



Mobile Games-Based Learning for Gamer Generations: A Systematic Review

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Abstract. This study reviews previous research articles on Mobile Game-based Learning (MGBL), particularly in the English language learning context. This study is a systematic review in nature. A total of 26 empirical articles published from 2007 to 2022 were reviewed. The articles were downloaded from Springer, Sage, Elsevier, Google Scholar, Taylor and Francis, Science Direct, and ERIC. The data were analyzed by applying the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol consisting of four steps: identification, screening, eligibility, and inclusion. This systematic review identified 15 types of mobile games. The engagement of MGBL helps improve students' reading, writing, grammar, and vocabulary. The role of some students' differences has been investigated. Some factors might challenge the integration of MGBL. Further studies are required to provide more insightful results, which can be used to understand better the promising benefits of mobile games for Gamer Generations.

Keywords: Digital game-based learning · Mobile game-based learning · English language learning

1 Introduction

Digital games have been played massively by students all over the world. Currently, digital games have been brought into educational settings and have become part of learning ecologies (Persico et al., 2019). The wide acceptance of digital games in the learning context by both teachers (Chik, 2011; Koh et al., 2012) and students (Ab. Rahman et al., 2018; Licorish et al., 2018; Taskiran, 2019), which leads to the so-called digital game-based learning (DGBL), a form of advancement in learning technology (Wang & Tahir, 2020). A large body of study has been conducted in various learning contexts across different majors, such as science, mathematics, and language learning (Jabbar & Felicia, 2015). DGBL, in general, is reported to positively affect students' motivation (Alomari et al., 2019; Bawa, 2019; Bovermann et al., 2018; Chapman & Rich, 2018; Licorish et al., 2018; Lin et al., 2018; Taskiran, 2019), engagement (Alomari et al., 2019; Chen et al., 2019a; b), learning outcomes (Chen et al., 2019a; b; Licorish et al., 2018), and knowledge reinforcement and retention (Coleman & Money, 2019; Purgina et al., 2019). These findings implied the promising role of DGBL in improving students' affective, cognitive, and social aspects.

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The platforms of digital games can be categorized into three: video consoles, personal computers (PC), and mobile devices (Vlachopoulos & Makri, 2017; Xu et al., 2019). Among the three platforms, PC was reported to be used mainly by students (Hailey et al., 2016; Xu et al., 2019). However, along with the proliferation of mobile or smartphones and the fact that students, especially university students, were reported to be highly addicted to smartphones (Ariel & Elishar-Malka, 2019; Soomro et al., 2019), the platform for playing digital games has also shifted to mobile games (Giannakas et al., 2017). This drastic change is mainly due to the issue of easy access offered by mobile games (Xu et al., 2019). In response to this phenomenon, the term digital game-based learning (DGBL) has also transformed into so-called mobile game-based learning (MGBL) (Giannakas et al., 2018). Some studies were also carried out in this new platform (Chen et al., 2019a; b; Cózar-Gutiérrez & Sáez-López, 2016; Huizenga et al., 2019; Schwabe & Göth, 2005; Touati & Baek, 2018) and prove the promising roles of MGBL.

Studies on MGBL have not been conducted as extensively as those on DGBL. Some studies applied a descriptive study on students' or teachers' perceptions of game-based learning, some applied an experimental study, and others employed either ex-post facto or a correlational study research design. Only a few dealt with a systematic review, whereas this type of study provides information on what has been investigated and what issues should be concerned in future studies. Based on the abovementioned review, this study is conducted to review the previous research articles by investigating MGBL.

This paper intends to give fruitful knowledge of integrating mobile game-based learning in the English learning context for English teachers. Therefore, they can implement MGBL in their teaching to provide exciting and fun learning while leading to improved English learning. For the studies, this paper offers some recommendations to conduct further studies on MGBL. This is intended to identify the types of mobile games used in language learning. Additionally, it is to review the role of MGBL in English proficiency, the role of individual differences in mobile game usage, and the factors which might challenge the implementation of MGBL.

