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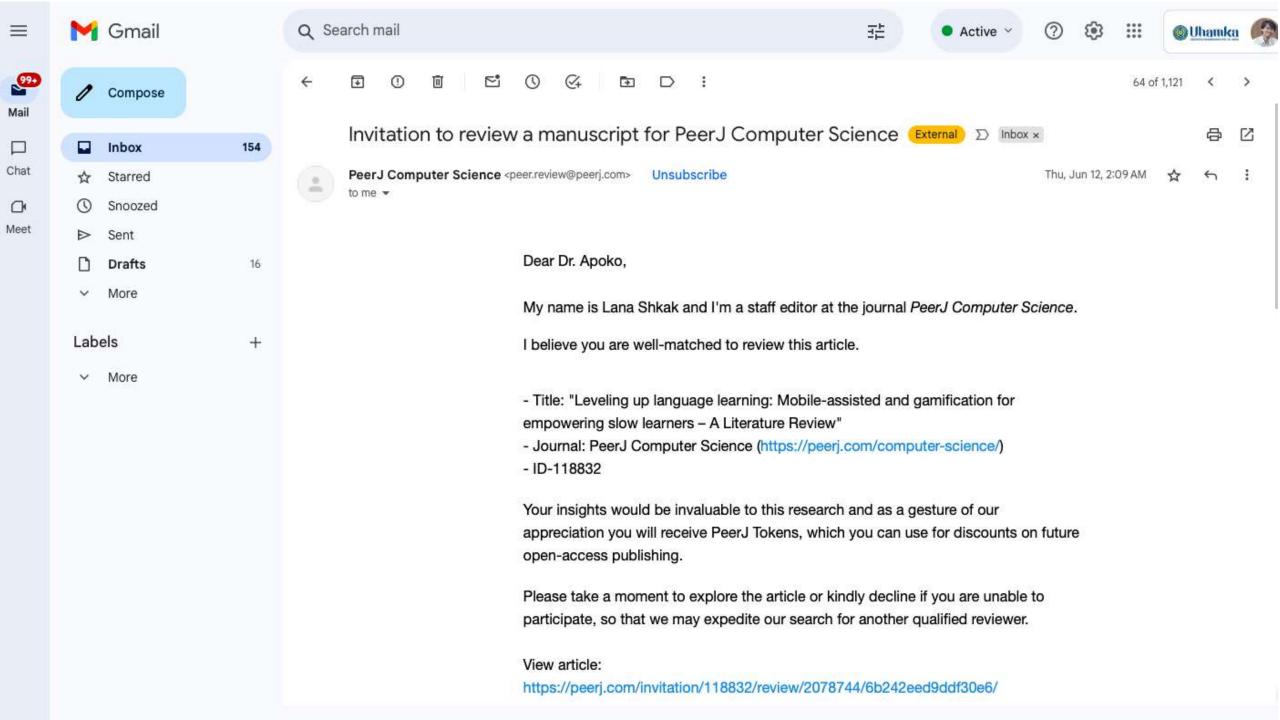
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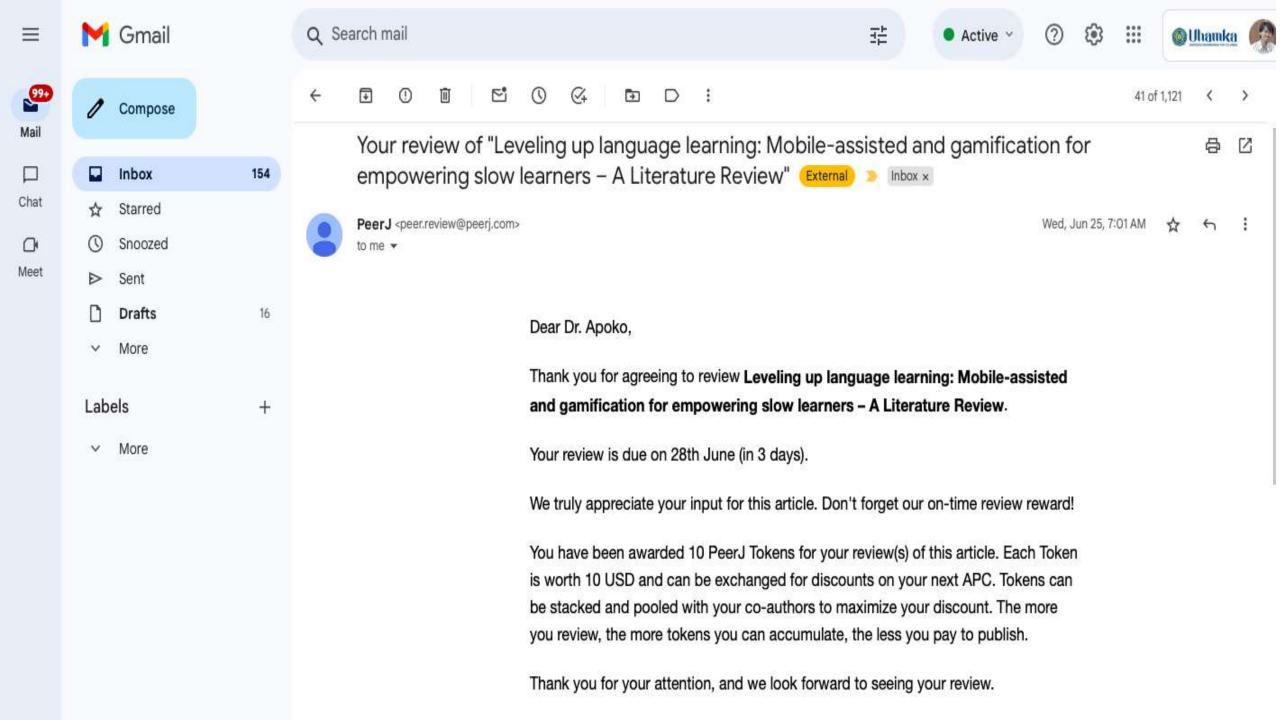
