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Personalization in Mobile Learning: A Hybrid Systematic Literature Review and Bibliometric Analysis

Yuli Sopianti, Yogi Prasetyo

Universitas Pendidikan Indonesia, Indonesia
*Correspondence: E-mail: yulisopianti@upi.edu

ABSTRACT

This study provides a comprehensive synthesis of Personalization in Mobile Learning Contexts through a combined Systematic Literature Review (SLR) and Bibliometric Analysis, based on 112 articles from the Scopus database. It aims to assess the topic's relevance for future research, map existing research distribution, and explore theoretical and practical implications to inform future directions. Findings indicate that Personalization in Mobile Learning is a dynamic and rapidly evolving field, driven by advancements in AI-driven personalization, adaptive learning, and learning analytics. Contributions are globally distributed across Asia, Europe, and the Americas, underscoring its interdisciplinary and collaborative character. Theoretically, the study highlights key areas for further exploration, such as Learning Design integration, MOOC-based personalization, deeper application of Learning Analytics, and gamification in mobile learning. Practically, the results provide actionable insights for educators, technology developers, and policymakers in creating more adaptive, responsive, and learner centered mobile learning environments. Visualization of research trends via VOSviewer further clarifies the field's developmental trajectory and supports the formulation of more systematic and innovative research agendas. Overall, this study contributes to mapping the current research landscape while offering strategic directions to advance theory and practice in Personalization in Mobile Learning Contexts, ensuring its sustained relevance and impact.

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1. INTRODUCTION

The rapid development of mobile technology and Artificial Intelligence (AI) has brought significant changes to the field of education. These technological advancements have facilitated the learning process, one example of which is the emergence of mobile learning (m-learning). Mobile learning refers to a learning process that utilizes mobile devices such as smartphones, tablets, and laptops to support flexible learning that can be easily accessed anytime and anywhere (Kidu, 2015). The rapid advancement of AI has further enhanced mobile learning by enabling more adaptive and personalized learning experiences tailored to the needs of individual learners (Baba et al., 2024).

Personalized learning refers to the use of technology to adapt content and learning strategies to meet the unique needs and preferences of each learner (Cai & Liu, 2024; Lamya et al., 2022). This approach is essential for maintaining student engagement and motivation, which are key factors for successful learning outcomes (Kayyali, 2025; Shukla et al., 2025). In addition to AI, Machine Learning (ML) and Learning Analytics (LA) also play a central role in supporting dynamic personalization, including the implementation of intelligent tutoring systems, adaptive learning platforms, and real-time feedback mechanisms (Abd Karim, 2025; Arrigo et al., 2024; Fulantelli et al., 2015; Mogili & Mohamed, 2023).

In line with these developments, previous studies have explored various approaches to supporting personalization in mobile learning. Many studies focus on the integration of artificial intelligence-based personalization. For example, Atta et al. (2025) developed a ChatGPT based mobile application to support C# programming learning, which provides real-time personalized assistance and debugging, and has been shown to improve student performance and motivation. El Ghouch & Mahboub (2025) proposed the use of dynamic case-based reasoning in a context-aware mobile learning system to adapt content to students' contexts, offering a personalized and flexible learning experience. Meanwhile, Pishtari et al. (2024) examined learning design in mobile learning through two case studies, emphasizing the importance of user-centered design and the integration of activity theory into practice. Efrianova et al. (2024) discussed formative assessment in mobile learning, using interactive tools, adaptive assessments, and analytics to enhance student engagement and learning outcomes. Research on gamification also demonstrates its potential to increase student motivation, although further studies are needed to explore its implementation in supporting learning personalization (Vieira & Coutinho, 2016). Sun et al. (2018) developed a cloud-based system that supports adaptive microlearning in MOOCs, using Educational Data Mining (EDM) techniques to customize content and learning paths according to students' needs.

Although personalized mobile learning has made significant progress, it is crucial to continuously monitor and map emerging developments in this field to better understand its future potential. Moreover, while research in this area is extensive, it remains fragmented, and future research directions have not yet been clearly established. Therefore, a comprehensive mapping and synthesis of existing research is necessary to identify trends, distribution patterns, and potential avenues for future development. Accordingly, this study aims to: (1) assess whether personalization in mobile learning contexts remains a significant topic for future research; (2) map the distribution of existing research; and (3) examine the theoretical and practical implications of the findings, as well as identify future research directions

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To achieve these objectives, a Systematic Literature Review (SLR) combined with Bibliometric Analysis is employed to systematically map and synthesize the body of research related to personalized mobile learning, providing a comprehensive understanding of the current research landscape. The SLR enables systematic synthesis of research findings and ensures a comprehensive literature review (Ghamrawi et al., 2025; Pulsiri & Vatananan-Thesenvitz, 2018), while Bibliometric Analysis quantitatively maps influential research trends, collaboration networks, and emerging themes (Gómez et al., 2025; Hallinger & Kovačević, 2022; Marzi et al., 2025). The combination of these two methods helps minimize researcher bias and provides a robust foundation for identifying research gaps and guiding future research directions (Abuhassna et al., 2024; Marzi et al., 2025).

