Investigation of the concept of gamification in mathematics education: Research in Web of Science database

Edanur Ulu*, Cukurova University, Adana, Turkiye https://orcid.org/0009-0000-8072-994X edanurulu@gmail.com
Emel Cilingir Altiner, Cukurova University, Adana, Turkiye https://orcid.org/0000-0002-8085-553X cilingire@gmail.com

Abstract

Gamification increases students' motivation and encourages them to participate in the lesson; improves students' ability to cooperate in the classroom, and many other positive effects have been revealed by research. A gamification is a tool used in mathematics education. Considering the abstract structure of mathematics, allows students to make connections between the concepts learned in mathematics lessons and daily life and to develop problem-solving skills. Considering the importance of gamification in mathematics education, it is important to examine the research in this field. This study aims to conduct a bibliometric analysis of the publications on gamification in mathematics education in the WoS database since 2013. It is aimed to identify research trends in this field, important authors and institutions, most cited studies, and keywords. With the findings obtained, the status of the studies on gamification in mathematics education is revealed with quantitative data and presented with scientific network mapping.

*Keywords***:** Bibliometric Analysis, Gamification, Mathematics Education, Vosviewer.

---

* ADDRESS FOR CORRESPONDENCE: Edanur Ulu , Cukurova University, Adana, Turkiye.
E-mail address: edanurulu@gmail.com

1. INTRODUCTION

Gamification has emerged as a compelling concept across numerous fields, including education, in recent years. Defined by Werbach and Hunter (2012) as the application of game elements in non-game contexts to enhance motivation and engagement, gamification has been researched and utilized in diverse areas such as health, management, education, marketing, and sustainability (Robson et al., 2015; Seaborn & Fels, 2015). The deployment of gamification in these various sectors reveals that its primary aim extends beyond mere entertainment; it serves as a mechanism to bolster commitment, relationships, interaction, motivation, and behavioral change through the use of strategic reinforcements (Robson et al., 2015; Seaborn & Fels, 2015). Since 2010, scholarly interest in gamification has witnessed a significant uptick (Deterding et al., 2011). Robson et al. (2015) attribute this growing inclination towards gamification to several factors: the rapid advancement of the gaming industry, endeavors to design more engaging and motivating games, the burgeoning usage of smartphones and social media, and the pursuit of novel and intriguing experiences.

1.1. The Effect of Gamification on Education

The motivational benefits of gamification have rendered it a burgeoning topic of study among researchers and practitioners in the educational domain (Caponetto et al., 2014; Dichev & Dicheva, 2017). Research has identified numerous advantages of implementing gamification in educational settings, such as enhancing students' retention of learned material, boosting their motivation and participation in lessons, fostering collaborative skills in the classroom, and providing immediate feedback on their academic performance (Kim et al., 2018; Nisbet & Williams, 2009; Uğurel & Moralı, 2008).

In the context of our country, the Interactive Science Network (EBA) exemplifies the application of gamification, aiming to motivate both students and teachers through the accumulation of points when specific goals are achieved (Türkmen, 2017). Within the EBA framework, students earn various badges and points by completing designated tasks, which are key elements of gamification. Students have reported that the gamification features in EBA are innovative, experiencing happiness upon earning badges, deriving pleasure from the process, and recognizing their own achievements (Aksoy & Usta, 2020).

1.2. Gamification in Mathematics Education

In mathematics education, teaching abstract concepts with traditional tools causes students to have difficulty in the learning process, to lose interest, and thus to develop a negative attitude towards the course (Türkmen, 2017). Mathematics education, which emphasises abstract concepts, offers a unique opportunity to benefit from the power of gamification instead of traditional tools. Gamification can strengthen the connections between theory and real-world applications by facilitating the concretisation of abstract mathematical concepts (Sakai & Shiota, 2016). Gamification can encourage a growth mindset among students by creating a safe space for experimentation and error correction (Buckley & Doyle, 2016; Yalçın, 2018). Another factor that makes it important to use gamification as a tool in mathematics education is that it can make the process of acquiring and using mathematical knowledge fun while shortening it (Yalçın, 2018). Recent studies have investigated the integration of gamification into the mathematics curriculum and obtained promising results.

