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Role of Digital Humanities in Libraries: Mapping Gamification Gimmicks

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ABSTRACT

Libraries have started incorporating game-like elements into their services, while the latter have added game-based facilities to their collections. Now a days, Gamification is a well-known concept in education and marketing. It entails incorporating game-like features into a certain process. It can serve to attract people's attention, interest them in a specific activity, and affect their behaviour. Gamification can be used to grab library users' attention, engage them in game-like library activities, and impact their overall library user behaviour. Ten years of data from 2013 to 2023 was extracted from Web of Science, and R Software (*Biblioshiny*) has been used for visualising the extracted data. Findings are mainly based on indicators like- most relevant sources, authors, globally cited documents, affiliations, country scientific production, three field plot, word growth, keyword plus and co-occurrence network. This study emphasises the importance of Gamification in library culture as it motivates users and makes learning more engaging.

Keywords: Gamification; Digital humanities; Biblioshiny; RStudio; Game-based learning; Gamified e-library services

1. INTRODUCTION

Gamification entails implementing game-based ideas, techniques, and qualities in scenarios that are not traditionally associated with gaming. Gamification is the incorporation of game mechanics and game thinking into non-game activities. It is one of the educational methods and strategies that raise students' motivation and involvement.[1] Hamari opined that 'gamification' encompasses a broad spectrum of economic, social, cultural, and technological shifts that make everyday life more like a game. It provides more opportunities for learning and development in problem-solving, organisation, mood regulation, leadership, empathy, and motivation.[2] To enhance processes and improve experiences in non-gaming contexts, the utilization of game mechanics is referred.[3] The basic game elements are feedback, goals, badges, a point system, a leader board and user levels.[4] Hyrynsalmi, Kimppa and Smed discussed gamification ethics as it is the study and comprehension of good and wrong conduct by or with gamified solutions. As gamification plays on people's inherent desire to play, developers must take ethical concerns into account.[5] Bradley highlighted the three tool paradigms, i.e., a tool for making, exploring and thinking.[6] PoemViewer, Tapor, Omeka, Juxtacommons, TXM, Voyant tools and Wordhoard, Mallet, Gephi, R, D3.js, Google Ngram Viewer, RAW, ManyEyes, Scalar, Second Life, GISArc, GEPHI are some prominently used digital humanities tools.[7]

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1.1 Studies on Digital Humanities and Gamification

The most influential texts, writers, nations, and organisations were determined by Bassanelli, et al., who also investigated how trends changed over time. Further, they stated that the research community is constantly expanding, but it is primarily based on outdated and diverse theoretical texts, which continue to serve as the foundation for future publications, leading to a disregard for recent materials. The number of scholarly articles on gamification has grown during the past few years. It has been used in various sectors, such as learning and training, mental health, encouraging good behaviour and behaviour change, hiring and training staff, etc.; as a result, the scientific community has dispersed throughout various domains and with various goals.[8] The difficulties of constructing the terminological base of multidisciplinary areas of scientific inquiry

to uncover new information, make predictions, and detect the effects of public discourse on the dynamics of scientific interests. In addition, the paper highlights gamification as an interdisciplinary field and illustrates a complicated approach to contextual knowledge research with scientific text mining using the topic of "gamification in the major realms of digital society" as an example.[9] However, Zohari, et al. studied scientific publications to discover production trends, topic areas, countries, institutions, authors, and co-authorship patterns in serious games, gamification, and game-based learning in medical education.[10] Similarly, Nadi-Ravandi and Batooli conducted a scientometric analysis of the co-occurrence and content of systematic review and meta-analysis on gamification in education.[11]

2. GAMIFICATION IN LIBRARIES

Evidence for the usefulness of game-based learning has been accumulating in recent years. Despite the widespread use of game-based technologies and the growing importance of games in people's daily lives, game-based learning has lagged. Many teachers still don't see the value in using games in the classroom because they see them as a novel and potentially disruptive type of information technology.[12] Gamification is an effective strategy for luring, enticing, and encouraging consumers to use library services. Gamification in library services will increase patron engagement and interaction, enhancing public perception of the library among current and potential users.[13-14] Students can take benefit from the gamified orientation experience in that it serves its original aim of orienting users to the library and encourages continued use of the actual physical library. New outreach tactics must be considered now that physical library traffic has significantly decreased. After playing LibGO (short for library game orientation), participants gave feedback through an online survey. Interactive storytelling has previous applications in librarianship to create an immersive and self-guided user experience.[15] Gamification addresses engagement issues, emphasising the enjoyable aspect and honing linguistic abilities. Library orientation, website, databases, and education are a few instances of gamified e-library services.[16]

3. GAMIFICATION TOOLS

The resources are available to teacher-librarians who want to use either approach to create exciting lessons. To create surveys and prompt discussions, teachers use interactive quizzes and class response systems such as Quizizz, Socrative, and Kahoot!

