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Mobile-Assisted Language Learning (MALL) for grammar: Trends and outcomes (2018-2023)

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A B S T R A C T

Mobile Assisted Language Learning (MALL), especially in grammar skills, may have a favorable impact on the teaching and learning process as industrial technology 4.0 advances. Thus, this systematic review analyzed the trends and the outcomes of Mobile Assisted Language Learning MALL in teaching grammar from a diverse range of studies. This study was conducted by using Publish or Perish software to compile the data and VOSviewer to generate the data visualization and report in bibliometric analysis in the last 5 years (2018-2023), with exclusion and inclusion criteria considered. A total of 149 articles were excluded as criteria, and 15 selected articles were systematically analyzed. The analysis highlighted the outcomes of Mobile Assisted Language Learning (MALL), such as interactive learning experiences. The finding implied that the students' grammar skills were positively impacted due to the use of mobile applications such as Duolingo, Anki, Telegram, Throwback Time (TBT), and other tools. Besides, it also influenced students' interest in the teaching-learning process, which tended to increase students' engagement, since it can save time, energy, and money. However, there was a need to develop more adjustments and useful features to deal with some challenges in teaching and learning grammar using MALL. It is therefore suggested that future research focus on the challenge and approach to teaching grammar using MALL or mobile learning.

1. INTRODUCTION

The rapid advancement of technology has significantly influenced numerous aspects of life. This phenomenon arises due to the critical and novel dimension that technology represents, especially within the domain of language acquisition(Maharani et al., 2024). In investigating the integration of technology into English language instruction, it becomes evident that a diverse array of digital tools, including mobile apps, virtual reality simulations, and online learning platforms, are reshaping pedagogical practices(Wiranata et al., 2024). Over the past decade, the rise of Mobile Assisted Language Learning (MALL) has provided an accessible method for teaching and learning activities. With more interactive educational content, MALL offers the flexibility to use it everywhere(Anwar et al., 2022; Çakmak, 2019; Panah et al., 2021; Rao, 2019). The integration of MALL into language education has particularly opened new opportunities for grammar instruction, a foundational component of language learning. Studies suggest that MALL can promote a deeper understanding of grammatical concepts by enabling practice beyond traditional classroom settings(Patria, 2022). Many educators and researchers have recognized the potential of MALL to support language learning. In Malaysian universities, the potential mobile

applications can be used as a supplementary resource for learning grammar, which also has a positive impact on students' grammar skills(Metom et al., 2024; Rozina et al., 2017). Those studies reveal that mobile applications are being designed not only for learning but also for interactive practices. students' grammar skills. Furthermore, the investigation in 2021 revealed that 598 EFL students have obtained a significant positive impact in learning grammar through self-regulated learning (SRL) as a method in the classroom(Wang et al., 2021). Besides, more than 90% of students of EFL senior high school also derive the positive impact of Duolingo in learning grammar (Maharani et al., 2024).

While existing studies highlight the effectiveness of MALL in enhancing grammar learning, research in this area remains fragmented, often focusing on isolated case studies, single applications, or specific learner populations. To date, there is limited comprehensive synthesis that systematically maps the broader trends, platforms, methods, and learning outcomes associated with mobile-assisted grammar learning from certain period. This gap hampers a full understanding of the evolving landscape and best practices of MALL for grammar instruction across diverse educational contexts.

Addressing this gap, the present study offers a systematic review that examines recent empirical findings to assess the effectiveness of MALL in improving students' grammar proficiency. It also identifies the types of digital platforms most commonly utilized and their pedagogical impact. By consolidating and analyzing research trends and outcomes over the past five years, this review provides novel insights into how mobile technologies are reshaping grammar learning practices and suggests directions for future research and application. Spesifically, this study aims to answer the following critical questions: 1) Does MALL improve students' grammar proficiency? 2) What kinds of digital platforms are employed to help students become more proficient in grammar?

2. METHODS

2.1 Bibliometric Analysis Procedure

A two-stage procedure was employed in this research, beginning with a bibliometric analysis to obtain comprehensive data. This study was conducted to identify current trends and understand the publication's current portrayals of the use of MALL in teaching and learning grammar skills. Firstly, Publish or Perish was used as software to collect data during compilation. Next, the researcher used VOSviewer to process the search results. This was conducted since the search result might be generated, becoming the data visualization as the first objective. Secondly, to probe into emerging trends, Google Scholar was used to search for papers and to obtain relevant papers from the database. Then, to gain relevant data, the researcher used specific search terms such as "Mobile Assisted Language Learning (MALL)", "MALL", or "Mobile Learning". Additionally, "Teaching Learning Grammar," "Teaching Grammar," or "Grammar Skills" were included. Lastly, the paper was compiled and generated to be analyzed. The flowchart is depicted in Figure 1.