According to the research on gamification conducted in recent years in our country, it has been observed that students find gamification activities instructive, interesting and entertaining in the course process at the secondary school level, and that there is an increase in participation in line with the increasing desire and enthusiasm of students during the activities (Çin, 2022; Eray, 2022); gamification has a positive effect on

learning the subject of fractions (Karamert, 2019); gamification does not have a significant effect on teaching sets (Pehlivan, 2020). The fact that the researches have given different results in this way has revealed the need for further research on gamification.

Given the importance of gamification in mathematics education, it is crucial to examine the existing body of research in this field. This study aims to conduct a bibliometric analysis of publications related to gamification in mathematics education from the Web of Science (WoS) database since 2013, using VOSviewer for data vTo achieve this aim, the study seeks to answer the following research questions:

a)   What are the annual publication trends in the field of gamification in mathematics education?

b)   What is the distribution of publications by language in the selected dataset?

c)   Which countries are the leading contributors in terms of publications on gamification in mathematics education?

d)   Which journals have published the most research on this topic?

e)   Which studies have received the most citations and have been the most influential in this field?

f)   What is the structure of co-authorship networks among researchers in this area?

g)   What are the patterns of international collaboration, based on co-authorship between countries?

h)   What are the citation networks of countries, and how do they reflect the global impact of research in this field?

i)   Which institutions are the most cited, and what is their contribution to the development of the field?

What are the key themes and topics, as revealed through keyword analysis that have emerged in gamification research within mathematics education? By addressing these questions, this study seeks to provide a comprehensive overview of the current state of research on gamification in mathematics education. This analysis will contribute valuable insights to inform future research directions and the development of effective gamified learning strategies for mathematics classrooms.

2.   METHODS AND MATERIALS

This study adopts a holistic approach to examining the role of gamification in mathematics education through a bibliometric analysis of relevant scientific publications. Bibliometric analysis, which focuses on science mapping, provides a valuable framework for evaluating the breadth, trends, and impact of research in a particular field. As bibliometric studies rely on extensive datasets to uncover patterns and trends, the selection of a comprehensive and reliable database is crucial (Karagöz & Şeref, 2020). For this analysis, the Web of Science (WoS) database was chosen due to its reputation for providing high-quality and expansive coverage of peer-reviewed publications. WoS is known for its advanced search options, which allow for precise filtering and data extraction, making it an ideal source for conducting bibliometric studies (Dirik et al., 2023).

Using the VOSviewer software, this study analyzes key bibliometric indicators such as publication trends, citation patterns, co-authorship networks, and keyword frequencies, to provide a detailed overview of the existing body of research on gamification in mathematics education.

2.1. Data Collection

To achieve the objectives of this research, the Web of Science (WoS) database was accessed online on April 23, 2024, and a query was conducted to gather relevant studies. The search query was constructed as follows: (TI=('mathematics' AND 'gamification') OR AB=('mathematics' AND 'gamification') OR AK=('mathematics' AND 'gamification')). This query targeted titles (TI), abstracts (AB), and keywords (AK) that included both the concepts of "gamification" and "mathematics."

As a result of the search, a total of 221 studies were identified. These included 209 journal articles, 103 conference papers, 7 review articles, 5 early access publications, 1 editorial material, 1 data paper, and 1 meeting summary. All retrieved studies were published from 2013 onward, as no additional time restriction was applied beyond the default search range.

To refine the dataset for relevance, the WoS categories were used to filter for studies related to educational research and education-related scientific disciplines. After applying this filter, a total of 140 studies were selected for further analysis, focusing specifically on the intersection of gamification and mathematics education.

2.2. Data Analysis

To analyze the 140 studies retrieved from the Web of Science database, various statistical tables and visual representations were generated, including the distribution of studies by year, author, language, country, and publisher. These analyses were conducted using the built-in analytical tools provided by the Web of Science (WoS) database.

In addition to the descriptive statistics, VOSviewer (Version 1.6.20) was utilized for science mapping and conducting bibliometric analyses. VOSviewer enabled the creation of co-authorship networks, citation analysis, and keyword co-occurrence maps, providing deeper insights into the intellectual structure and collaborative trends within the field of gamification in mathematics education.

3. RESULTS /FINDINGS

Bibliometric findings obtained through WoS and VOSviewer are presented in tables and figures. The distribution of publications according to years is given in Table 1 as frequency and percentage.

Table 1.

