other (Adults, private courses)	5 (20%)

The majority of research on language learning applications and language learners has been conducted in university settings, as Table 4 above makes evident; studies conducted in primary and elementary schools have trailed behind them by a percentage of 30, and studies conducted with adults and in private courses account for 20% of all studies on the subject. Table 4 also makes clear that no studies have been done on secondary schools and language learning applications, despite the assumption that teenagers use mobile devices extensively. This systematic review highlights the need for studies conducted in secondary school settings.

Following the setting of studies, methodology of the studies in the selected journals has been presented below in Table 5.

Table 5. Methodology of the studies

Methodology	<i>f</i> (%)
(Quasi) Experimental	10 (38%)
Mixed-methods	14(54%)
Instrumental (Case Study)	1(4%)
Quantitative	1(4%)

As is clear from Table 5 above, most of the studies conducted on language learning applications include mixed-methods studies which include both experimental and quantitative studies with attitude or perception surveys because of the nature of such studies. The rest of the studies are only quasi-experimental studies with a percentage of 38. There is only one study which is regarded as an instrumental study conducted with young learners and only one study regarding the perceptions of learners on the use of a vocabulary application with 291 participants. Following the distribution of studies based on settings and methodologies, the skills and sub-skills they cover have been presented and discussed as the answer to the second research question.

Research Question 2: What language skills and sub-skills are focused in the use of mobile learning applications?

In order to answer the second research question, the studies included in this systematic review have been grouped according to the skills and sub-skills of the language learning applications the studies have focused on.

Table 6. Skills and sub-skills the studies have focused on

Skills and Sub-skills	<i>f</i>
Reading	0
Writing	2
Listening	1
Speaking	9
Grammar	1
Vocabulary	9
All-Skills	7

Table 5 makes it evident that the majority of the studies have been conducted in the areas of vocabulary, speaking, and covering all skills. Burston and Arispe (2022) state that over 40% of experimental studies have primarily focused on vocabulary acquisition; this systematic review appears to corroborate their assertion, as 35% of the included studies address vocabulary applications; when these are combined with applications covering all skills, this rate appears to be nearly equal to what Burston and Arispe (2022) stressed.

As with vocabulary applications, speaking is the other skill that is primarily focused on with a percentage of 35. However, this analysis has shown that there is only one experimental study covering listening skills published in the referred journals, while there are no publications on the reading skill, which appears to be a requirement to test the efficacy of such applications.

Research question 3: To what extent are mobile learning apps effective in learning?

In order to answer the final research question, the results of the studies have been presented in accordance with the skills they cover as mentioned above. The following table, Table 7, presents the effectiveness of the language learning applications in accordance with the language skills they focus.

Table 7. *Effects of the language learning applications in accordance with skills*

Skills and Sub-Skills	No Significant Difference (f)	Positive Effect (f)	Negative Effects (f)
All Skills	(1) in students' Spanish achievement or in academic self-efficacy between Duolingo® and traditional face-to-face instruction.	(6) Improvements in learning outcomes, communication skills, multimodal literacy, self-efficacy beliefs	(1) Cognitive loads of students were lower
Vocabulary	(0)	(9) Improvements in learning outcomes including performance, concentration, and motivation	(0)
Speaking	(0)	(9) Improvements in outcomes especially on fluency, pronunciation, and self-efficacy	(0)
Writing	(1) No difference in focused dimension	(2) Improvements in production, organization skills and lowering writing barriers	(0)
Listening	(0)	(1) Better listening comprehension and recall together with increased motivation	
Grammar	(1) No difference in test	(0)	(0)

Table 7 illustrates that the majority of the studies have reported positive outcomes, particularly in learning outcomes, self-efficacy beliefs, pronunciation, and other areas. However, this review has also shown that, despite the small number of studies on grammar and language learning applications, there is no significant effect on grammar learning from the use of language learning applications; additionally, one study found no significant impact on learners' academic achievements when using the language learning application DuoLingo.

In addition, the studies regarding the use of language learning applications on writing skills have revealed that the applications have a positive effect on learners' production and lowering their writing barriers while they have no effect in focused dimension compared to traditional face-to-face teaching. Overall, it may be commented that based on this systematic review, the use of language learning applications has a positive effect on learning outcomes while they have a few shortcomings which may be compensated by combining in-class face-to-face teaching with the use of language learning applications.

Conclusion

This study has been carried out as a systematic review of three journals: Language Learning and Technology, ReCALL, and CALL. All these journals have been indexed in SSCI and are intended to publish articles in the field of language education and technology. The articles have been chosen based on their experimental nature, including the use of language learning applications. The results of this study indicate that there are very few studies addressing the effectiveness of language learning applications aimed at the acquisition of reading skills and that the number of studies addressing vocabulary and speaking skills is much higher than that of listening, grammar, and writing. Finally, this study has also revealed that the use of language learning applications in educational contexts mostly have a positive effect on learners and learning outcomes especially based on lowering their barriers, self-efficacy beliefs, concentration and motivation.

This study has been conducted as a systematic review, and as for the further research, can be turned into a meta-analysis including the statistics it reveals. Besides, since this study is only limited to three journals, it may be expanded to further research by including other databases and conference papers to reveal more comprehensive results.

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