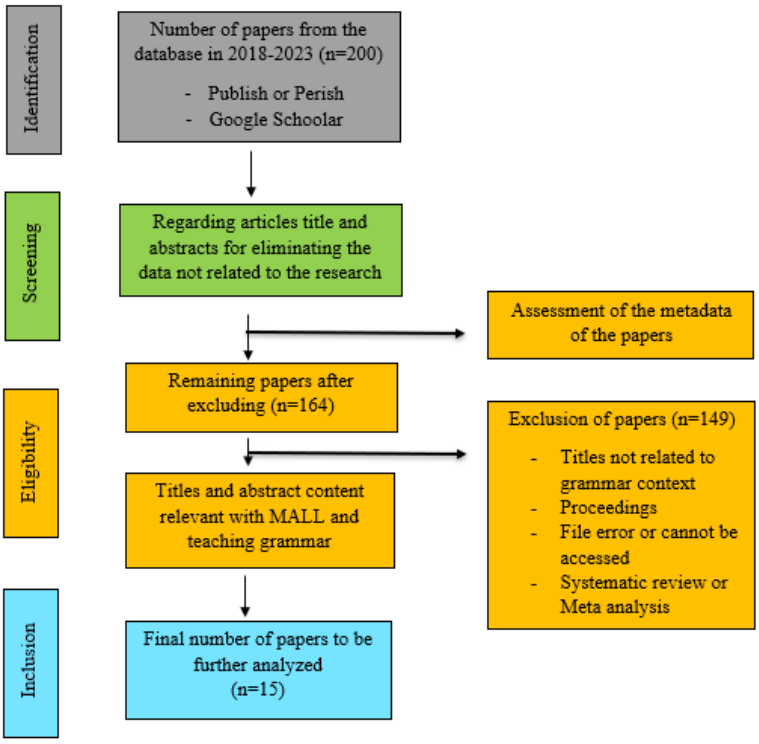

Figure 2. PRISMA data selection process

2.2 Harvesting and Screening Data

The main database used to gain the papers is Google Scholar. The researcher determined the search yielded 200 papers from 2018 to 2023 using Publish or Perish. Next, all papers were recorded in the analysis file of the bibliometric report after they were read. All entries having been cross-checked were analyzed further to figure out whether the titles matched to inclusion criteria or not. The criteria of inclusion are that the article has a title and abstract content relevant to MALL and teaching grammar, not proceedings, the file cannot be accessed, and not a systematic review or meta-analysis. Moreover, as the final stage in harvesting and screening data, the researcher assigned a color to each data point according to the included criteria for analysis.

2.3 Data Analysis Procedure

The final phase in identifying the principal themes and applying the inclusion criteria involved a systematic analysis of the selected publications. Initially, the researcher examined the abstracts to extract and synthesize essential information, including authorship, research objectives, methodological tools, data collection techniques, and key findings. Subsequently, each paper was coded—using a category-based system—to indicate its relevance to the core research topic. In the concluding step, the researcher compiled a comprehensive dataset comprising studies aligned with the main topic and organized them following the predefined inclusion criteria.

3. RESULT AND DISCUSSION

3.1 The Visualization of Data

The analysis of the studies between 2018 and 2018 reveals an increasing interest in MALL as a tool for grammar instruction. The following key trends were identified, particularly in the use of mobile applications for grammar practice, such as Telegram, Duolingo, Anki, Gengobot, The Snakes and Ladders games, etc. To see this trend, VOSviewer is designed to assist researchers in

analyzing the trend and collaboration in the research field. Some types of visualization modes are network visualization, overlay visualization, and destiny visualization. The visualization of data on publications regarding learning and teaching grammar using Mobile Assisted Language learning is shown in the network visualization. This shows the correlation or network among elected elements, such as keywords, authors, institutions, or journals, and helps to understand the association structure between the authors and institutions.

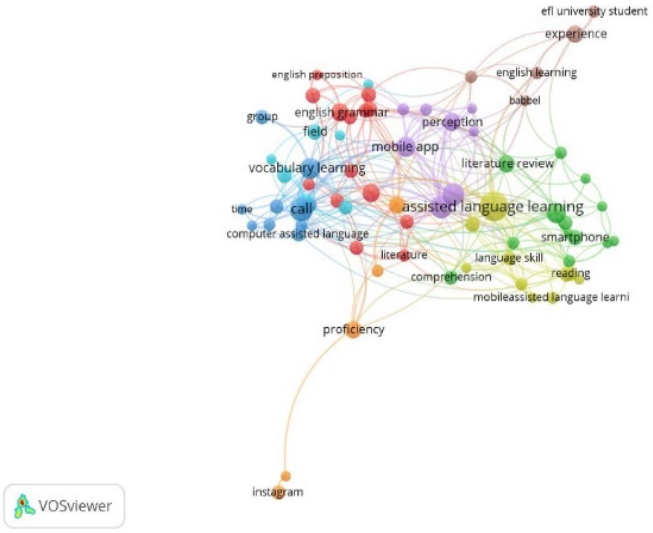

Figure 2. Network Visualization from VOSviewer about MALL in grammar mastery

If viewed in time information, overlay visualization shows that the research field evolves from time to time, and identifies developed research. This research study indicated that the use of MALL has attracted much attention in the last five years (Figure 2). Moreover, identification of the most used scope or topic is yielded in destiny visualization, depicted in Figure 3 and Figure 4.

