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Mobile-Assisted Language Learning Intervention and Its Effect on English Language Proficiency of EFL Learners: A Meta-Analysis

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***Abstract*—Some researchers have investigated the impact of mobile language learning on English proficiency for EFL learners. Mobile language learning has a positive effect on English skills in EFL students. However, the effectiveness of language learning with mobile assistance to enhance the success of EFL students remains to be discussed. Furthermore, it is not known if the effects of mobile-assisted language learning vary based on context. The purpose of this study was to conduct a meta-analysis of the findings of experimental studies assessing the impact of mobile-assisted language learning on the English language proficiency of EFL learners between 2015 and 2021. Experimental studies on mobile-assisted language learning and EFL learner English proficiency were analyzed using meta-analysis. The study found that the model of the random effects was utilized, and the effect size was determined to be substantial (d = 0.91). The meta-analysis calculated 25 effect sizes of type- d for the 25 studies. The analysis of moderator variables examined five different characteristics whose effects differed significantly only concerning majors, language learning objectives, and instrument type.**

***Index Terms*—EFL learners, English language proficiency, mobile-assisted language learning**

I. Introduction

Educational technology has shifted from computer-based learning to mobile devices due to the proliferation of mobile devices with internet access. In education, numerous studies have been conducted using mobile (Gutiérrez-Colón et al., 2020; Haerazi et al., 2020; Hwang & Tsai, 2011; Krasulia & Saks, 2020; Rajendran & Yunus, 2021). Most people now have internet-connected mobile devices, so educational technology has shifted from computer-based learning to mobile devices (Rozitis, 2017). Several scholars are investigating mobile-assisted language learning (MALL) in the era of rapid advancement of mobile gadgets and the ubiquity of mobile apps and devices.

The high prevalence of mobile device use has encouraged researchers to consider them a pedagogical tool (Haerazi et al., 2020; Díaz et al., 2014; Rajendran & Yunus, 2021). Educators are beginning to utilize mobile technology in formal classroom instruction and to integrate these technologies into informal educational settings and daily activities (Dobbins & Denton, 2017). Through various autonomous learning apps, technology facilitates language competency and enhances the language-learning procedure for students (Jeyavani & Karthika, 2021). Technology encourages critical thinking and engagement among students (Prems & Raj, 2021). Through mobile-assisted learning, students can practice language skills such as speaking, writing, reading, and listening.

The worldwide teaching and learning English as a Foreign Language (EFL) are increasingly utilizing mobile apps. Learners could use learning applications to engage in independent study at any time, from any location, inside or outside the classroom (Dobbins & Denton, 2017). In addition, the application is applied to improve learners' language achievements. Researchers can also achieve how language acquisition occurs outside the classroom, such as in the home and in social settings. As a result, mobile devices are an integral part of instructional activities such as language acquisition (Hwang & Tsai, 2011; Hsu et al., 2013).

Many researchers have previously researched mobile device use in language learning (Cho et al., 2018). Researchers have previously identified the influence of device use throughout the increase in English listening (Al-Shamsi et al., 2020; Kim, 2018a), speaking (Kusmaryani et al., 2019; Tonekaboni, 2019), vocabulary (Katemba, 2021), pronunciation (Sherine et al., 2020). The mobility, flexibility, connectedness, and uniqueness of mobile devices have all been found in previous studies (Hsu et al., 2013; Kim, 2009). As mobile devices become more common in daily life, learners will utilize them whenever they want because of their portability (Elfeky & Masadeh, 2016a).

This study addresses issues about the academic performance of MALL and the English proficiency of EFL learners. A few of these language acquisition components are considered especially suitable for m-learning. English listening (Al-Shamsi et al., 2020; Kim, 2018), speaking competency (Kusmaryani et al., 2019; Tonekaboni, 2019), vocabulary mastery (Katemba, 2021), and pronunciation (Sherine et al., 2020) are typical, particularly for mobile learning environments. However, this is unknown whether providing MALL for EFL learners' English proficiency is more effective than other learning methodologies, such as computer-based or print-based resources. In addition, it is unknown if the outcomes of mobile learning differ by the situation.

This paper presents the outcomes of experimental studies investigating the impact of MALL on the English proficiency of EFL learners. Using a meta-analysis, the researcher explores the influence of MALL on EFL students' English proficiency. The researchers systematically evaluate and systematically synthesize data from relevant materials, such as published publications, from the language acquisition sectors. This research aims to perform a meta-analysis of experimental studies examining the effects of MALL on EFL learners' English proficiency achievement with different moderator variables between 2015 and 2021.