This study is expected to contribute a comprehensive and up to date understanding of personalization in mobile learning, while offering significant contributions to both research and practice, particularly within the fields of Computer Science and Educational Technology. The findings of this study are also intended to assist educators, policymakers, and researchers in formulating best practices and innovative strategies to enhance personalized learning experiences through mobile technology.

2. METHODS AND ANALYSIS

This study employs a Systematic Literature Review (SLR) approach combined with Bibliometric Analysis to obtain a comprehensive understanding of the trends, distribution, and direction of research development in the context of personalization in mobile learning. The research process is conducted through two main stages: (1) Planning, which includes the formulation of research questions; and (2) Conducting, which involves determining data sources, search keywords, and inclusion and exclusion criteria.

2.1 Planning

The planning stage focuses on formulating research questions that align with the objectives of this study. The research questions are as follows:

1. RQ1: Is personalization in mobile learning contexts still a significant topic for future research?
2. RQ2: What is the distribution of research that has been conducted on personalization in mobile learning contexts?
3. RQ3: What are the theoretical and practical implications of existing research findings in the field of personalization in mobile learning contexts, and what are the directions for future research development?

2.2 Conducting

The conducting stage is carried out through several steps to ensure a systematic and transparent research process.

2.2.1 Literature Search Strategy

The literature search was conducted using the Scopus database due to its broad coverage, high metadata quality, and consistent indexing (Alryalat et al., 2019). The search period was set up to May 31, 2025. The search strategy focused on the Title, Abstract, and Keyword fields in Scopus, using the following search formula:

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personalized OR personalization OR adaptive OR "recommender system" OR "intelligent tutoring system" OR "learning analytics" AND ("mobile learning" OR "m-learning" OR "smartphone learning" OR "tablet learning")

personalization in mobile learning, including adaptive learning, recommender systems, intelligent tutoring systems, and learning analytics, all applied within the context of mobile learning (including m-learning, smartphone learning, and tablet learning).

This strategy is expected to yield a collection of relevant and up-to-date literature that will provide a strong foundation for mapping current trends and identifying directions for future research.

2.2.2 Inclusion and Exclusion Criteria

These criteria were used to filter articles to ensure their relevance to the research focus, including inclusion and exclusion criteria.

1. Inclusion Criteria:
   - Articles published up to May 31, 2025.
   - Articles within the field of computer science, consistent with the research focus on AI, machine learning, and recommender systems in mobile learning.
   - Articles published as journal articles, to maintain quality and publication consistency.
   - Articles written in English, to ensure international accessibility.
   - Articles that explicitly discuss the concept of personalization within the context of mobile learning, using additional keywords such as "Computer Aided Instruction," "Personalized Learning," "Learning Analytics," "Intelligent Tutoring System," "Adaptive Learning," and "Artificial Intelligence."
2. Exclusion Criteria:
   - Articles that only mention personalization or mobile learning superficially, without in-depth discussion of personalized mobile learning.
   - Articles that are not journal articles, such as conference papers, book chapters, review articles, and editorial materials.
   - Articles published in languages other than English.
   - Articles that are not directly related to the field of computer science.

To ensure the quality and relevance of the selected articles, the selection process followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework. PRISMA ensures that the literature review process is conducted systematically and transparently, allowing the process to be replicated by other researchers. Additionally, PRISMA helps to visualize the article screening and selection process through a flowchart. The flow of the data retrieval and filtering process in this study is presented in the PRISMA flowchart (see Figure 1). Furthermore, bibliometric analysis was performed using VOSviewer software to visualize bibliographic data, such as citation networks, collaborations between authors, and frequently occurring keywords. This analysis aims to provide insights into the dynamics of research development in the field of personalization in mobile learning contexts