Publication frequencies and percentages according to years

Year of Publication	Frequency (f)	Percentage (%)
2013	1	0.714
2014	2	1.429
2015	5	3.571
2016	7	5.000
2017	17	12.143
2018	13	9.286
2019	18	12.857
2020	17	12.143
2021	20	14.286
2022	17	12.143
2023	20	14.286
2024	3	2.143

Total	140	100.00

When the publication years of the studies in the field of gamification in mathematics education in Table 1 are examined, the year with the least number of publications in this subject is 2013 (n=1), while the years with the most publications are 2021 and 2023 (n=20). The graph showing the distribution of publication frequencies according to years is given in Figure 1.

Figure 1.

Distribution of publication frequencies according to years
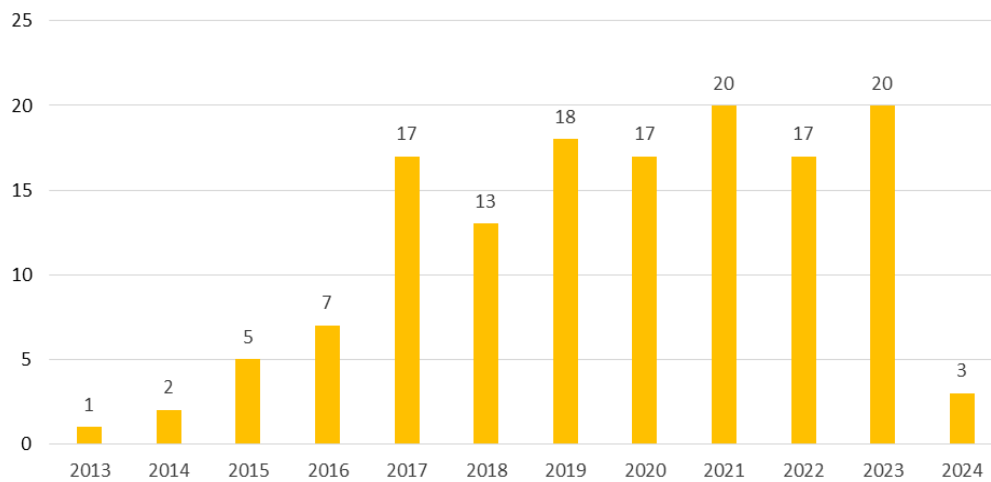
When Figure 1 is examined, there is an increase in the number of publications in the field of gamification in mathematics education until 2018. Since 2018, there is a fluctuation in the number of publications in this field. The frequencies of the years have been higher since 2016. This shows that the concept of gamification in mathematics education has been trending since 2017. Table 2 shows the frequency distribution of publications according to the language of publication.

Table 2.
Analysis of Publications by Language of Publication

Language	f	%
English	121	86.429
Spanish	14	10.000
Portuguese	4	2.857
Bulgarian	1	0.714
Total	140	100.00

When the languages in which the studies were published are analysed in Table 2, it is seen that there are 4 different languages in total: Bulgarian, English, Spanish and English. Among these publications, English is the language with the highest number of publications (n=121) and Bulgarian is the language with the lowest

number of publications (n=1). Table 3 shows the frequency distribution according to the top 10 countries contributing to the field of gamification in mathematics education.

Table 3.

Top 10 countries with the most publications

Countries	f	%
Spain	30	21.429
Mexico	12	8.571
Portugal	9	6.429
United States of America	9	6.429
Germany	7	5.000
Taiwan	7	5.000
Brazil	6	4.286
Norway	6	4.286
China	6	4.286
Bulgaria	5	3.571

When Table 3 is examined, the first four countries that contributed the most to the field of gamification in mathematics education are Spain (n=30), Mexico (n=12), Portugal (n=9) and the United States of America (n=9). Table 4 shows the top 10 journals publishing in the field of gamification in mathematics education.

Table 4.

Top 10 journals with the most publications

Publication/Journal	f
Iated-Int Assoc Technology Education & Development	37
Springer Nature	19
IEEE	16
Mdpi	6
Taylor & Francis	5
Elsevier	4
Acad Conferences Ltd	3
Gate Assoc Teaching & Education Gate	3
Education Univ Hong Kong	2
Red Univ Campus Virtuales	2

The first three journals contributing to the development of the field are Iated-Int Assoc Technology Education & Development (n=37), Springer Nature (n=19) and IEEE (n=16). Table 5 shows the 5 most cited studies.

