

Game-Based Assessment Research Trends in Education: Bibliometric Analysis in The Context of Islamic Religious Education

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Abstract

Purpose: This study aims to explore the development of Game-Based Assessment research, as well as identify opportunities for the development of Islamic Religious Education learning evaluation.

Methodology: This study uses a bibliometric approach. Data sourced from Scopus obtained on January 23, 2026 with a focus on the publication of 2011-2026. This research has 3 stages, literature review, data search and cleaning process, and the last is data analysis. The data was analyzed using VosViewers, Ms.Excel, and Biblioshiny software. In the search for data, several inclusive criteria were set so that 101 articles were obtained for analysis.

Results: The results of the study show that publications related to game-based assessments have increased significantly. The highest publication occurred in 2025, with 19 publications. The most publications are published by the United States as a developed country that discusses a lot of studies on game-based assessment. Thematic mapping reveals findings such as 21st century skills, evaluation methodologies, and feedback, reflecting new directions and potential innovations in advanced research. Overall, the bibliometric analysis shows that the game-based assessment research cluster is more developed in the context of general education and technology-based learning, the keywords and themes that explicitly represent Islamic Religious Education do not emerge as the dominant cluster, indicating that the study of game-based assessment in the context of Islamic Religious Education assessment is still relatively limited in the literature.

Applications/Originality/Value: This research contributes in the form of trend mapping of Game-based assessment directed at the need for learning evaluation of Islamic Religious Education in the digital era, as well as opening up opportunities for further research related to the development and application of game-based assessment in the evaluation of Islamic Religious Education learning.

Introduction

The development of digital technology in the current era has brought significant changes in various aspects of human life, including in the field of education. Technology integration not only affects the way humans communicate and access information, but also changes the learning paradigm, the role of educators, and the evaluation systems used in the educational process (Rahimi & Oh, 2024). In this case, technological advances can be understood as both an opportunity and a challenge (Al-Emran & Griffy-Brown, 2023). Technology is an opportunity if used optimally to improve the quality of learning, assessment effectiveness, and student involvement (Md Sabri et al., 2024). On the other hand, technology can be a challenge if it is not balanced with the pedagogic competence and digital literacy of educators, so that its use is superficial or irrelevant to the learning objectives (Sutarto, 2023). Therefore, education is required to continue to adapt and make updates to stay in tune with the dynamics of the times.

These adaptation efforts are reflected in the reform of the education system which includes curriculum, learning strategies, and evaluation approaches. Educational transformation does not only stop at curriculum changes, but also is rooted in classroom learning practices, including the methods, models, and evaluation instruments used to measure student learning outcomes. Learning evaluation has a strategic role because it functions as a measuring tool for the success of the educational process as well as a basis for decision-making for learning improvement (Fitriani et al., 2025). From the perspective of Islamic education, evaluation is one of the important components in the education system that must be carried out in a systematic, planned, and based on Islamic values (Haikal et al., 2025). Evaluation is not only understood as an activity to measure learning outcomes, but also as a means of reflection on the learning process (Adom et al., 2020). In the Qur'an, the concept of evaluation can be associated with the term *al-bala'*, which means test or trial (Wahidi et al., 2025). Conceptually, evaluation is closely related to assessment and measurement, which in practice are carried out sequentially to obtain a comprehensive picture of students' learning outcomes (Aly & Inayati, 2019).

However, the practice of learning evaluation at various levels of education, including Islamic Religious Education, is still dominated by conventional approaches that emphasize written and oral tests. Research conducted by (Fitri et al., 2025) shows that the implementation of formative evaluations that still focus on written and oral tests tends to be less in

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demand by students. This condition causes a low level of attention and involvement of students, which can be seen from the indifference and tendency of students to not focus during the evaluation process. Along with the development of the times, there is a demand to present a form of assessment that is more innovative, interactive, and able to accommodate the characteristics of the digital generation who are used to technology-based learning environments.