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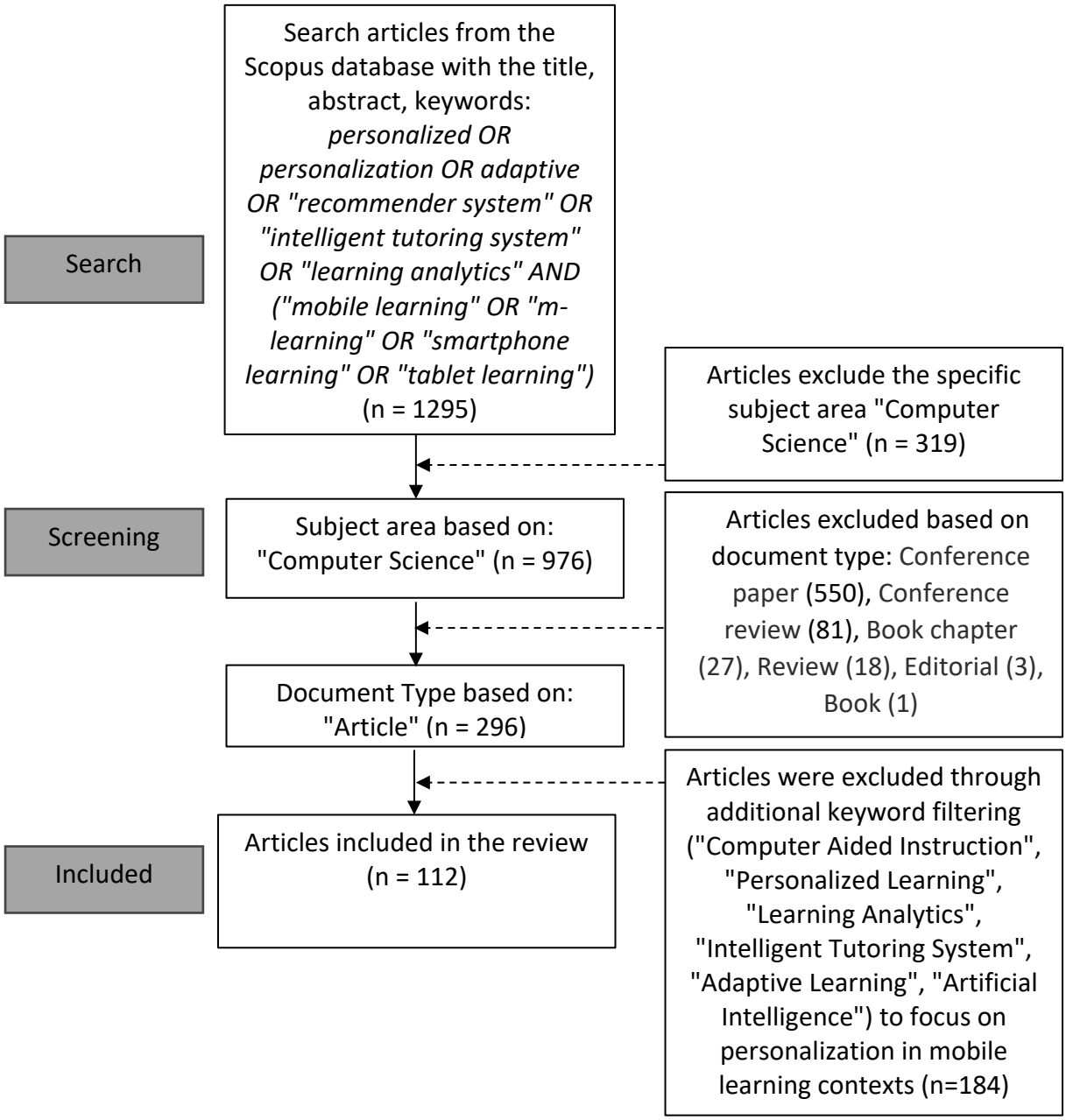

Figure 1. Systematic Literature Review information flow using PRISMA.

Based on the literature search conducted up to May 31, 2025, through the Scopus database focusing on the Title, Abstract, and Keyword fields according to the predefined search formula, and covering publications from 2008 to May 31, 2025, a total of 1,295 documents were initially retrieved (see Figure 1). Subsequently, a screening process based on subject area was conducted, during which only articles categorized under "Computer Science" were retained, resulting in 976 documents. The next filtering stage was conducted based on document type, where only journal articles were included in this review. This filtering process yielded 296 articles. The types of documents excluded at this stage included: Conference papers (550), Conference reviews (81), Book chapters (27), Reviews (18), Editorial (3), and Books (1). In the final stage, an additional keyword-based screening was conducted to ensure that the selected articles were closely aligned with the focus of this study. The additional screening used the following keywords: "Computer Aided Instruction," "Personalized

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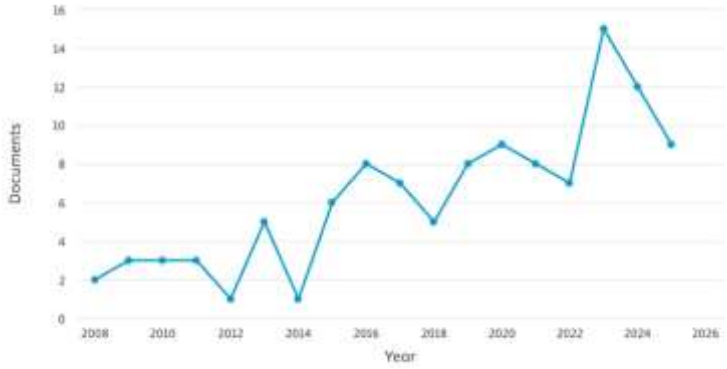
Learning," "Learning Analytics," "Intelligent Tutoring System," "Adaptive Learning," and "Artificial Intelligence." Articles that did not clearly relate to the context of personalization in mobile learning were excluded from the analysis. As a result of this entire process, 112 articles were finalized for in-depth analysis to address the research questions of this study.