2 Literature Review

Digital game-based learning (DGBL), according to Xu et al. (2019), was defined as an activity done digitally and playfully to attain learning objectives and assess students' learning. Along with the rapid change in the world of technology, digital game platforms have been replaced by mobile platforms. Therefore, the term digital game-based learning (DGBL) has also transformed into mobile game-based learning (MGBL) (Giannakas et al., 2017). This shift is in response to the fact that most students are highly addicted to smartphones (Ariel & Elishar-Malka, 2019; Soomro et al., 2019). Furthermore, in higher education, students can bring their digital devices to class (Anshari et al., 2017). Therefore, it enables complete digital access to digital learning in the classroom despite the limited technological infrastructure (Sykes, 2018). Moreover, according to a survey made by Anshari et al. (2017), students brought their smartphones to class mainly to support their learning process. Therefore, this finding can be applied as a consideration to integrate mobile game-based learning (MGBL) to provide easier access (Xu et al., 2019) and a more personalized learning experience (Pechenkina et al., 2017).

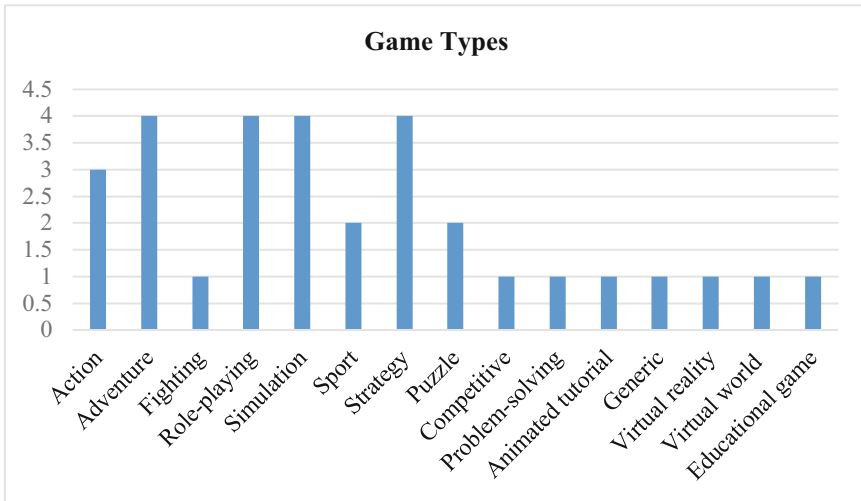
Like DGBL, mobile game-based learning (MGBL) was adopted in various learning domains such as environmental learning, tourism and place exploration, biology/chemistry and mathematics, engineering, information security, sociology/music, social behavior, and foreign language (Giannakas et al., 2017). Some studies (Chen et al., 2019; Huizenga et al., 2019; Schwabe & Göth, 2005; Touati & Baek, 2018) proved the promising roles of MGBL. Schwabe and Göth (2005) reported that university students find excitement and fun when learning in MGBL situations. Meanwhile, secondary students are more interested in the game topic after being engaged in MGBL activities (Huizenga et al., 2019). However, further finding shows a negative correlation between MGBL and students' interest in the subject and subject knowledge. In contrast, Cózar-Gutiérrez and Sáez-López (2016) found that students' interest, engagement, and motivation are significantly improved after an experiment with *MinecraftEdu*. Touati and Baek (2018) investigated the students' perceptions of implementing MGBL and reported that MGBL could promote students' interest and help students learn more enjoyably. In the English learning context, Chen et al. (2019a; b) unveiled that the integration of MGBL promotes EFL students' English vocabulary. The students also perceived the application of MGBL as more effective and satisfying for vocabulary learning.

3 Methodology

This study aims at reviewing previous research articles on mobile game-based learning (MGBL) in the English language learning context. Therefore, this study is a systematic review in nature. The articles were obtained from Springer, Sage, Elsevier, Google Scholar, Taylor and Francis, Science Direct, and ERIC databases. They were published in the last fifteen years, from 2007 to 2022. The keywords to get the intended articles were “digital games, digital game-based learning, DGBL, digital games and English learning, mobile games, mobile game-based learning, mobile games in English classrooms, mobile game-based learning in English context, MGBL”. The data were analyzed by applying the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol consisting of four steps: identification, screening, eligibility, and inclusion. A total of 196 articles were identified based on the keywords. After the screening process, 136 articles were excluded since they focused on digital game-based learning, representing 60 eligible articles on MGBL. Based on the screening process, 34 articles were excluded since they were conducted in non-English contexts. Finally, a total of 26 articles were included to be reviewed.