Research Questions

This study aims to determine to what extent MALL intervention influences the English language proficiency of EFL learners. This study expected that the MALL intervention could be identified as an effective strategy for improving the English language proficiency of EFL learners. Two research questions guided the study:

1. To what extent does MALL intervention improve EFL learners' English language proficiency?
2. How do possible moderator variables (*source of studies, number of participants, majors of students, target language learning, and type of instruments* moderate the effect of MALL intervention on EFL learners' English language proficiency?

II. Literature Review

A. The Notion of Mobile Learning

Education practitioners often use varying terms to characterize mobile-based learning (Grant, 2019). Using apps explicitly designed for mobile devices, students may study anywhere and anytime with mobile-based learning. In recent years, its popularity has skyrocketed (Alharbi, 2021; Al-Shamsi et al., 2020; Traxler & Hulme, 2005). Using mobile devices, students can study anywhere, anytime, using mobile-based learning. Quinn (2012) describes mobile learning (m-learning), which combines mobile computing and eLearning, as having the following characteristics: resources can be accessed from anywhere, search capabilities are extensive, there is a lot of interaction, and there is an emphasis on practical learning, and assessment is based on performance (Alzieni, 2021). According to Brown (2005), m-learning is a subset of e-learning focusing on two main aspects of online education: material delivery and web-based learning management. As an adaptable method of schooling, m-learning is used. As defined by academics, mobile learning allows students to access course materials and conduct outside-of-class assignments (Miangah, 2012). Easy and versatile access to a wealth of high-quality learning resources makes it possible to gain from personalized learning. Consequently, m-learning has the potential to make education more adaptable to the learner, instantaneous, casual, and pervasive (Miangah, 2012).

B. Mobile Learning in the Pedagogical Context

The rise of technology in recent decades has had far-reaching consequences across all sectors, but the educational system has significantly benefited from this trend. Educational technology fosters fruitful collaboration amongst students, instructors, and tools as an emerging field. Some fields under this umbrella are linguistics, e-learning, online study, and m-learning (or "mobile learning"). Cell phones, or mobile phones, are among the most ubiquitous forms of mobile technology. All age groups make use of mobile phones for a variety of reasons. Until recently, mobile phones have served only as a means of communication. Later, additional features such as short message service (SMS), cameras, games, music streaming, video streaming, the internet, etc., were introduced. The proliferation of smartphones means they must be used in language learning.

Studies have begun considering the development of educational apps in response to the widespread adoption of mobile devices (Haerazi et al., 2020; Rajendran & Yunus, 2021). Educators use it as a tool (Díaz et al., 2014). In addition to incorporating mobile devices into informal, everyday learning settings, teachers are starting to use them in more traditional classroom contexts (Dobbins & Denton, 2017). According to previous researchers Cho et al. (2018) and Traxler and Hulme (2005), students are becoming more and more comfortable with and enthusiastic about learning via mobile devices. As digital technologies continue to advance rapidly, MALL has been a topic of interest in the field of training systems. Due to the rapid advancement of ICT and the effects of globalization, there are now more possibilities than ever before to incorporate ICT into the classroom (Cho et al., 2018; Hwang & Tsai, 2011; Sung et al., 2016; Wen et al., 2019). The use of mobile devices is increasing rapidly across all levels of schooling (Cho et al., 2018; Traxler & Hulme, 2005). Smartphones and other mobile gadgets are becoming more commonplace. Compared to traditional e-learning, m-portability learning's benefit stands out (Cho et al., 2018; Traxler & Hulme, 2005). There are no more barriers to accessing educational materials, such as distance or time (Traxler & Hulme, 2005). M-learning refers to any form of education that allows students to get materials and instruction from their mobile devices, regardless of where they happen to be (Traxler & Hulme, 2005).

C. Mobile-Assisted Language Learning and EFL

Learning through MALL is rising worldwide, especially among those learning a foreign language (Statti & Villegas, 2020). The MALL is another rapidly developing area of mobile learning (Sung et al., 2016a). MALL is dedicated to mobile technology (Cho et al., 2018). Any language class that takes place entirely on a mobile device is called a MALL

(Rahimi & Miri, 2014). MALL is a cutting-edge language study method (Azar & Nasiri, 2014). Computer-assisted language learning (CALL) is a broad umbrella term, of which MALL is a subset (Dağdeler et al., 2020).