3. RESULTS AND DISCUSSION

3.1 RQ1: Is personalization in mobile learning contexts still a significant topic for future research?

The number of publications is an important indicator that can serve as a benchmark for the progress of a research field. Changes in publication volume from year to year also reflect trends and developments in research interest within the field. Figure 2 presents the annual number of publications related to Personalization in Mobile Learning Contexts during the period from 2008 to 2025.



Source: Scopus database

Figure 2. The annual number of publications related to Personalization in Mobile Learning Contexts during the period from 2008 to 2025.

Overall, the publication trend shows two distinct phases of development. In the early period, from 2008 to 2019, the number of publications per year was relatively low and fluctuating, with an average of between 2 and 8 articles annually. During this phase, research in the field was still in its early exploration stage. This stage was characterized by various approaches attempting to integrate the principles of personalization into mobile learning environments. For example, Gan et al. (2017) discuss the adoption of mobile learning in higher education. This study explores various factors that influence the acceptance and implementation of mobile learning in higher education institutions. It identifies key elements such as institutional support, technology readiness, and psychological factors of users, all of which play a crucial role in the success of mobile learning adoption. The findings provide insights into the challenges and opportunities in integrating mobile-based learning in higher education and offer recommendations for improving the acceptance and effectiveness of mobile learning implementation. Meanwhile, Ng et al. (2015) introduce an adaptive mobile learning application for beginners learning basic Japanese. This application proposes an adaptive learning system that aims to provide additional exercises or different learning approaches based on the current performance of each individual. Furthermore, Zhang et al. (2016) introduced a context-based mobile system designed for work-based learning. This system allows professionals to access timely and customized learning support via mobile devices in their work environment

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Entering the period from 2020 to 2025, research in the field of Personalization in Mobile Learning Contexts has demonstrated remarkable growth. This development is closely linked to the rapid advancements in mobile technology, Artificial Intelligence (AI), machine learning, and the increasing adoption of learning analytics to support personalized learning. Based on the analysis of the existing literature, several key trends have been identified that are currently shaping the direction of research in this field:

1. AI-driven personalization has become the most widely adopted approach, supporting personalized content delivery, adaptive learning paths, and intelligent tutoring systems. A prominent example of this is the development of AI-based cross-platform personalized learning systems by Huang & Ma (2024).
2. Learning analytics is extensively used to support personalized feedback and adaptive learning design. For example, Efrianova et al. (2024) utilized mobile learning analytics to provide personalized formative assessments.
3. Adaptive learning systems and recommender systems form the core foundation for designing learning experiences tailored to user needs. Adnan et al. (2020); Jing (2024) integrated deep learning with recommender systems to enhance the effectiveness of personalization in mobile learning environments.
4. Context-aware and location-based personalization are emerging as important trends, with learning systems increasingly leveraging user context data such as location, time, and usage patterns to create more personalized learning experiences. Examples of this application can be seen in the research of De Troyer et al. (2020); Higashimura et al. (2024).
5. Support for Self-Regulated Learning (SRL) through personalization is also expanding. For instance, Baars & Viberg (2022) developed a personalized mobile learning strategy aimed at enhancing SRL.
6. Research utilizing behavioural analytics based on smartphone usage patterns to design personalized learning experiences is also gaining attention, as proposed in the study by Higashimura et al. (2024).

Overall, research trends from 2020 to 2025 indicate that Personalization in Mobile Learning Contexts has evolved into a dynamic and multidisciplinary field of research. Contributions to this field now come not only from the educational technology community, but also from disciplines such as computer science, AI, and data science. With the continuous advancement and growing sophistication of AI and mobile technology, along with the increasing availability of learning analytics data, it is anticipated that research in this field will continue to grow and will make significant contributions to both theoretical advancements and practical implementations in the future. Accordingly, the results of this study support a positive conclusion for RQ1, indicating that Personalization in Mobile Learning Contexts continues to be a highly relevant and promising topic for future research development.

3.2 RQ2: What is the distribution of research that has been conducted on personalization in mobile learning contexts?

The analysis of the distribution of research related to Personalization in Mobile Learning Contexts across 112 articles was conducted by categorizing the articles based on country, institutional affiliation, journal source, and author, with a focus on the top 10 entities in each category. Understanding this distribution is important for assisting both academics and practitioners in formulating future research agendas, as well as in mapping potential international collaborations in the development of personalized mobile learning.