Various studies show that digital-based assessments, especially those that integrate elements of games, have the potential to improve the quality of learning processes and outcomes. Several empirical studies report that the use of game-based platforms, such as Quizizz and Wordwall, can improve learners' critical thinking skills, provide direct feedback, and encourage active participation in learning (Katual et al., 2023). Research conducted by Qomaria et al., (2024) shows that the application of game-based assessment (wordwall) has an influence on student learning outcomes. Similar findings were also put forward by Mahendra (2022), which states that the use of Quizizz in formative assessments results in significant differences in students' critical thinking skills. Although the platform is just one example, these findings show the great potential of game-based assessment approaches in supporting a more effective learning evaluation process.

The game-based assessment approach is an assessment approach that integrates game mechanisms and elements to measure learners' abilities, understanding, and skills more authentically (Gomez et al., 2023). Game-Based Assessment does not only focus on the final result, but also on the learning process that students experience while interacting with the game environment. This approach represents a paradigm transformation of evaluation from traditional assessment models that tend to be static and teacher-centered towards assessments that are more interactive, adaptive, and oriented towards developing student competencies in a holistic manner (Siska, 2025). Therefore, Game-Based Assessment is increasingly attracting the attention of researchers and education practitioners in various disciplines and levels of education.

Along with the increasing interest in Game-Based Assessment, scientific publications on this topic have also shown a significant growth trend, as seen in the documents by year chart (figure 1). However, studies that specifically associate Game-Based Assessment with the context of Islamic Religious Education are still relatively limited. In fact, Islamic Religious Education faces similar challenges to other fields of education, especially in presenting assessments that are relevant to the characteristics of students in the digital era. The limitations of this study show that there is a research gap, especially in mapping the position and development of Game-Based Assessment and its implications for the development of Islamic Religious Education learning evaluation.

Based on this description, this study aims to map the development of Game-Based Assessment research globally through a bibliometric approach, which includes analysis of publication trends, authors, keywords, and thematic mapping. The results of the bibliometric mapping are expected to provide an overview of the structure and trends of Game-Based Assessment research in the field of education, as well as identify research spaces that are still open. The findings of this research are further expected to be an initial reference in the development of learning assessments, especially in Islamic Religious Education.

Method

This study uses a bibliometric analysis method, which is a quantitative approach that utilizes statistical techniques to analyze the patterns and structure of academic literature based on bibliographic data, such as citations, author collaborations, keywords, and publication sources, in order to map the development of a field of study (Kumar, 2025). The bibliometric method is widely used in the study of library and information science to identify research trends, intellectual structures, and dynamics of the development of scientific publications (Gumus et al., 2018; K. Hasan & Juhannis, 2024 in the (Zamroni et al., 2025)). The research data includes scientific publications indexed in the Scopus database in the range of 2011–2026. Data was obtained on January 23, 2026 at 18.39. The selection of Scopus is based on its reputation as one of the internationally reputable databases that provides a wide and curated coverage of academic literature (Baas et al., 2020). The data collection process was carried out through a search using the Boolean operator TITLE-ABS-KEY (Game-Based Assessment AND Learning AND Education), which resulted in 223 publication documents. Furthermore, to obtain data that is more relevant to the focus of the research, a screening process is carried out with inclusion criteria in the form of the year of publication, type of document, language, and source of publication. Search queries are refined to TITLE-ABS-KEY (Game-Based Assessment AND Learning AND Education) AND PUBYEAR > 2011 AND PUBYEAR < 2026 AND LIMIT-TO (DOCTYPE, "ar") AND LIMIT-TO (LANGUAGE, "ENGLISH") AND LIMIT-TO (SRCTYPE, "j"). This criterion is applied with the consideration that English-language journal articles are the main source in the dissemination of scientific findings that have gone through a peer review process. Through this screening process, 101 documents were obtained that were considered relevant to the purpose of the research.

Data analysis was carried out using several auxiliary tools, namely Scopus Analyzer, Microsoft Excel, OpenRefine, and VOSviewer. Scopus Analyzer is used to analyze annual publication trends as well as document distribution by country and author. Microsoft Excel is used to help with the processing of descriptive statistical data and simple visualizations in the form of graphs. OpenRefine is used in the pre-processing stage of data to clean and standardize data, especially in keyword writing variations, to reduce duplication and data inconsistencies. Furthermore, bibliometric mapping is performed using VOSviewer software. The analysis carried out included mapping the author's collaboration network,

keyword co-occurrence analysis, time-based analysis, and thematic mapping. This mapping aims to identify the thematic structure, the tendency of research focus, and the dynamics of the development of Game-Based Assessment studies in the field of education. The results of thematic bibliometric analysis were used to analyze indications of development opportunities in the evaluation of Islamic Religious Education learning.