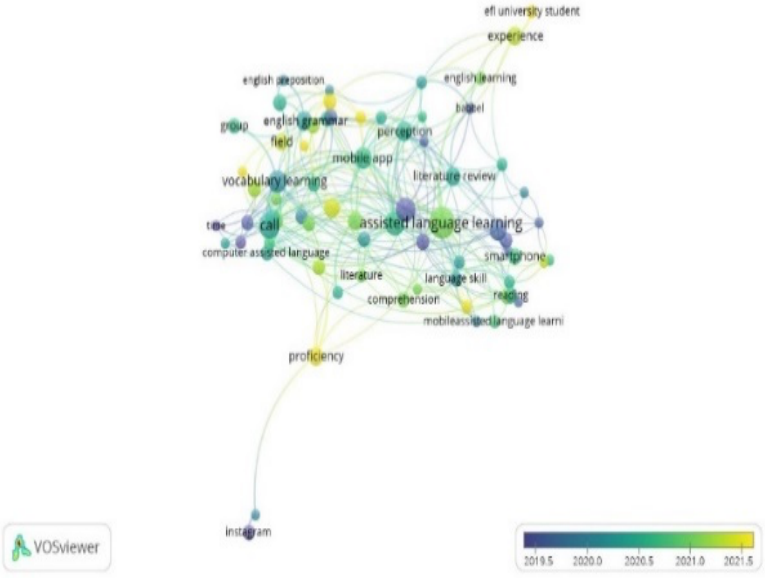

Figure 3. Overlay Visualization from VOSviewer about MALL in grammar mastery

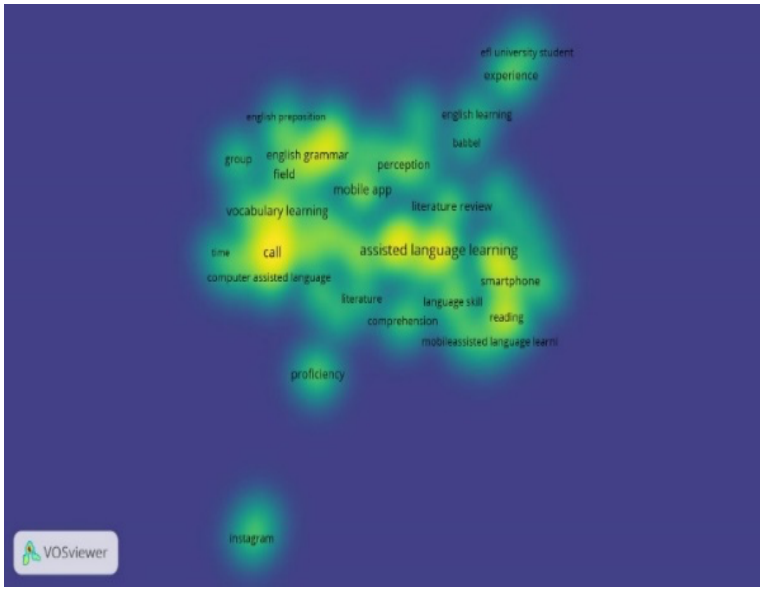

Figure 4. Destiny Visualization from VOSviewer about MALL in grammar mastery

3.2 Data Findings from Selected Studies

The empirical studies reviewed for the synthesis ranged from 2018 to 2023. 15 studies were matched with the criteria of this study that dealt with teaching-learning grammar using Mobile Assisted Language Learning. Of these 15 articles, 3 studies were conducted employing a method, 10 studies reported the data collection used quantitative methods, 1 study was qualitative, and 1 was the research and development method. Most studies focused on investigating the effectiveness and effect of Mobile Assisted Language Learning (MALL) in teaching grammar. However, more results and findings revealed that the students were motivated to learn grammar, and the applications they used could positively impact the learning process. A summary of reviewed studies is presented in Table 1.