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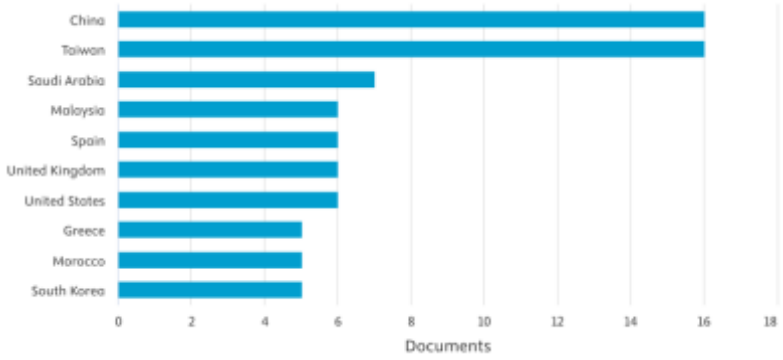
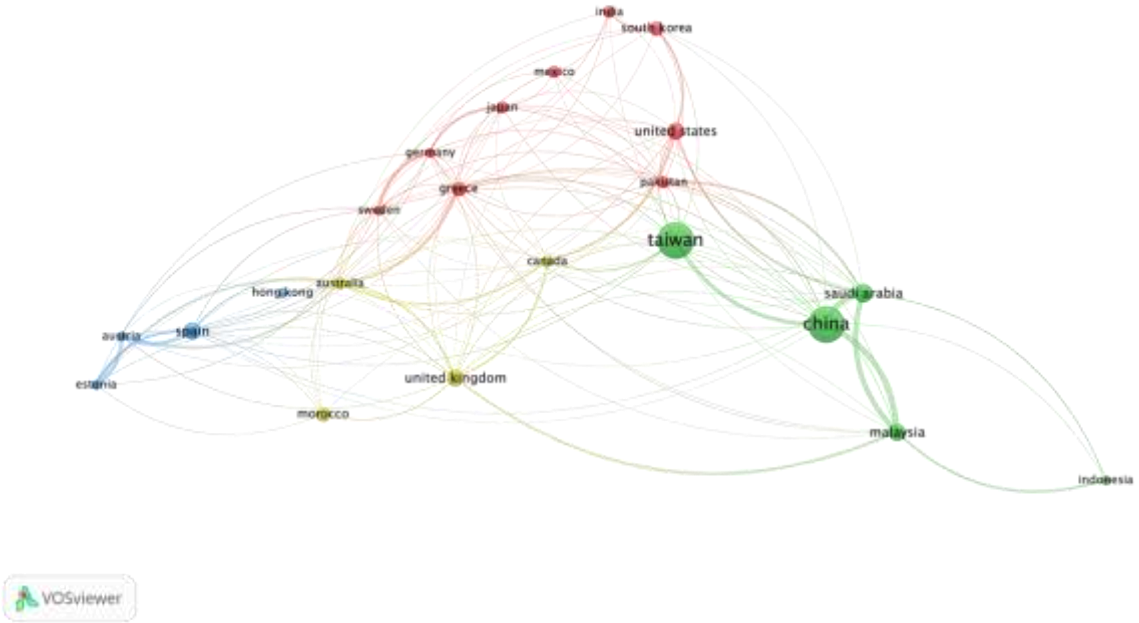
The distribution of research by country or geographic region indicates that China and Taiwan are currently the leading contributors, each with 16 articles. These are followed by Saudi Arabia (7 articles), Malaysia (6 articles), Spain (6 articles), the United Kingdom (6 articles), the United States (6 articles), Greece (5 articles), Morocco (5 articles), and South Korea (5 articles) (see Figure 3).



Source: Scopus database

Figure 3. The Number of the publications on Personalization in Mobile Learning Contexts based on Country or Territory (Top 10)

These findings indicate that the issue of Personalization in Mobile Learning Contexts has attracted attention not only in countries with high levels of mobile technology adoption in the Asian region, but also in European and American countries, reflecting the global relevance of this topic. In addition, this study also analyses collaborative relationships between countries involved in Personalization in Mobile Learning Contexts research, using VOSviewer software. This analysis is important for helping to formulate a more systematic and forward-looking research agenda in the future. The VOSviewer findings in this study are expected to reveal the international collaborative networks that have been formed among countries conducting research in the field of Personalized Mobile Learning (see Figure 4).