Table 5.
Top 5 most cited studies

Publication Name	Authors	Publication Year	Total Citation
1. Gamification in assesment: Do points affect test performance?	Yigal Attali ve M. Arieli-Attali	2015	196
2. The effects of gamification-based teaching practices on student achievement and students' attitudes toward lessons	İbrahim Yıldırım	2017	152
3. A comparison of flipped learning with gamification, traditional learning, and online independent study: the effects on students' mathematics achievement and cognitive engagement	Chung Kwan Lo ve Khe Foon Hew	2020	103
4. Examining competitive, collaborative and adaptive gamification in young learners' math learning	Tomislav Jagust, Ivica Boticki ve Hyo-Jeong So	2018	98
5. The impact of gamification in educational settings on student learning outcomes: a meta-analysis	Rui Huang, Albert D. Ritzhaupt, Max Sommer, Jiawen Zhu, Anita Stephen, Naterica Valle, John Hampton ve Jingwei Li	2020	92

When Table 5 is examined, the most cited study with 196 citations in the field of gamification in mathematics education is 'Gamification in assesment: Do points affect test performance?', which is a study in which the performance of students is investigated by including gamification in the assessment-evaluation phase in mathematics course. When the other cited studies are examined, the effect of gamification integration into the course on variables such as student achievement, student attitude and motivation are investigated and evaluated. Figure 2 shows the network map of the studies based on co-authorship.
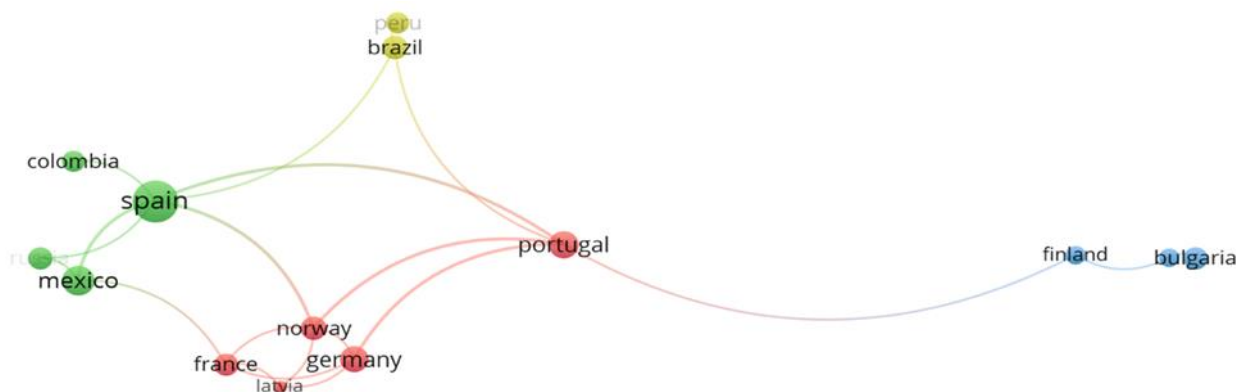
Figure 2.
Co-author network mapping
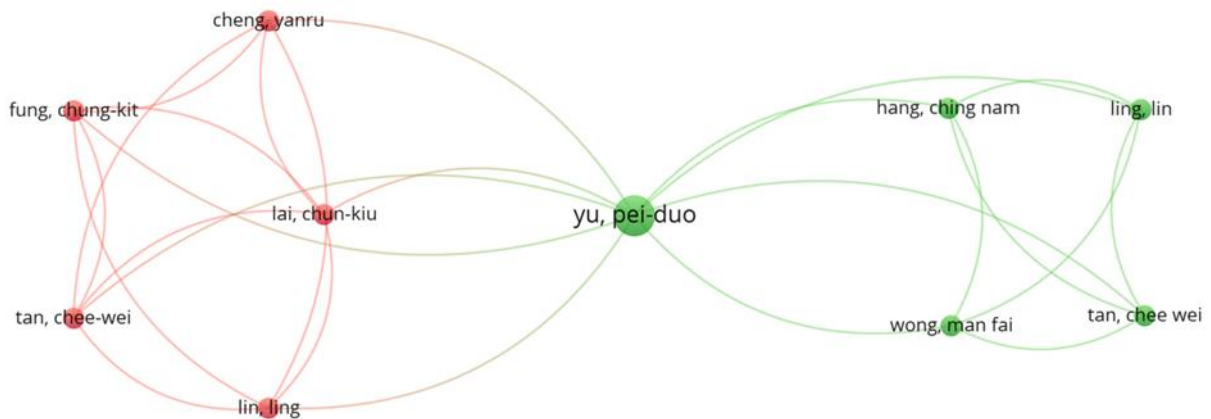
When Figure 2 is examined, the analysis was carried out with a minimum of 1 publication and a minimum of 1 citation filtering to determine the collaboration of co-authors. After the filtering, co-author analysis was performed on 239 of 419 authors. As a result of the analysis, the total link strength was 25 and the authors were divided into two clusters (red and green) showing collaboration. Figure 2 shows that the author with the highest total link strength is Pei-Duo Yu. Figure 3 shows the network map based on authors' collaboration by country.