Table 1. A summary of the findings from selected studies

Author (s)	Objective and Result	Specific Apps/Tools Used
(Ghorbani & Ebadi, 2020)	Investigated the impact of MALL on grammatical development. Found Telegram can engage and develop learners' grammatical structure	Telegram
(Parsa & Fatehi Rad, 2021)	Determined the impact of a mobile learning program on grammar proficiency. Found that a mobile application (Sky Room and Telegram) significantly affects the grammar proficiency of EFL learners.	Sky room and Telegram
(Refat et al., 2020)	Investigated mobile-assisted tools for learning tenses and enhancing learners' motivation through the ARCS model. This study found that the ARCS model's IMMS motivates grammar learning and positively influences attitudes toward learning, implying improved engagement, which can lead to better grammar acquisition.	ARCS model IMMS (applied to mobile)

Author (s)	Objective and Result	Specific Apps/Tools Used
(Pal Thamburaj et al., 2021)	Determined whether using the Tamil Grammar App to teach the language is effective. Findings indicate the app has a positive impact.	TAMIL Grammar App
(Dewi et al., 2020)	Investigated how Quizizz affects students' grammar mastery. Grammar instruction can be facilitated with the Quizizz app.	Quizizz
(Purgina et al., 2020)	Discussed mobile apps' increasing gamification and presented their system using Duolingo and Anki. Found Duolingo positively improves learning. (Note: Anki's specific grammar impact isn't explicitly stated here.)	Duolingo, Anki
(Tengku Paris et al., 2021)	Aimed to attract students' interest in learning grammar and deal with fear using the Throw Back Time (TBT) application. Found that TBT can improve students' grammar knowledge.	Throw Back Time (TBT)
(Haristiani et al., 2019)	Developed Gengobot integrated with the MIM service LINE for teaching-learning grammar. Test results showed Gengobot successfully functioned as a medium for teaching grammar.	Gengobot (LINE)
(Aghajani & Zoghipour, 2018)	Compared learners' progress in using Telegram for teaching-learning grammar. Found a significant level of progress with Telegram use.	Telegram
(Hashim et al., 2019)	Aimed to improve ESL learners' grammar using online language games. Found that gamified learning can be an effective tool for teaching grammar.	Online Language Games
(Chu et al., 2019)	Focused on internalizing grammar knowledge using English mobile gaming and collaborative learning. Found that grammar idea mapping with mobile gaming helps low-achieving students have better learning outcomes.	English Mobile Gaming
(Mahmoudi, 2020)	Investigated the effectiveness of grammar accuracy gains for Iranian EFL students utilizing smartphone-based online learning. The experimental group using online learning performed better in grammar accuracy.	Online Classroom
(Maliqul et al., 2020)	Focused on facilitating teaching aids with game-based activities. Found that game-based activities (specifically Snakes and Ladders) successfully improved students' grammar skills.	Snakes and Ladders game
(Haristiani & Rifai, 2021)	Investigated the use of the Gengobot application as an autonomous Japanese learning medium. Found that Gengobot can engage students' interest and improve Japanese students' grammar skills.	Gengobot

3.3 The Outcomes of Mobile Assisted Language Learning (MAL) to Students' Grammar Skills

The objective of this review article was to identify and examine the trend, effectiveness, and outcomes of MALL in teaching grammar in studies performed between 2018 and 2023. Even though these tools and mobile applications offer plenty to facilitate and enhance the students' grammar skills. When it comes to practicing teaching grammar using MALL, some findings revealed that Telegram, Duolingo, Anki, Gengobot, and Throw Back Time (TBT) applications could be employed in teaching-learning grammar to develop the students' grammar skills. Undoubtedly, modern technology like applications provides interactive and attractive tools as media to support the teaching-learning process in enhancing the students' grammar skills.

3.4 The Challenge of Teaching Learning Grammar Using Mobile Assisted Language Learning (MALL)

On the contrary, the findings of this review show that there are challenges for students to learn grammar using MALL. In response to the research, the findings reported that there was no significant distinction between the experimental and control classes while they learned grammar using Telegram(Aghajani & Zoghipour, 2018) . The scores detected no significant difference between the grammar achievement scores of the students in both groups. Furthermore, the result of the findings has no discernible impact on the student using MALL at Haftvad Institute, Bam-Kerman. Sky room and Telegram as learning media do not have a significant impact on students' grammar skills(Parsa & Fatehi Rad, 2021)

4. CONCLUSION

This review study has outlined the mapping visualization of publication data, followed by the trend on the use of MALL in teaching grammar in the range 2018 to 2023. The findings illustrate the use of MALL, such as Telegram, Duolingo, Anki, Gengobot, The Snakes and Ladders games, to enhance students' grammar skills and might be a continuous way, considering the students' attractiveness in the teaching-learning process. In addition, the challenge of using Sky room and Telegram while the students learn must be given further attention since there is still a lack of the effect of MALL on developing students' grammar skills. Hence, the result of the bibliometric analysis might be applicable in the context of providing current studies, as well as triggering further extension and development of new potential ideas of technology-enhanced learning processes.

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