Results and Discussion

1. Document Analysis

1.1 Trends in Scientific Publications of Game-Based Assessments in 2011-2026

Table 1. Showing the results of bibliometric analysis using Biblioshiny on Scopus data, obtained as many as 101 documents published in the period 2011–2026 and spread across 74 publication sources. The average age of the document was 4.9 years with an average citation of 16.49 per document, indicating that this topic has a significant scientific impact. A total of 324 authors were involved in the publication with a relatively high level of collaboration, shown by an average of 3.75 authors per document and international collaboration of 31.68%.

Table 1. Research data information on game-based assessment

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2011:2026
Sources (Journals, Books, etc)	74
Documents	101
Annual Growth Rate %	0
Document Average Age	4.9
Average citations per doc	16.49
References	0
DOCUMENT CONTENTS	
Keywords Plus (ID)	494
Author's Keywords (DE)	365
AUTHORS	
Authors	324
Authors of single-authored docs	5
AUTHORS COLLABORATION	
Single-authored docs	5
Co-Authors by Doc	3.75
International co-authorships %	31.68
DOCUMENT TYPES	
article	101

1.2 Game-based Assessment Publication Document By Country

The graph in **Figure 1.** shows the trend of Game-Based Assessment research publications from 2011 to 2026. In the early period of 2011–2014, the number of publications was still low and inconsistent, indicating that this topic has not received much attention from researchers. Entering the 2015–2018 period, publications began to increase although they still fluctuated. Since 2019, there has been a more pronounced increase, with a surge in publications in the 2020–2023 period, which shows an increasing interest in the use of games as a learning evaluation tool. This trend continues and peaks in 2025 with the publication reaching 19 articles, which signifies that Game-Based Assessment has become a focus of research that is increasingly in demand. The decline in the number of publications in 2026 is likely due to incomplete data because it is still the current year. Overall, a significant increase in publications, suggests that game-based assessments are increasingly seen as relevant in learning evaluation. This development opens up opportunities for further study of the relevance and adaptation of the game-based assessment approach in the context of Islamic Religious Education.

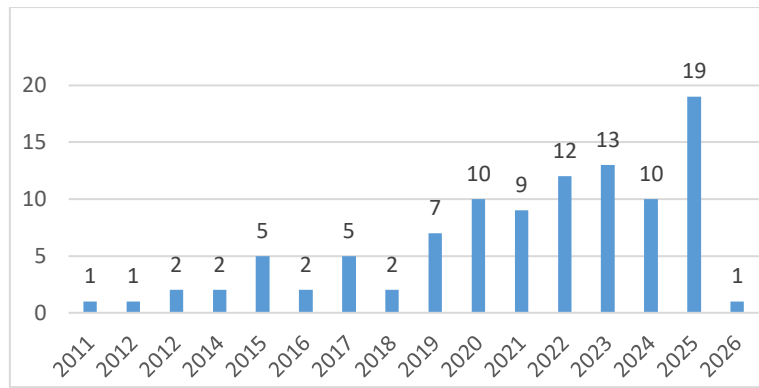


Figure 1. The development of play-based assessments from 2011-2026

Figure 2. shows the distribution of research publications on game-based assessment by country. The United States occupies the top position with the highest number of publications, demonstrating the country's dominant role in the development and study of the GBA. Furthermore, the United Kingdom and Spain are next with a significant number of documents, followed by Australia, China, and Germany with medium publication contributions. Meanwhile, the Netherlands, Canada, Finland, and Taiwan showed a relatively lower number of publications, but still contributed to the development of this study. Overall, the distribution of this publication shows that research on game-based assessment is dominated by developed countries with strong research infrastructure and educational technology, although contributions from other countries are also starting to grow.