Figure 3.
Collaboration network mapping according to authors' affiliation countries


For the detection of international author collaboration, the analysis was performed with a minimum of 1 publication and a minimum of 1 citation filtering. After the filtering, 44 out of 52 countries were analysed.

According to the countries, the co-authorship network consists of 4 clusters (green, red, yellow and blue). The country with the highest total connection strength is Spain, followed by Portugal and Norway. Figure 4 shows the citation network map based on total link strength by country.

Figure 4.
Citation network mapping of countries
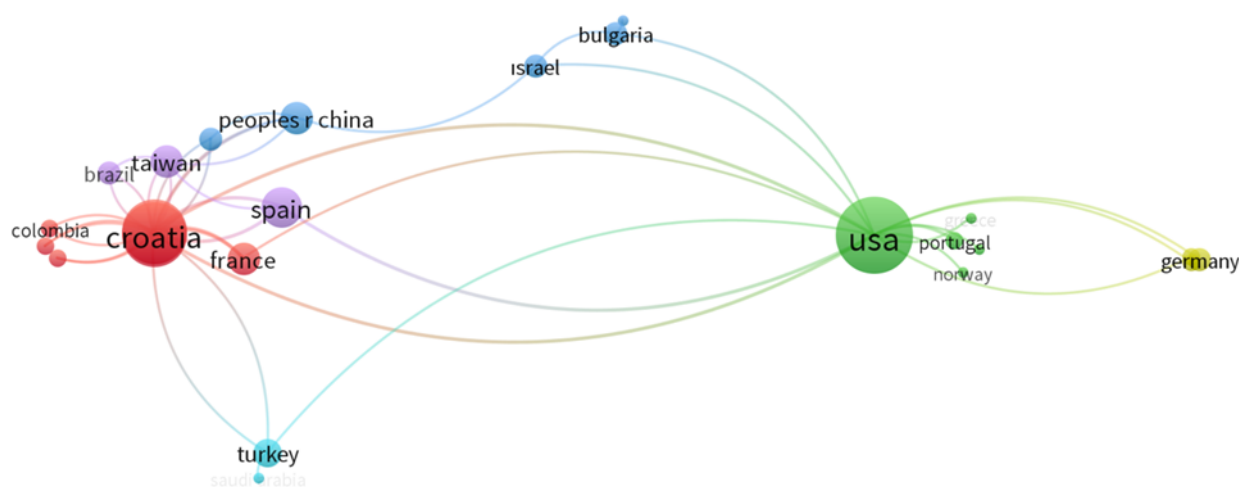
In order to determine the citation analysis of the countries, the analysis was made by filtering minimum 1 publication and minimum 1 citation. After the filtering, 44 out of 52 countries were analysed. The country with the highest total linking power is the United States of America, followed by Croatia and South Korea. When these countries are analyzed in terms of the number of citations, the United States of America ranks first, followed by Turkey and the People's Republic of China. Figure 5 shows the citation network map based on total link strength according to institutions.

Figure 5.
Citation network mapping based on total connection strength of institutions

In order to determine the citation analysis of the institutions, the analysis was made by filtering minimum 1 publication and minimum 1 citation. After the filtering, 122 out of 204 institutions were analysed. The institution with the highest total link strength is 'Enwa Womans University' in South Korea, followed by 'Zagreb University' in Croatia and 'Educational Testing Service' in the United States. When the institutions are analysed according to the number of citations, 'Educational Testing Service' ranks first, followed by 'Harran University' in Turkey and 'Hong Kong University' in China. Table 6 shows the distribution of the co-occurrence of keywords in the studies.

Table 6.