4 Results

After reviewing and analyzing the selected articles, the data regarding mobile game-based learning research from the articles were categorized based on the types of mobile games, the role of mobile games in English proficiency, the role of students' differences in the use of mobile games, and some considerations of using mobile games.

Table 1. Types of Mobile Games

4.1 Types of Mobile Games

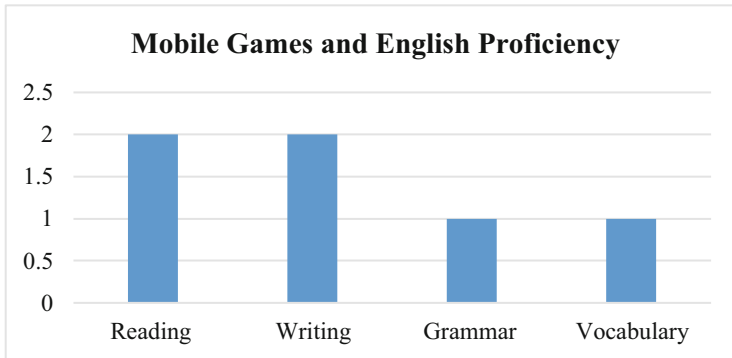
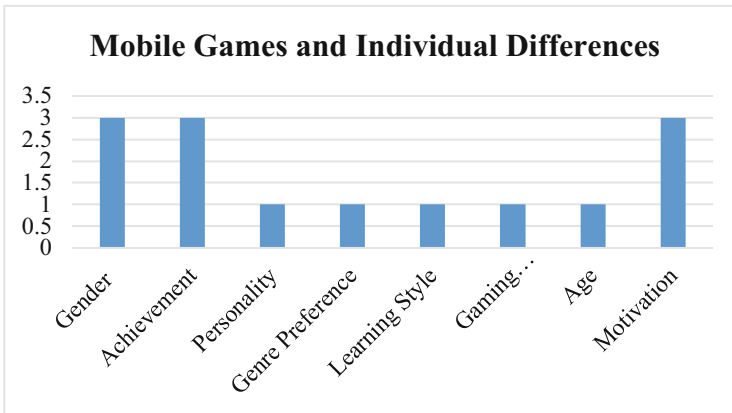
Based on the analysis, four articles identified the types of mobile games (Connolly et al., 2012; Gros, 2007; Hainey et al., 2016; Jabbar & Felicia, 2015). The classification is described in Table 1.

Table 1 describes that there are 15 types of mobile games. Among those types, adventure, role-playing, simulation, and strategy were found in four studies (Connolly et al., 2012; Gros, 2007; Hainey et al., 2016; Jabbar & Felicia, 2015). The action was found in three studies (Connolly et al., 2012; Gros, 2007; Jabbar & Felicia, 2015), while sport (Gros, 2007; Jabbar & Felicia, 2015) and puzzle (Connolly et al., 2012; Gros, 2007; Jabbar & Felicia, 2015) were identified by two studies. Meanwhile, fighting, competition, problem-solving, animated tutorial, generic, virtual reality, virtual world, and educational games were found in one study (Gros, 2007; Hainey et al., 2016; Jabbar & Felicia, 2015).

4.2 Mobile Games and English Proficiency

Based on the previous studies, six studies investigated the role of Mobile Game-based Learning in English proficiency (Chen et al., 2019a; b; Chiang, 2020; Hou, 2018; Lam et al., 2017; Purgina et al., 2019; Lam et al., 2017) as described in Table 2.