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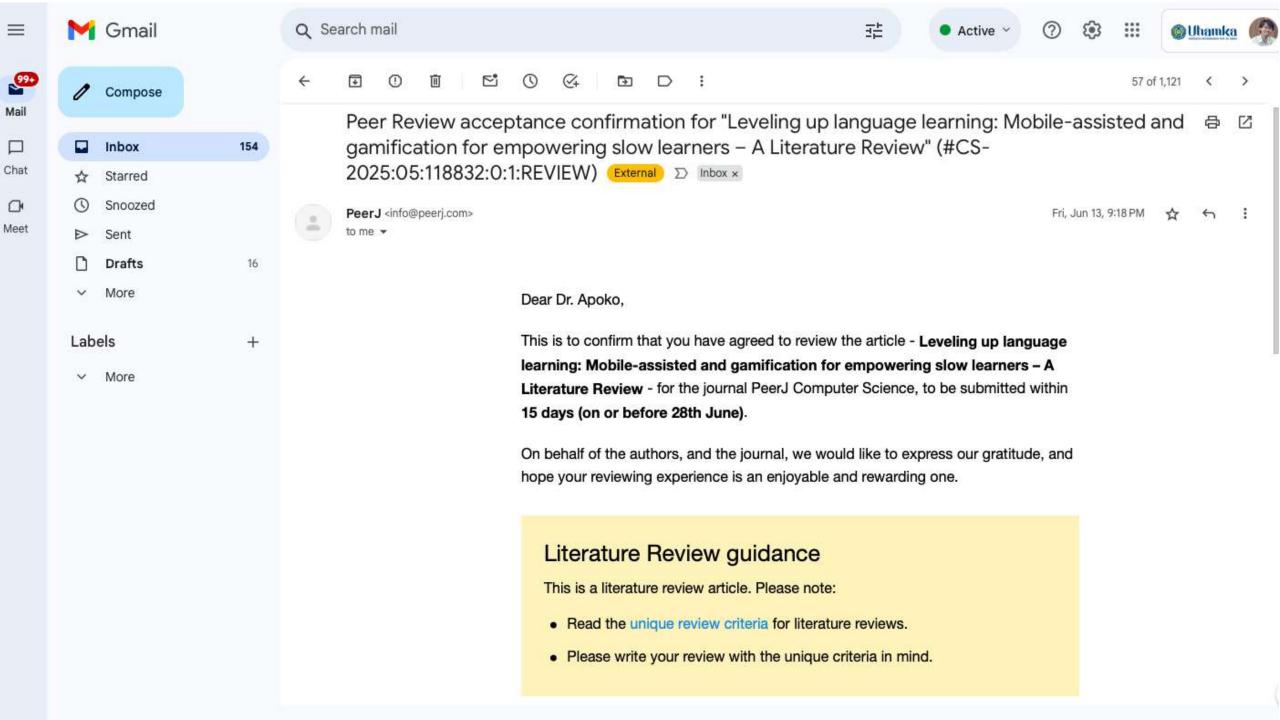
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New submission