Co-occurrence of keywords in studies and total link strength distribution
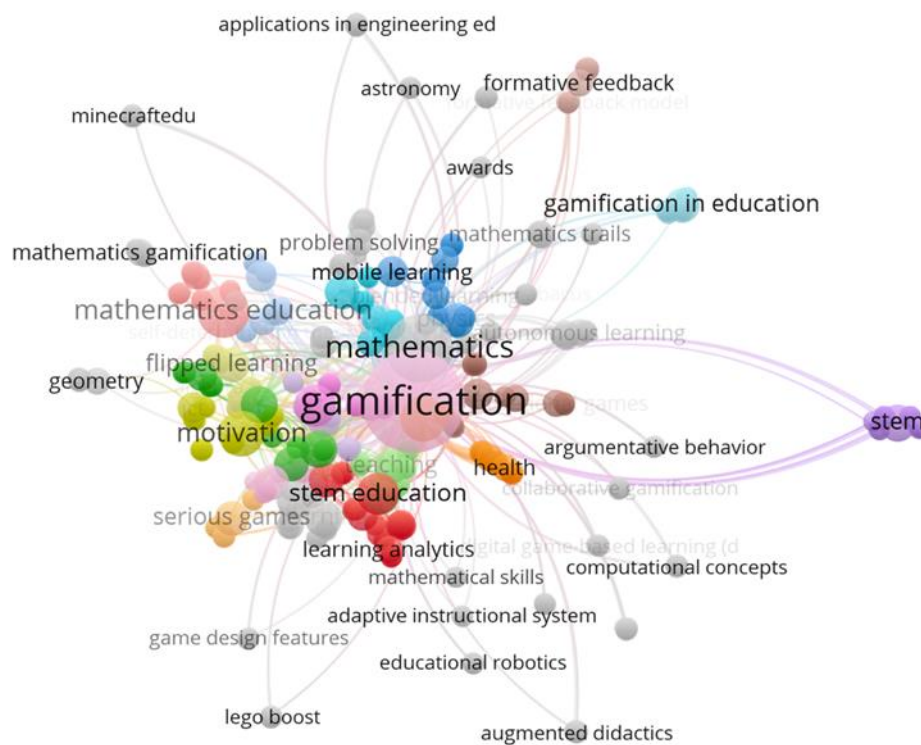
Keyword	Co-occurrence	Total Link Strength
1. Gamification	94	373
2. Mathematics	29	142
3.Mathematics Education	13	51
4. Education	9	54
5. Motivation	9	33
6. STEM Education	7	33
7. Game-Based Learning	7	27
8. Engagement	5	27
9. Escape Room	5	24
10. Primary Education	5	20

* This table includes the top 10 keywords with the highest total link strength.

When the co-occurrence of keywords in the studies on gamification in mathematics education is examined, it is seen that the word 'gamification' comes first. At the same time, this word has the highest total connection power. Figure 6 shows the network map based on the keywords in the studies.

Figure 6.

Co-occurrence network mapping of keywords

In the keyword analysis, a total of 415 words were analysed by filtering at least 1 co-occurrence. In this case, 415 keywords were included in the analysis. In Figure 6, the area of the circle shows the size of the total link strength. In the centre of the map, the word 'gamification' with the highest total link strength is seen.

4. Discussion

In alignment with the objectives of this study, a bibliometric analysis of 140 publications in the categories of educational research and educational scientific disciplines on gamification in mathematics education, sourced from the Web of Science (WoS) database since 2013, was conducted using VOSviewer. The analysis of publications over the years reveals that the fewest studies were conducted in 2013, with only one publication, while the highest number of studies was observed in 2021 and 2023, each with 20 publications. The average number of studies per year between 2017 and 2023 was 17, reflecting a significant increase in research on gamification in mathematics education during this period. This trend aligns with Chugh and Turnbull (2023), who observed that the growing interest in gamification stems from the need for innovative teaching strategies that address modern students' needs, as opposed to traditional methods, as well as the increasing integration of gamification into diverse instructional practices. The relatively low number of studies in 2024 (n=3) can be attributed to the timing of this study, which was conducted in April 2024.

When considering the geographical distribution of research, Spain led the field with 30 publications, followed by Mexico (n=12) and Portugal (n=9). Regarding the language of publication, English dominated with 121 studies, while Spanish ranked second (n=14) and Portuguese (n=4) third, reflecting the high output of Spanish-speaking countries in this field.