Notwithstanding this, Kukulska-Hulme and Shield (2008) state MALL and CALL are not interchangeable terms. It makes use of technologies that are easy to use and portable to provide persistent or instantaneous access and engagement across various environmental circumstances. MALL uses mobile learning to increase language acquisition (Dağdeler et al., 2020). According to Dağdeler et al. (2020) and Miangah (2012), MALL is an effective method for overcoming the limitations of time and place that come with learning a foreign language. MALL has proven to be an effective method for enhancing language abilities in students of foreign languages. This is because many researchers strive to improve their work. Learning English as a foreign language uses mobile applications to enhance the student's performance in all four language skills: reading, listening, speaking, and writing (Cho et al., 2018).

Researchers in language and linguistics have experimented with a wide variety of strategies to enhance student's learning outcomes and performance by utilizing technology-based learning (Cho et al., 2018; Hulme & Shield, 2008; Sung et al., 2016b; Sandberg et al., 2011). The vast majority of studies that have been conducted to investigate the effect of MALL on English languages and listening abilities, in general, have found that it has a positive impact. This is because the devices offer the student more opportunities to practice and a higher level of language exposure (Alzieni, 2021). Research conducted by MALL focuses primarily on teacher-driven mobile learning, students' use of mobile applications, and the function of mobile applications in students' education (Alharbi, 2021; Steel, 2012).

III. Methodology

A systematic literature review of MALL was conducted to identify the necessary studies. Literature searches were conducted utilizing databases such as Scopus, ERIC, Google Scholar, JSTOR, and ProQuest. "Mobile learning", "mobile-assisted language learning", "and EFL learners" and "and EFL achievement" were used as search terms in conjunction with one another. There were 405 articles within the Scopus database, 574 within ERIC, and 554 within ProQuest. We discovered 246 articles in Sage Journals and 591 in JSTOR. All research papers utilized in the meta-analysis have been published.

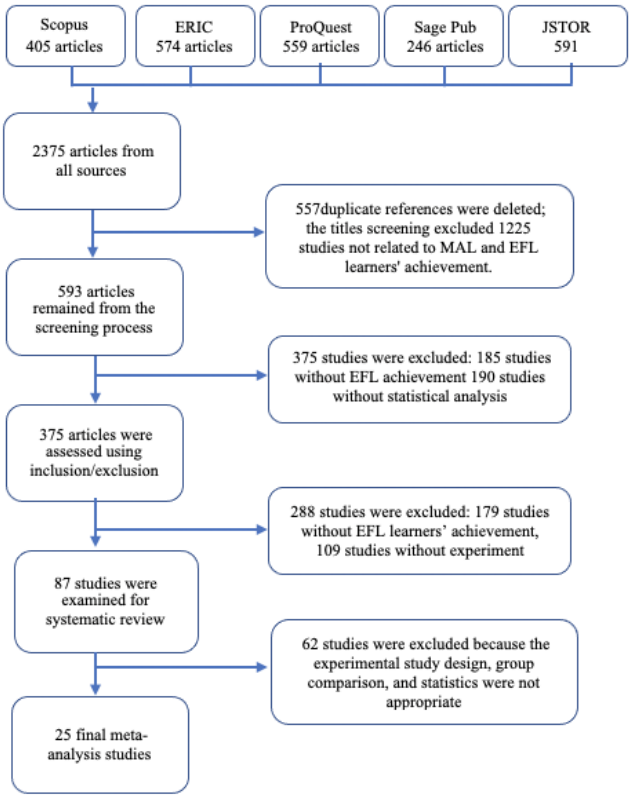

Figure 1 Literature Search Flow Chart

A. Rules for Inclusion and Exclusion

Figure 1 displays the results of the literature review as well as the excluded studies. Initial database searches generated 2,375 articles, and the filtering procedure yielded roughly 375 potentially relevant articles. (1) MALL, (2) an experimental design for the comparison of MALL, (3) English language instruction activities done by MALL, (4) accurate descriptions of students, and (5) statistical analysis information for the computation of d-type effect sizes were

required for inclusion in the review. The study was also excluded from the compilation if it (1) was unrelated to MALL and English learners, (2) did not evaluate EFL learners' proficiency, (3) was published before 2015, or (4) exhibited outlier effect sizes with enormous effect sizes. These criteria were met by 87 publications, of which 87 were selected for further examination. Sixty-two papers were removed because of the preliminary experimental study design, group comparison, and statistical analysis. Eventually, only twenty-five studies were left.

B. Data Evaluation

There was a total of twenty-five effect sizes reported in 25 different publications. The findings and their classification scheme are presented in Table 1. There are three types of encodings: (1) participant information, (2) treatment information, and (3) statistical information (sample size, mean, standard deviation).