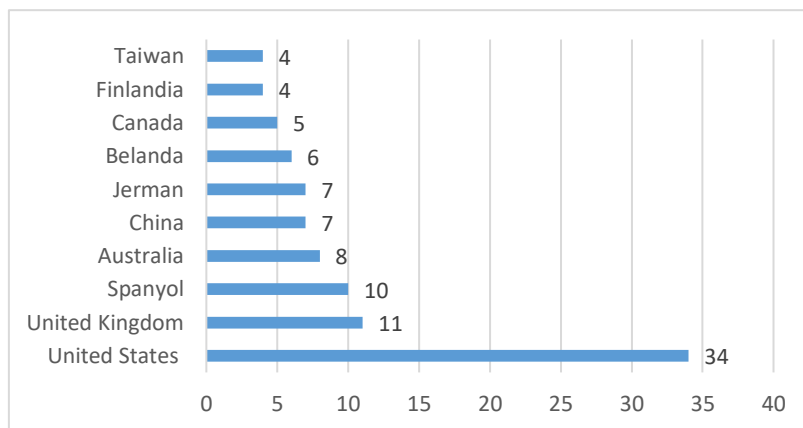


Figure 2. Game-based scoring documents by country

Figure 3. Shows the author's contribution in the publication of research on game-based assessment. Kim, Y.J. is the author with the highest number of publications, followed by Gomez, M.J. with a fairly high contribution. Furthermore, Ruiperez-Valiente, J.A. and Rupérez-Valiente, J.A. also occupy important positions with a relatively balanced number of documents, which shows the author's active involvement in the GBA study. Several other authors such as Cutumisu, M., Foulkes, J., Killi, K., Mertens, P.R., Ming, A., and Rudd, J. have a smaller number of publications but still contribute to the development of this topic. Overall, this distribution shows that the game-based assessment research was developed by a number of key authors with quite prominent contributions, accompanied by other authors who reinforced the diversity of perspectives in the study.

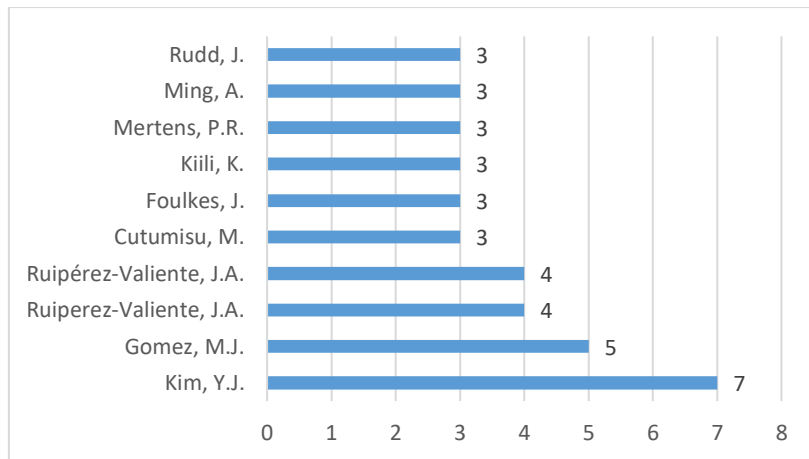


Figure 3. Game-based assessment documents according to the top 10 authors

Figure 4. describes the network of collaboration between authors in the field of research studied. Each node represents an author, while the connecting line (edge) indicates a collaborative relationship in writing scientific papers. The existence of lines between authors indicates that they were once involved in a joint publication in the period of the study analyzed. The visualization results show that all authors are in one interconnected collaboration cluster. This condition indicates that there is no fragmentation of research groups, but rather the formation of a relatively integrated collaboration network. Some authors, such as Anne Katrin Baum, Peter Rene Mertens, and Antao Ming, appear to have a fairly central position within the network, which hints at their role as important actors in building and maintaining research collaborations. In addition, the relatively close distance between the nodes reflects the intensity of the cooperation between the authors. This tightly built collaborative network shows that the development of studies in this field is mostly carried out through cooperation between researchers, not individually.