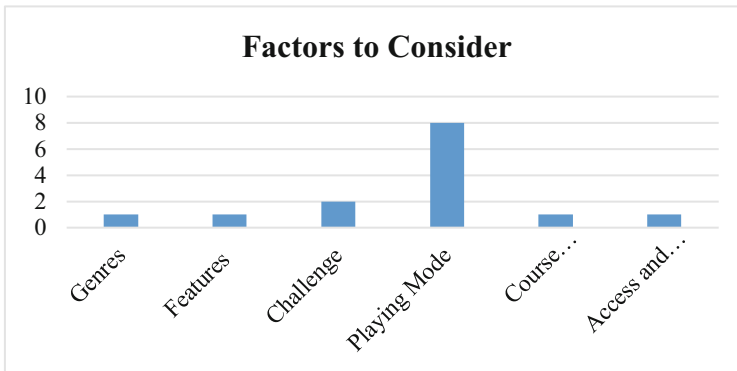
Table 2 describes Mobile Game-based Learning (MGbL)'s a promising role in English proficiency, such as reading, writing, grammar, and vocabulary. Two studies conducted by Lam et al. (2017) and Zhang et al. (2019) investigated the role of MGbL in writing skills, while the studies of Hou (2018) and Chiang (2020) focused on reading skills. Two other studies (Purgina et al., 2019; Chen et al., 2019a; b) were conducted on grammar and vocabulary.

Table 2. Mobile Games and English Proficiency**Table 3.** Mobile Games and Students' Differences

4.3 Mobile Games and Students' Differences

The analysis finds six studies concerned with the role of students' differences in integrating mobile games in the English learning context, as described in Table 3.

Table 3 describes that the previous studies involved eight individual differences. Three studies reported the role of gender (Ventura et al., 2012; Vlachopoulos & Makri, 2017; Turner et al., 2018), achievement (Ventura et al., 2012; Vlachopoulos & Makri, 2017; Turner et al., 2018), and motivation (Connolly et al., 2012; Dankbaar et al., 2015; Persico et al., 2019). Meanwhile, personality and genre preference were reported by Ventura et al. (2012), learning style and gaming experience were investigated by Turner et al. (2018), and age was found in one study (Persico et al., 2019).

Table 4. Factors to Consider in Selecting Mobile Games

4.4 Factors to Consider in Selecting Mobile Games

A total of 11 studies (Chen et al., 2015; Chen et al., 2015; Chen, 2019a; b; Elverdam & Aarseth, 2007; Hailey et al., 2011; Hailey et al., 2016; Hamari et al., 2016; Jabbar & Felicia, 2015; Meluso et al., 2012; Shadiev et al., 2018; Vlachopoulos & Makri, 2017) investigated the factors to consider when integrating MGBL in English language learning context. The analysis is presented in Table 4.

Table 4 describes the previous studies that analyzed six factors to be considered when integrating MGBL in an English learning context. Eight studies (Chen et al., 2015; Chen, 2019a; b; Elverdam & Aarseth, 2007; Hailey et al., 2011; Meluso et al., 2012; Shadiev et al., 2018; van der Meij et al., 2007; Vlachopoulos & Makri, 2017) reported that playing mode is the primary consideration. Another factor is the game challenge, as reported by (Hamari et al., 2016). Other factors, such as game genres, features, course appropriateness, and ease of access and use, were studied by different researchers (Hailey et al., 2016; Hamari et al., 2016).

5 Discussions

5.1 Types of Mobile Games

Four studies identified the types of mobile games. The initial classification of game types was proposed by Gros (2007). He categorized games into seven types: action games (players play reaction-based games), adventure games (players solve several tests to make level progress through a virtual world), fighting games (players fight against computer-controlled characters or those controlled by other players), role-playing games (players play roles of fictional characteristics), simulation games (players make a trip to recreational place or situation to achieve a particular goal), sports games (plays do different kinds of sports), and strategy games (players set specific strategies to attain a goal to recreate a historical or fictional situation).

Besides, the categorization of games was made based on some systematic reviews. Connolly et al. (2012) reported strategy, puzzle, simulation, role-playing, adventure,

and action games as the most popular games. A similar review conducted by Jabbar and Felicia (2015) reported that role-playing games (RPGs) are the most popular, followed by puzzle, action-adventure, competition, simulation, problem-solving, and strategy games. RPGs are the most frequently employed for skill acquisition and knowledge acquisition, followed by puzzle-based games. According to Hainey et al. (2016), mobile games are categorized into adventure, animated tutorial, generic, puzzle, role-playing, simulation, sports, strategy, virtual reality, virtual world, and games-based construction learning (GBCL). Strategy games are reported to be the most played type, followed by puzzle, simulation, role-playing, adventure, and generic games. Based on the existing studies, the most played game types are strategy, puzzle, role-playing, action-adventure, and simulation.