TABLE 1
LIST OF SELECTED STUDIES WITH MODERATOR VARIABLES

Authors	N	d	SE	Source of Study	Number of Participants	Majors of Students	The target of Language Learning	Type of Instrument
Abeer Hadi, 2019	60	0.41	0.26	Journal	Medium	English	Listening	Custom instrument
Abdellah & Thouqan, 2016	50	1.59	0.32	Journal	Medium	English	Speaking	Custom instrument
Abdullah Al-Shamsi, et.all., 2020	31	0.90	0.37	Journal	Small	Non-English	Listening	Custom instrument
Ahmad Ameri-Golestan, 2016	80	1.12	0.24	Journal	Large	English	Vocabulary	Standardized instrument
Ahmet Basal et al., 2016	54	1.40	0.30	Journal	Medium	English	Vocabulary	Custom instrument
Ali Morshedi, 2019	60	-0.06	0.26	Conference	Medium	English	Speaking	Standardized instrument
Arif Ahmed & Mohammed Hassan, 2021	80	2.96	0.32	Journal	Large	English	Grammar	Custom instrument
Arthur Lai, 2016	40	0.48	0.32	Journal	Medium	Non-English	Vocabulary	Custom instrument
Chansophea & Wilawan, 2019	40	0.14	0.31	Conference	Medium	Non-English	Speaking	Custom instrument
Fahad Alkhezzi, 2016a	40	0.87	0.33	Journal	Medium	Non-English	Vocabulary	Custom instrument
Fahad Alkhezzi, 2016b	40	0.41	0.32	Journal	Medium	Non-English	Grammar	Custom instrument
Fahad Alkhezzi, 2016c	40	0.09	0.31	Journal	Medium	English	Writing	Custom instrument
Hussam Alzieni, 2020	63	1.69	0.29	Journal	Medium	English	Listening	Standardized instrument
Ismail & Mahmood, 2020	38	1.51	0.37	Journal	Small	English	Vocabulary	Standardized instrument
Kübra Okumuş et al., 2020	69	0.95	0.25	Journal	Medium	English	Vocabulary	Standardized instrument
Leila Khubyari & Mehry Haddad, 2016	40	1.43	0.35	Journal	Medium	English	Reading	Standardized instrument
Mahnaz M. & Mohammad R., 2019	35	1.54	0.38	Journal	Small	English	Reading	Custom instrument
Mohammed M. Alhawiti, 2015	36	1.15	0.36	Journal	Small	English	Grammar	Custom instrument
Ornprapat & Wiwat, 2015	80	-0.63	0.23	Journal	Large	Non-English	Vocabulary	Custom instrument
Paiman Z. & Fatimah R., 2018	57	0.42	0.27	Journal	Medium	English	Listening	Custom instrument
Said Fathy El Said, 2015	30	1.29	0.40	Journal	Small	English	Writing	Custom instrument
Suparmi, 2015	44	1.56	0.34	Conference	Medium	Non-English	Speaking	Custom instrument
Yoon Jung Kim, 2017	10	0.21	0.60	Conference	Small	Non-English	Listening	Standardized instrument
Yuan Zhang, 2016	120	1.69	0.21	Conference	Large	Non-English	Listening	Standardized instrument
Zhong Sun et al., 2017	72	-0.23	0.24	Journal	Large	Non-English	Pronunciation	Standardized instrument

C. Moderators Variables

Table 1 referenced five factors that could act as moderators: study design, sample size, a field of study, language proficiency goal, and assessment tool. The first was a journal, and the second was a conference. In the introduction, we divided the total number of people into three groups: (1) very large, (2) reasonably large, and (3) relatively small. Students declared their concentrations as either English or non-English. Speaking and pronunciation, listening, vocabulary; reading; grammatical knowledge; reading comprehension; writing are the six focus areas for language study. There were two categories of instruments: (1) standard instruments and (2) customized ones.

D. Calculating Effect Sizes

A total of 25 effect sizes were retrieved from 25 studies after the inclusion and exclusion criteria were applied. The established effect size is known as 'Hedges' d'. Hedges (1985) was used to estimate the variable difference between MALL and conventional. To evaluate the effect of paired treatments, this method was chosen since it provides an effect size estimate independent of sample size, measurement unit, or statistical test findings. To create the experimental group (E), we pooled the MALL that was being distributed, and to make the control group (C), we did the same thing with the MALL that was being distributed normally. Using the above formulas, the effect size (d) was calculated.

$$d = \frac{\bar{X}^E - \bar{X}^C}{S} J$$

$\overline{X}^{E'}$ represent the experimental group, while '$\overline{X}^{C}$' designate the control group. A small sample correction factor, denoted by "J," is found by applying the following formula.