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Reviewing

PeerJ Computer Science Reviewing Manuscript 118832v1

Leveling up language learning: Mobile-assisted and gamification for empowering slow learners - A Literature Review

This review has been submitted to the editor.

Review

Reviewer 2

Tri Wintolo Apoko MINOR REVISIONS

triwin_apoko@uhamka.ac.id

This review will be anonymous.

Reviewed 18 minutes ago

Basic reporting

Overall, this manuscript has been good. However, there are few mistakes in spelling in some tables shared. In one or two cases, it is also found mistakes in grammar use. You need to be more careful.

Experimental design

The study design you proposed was appropiately conducted. Regarding the survey method, you already elaborated with details and cited some sources. However, it could be strengthened with how you analysed the collected data.

Validity of the findings

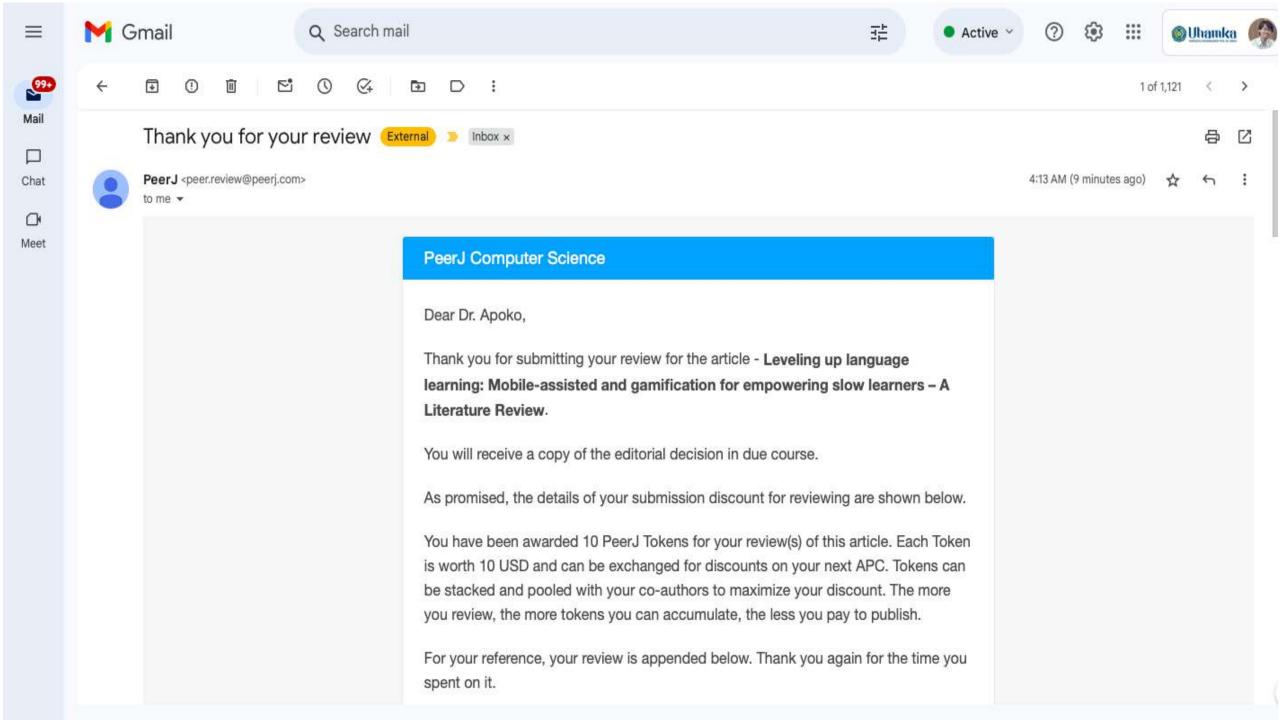
The results you assessed have been comprehensively presented with provided research questions. Hoever, the conclusions you stated should link to the five research questions.