This current review shows that research investigating the types of mobile games used in the English learning context has not been widely conducted. Moreover, the previous studies mainly involved non-educational mobile games. Thus, future studies need to precisely identify the types of educational games to provide English teachers with alternatives in selecting mobile games that fit the course and student needs.

5.2 Mobile Games and English Proficiency

In line with Digital Game-based Learning (DGbL), some research findings confirmed the promising benefits of mobile games on student's English proficiency, such as in learning writing (Lam et al., 2017; Zhang et al., 2019), reading (Chiang 2020; Hou, 2018), grammar (Purgina et al., 2019), and vocabulary (Chen et al., 2019). In writing skills, Lam et al. (2017) combined blended learning and gamification approaches to teaching a writing course in a Hong Kong secondary school. The online platform used was Edmodo, while the gamification was the adoption of game elements such as a point-based system and leaderboards. The finding demonstrated that only the blended learning system improves students' argumentative writing quality. Meanwhile, the gamification element is insignificant, suggesting that gamification does not directly improve the student's writing performance. However, the use of gamification is proven to promote students' motivation. A similar study was carried out by Zhang et al. (2019). They introduced Gwrit (Game of Writing), a digital game purposefully developed to ease students in doing peer reviews. Features tied to grades are likely more interesting as it is used more frequently than that not tied to grades. The feature of assignment deadlines is also valuable for promoting learning motivation.

Moreover, using Gwrit can improve the students' quality of ideas and expression, which leads to positive learning outcomes. For example, in reading skills, students perceived the integration of Kahoot! Positively for learning boosters and evaluation tools (Chiang, 2020). This game application also promotes students' motivation (Hou, 2018). In the grammar aspect, Purgina et al. (2019) reported that the integration of Word Bricks, a redesigned game for grammar learning by using a mobile app, leads to an increase in Japanese university students' grammar test scores. In addition, its handy visualization encourages the students to produce more accurate sentences syntactically through experimentation and immediate feedback. Finally, the game-like elements in this app also offer learning enjoyment, especially for young learners with low motivation. In vocabulary learning, Chen et al. (2019a; b) conducted an experimental study and

found that Taiwanese EFL students' English vocabulary is improved after implementing Kahoot! Based on the survey, the students perceived that their vocabulary learning is more effective and satisfying when MGbL activities are delivered in their classroom.

The limited number of studies highlighting the potential role of MGbL in the English language learning context indicates the need to conduct future research on this issue, especially in different English skills (e.g., listening and speaking). In addition, most of the previous studies focused on educational games. Therefore, examining the role of non-educational games in English learning is recommended since most students play non-educational games.

5.3 Mobile Games and Student Individual Differences

The analysis finds six studies concerned the role of students' differences, such as gender, achievement, motivation, personality, genre preference, learning style, gaming experience, and age. The correlation between video game genre, preference, GPA, and personality is reported by Ventura et al. (2012). A positive relation was found between students' openness (a character to engage in intellectual experience) and game type preferences (i.e., role-playing, puzzle, strategy, platformer, action-adventure, and simulation games). Meanwhile, a negative relationship between violent games and GPA, game types, and outcomes is found. The positive and negative correlations indicate that certain game types might influence valued outcomes differently. Turner et al. (2018) revealed no significant difference between the final grade, age, gender, gaming experience, and learning style. Umamah and Saukah (2022) also reported no significant difference in the students' perceptions of using digital games in English learning. A meta-analysis by Vlachopoulos and Makri (2017) confirmed that there are still controversial findings among previous studies regarding gender differences in perceiving game-based learning.

Motivation is another variable that grabs wide attention from game-based learning studies. Game-based learning can inspire students' motivation to learn (Connolly et al., 2012; Dankbaar et al., 2015). Motivation for playing games in this context is related to playing mobile games consciously for learning or entertainment. Some students tend to play games merely to get entertainment and ignore the potential role of the games in promoting their personal and educational development (Persico et al., 2019). Thus, students are willing to play based on expected learning gains, which may achieve learning objectives more quickly than those more reluctant to play educational games (Calvo-Ferrer, 2015). Therefore, further studies on the interplay between motivation and performance are required (Dankbaar et al., 2015) since motivational factors such as satisfaction with games and willingness to learn with games are influential factors that can lead to positive learning outcomes (Müller et al., 2018).