In terms of publishers, IATED—International Association for Technology, Education and Development led with 37 publications, particularly focusing on educational technologies and developments. This was followed by Springer Nature (n=19) and IEEE (n=16). Among the most cited works, the study by Yigal Attali and M. Arieli-Attali titled "Gamification in Assessment: Do Points Affect Test Performance?" received the highest number of citations (n=196), underscoring its significant influence in the field.

The VOSviewer analysis further revealed that Pei-Duo Yu is the author with the strongest collaborative network in this area. While Spain emerged as the country with the highest number of publications and the strongest co-authorship links, it did not rank among the top three countries in citation impact. Instead, the United States ranked first in terms of citation impact, indicating that despite Spain's prolific output, its international influence remains relatively low. Furthermore, citation analysis of institutions highlighted South Korea and Croatia as having the highest total link strength, with Ewha Womans University and Hong Kong University standing out as key institutions in the field. In the keyword analysis, "gamification" emerged as the term with the highest total link strength, reflecting its central role in the research. By analyzing the data from the Web of Science on gamification in mathematics education, this study provided a detailed bibliometric overview, examining the publications according to year, language, author contributions, citation impact, country of origin, collaboration networks, and key research themes. The findings offer a comprehensive overview of the current status of research in this field, supported by VOSviewer's science mapping of networks.

This study presents a multidimensional perspective on the structure of research in gamification for mathematics education, offering valuable insights to researchers interested in exploring this area. With the increasing integration of digital technologies, gamification activities are becoming more prevalent and

effective in educational settings. The analysis indicates that gamification is widely adopted in both teaching and assessment processes, particularly through the use of digital tools. Similarly, Hainey et al. (2016) noted that gamification is most frequently employed in digital formats, particularly via computer-based activities. Mielgo-Conde et al. (2022) emphasized the growing importance of these tools, citing their ability to enhance cognitive development, motivation, and creativity in students. Silva and Maran (2020) also highlighted the significant potential of gamification to improve the teaching process due to its positive contributions.

Given students' deep engagement with technology, the use of well-designed gamification activities, supported by digital tools, tailored to their interests and curiosity, can provide an innovative and effective approach to enhancing the educational experience.

5. CONCLUSION(S)

The bibliometric analysis conducted in this study was limited to publications indexed in the Web of Science (WoS) database, specifically focusing on 140 studies categorized under educational research and educational scientific disciplines. However, bibliometric analyses can be enriched by incorporating different or multiple databases, providing a broader perspective on the subject. Gamification, as a versatile tool employed in various domains, including education, warrants further investigation, particularly regarding its development within our national context. A deeper exploration of this concept's growth and integration into educational practices could offer valuable insights.

6. RECOMMENDATIONS/FUTURE DIRECTIONS

Considering the innovative potential of gamification in education, it is recommended that educational faculties integrate gamification applications into their curricula. By doing so, prospective teachers would develop a deeper understanding of how gamification can be effectively utilized as a pedagogical tool, preparing them to incorporate these methods into their future teaching practices.

Ethical Approval: Since the study is a bibliometric analysis study, it is not included in the group of studies that require Ethics Committee Permission. Therefore, Ethics Committee Permission was not declared.

Conflict of Interest: The authors declare no competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

REFERENCES

Aksoy, N., & Usta, E. (2020). Ortaokul Öğrencilerinin Eğitim Bilişim Ağı (EBA) Sistemindeki Dijital Rozet Kullanımına İlişkin Görüşleri. *Turkish Journal of Primary Education*, *5*(1), 59-64. 10.16949/turkbilmat.341178

Buckley, P., & Doyle, E. (2016). Gamification and student motivation. *Interactive Learning Environments*, *24*(6), 1162-1175. https://doi.org/10.1080/10494820.2014.964263

Caponetto, I., Earp, J., & Ott, M. (2014). Gamification and Education: A Literature Review. *Proceedings of the 8th European Conference on Games-Based Learning - ECGBL 2014*, *1*, 50-57.