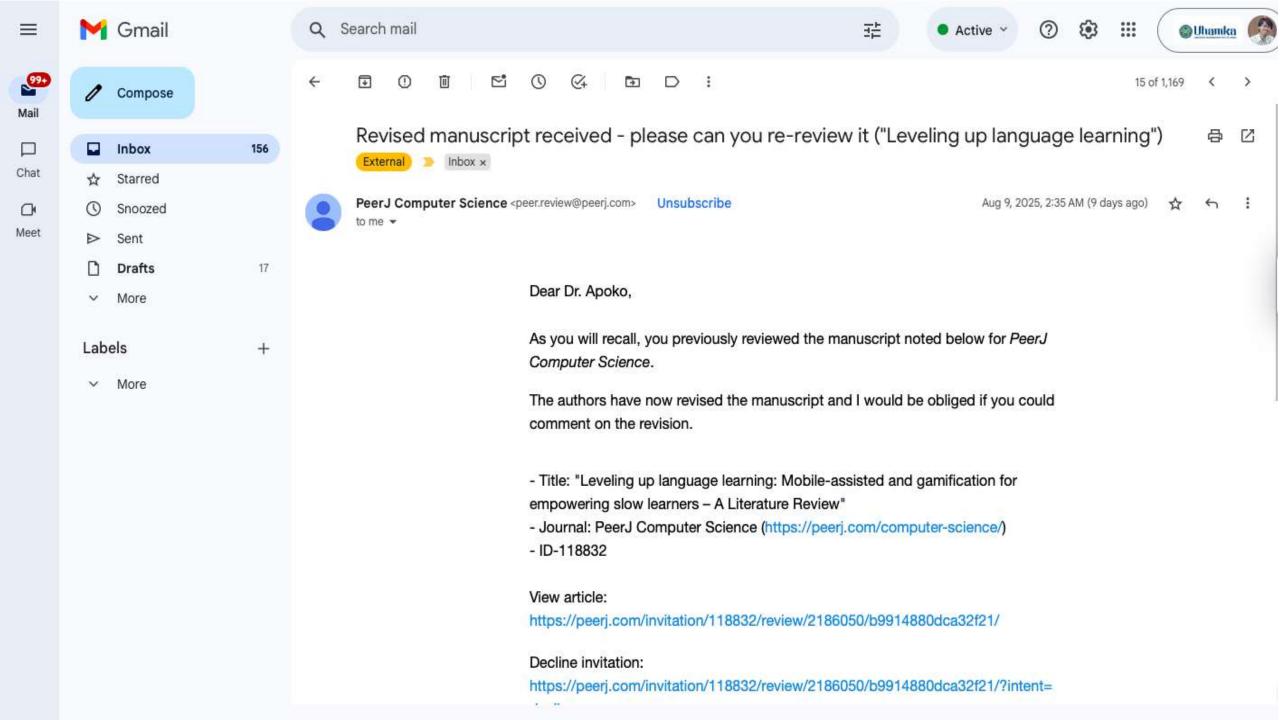
Additional comments

After I read the manuscript comprehensively, the topic is quite interesting and indicates a novelty in the type of learners in the use of mobile assisted learning and gamification in English language learning (slow learners). Moreover, this contibutes to some implications. However, you may need to improve this better technically.

- 1. You should include the research questions in the introduction sections, not in the methodology
- 2. You may need to elaborate the discussion section based on the results with some prior relevant studies.
- 3. Make sure that you consistent with the type of references used for APA 6 or 7. In addition, some titles are all capitalized. Overall, the references are already provided with DOIs and updated.