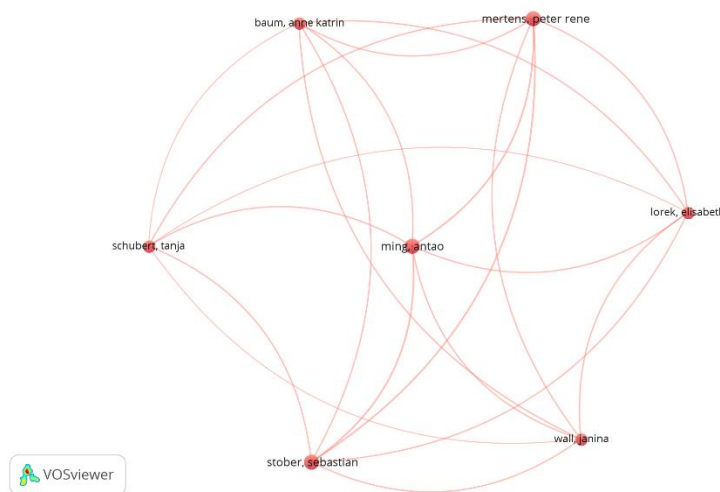


Figure 4. A network of collaborations between writers

2. Network Analysis

2.1 Research keyword analysis

Figure 5. display the results of the visualization of the network analysis of research keywords related to Game-Based Assessment analyzed using the VOSviewer software, by identifying 101 articles using a minimum citation limit of 2. The analysis conducted in this study found 753 keywords, with 132 meeting the threshold and classified into 6 large groups. Each cluster is marked with a different color. These themes are intertwined and relevant. The first cluster is marked in red, indicating the keyword assessment with a total link strength of 14 and 6 occurrences, Cognitive Assessment with a total link strength of 6 and occurrence of 3, Computer games with a total link strength of 23 and occurrences of 7, digital games

with a total strength of 15 links and occurrences of 5, education with a total strength of 16 and occurrences of 7, gamification with a total strength of 18 links and occurrences of 11, Learning Systems with a total link strength of 30 and a spawn of 10, a serious game with a total strength of 6 and a spawn of 3. This keyword represents digital game-based assessment in the education system.

The second cluster is marked in green, showing artificial intelligence keywords with a total link strength of 6 and 3 occurrences, feedback with a total link strength of 11 and occurrence of 6, formative assessment with a total link strength of 5 and occurrence of 2, gameplay with a total link strength of 10 and occurrence of 3, learning with a total link strength of 13 and occurrence of 4, Learning Outcome with a total link strength of 7 and 2 appearances, Teacher with a total link strength of 5 and appearances of 2, Video games with a total link strength of 7 and appearances of 2. This cluster shows a focus on the learning evaluation process and learning outcomes. The third cluster is marked in blue, showing the keywords critical thinking with a total link strength of 4 and 3 occurrences, educational technology with a total link strength of 37 and occurrences of 16, games with a total link strength of 8 and occurrences of 4, game-based assessment with a total of 83 link strength and occurrence of 57, learning analytics with a total of 29 link strength and occurrence of 9, Problem solving with total link strength 4 and occurrence 2. It features the core of the study of game-based assessment based on educational technology.

The fourth cluster is marked in yellow, indicating e-learning keywords with a total link strength of 20 and 7 occurrences, educational games with a total link strength of 12 and occurrences of 4, learning processes with a total link strength of 6 and occurrences of 3. This keyword describes the application of educational games in online learning. The fifth cluster is marked in purple, indicating the keyword motivation with a total link strength of 12 and 6 occurrences, quizziz with a total of 2 link strength and 2 occurrences. The key word here emphasizes the aspect of learning motivation through digital quiz media. The sixth cluster is marked with light blue, indicating the keywords teaching and learning with a total link strength of 7 and 2 occurrences, technology integration with a total link strength of 2 and occurrence 2. This keyword indicates the integration of technology in the learning process.

The findings of the keyword network show that game-based assessment research is evolving along with the integration of digital technology in the learning evaluation system. This approach answers the challenge of conventional learning evaluation which tends to be traditional and has not been optimal in utilizing technology as part of the learning process (Meylani, 2024). The use of digital platforms such as Quizizz allows for the implementation of more interactive assessments, so as to encourage students' motivation to learn and increase their involvement in the evaluation process (Zhang & Crawford, 2024). In addition, the use of game-based assessments also has the potential to develop students' low-level thinking skills (ur Rahim & Ali Mohammed, 2024). However, studies on game-based assessment in Islamic Religious Education are still very limited, so this finding opens up further research opportunities to examine the application of game-based assessment in the evaluation of Islamic Religious Education learning.