Chugh, R., & Turnbull, D. (2023). Gamification in education: A citation network analysis using CitNetExplorer. *Contemporary Educational Technology*, *15*(2), ep405. https://doi.org/10.30935/cedtech/12863

Çin, S. (2022). *Oyunlaştırma temelli matematik eğitiminin öğrencilerin akademik başarılarına, motivasyonlarına ve girişimcilik becerilerine etkisi* [Yüksel Lisans Tezi]. Gazi Üniversitesi. Ankara

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: Defining "gamification". *Proceedings of the 15th International Academic MindTrek Conference: Envisioning*

Future Media Environments, 9-15. https://doi.org/10.1145/2181037.2181040

Dichev, C., & Dicheva, D. (2017). Gamifying education: What is known, what is believed and what remains uncertain: a critical review. *International Journal of Educational Technology in Higher Education*, *14*(1), 9. https://doi.org/10.1186/s41239-017-0042-5

Dirik, D., Eryılmaz, İ., & Erhan, T. (2023). Post-Truth Kavramı Üzerine Yapılan Çalışmaların VOSviewer ile Bibliyometrik Analizi. *Sosyal Mucit Academic Review*, *4*(2), 164-188. https://doi.org/doi: 10.54733/smar.1271369

Eray, F. (2022). *Ortaokul 8. Sınıf öğrencileri üzerinde yürütülen oyunlaştırma tabanlı etkinliklerin öğrencilerin motivasyon, öz yeterlik ve matematik kaygılarına etkisi* [Yüksel Lisans Tezi]. Aydın Adnan Menderes Üniversitesi, Aydın.

Hainey, T., Connolly, T., Boyle, E., Ford, A., & Razak, A. (2016). A systematic literature review of games-based learning empirical evidence in primary education. *Computers & Education*, *102*. https://doi.org/10.1016/j.compedu.2016.09.001

Karagöz, B., & Şeref, İ. (2020). Yazma becerisiyle ilgili makaleler üzerine bir inceleme: Web of Science veri tabanında eğilimler. *Ana Dili Eğitimi Dergisi*, *8*(1), 67-87. https://doi.org/10.16916/aded.619090

Karamert, Ö. (2019). *Oyunlaştırmanın 5. Sınıf matematik dersindeki başarıya ve tutuma etkisi* [Yüksel Lisans Tezi]. Düzce Üniversitesi.

Kim, S., Song, K., Lockee, B., & Burton, J. (2018). *Gamification in learning and education*. Springer Nature.

Mielgo-Conde, I., Seijas-Santos, S., & Grande de Prado, M. (2022). Systematic Literature Review: Benefits of video games in Primary Education. *Innoeduca-Internatıonal Journal Of Technology And Educatıonal Innovatıon*, *8*(1), 31-43. https://doi.org/10.24310/innoeduca.2022.v8i1.11144

Nisbet, S., & Williams, A. (2009). Improving students' attitudes to chance with games and activities. *Australian Mathematics Teacher*, *65*(3), 25-37.

Pehlivan, F. (2020). *Dönüştürülmüş sınıflarda oyunlaştırmanın matematik başarısına, güdülenme ve öğrenme stratejilerine olan etkisi* [Yüksel Lisans Tezi]. Aydın Adnan Menderes Üniversitesi, Aydın

Robson, K., Plangger, K., Kietzmann, J. H., McCarthy, I., & Pitt, L. (2015). Is it all a game? Understanding the principles of gamification. *Business Horizons*, *58*(4), 411-420. https://doi.org/10.1016/j.bushor.2015.03.006

Sakai, K., & Shiota, S. (2016). *A practical study of mathematics education using gamification*. International Conferences ITS, ICEduTech and STE.

Seaborn, K., & Fels, D. I. (2015). Gamification in theory and action: A survey. *International Journal of Human-Computer Studies*, *74*, 14-31. https://doi.org/10.1016/j.ijhcs.2014.09.006

Silva, J., & Maran, V. (2020). Gamification applications in mathematic education: A systematic mapping. *Ciência e Natura*, *42*, e90. https://doi.org/10.5902/2179460X42317

Türkmen, G. P. (2017). *Oyunlaştırma yöntemiyle öğrenmenin öğrencilerin matematik başarılarına ve derse yönelik tutumlarına etkisi* [Yüksel Lisans Tezi]. Erciyes Üniversitesi, Erciyes.

Uğurel, I., & Moralı, S. (2008). Matematik ve oyun etkileşimi. *Gazi Eğitim Fakültesi Dergisi*, *28*(3), 75-98.

Werbach, K., & Hunter, D. (2012). *For the win: How game thinking can revolutionize your business*.

Yalçın, T. (2018). Matematik eğitiminde anlamlı oyunlaştırma. *1. Uluslararası Çağdaş Eğitim ve Sosyal Bilimler Sempozyumu Bildiri Kitabı*, *1*, 237-243.