Leveling Up Language Learning: Mobile-Assisted and Gamification for Empowering Slow 2 Learners - A Literature Review Zeeshan Ahmad¹, Kashif Ishaq¹, Atif Alvi¹, Nurhizam Safie², Naeem A. Nawaz¹, Abdul Basit Dogar¹ School of System and Technology, University of Management and Technology, Lahore, Pakistan ²Faculty of Information Science and Technology, Universiti Kebangsaan Malaysia, Malaysia 0 **Corresponding Authors:** 10 Kashif Ishaq 11 School of System and Technology, University of Management and Technology, Lahore, Pakistan 12 kashif.ishaq@umt.edu.pk 14 Nurhizam Safie 15 Faculty of Information Science and Technology, Universiti Kebangsaan Malaysia, Malaysia 16 nurhizam@ukm.edu.my ABSTRACT: 17 The acquisition of a new language presents formidable challenges, particularly for slow learners grappling with 18 deficits in retention, comprehension, and motivation. The global prioritization of English as a lingua franca 19 20 underscores the urgency of innovative pedagogical approaches to facilitate linguistic proficiency. This systematic 21 review synthesizes findings from 69 studies on Mobile-Assisted Language Learning (MALL), focusing on the efficacy 22 of mobile and gamified applications in fostering English language acquisition among slow learners. Leveraging the 23 ubiquity of smartphones and advancements in gamification, these applications employ diverse theoretical frameworks, 24 adaptive content, and interactive tools to create tailored learning environments that address the cognitive and 25 motivational barriers faced by slow learners. This review delineated educational levels and contextual factors 26 influencing MALL implementation, highlighting the role of personalized pacing, iterative reinforcement, and real-27 time feedback in enhancing learner outcomes. A novel taxonomy is proposed to categorize MALL methodologies and technologies, offering a structured framework for future research. This analysis elucidates the transformative potential 28 29 of adaptive visuals and motivational gamification in promoting engagement and proficiency, while identifying persistent challenges, such as the need for inclusive design and robust evaluation metrics. By advocating for context-30 31 specific, technology-enhanced interventions, this study underscores MALL's capacity to redefine language education, 32 fostering equitable and efficacious learning pathways for slow learners in a globalized linguistic landscape. Keywords: Digital learning; Education Technology; Gamification; Language learning; M-learning; Mobile-based; 33 34 Slow learner. INTRODUCTION: 35 36 Mobile devices in education enhance the teaching and learning processes but require training, resource selection, and student profile considerations (Barbosa et al., 2016). Mobile learning is a valuable educational strategy for inclusive 37 38 education and sustainable development, promoting learning for students with diverse needs and enhancing teaching tasks (Palomino, 2022). M-learning positively impacts pre-service teachers' knowledge, skills, and attitudes, but 39

requires specific equipment and facilitates efficiency. Mobile learning (m-learning) has become an essential tool in

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August 05, 2025

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Deleted: Learning a new language can be inherently challenging, particularly for slow learners who struggle with retention, comprehension, and engagement. Many nations promote the acquisition of international languages, with English being the most widely taught because of its global significance. The widespread use of smartphones, along with advancements in mobile applications and gamification, has created new opportunities for language learning, providing accessible and engaging resources that meet various learners' needs. This study systematically reviews 58 related research works on mobile-assisted and gamification-based applications to empower slow learners for language learning. These applications use different theories, frameworks, and sophisticated tools to design interactive learning environments. Slow learners can benefit from these tools with tailored pace, repetition, and immediate feedback, which are difficult with conventional learning methods. This study also examines levels of education and language learning contexts for each mobile-assisted language learning (MALL) application and the different measurement tools used. This emphasizes how adaptive content, visual support, and motivational gamification can engage slow learners and achieve better results. This research also suggests a taxonomy for MALL studies, which provides categories of important approaches and technologies. This section discusses challenges, especially designing more inclusive and adaptive gamified applications for slow learners.