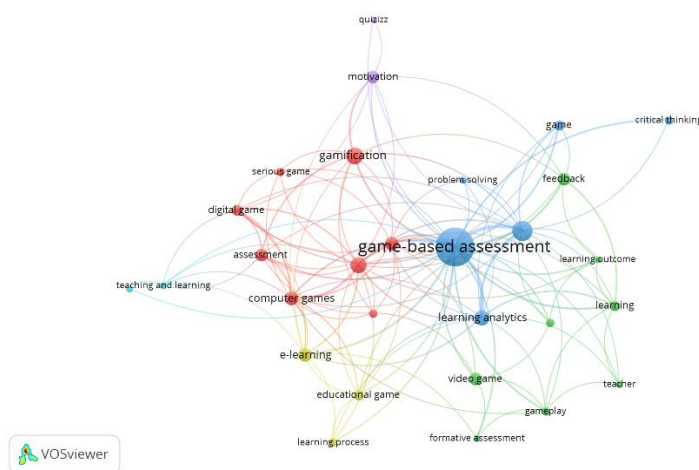


Figure 5. Visualization of a network of game-based assessment topics

Figure 6. Visualize a map of research progress in the field of game-based assessment based on the period of occurrence of the keyword. The color on the keyword network represents the development phase of the theme, where dark blue marks the dominant concepts in the early period, the blue to green gradation represents earlier research, while yellow indicates a relatively newer topic. The dark blue theme containing keywords such as digital games, formative assessment, computer games, educational games, tends to appear earlier in the 2020-2021 period, indicating the initial focus of research

on the use of games as a media/evaluation tool, exploration of digital game forms, and their integration in basic learning and assessment systems.

In the mid-phase, topics such as game-based assessment, gamification, learning analytics, feedback, problem solving, and motivation, appear to be graded from blue to green, indicating a shift in focus on strengthening the learning evaluation function. This pattern shows the development of studies from technical aspects and game design to its pedagogical use in the context of learning evaluation. Research in this phase began to examine how game-based assessments can provide feedback, increase motivation, and support students' thinking skills. Meanwhile, the latest phase (around 2022–2023) is marked by a focus on direct impact and application in learning, through keywords such as learning outcomes, teachers, teaching and learning, Quizizz, and critical thinking. This shows that the latest research emphasizes more on learning outcomes, the role of teachers, and the development of critical thinking skills through the application of game-based assessments in the classroom.

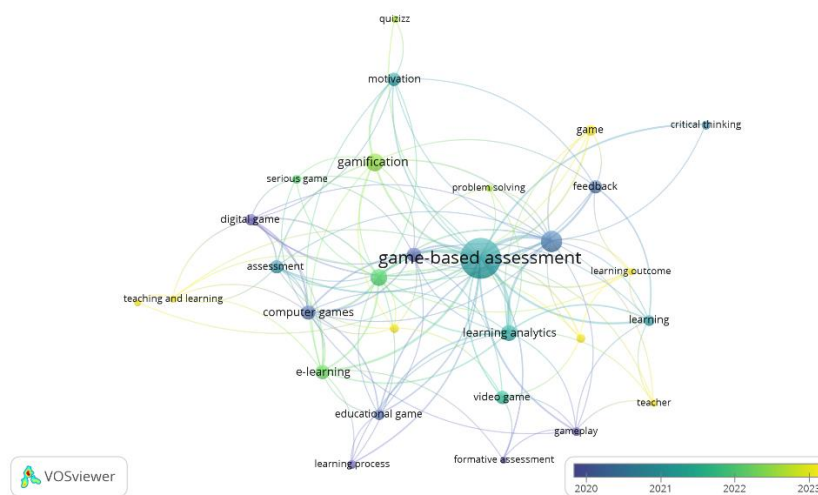


Figure 6. Network Distribution Game-based assessment topics based on overlays

2.2. Thematic Mapping of Game-Based Assessment Research

Figure 7. the results of the thematic mapping show the conceptual structure of game-based assessment research which is divided into four quadrants based on the level of centrality (relevance of the theme) and density (level of development of the theme). This mapping provides an overview of the position and role of each theme in the development of the analyzed study. In the motor themes quadrant, the game-based assessment cluster emerged as the dominant theme that had a strong connection with other themes and a high level of development, especially intersecting with educational technology, learning analytics, assessment, digital games, and motivation. This shows that recent research focuses on the use of digital technology and learning analytics to develop more interactive and adaptive game-based assessment models.