$$J = 1 - \frac{3}{(4N^C + N^E - 2) - 1)}$$

While 'S' denotes the pooled standard deviation, which may be determined from the following equation:

S stands for the pooled standard deviation, which can be calculated using the following formula:

$$S = \sqrt{\frac{(N^E - 1)(S^E)^2 + N^C - 1)(S^C)^2)}{(N^E + N^C - 2)}}$$

'N^{E}' indicates the experimental group's sample size, 'N^{C}' represents the control group's sample size, while 'S^{E}' and 'S^{C}' reflect the experimental and control groups' standard deviations, respectively. The following formula was provided to calculate the effect size variance.

$$V_d = \frac{(N^C + N^E)}{N^C N^E} + \frac{d^2}{(2(N^C + N^E))}$$

d indicates the effect size, which was calculated using the numerator's adjusted means and a calculation's pooled unadjusted standard deviation (Cho et al., 2018).

E. Data Analysis

(a). Meta-Analysis Utilizes

The researcher investigated effect size heterogeneity and publication bias using the confidence interval (CI) and funnel plots (Ornprapat & Wiwat, 2015). Q statistics such as QB and QW were calculated to identify potential moderators of the effect size of MALL on the success of EFL learners.

(b). Publication Bias

As long as there is no publication bias, the findings are evenly distributed and in the form of an upside-down funnel. The plot is frequently distorted by publication bias (Ornprapat & Wiwat, 2015). An asymmetric funnel plot passes Egger's test after first making a funnel plot and adjusting the mean. The ANOVA test and the funnel plot are two ways of detecting publishing bias.

(c). Moderator Analysis

The study's source, number of participants, participants' majors, the target of language learning, and instrument type were all considered effect size moderators. These variables were collected using categorical variables, and data analysis can be included under data collection and analysis.

IV. Results

Figure 2 displayed the adjusted mean and variance homogeneity tests for the 25 different effect sizes. Due to the large variety of impact sizes, the author continues with a comprehensive random-effects model study. The average effect size was large (d=0.91). These findings established the period within which 95 per cent of the total population effects could occur. It varied from 0.59 to 1.23, demonstrating that mobile learning was more successful and efficient than other language learning methodologies.