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methodical strategy guarantees a thorough, open, and independent research process. Zeeshan Formatted: Highlight 209 METHODOLOGY: Zeeshan 210 This survey implemented the guidelines for reviews as outlined in the field of engineering analysis by Wohlin et al. Formatted: Font color: Black, Highlight (2020). Following the finalization of research queries, a structured search methodology was developed to minimize 211 212 potential biases in the studies. This process involved three phases, illustrated in Figure 1 and elaborated on in the Zeeshan 213 subsequent sections. Formatted: Highlight 214 Review of the plan: 215 A well-defined search strategy was developed to identify all relevant strategies. Figures 1 and 2 illustrate the analysis 216 method and outline the search procedure for selecting articles, as well as the classification system and mapping. This research adopts a systematic and structured approach: 217 Zeeshan 218 Conduct Review: Deleted: 1 219 The review process consisted of four steps. In the first step, an examination was made from Google Scholar with The objective and motivation of this research are reshaped into research questions and defined in Table 2.5 220 aggregates publications, PubMed Central (PMC) with a focus on health, education, and psychological studies indices, DOAJ (Directory of Open Access Journals), ERIC (Education Resources Information Center), Web of Science (WoS), 221 222 Scopus, and Semantic Scholar with publication across relevant disciplines for relevant primary studies. The majority 223 of the examination was made from the Web of Science. In the second step, the collection of studies was filtered with 224 inclusion and exclusion criteria, and then in the third step, quality assessment standards were checked for consistency. The final step of backward snowballing was carried out to gather suitable and related articles. 225 226 Automated Research in Web of Science: Zeeshan 227 To find relevant information, we carried out a comprehensive investigation. The Web of Science core collection, a Formatted: Normal 228 meticulously arranged database of more than 21,120 peer-reviewed scholarly journals, served as our primary source 229 of information. These internationally renowned journals cover more than 300 academic fields and offer open-access 230 and traditional subscription-based options (Clarivate, 2024). WoS is a platform that enables users to rapidly collect, 231 comprehend, share, and filter data from multiple databases based on chosen keywords. WoS was the leading search 232 engine used by the researcher to conduct a literature review (LR) effectively. In addition, search resources include Scopus. They created targeted search queries by combining pertinent keywords with Boolean logic operators (AND, 233 Zeeshan 234 OR). In order to find relevant research papers, these operators supported crafting exact search strings. The results of Deleted: ¶ 235 this search strategy are shown in Figure 3, which presents an extensive overview of results retrieved from the Web of 236 Science databases. This also holds for other databases, such as Scopus. The final search string, which contained both Zeeshan 237 "AND" and "OR" Boolean operators along with particular keywords used to search the WoS core collection, is shown Formatted: Font: Times New Roman 238 in Table 3. Only article titles were considered in the search, and extra filters were applied for particular periods to 239 reduce the number of results relevant to the research. Zeeshan Formatted: Font: Bold, Ligatures: None Phase 1: Search for Relevant Research papers for the study 240 We conducted our analysis using a literature review in which research articles were taken from various sources, 241 242 including JSTOR, Scopus, Google Scholar, Springer Link, Web of Science, and ScienceDirect. Using pertinent 243 keywords, 54,400 journals were chosen. Table 3 summarizes the keywords used in the search process and provides a filter for the time period in various digital repositories. 244

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RQ 1: What are the prominent publication channels for research in MALL, particularly those focusing on integrating gamification and addressing the needs of slow learners? Additionally, which geographical regions have consistently contributed to MALL research over the years, along with quality assessments and publication sources?

Game-based learning increases learners' intrinsic and extrinsic motivation and fosters a sense of accomplishment by encouraging a desire for competition, achievement, and social interaction. Several scholars have examined how game design elements can be applied in **educational** content to increase learner satisfaction and participation; however, students' minds are not on the same level in the classroom. Some learn very quickly, while others take their time; these students are referred to as slow learners. This analysis focused on the instructional design and delivery of educational material made easy, especially for slow learners, highlighting the need for educators to rethink their teaching methods and incorporate game-like mechanics to accommodate a variety of learning styles. Finding the publication sites for analysis based on meta-information in the MALL and GBL for the slow learners' domain was necessary. Selected studies from various publication channels, including grade levels, types, years, and geographic distribution, were included in this section to analyze the MALL and GBL research. Research papers from Google Scholar and Springer Link are displayed in Table 5 of the literature review, while Figure 4 displays the selection of pertinent articles for using the review procedure.

This part looked at who published MALL research for slow learners and what research was conducted from multiple angles. When it was done, where it was done, and which education level it focused on. This gave a complete picture of how MALL research with a gamification approach for slow learners has to be developed. The finalized studies from different repositories were presented yearly, as shown in Table 5 and Figure 5. A maximum of publications was selected from the year 2024 20 out of 69, indicating that more interest is developing in MALL integration with a gamification approach in both teaching and learning. However, less interest in MALL integration with gamification was observed from 2015 to 2020 and from 2020 to 2025, resulting in more improvement for slow learners in teaching and learning.

Table 6 presents the country/continent-wise distribution of the studies. Most publications, 54 out of 69, were from Asia, and the fewest were from North America and Europe/Africa. According to a defined condition in "Research Methodology," each finalized study was assigned a Quality Assurance (QA) score, as displayed in Table 7; the score ranged from 1 to 4, indicating the quality of the evaluated studies. Scores below 4 were discarded. MALL researchers may find this QA system helpful when selecting studies on their topics, as it highlights usage and challenges. Most articles were published in the Q1 category and received the highest scores, while studies from less well-known journals, though still relevant, typically scored a four. In Tables 8 and 9, the researcher arranged all of the chosen studies, showcasing their classification and quality assurance ratings. They classified each study based on three primary factors: the type of research, the methods employed, and the research approach (empirical type). Each study was assigned to one of four groups: review papers, research that evaluates something, assessment frameworks, or solution proposals.

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1199	The authors used ChatGPT and Grammarly to improve the language of the manuscript.		2000000	6
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