Meanwhile, in the basic themes quadrant, the themes of cognitive ability, cognitive assessment, and serious games have a high level of relevance but still show relatively low density, indicating that the cognitive aspect is an important foundation in this study, but there are still opportunities for further development. The niche themes quadrant is filled with themes such as machine learning, video games, computational thinking, user experience, and technology integration that have developed specifically, but their connection to the main theme is still limited. As for the emerging or declining themes quadrant, general themes such as education, 21st century skills, evaluation methodologies, feedback, and games show a relatively low level of development and relevance, which can be interpreted as themes that are still early or have not yet become the main focus in game-based assessment research. Nonetheless, these themes still have the potential to be further developed, particularly in supporting the design and effectiveness of game-based assessments. Development in the aspect of evaluation methodology and game-based feedback mechanisms has the opportunity to strengthen the function of game-based assessment as an evaluation instrument that is not only innovative, but also valid and meaningful in measuring learning outcomes.

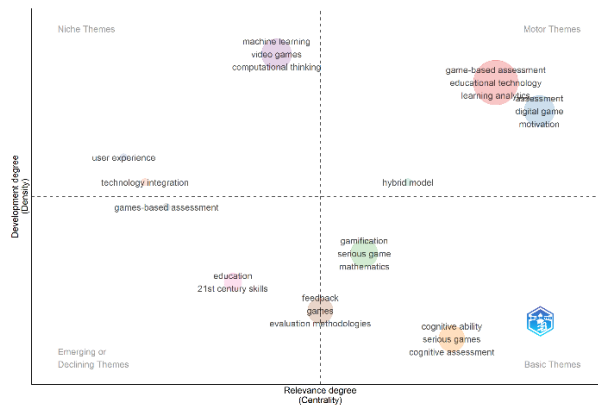


Figure 7. Thematic mapping of game-based assessment publications

Based on the results of thematic mapping and keyword network analysis, research on game-based assessment shows a pattern of development that leads to the integration of digital technology and an adaptive evaluation approach. This pattern indicates a shift in the assessment paradigm from conventional assessment to an evaluation model that is more interactive and oriented to the learning process of students. The findings show that game-based assessments are increasingly positioned in the literature as an evaluation instrument that not only measures learning outcomes, but also supports student engagement and development of thinking skills. However, the results of the thematic mapping show that the game-based assessment research cluster is more developed in the context of general education and technology. Meanwhile, keywords and themes that explicitly represent Islamic Religious Education do not appear as dominant clusters, indicating that the study of game-based assessment in the context of PAI assessment is still relatively limited in the literature. This condition opens up opportunities for the development of a conceptual study of game-based assessment in the context of Islamic Religious Education assessment, noting that aspects of assessment indicators, validity, and reliability need to be further studied in order to remain in line with the principles of learning evaluation.

Conclusion

The results of bibliometric analysis related to game-based assessment show a very significant research trend, especially in the 2020-2025 period. The highest contribution will occur in 2025 with 19 publications. The country with the highest contribution is the United States. Based on the analysis of the author's documents, it produced a closely built collaboration network, this shows that the development of studies in this field is mostly carried out through cooperation between researchers, not individually. Keyword network analysis shows that game-based assessment research is developing along with the integration of digital technology in learning evaluation systems. This shows a transformation in learning evaluation.

Based on the thematic mapping, key themes such as game-based assessment, educational technology, learning analytics, assessment, digital game, and motivation play a key driver of the development of the study, while themes related to 21st century skills, evaluation methodologies, and feedback, show opportunities for further research. The results of the overall bibliometric research show that game-based assessment is developing as an innovative assessment approach, oriented towards the integration of technology and improving students' thinking skills, but studies that specifically link it to Islamic Religious Education learning assessments are still limited. This finding confirms the existence of opportunities to develop a conceptual study of game-based assessment in the context of Islamic Religious Education assessment.

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