The previous studies have investigated eight individual differences. However, other individual differences might be essential in mobile game use. For example, achievement in specific English skills and components is essential to investigate since some existing studies reported the benefits of MGbL in English learning. Other aspects, such as Internet addiction, socioeconomic status, and boredom, also need further investigation since they are closely linked to mobile games.

5.4 Factors to Consider in Selecting Mobile Games for Learning

Based on 13 previous studies, six factors must be considered when integrating MGBL in an English learning context. Most studies reported playing mode as the paramount consideration, followed by game challenges, genres, features, course appropriateness, and ease of access and use. Despite their promising benefits, not all games are appropriate for learning. For example, in primary education (PE), specific genres such as fighting, platform, and racing games are not found in many studies involving primary students (Hainey et al., 2016). In addition, game features such as enjoyment and challenge might also affect learning effectiveness (e.g., vocabulary) (Chen et al., 2015). Enjoyment can be a determining factor in game-based learning (Calvo-Ferrer, 2015) regarding achievement (Touati & Baek, 2018). Some game elements, such as learning resources, chat forums, and built-in learning tools for knowledge sharing and collaboration, can support and enhance learning (Jabbar & Felicia, 2015). Meanwhile, the challenge can strongly predict the students' learning outcomes (Hamari et al., 2016). These findings indicated that certain game types with specific features might contribute differently depending on the student's proficiency levels and aspects of English.

Selecting the most appropriate and beneficial types of games is essential, but how the games are played will also influence the benefits the students can get. Based on the playing mode, games can be categorized into single-player, single-team, two-player, two-teams, multiplayer, and multiteam (Elverdam & Aarseth, 2007; Vlachopoulos & Makri, 2017). Playing games individually is considered to better enhance students' performance than playing collaboratively (Merchant et al., 2014) since playing a game collaboratively does not guarantee that the players will discuss issues related to the learning task (Wouters & van Oostendorp, 2013). In contrast, Shadiev et al. (2018) reported that students performed best when they collaborated in learning using mobile technology. Furthermore, in a multiplayer environment, students tend to have a sense of competition, cooperation, recognition, fantasy, and curiosity (Chen, 2018; Hainey et al., 2011).

Meanwhile, Chen et al. (2015) presented a neutral finding that individual and collaborative play modes can lead to positive learning outcomes because there is no significant difference between the two-game modes (Meluso et al., 2012). A different finding that collaborative games do not affect game engagement or individual test scores is reported by van der Meij et al. (2011). These inconsistent findings raise a recommendation to compare the individual and collaborative play to identify further pedagogical benefits (Hainey et al., 2016). Moreover, games can provide students with a wide chance for collaborative learning, improvement of interactivity and feedback among players, and social and soft skill development (Vlachopoulos & Makri (2017). A current study proposed some considerations for integrating mobile games into English learning to obtain the maximum benefits. First, the games must match the learning objectives and materials. Second, the games offer a variety (e.g. types of questions) as well as provide interesting features (e.g., time limit and game levels) to avoid boredom and give challenges. Finally, the games should be user-friendly to users regarding access and use (Umamah & Saukah, 2022). Studies highlighting the challenges which might hamper the success of implementing MGBL seem to be comprehensive enough. However, more experimental studies are still required to find ways to deal with the challenges of integrating MGBL.

6 Conclusions

Compared to Digital Game-based Learning (DGbL), investigation on Mobile Game-based Learning (MGbL), particularly in the English learning context, has not been extensively and comprehensively done. The existing studies have provided information about the types of mobile games, the promising benefits of mobile games for English proficiency, the role of some students' differences, and several considerations for implementing MGbL successfully. However, further studies are required to explore better the potential benefits that today's English students, as Gamer Generations, can take from playing mobile games. Based on this current review, future studies are suggested to precisely identify the types of educational games. Additionally, it is crucial to examine the potential role of MGbL in other English skills, such as listening and speaking. Also, examining the role of non-educational games in the English learning context will provide fruitful results. Furthermore, individual differences, specific English achievement, Internet addiction, socioeconomic status, and boredom also need further investigation. Finally, experimental studies are demanded to cope with the challenges of integrating MGbL.

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