Source: Output VOSviewer Software

Figure 4. The visualization of the collaboration network between countries

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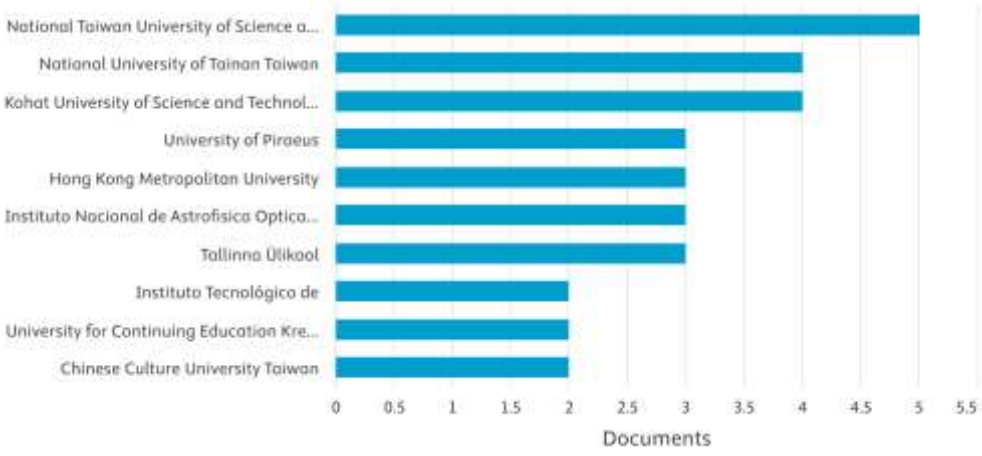
The visualization of the collaboration network between countries, as shown in Figure 4, reveals several strong international collaboration clusters. China and Taiwan are depicted as two major collaboration hubs, with strong connections to other Asian countries such as Malaysia, Saudi Arabia, and Indonesia. Additionally, there is a cross-continental collaboration network, where European countries such as the United Kingdom, Spain, Greece, Germany, and Sweden actively collaborate with countries in Asia and the Americas. The United States also plays a key role as one of the important nodes in this global network, maintaining connections with various countries across Asia and Europe. These findings indicate that research on Personalization in Mobile Learning Contexts is becoming increasingly globally integrated, with intensive cross-country and cross-disciplinary collaboration.

When examining the distribution of research in Personalization in Mobile Learning Contexts by institutional affiliation, a clear dominance of institutions in the Asian region, particularly Taiwan, can be observed. Based on the data analysis, the National Taiwan University of Science and Technology (Taiwan) emerges as the most productive institution, contributing 5 articles. This is followed by the National University of Tainan (Taiwan) and Kohat University of Science and Technology (Pakistan), each contributing 4 articles. Several other institutions that have also made significant contributions include the University of Piraeus (Greece), Hong Kong Metropolitan University (Hong Kong), Instituto Nacional de Astrofísica Óptica y Electrónica (Mexico), and Tallinna Ülikool (Estonia), each producing 3 articles. In addition, institutions such as the Instituto Tecnológico de Monterrey (Mexico), the University for Continuing Education Krems (Austria), and the Chinese Culture University (Taiwan) have each contributed 2 articles to this field (see **Figure 5**).



Source: Scopus database

Figure 5. The number of the publications on Personalization in Mobile Learning Contexts based on Affiliation (Top 10)

These findings indicate that research contributions in the field of Personalization in Mobile Learning Contexts are not only concentrated in countries with advanced mobile and AI technologies, such as Taiwan and Hong Kong, but also involve institutions from various regions, including Europe (Greece, Estonia, Austria) and the Americas (Mexico). This pattern reflects that the topic of Personalization in Mobile Learning is inherently multidisciplinary and possesses global appeal, which fosters cross-country and cross-institutional collaboration.

Furthermore, publications related to Personalization in Mobile Learning Contexts, when viewed by journal source, are dominated by journals in the fields of educational technology,

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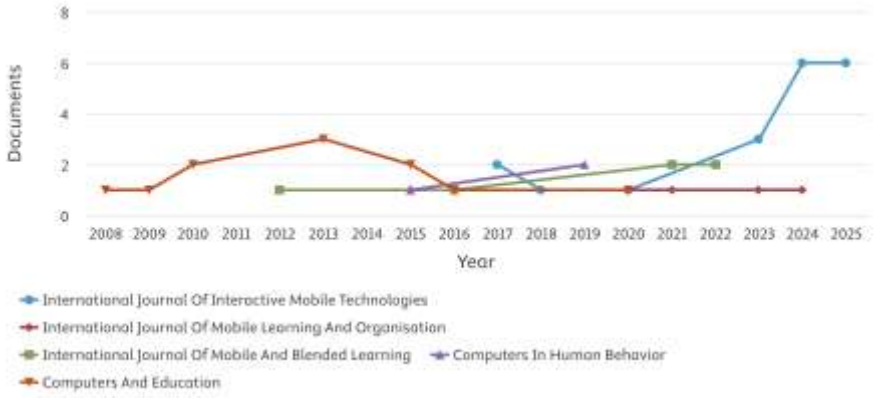
mobile learning, and human-computer interaction. The journal with the highest contribution is the International Journal of Interactive Mobile Technologies, which has shown a rapidly increasing trend over the past five years, reaching six publications in 2024–2025. In addition, the International Journal of Mobile Learning and Organization has consistently published articles in this field since 2008, albeit at a more stable rate (approximately one article per year). The International Journal of Mobile and Blended Learning also demonstrates a stable contribution trend, while Computers in Human Behavior has been actively publishing articles in this field since 2016, with an upward trend through 2023. Computers and Education is one of the earliest journals to publish articles related to personalization in mobile learning, beginning in 2008, with fluctuating but significant contributions during the early stages of the field's development (see **Figure 6**).