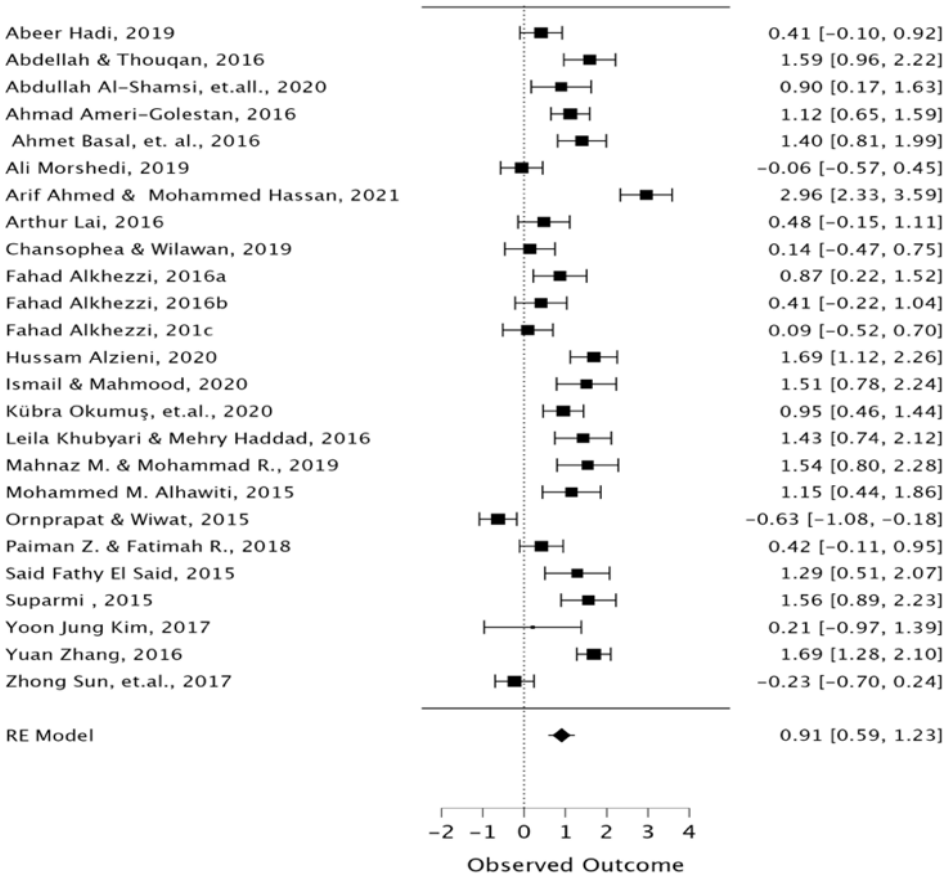

Figure 2 Forest Plot of Effect Sizes for All Studies

On the forest plot above, the black box represented the effect size, and the horizontal line represented the 95 per cent confidence interval on each side of each square on the graph. Furthermore, the Forest plot in Figure 2 (Al-Ahdal & Alharbi, 2021) had the largest mean impact size. Nonetheless, the single (Ornprapat & Wiwat, 2015) did not affect the mean impact size. The remaining eight effect sizes were all positive, whereas only one of the 25 effect sizes was negative.

TABLE 2
MEAN EFFECT SIZES FOR ENGLISH PROFICIENCY USING MALL WITH A VARIETY OF SETTINGS

	Effect Size			95% CI		Test of Null	Test of Heterogeneity	
	k	d	SE	Lower	Upper	z	Q_B	df
All Studies	25	0.91	0.16	0.59	1.23	5.62		
Source of Study							0.21	1
Journal		0.95	0.18	0.60	1.30	5.25		
Conference		0.74	0.40	-0.04	1.52	1.87		
Number of Participants							1.18	2
Small		0.99	0.22	0.56	1.42	4.50		
Medium		0.85	0.17	0.52	1.19	4.98		
Large		0.98	0.65	-0.29	2.24	1.51		
Majors							11.11 *	1
Non-English		0.73	0.32	0.11	1.35	2.30		
English		1.05	0.17	0.72	1.37	6.34		
The target of Language Learning							23.05 *	5
Speaking & Pro		0.58	0.40	-0.21	1.37	1.45		
Listening		0.94	0.28	0.40	1.49	3.41		
Vocabulary		1.07	0.36	0.37	1.78	2.98		
Reading		1.48	0.26	0.97	1.99	5.71		
Grammar		0.76	0.37	0.04	1.48	2.06		
Writing		0.66	0.60	-0.51	1.84	1.10		
Type of Instrument							14.52 *	1
standardized instrument		1.14	0.31	0.54	1.74	3.73		
Custom instrument		0.75	0.18	0.40	1.09	4.28		

A. Moderator Variable Analysis

The researcher then examined the five potential moderators of the impact sizes he identified in the previous stage. Majors, language learning target, and instrument type were all significant moderators in ANOVA-style mixed-effects models. Table 3 shows the weighted mean impact sizes of the various conditions on language learning achievement. The effect sizes of the five modifiers were then examined. The source of studies, number of participants, majors of participants, language learning objective, and kind of instruments were all critical factors in the ANOVA-like mixed-effects model. Table 3 indicates the language proficiency effect sizes in various circumstances.

TABLE 3
RESULTS OF QB AND QW ANALYSES

	Effect Size			95% CI		Test of Null	Test of Heterogeneity
	d	SE	k	Lower	Upper	Q_B	Q_W
Source of Study	0.91	0.16	25	0.59	1.23	0.21	188.20
Journal	0.95	0.18		0.60	1.30		149.21
Conference	0.74			-0.04	1.52		38.99
Number of participants						1.18	187.23
Small	0.99	0.22		0.56	1.42		13.95
Medium	0.85	0.17		0.52	1.19		51.09
Large	0.98	0.65		-0.29	2.24		122.19
Majors						11.11 *	177.29
Non-English	0.73	0.32		0.11	1.35		135.29
English	1.05	0.17		0.72	1.37		42.01
The targets of Language Learning						23.05 *	165.35
Speaking & Pronunciation	0.58	0.40		-0.21	1.37		36.14
Listening	0.94	0.28		0.40	1.49		27.78
Vocabulary	1.07	0.36		0.37	1.78		93.36
Reading	1.48	0.26		0.97	1.99		0.04
Grammar	0.76	0.37		0.04	1.48		2.40
Writing	0.66	0.60		-0.51	1.84		5.64
Type of Instrument						14.52 *	173.89
standardized instrument	1.14	0.31		0.54	1.74		101.77
Custom instrument	0.75	0.18		0.40	1.09		72.11

(a). Source of Studies

The effect sizes in the journal article and conference studies were not significantly different, with d = 0.95 (SE = 0.16) and 0.74 (SE = 0.18), respectively. There was no statistically significant change in mean impact magnitude in most cases. The research sources did not provide a moderator explaining all of the changes in effect amongst groups, given the significant levels of variation (QB = 0.21, p > 0.05).