Source: Scopus database

Figure 6. The number the publications on Personalization in Mobile Learning Contexts based on Source

These findings indicate that research on Personalization in Mobile Learning Contexts is interdisciplinary, with publications appearing not only in journals specifically focused on mobile learning or education, but also increasingly in journals that address user behavior, human-computer interaction (HCI), and the application of AI in education. This reflects the growing maturity of the field and the widespread attention it is receiving from various academic disciplines.

3.3 RQ3: What are the theoretical and practical implications of existing research findings in the field of personalization in mobile learning contexts, and what are the directions for future research development?

The analysis was conducted on 112 articles retrieved from the Scopus database. VOSviewer software was used to illustrate that the findings of this study have both theoretical and practical implications for the advancement of future research in the field of Personalization in Mobile Learning Contexts. The results of metadata analysis using VOSviewer help researchers and practitioners gain a deeper understanding of the underlying assumptions, emerging topic trends, and key findings that are shaping the field of mobile-based learning personalization. Furthermore, the bibliometric analysis highlights topics that have been extensively explored, while also identifying research gaps that remain underexplored and present opportunities for future investigation. These findings are

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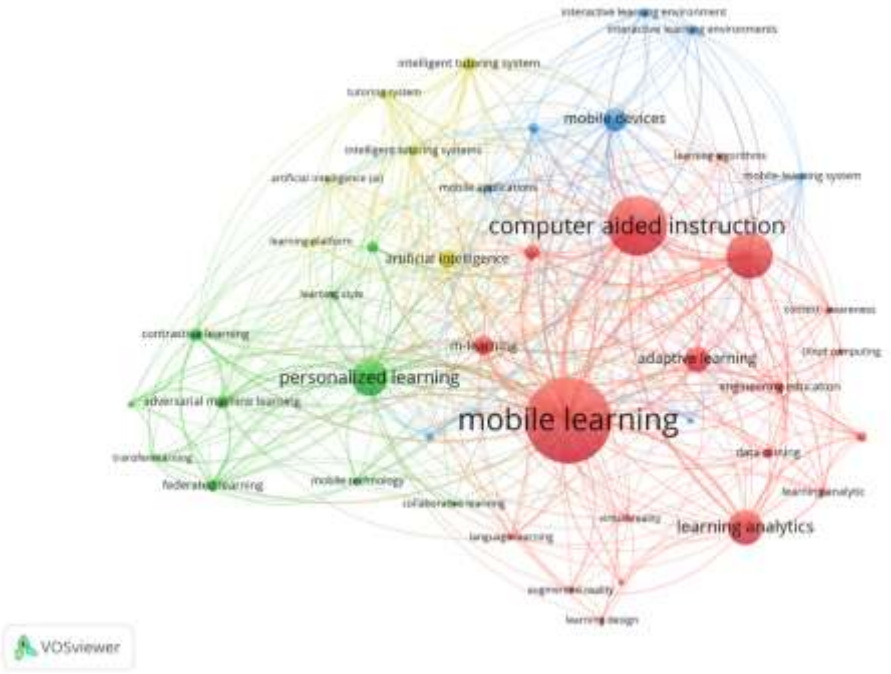
expected to serve as an important foundation for developing a more structured and sustainable research agenda moving forward.

In addition, the VOSviewer results also reveal the most frequently occurring topics within this study. Based on **Figure 7** and **Table 1**, the most discussed topics include mobile learning (74 occurrences), followed by computer aided instruction (49 occurrences), learning systems (37 occurrences), personalized learning (28 occurrences), and learning analytics (27 occurrences). Other highly relevant topics in the development of personalization in mobile learning include mobile devices (17 occurrences), educational computing (10 occurrences), and adaptive learning (19 occurrences). The role of artificial intelligence is also prominently featured, with terms such as artificial intelligence (13 occurrences), adversarial machine learning (9 occurrences), contrastive learning (9 occurrences), and federated learning (8 occurrences), indicating that AI-driven approaches are becoming increasingly integrated into the personalized mobile learning ecosystem. Additionally, concepts such as m-learning (14 occurrences), intelligent tutoring system (9 occurrences), and intelligent tutoring systems (6 occurrences) reflect a growing trend toward the development of mobile-based intelligent tutoring systems.



Source: Output VOSviewer Software

Figure 7. Co-occurrence framework and representation of key terms

Table 1. Co-occurrence and total link strength

No.	Keyword	Occurrences	Total Link Strength
1	mobile learning	74	344
2	computer aided instruction	49	274
3	learning systems	37	219
4	personalized learning	28	152
5	learning analytics	27	102
6	mobile devices	17	93
7	education computing	10	83

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8	adaptive learning	19	75
9	m-learning	14	68
10	intelligent tutoring system	9	64
11	adversarial machine learning	9	63
12	contrastive learning	9	63
13	artificial intelligence	13	54
14	federated learning	8	53
15	educational technology	7	43

From a theoretical perspective, the results of this bibliometric analysis provide an overview of variables that have been widely studied, while also identifying areas that remain open for further exploration. For example, themes related to the integration of artificial intelligence, adaptive learning, and learning analytics within the context of personalization in mobile learning still present broad potential for future research, particularly in the development of increasingly contextual and data-driven learning models. From a practical perspective, these findings can assist educational practitioners and learning technology developers in designing mobile learning systems that are more adaptive, responsive, and aligned with the individual needs of learners. The use of intelligent tutoring systems and data mining, for instance, offers significant opportunities for creating personalized and evidence-based learning experiences.

Overall, this study makes an important contribution to the development of a research map in the field of personalization in mobile learning contexts. Additionally, the visualization results generated through VOSviewer are expected to serve as a reference for researchers in formulating a more systematic and innovative research agenda in the future, aimed at advancing both theory and practice in this field. Thus, the findings of this study address RQ3 by providing not only a solid theoretical foundation but also practical implications that can guide future research and innovation in Personalization in Mobile Learning Contexts.

As further reinforcement of this study's findings, a qualitative analysis was also conducted on all 112 selected articles. The results of this analysis indicate that current research trends in the field of personalization in mobile learning are heavily influenced using Artificial Intelligence (AI), with a clear dominance of AI-driven personalization approaches (Atta et al., 2025; El Ghouch & Mahboub, 2025; Khaddar et al., 2025; Sun et al., 2018). Meanwhile, other approaches, such as adaptive learning based on context-aware systems, have also been identified in several studies (El Ghouch & Mahboub, 2025). However, contributions to areas such as Learning Design, Learning Analytics, and MOOC based personalization remain relatively limited. Only a few articles address the integration of Learning Design (Pishtari et al., 2024), and very few explore the potential of Learning Analytics (Efrianova et al., 2024) or MOOC based personalization (Sun et al., 2018). Moreover, there has been no research explicitly examining the application of gamification in supporting personalization in mobile learning (Vieira & Coutinho, 2016).

These findings reinforce the conclusion that, although personalization in mobile learning has demonstrated rapid progress particularly in the integration of AI there remains significant opportunity to further develop other aspects such as Learning Design, Learning Analytics, MOOC-based personalization, and gamification. Thus, this study contributes not only by mapping the trends and distribution of existing research, but also by providing strategic directions for future research development.

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4. CONCLUSION

This study presents a comprehensive mapping of research developments in the field of Personalization in Mobile Learning Contexts through a combination of Systematic Literature Review (SLR) and Bibliometric Analysis, by analysing 112 articles from the Scopus database. The study aims to assess the extent to which this topic remains relevant for future research (RQ1), map the distribution of existing research (RQ2), and explore both theoretical and practical implications, as well as formulate future research directions (RQ3).

The results indicate that Personalization in Mobile Learning Contexts is a field that continues to undergo significant growth, driven by technological advancements particularly in AI-driven personalization, adaptive learning, and learning analytics. Geographically, research in this field reflects extensive contributions from various regions, including Asia, Europe, and the Americas, highlighting its increasingly interdisciplinary and collaborative nature. In terms of theoretical contributions, this study successfully identifies several well-explored themes while also revealing key research gaps, such as the integration of Learning Design, MOOC based personalization, further utilization of Learning Analytics, and the application of gamification in the context of mobile learning. These findings offer promising opportunities for the development of more adaptive, contextual, and data driven learning models. From a practical perspective, the study provides valuable insights for educators, learning technology developers, and policymakers in designing mobile learning solutions that are more personalized, responsive to individual needs, and aligned with the dynamics of modern learning environments.

The visualization of research trends through VOSviewer further enhances understanding of the field's developmental trajectory, while also supporting researchers in formulating a more systematic and innovative research agenda for the future. Although AI based approaches currently dominate, there remain considerable opportunities to advance other approaches, such as design based, analytics driven, and gamification enhanced personalization. In conclusion, this study contributes not only to mapping the current research landscape, but also to offering strategic directions that can foster stronger theoretical contributions and the development of innovative practices within the field of Personalization in Mobile Learning Contexts. The findings and proposed research agenda are expected to serve as an important foundation for the continued advancement of this field in the years to come.

5. ACKNOWLEDGMENT

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6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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