(b). Number of Participants

The number of participants, categorized as small, medium, and large, was used to make predictions. The mean effect sizes of MALL studies done in small, medium, and large settings were not significantly different from zero, as shown in Table 3. Due to the considerable levels of variation (QB = 0.21, p > 0.05), the number of participants did not provide a moderator to explain all the effect differences between groups.

(c.) Majors of Students

Researchers established two sorts of majors for the predictor: English and non-English. According to the findings, the outcomes of English-related research differed significantly from those of non-English departments. English majors demonstrated significantly bigger impact sizes (1.05, se=0.17) than non-English majors (d = 0.73, se=0.32). The majors moderated the effects of MALL use on language learning (QB = 11.11, p 0.05). The majors served as a moderator to explain all population-specific effects.

(d). Target Language-Learning

The studies on MALL focused on speaking, pronunciation, listening, vocabulary, reading, grammar, and writing. Table 3 demonstrates that language learning has a substantial effect on the outcomes. Using mobile devices to learn a language was adequate for most language skills. The target language learning moderated the impact of MALL usage on language acquisition (QB = 23, 05, p 0.05). The language learning objectives might explain all population disparities in effects.

(e). Type of Instruments

Two sorts of instruments were included in the predictor: standard and customized tests. The achievements of EFL learners measured by the researcher's customized instruments were significantly different from those measured by the commercially standardized instrument. In this study, the impact sizes of standardized instruments were significantly larger than those of custom instruments (d = 1.14, SE = 0.31 vs. d = 0.75, SE = 0.18).

B. Publication Bias

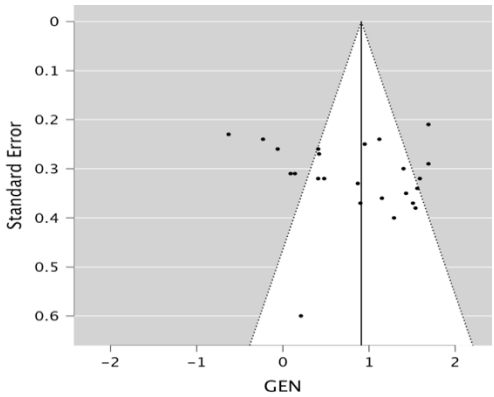

Figure 3 The Funnel Plots

The funnel plot displayed 25 research results submitted to symmetrically distributed meta-analysis. Using research with a large sample size, the analysis found an average of 25 findings. Most of the study's point distribution was positioned toward the top. In addition, it revealed that the studies utilized in the meta-analysis satisfied the predetermined criteria. Therefore, publication bias was not a possibility.

V. Discussion

This study examines the effect sizes of 25 studies to determine whether MALL improves EFL learners' English proficiency. The studies varied in terms of majors, the target of language learning, and the measurement methods utilized. Learners' proficiency was explored in various research settings and conditions, such as the number of participants and majors. Journal articles and conference presentations contributed to the research.

A. Results of a Study on the Overall Effects of MALL on the Proficiency of EFL Learners

Overall, the findings indicated a high positive influence of MALL on EFL learners' English proficiency, confirming that MALL could be beneficial for learning EFL. Other studies have shown that MALL affects the development of future language learning skills, including speaking and pronunciation, reading, vocabulary, listening, and grammar.

B. The Effects of MALL in A Variety of Circumstances

Large impact sizes for MALL across all study participants indicate that MALL influences the English proficiency of EFL learners. Researchers who employed MALL with fewer participants reported bigger effect sizes than those who used MALL with more participants. As part of this study, the researcher additionally investigated if MALL in different majors resulted in a statistically significant difference. Compared to non-English majors, English majors significantly impacted the proficiency of EFL learners, suggesting that English majors have a considerable impact on EFL learners' English proficiency. This study demonstrated that MALL, with a modest number of participants, increased the achievement of EFL students.

The researcher compared the groups based on their language target: speaking, pronunciation, and predicted effect size (Chhum & Champakaew, 2019; Elfeky & Masadeh, 2016b; Suparmi, 2015of; Tonekaboni, 2019), listening (Al-Shamsi et al., 2020; Alzieni, 2021; Azeez & Al Bajalani, 2018; Kim, 2018; Salih, 2019; Zhang, 2016), vocabulary (Al-Ahdal & Alharbi, 2021; Alkhezzi & Al-Dousari, 2016; Basal et al., 2020; Dağdeler et al., 2020; Lai, 2016; Ornprapat & Wiwat, 2015; Xodabande & Atai, 2020), reading (Khubyari & Narafshan, 2016; Moayeri & Khodareza, 2019a), grammar (Alhawiti, 2015; Alkhezzi & Al-Dousari, 2016). MALL is an alternative method for enhancing learners' speaking skills and employing the language's speech patterns. Teaching someone how to speak is challenging since good communication depends on both partners actively listening to one another (Liu et al., 2019; Moayeri & Khodareza, 2019). Students' speaking abilities and fluency in the target language should be nurtured through carefully chosen speaking exercises. Students can benefit from intensive oral communication exercises since they increase self-assurance and encourage regular public speaking (Rouhshad et al., 2016). MALL has been shown to improve pupils' pronunciation of English words and make learning to pronounce such words easier (Miqawati, 2020). The results of this research are consistent with those of other studies (Shahrokhi & Arashnia, 2016; Kim & Kwon, 2012) that found that MALL helped students improve their pronunciation.

Individualized lessons and activities that focus on the needs of each student are two additional benefits that MALL offers. This study's results suggest that MALL has the potential to inspire students to participate in class and develop their abilities actively. Thus, MALL is added to the list of options to help students with pronunciation training. It's because incorrect pronunciation can render a speaker unintelligible, and understanding the speaker's intentions and language use has become increasingly dependent on correct pronunciation (Reed & Levis, 2019).

The use of MALL can help hone one's listening skills. EFL students will focus on listening skills since that teachers no longer employ the old ways. With MALL, they may learn on their own time, at their own pace, and from any location. It was also found that MALL was beneficial in helping EFL students enhance their listening abilities (Shanmugapriya & Tamularasi, 2013). Therefore, educators are strongly urged to experiment with and use novel approaches to teaching English, mainly listening, such as mobile-based media.

Vocabulary learning was considerably aided by being in a mall (Ahmad et al., 2017). Mobile gadgets moderately affect vocabulary development (Liu & Zhang, 2018). This meta-analysis indicated that MALL significantly impacted vocabulary learning, and these results are generalizable throughout the entire vocabulary acquisition process. The impact of mobile devices on vocabulary learning in elementary and secondary schools needs more study because most past research has focused on adult learners.

The study's findings showed that participants who received MALL had considerably higher listening evaluations than those who did not (Baleghizadeh & Oladrostam, 2010). Using mobile devices to supplement language learning has significantly boosted students' engagement with grammar study (Khodabandeh et al., 2017). The results of this study suggest that increasing student participation in the educational process can be achieved by presenting them with engaging and varied learning opportunities in an environment where both the teacher and the students are required to preserve order (Al-Hamad et al., 2019). MALL has the potential to be a valuable tool for teachers, especially when it comes to helping pupils improve their writing abilities. Exercises are used throughout MALL training to keep students interested and motivated throughout the course.

The results revealed that the target language makes a statistically significant impact on the achievement of EFL learners. However, the effect size assessed in (Cho et al., 2018) revealed no significant differences based on the language target. The author examined five critical learning outcomes in the mobile-learning study: vocabulary, speaking, reading, pronunciation, and writing skills. Except for reading comprehension, which had only a minor impact, there were statistically significant beneficial effects on vocabulary and pronunciation acquisition outcomes. Furthermore, using MALL for language learning helped meet language learning objectives across most target abilities. This mixed-effects model revealed that the value of QB was statistically significant at the level of 0.05 (QB = 23.05, p 0.05), demonstrating that target language learning moderates the effects of MALL use on language acquisition.

The findings of earlier research meta-analyses, such as those (Lee et al., 2020; Cho et al., 2018), demonstrated that the kind of instrument also moderates the influence of mobile devices. In terms of instrumentation, favourable treatment effects were identified only when researcher-designed scales measured language acquisition achievement, and these scales were most likely created to fit specific research purposes. Furthermore, standardized measures can be used to identify and evaluate regions of linguistic proficiency.

VI. Conclusion

The results indicated that the mean impact size value was a high effect level (d = 0.96). Utilizing MALL had a significant favourable impact on the English proficiency of EFL learners. The findings showing a significant good influence of MALL on EFL learners' achievement confirmed that MALL could be advantageous for learning English as a foreign language. There were five moderator factors, but only majors, the targets of language learning, and instrument types exhibited statistically different effects. The number of studies and participants did not provide a moderator to explain the disparities in effect between populations. This study shows that MALL can improve the English proficiency of EFL learners.

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