In Virtual escape rooms, students are given a mission or quest to complete while being led by an immersive storyline and given hints to assist them. Librarians can introduce students to library resources or teach information literacy through escape room games. For example, EBSCO developed a trans disciplinary escape room project to provide kids in grades five through eight practices of searching in Explora. Another option is Coding Clubs, which help prepare students in grades K-12 for careers in technology by teaching them computer science and computational thinking. Libraries that provide coding courses equip students with the skills they need to become active participants in the rapidly expanding field of digital media production.[17]

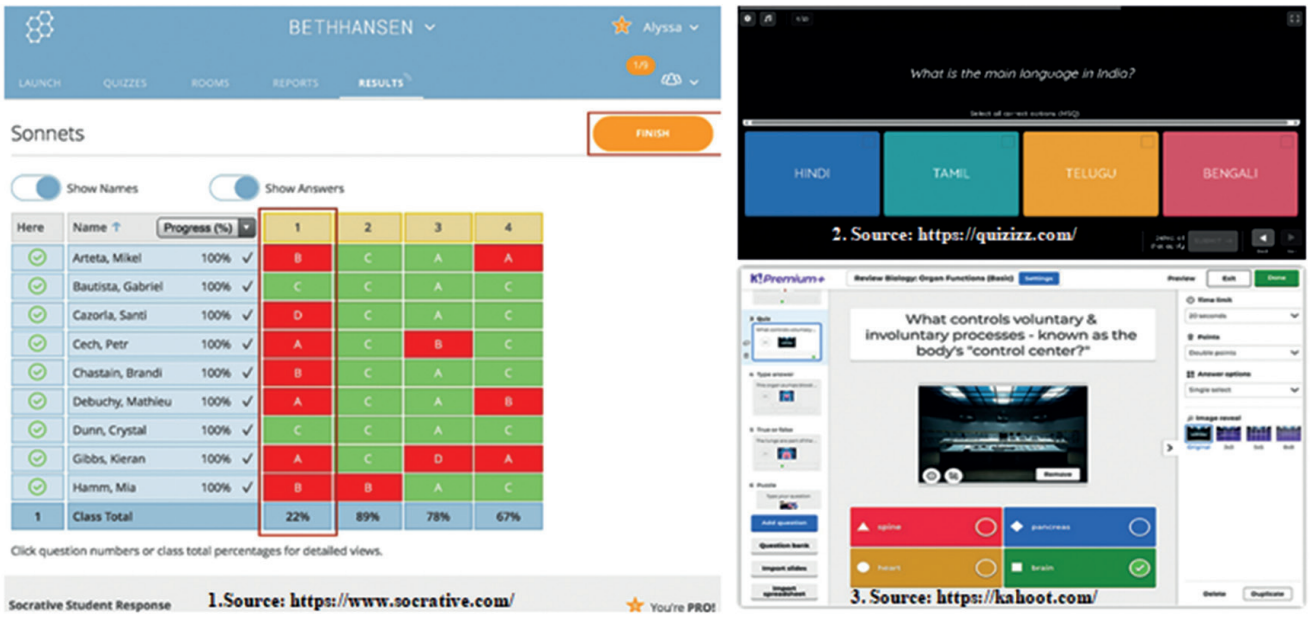


Figure 1. Gamification tools.

4. OBJECTIVES

- To know the most relevant authors and affiliations
- To find out the most prominent documents and source
- To illustrate the three-field plot of author, affiliations, and country
- To investigate the trend and growth in the field

of 'gamification'
- To know research on 'gamification' in the library and information science.

5. METHODOLOGY

The following illustrations show the overall methodology of the studies.

The three main components of the research method are database selection, data analysis, and data visualisation. Researchers have chosen the Web of Science (WoS) to collect data in the "Gamification" field. The term "Gamification*" was searched in the topic field of basic search in WoS. And WoS*Topic* field contains the title, abstract, author keywords, and Keywords Plus. All records from 2013 to 25 February 2023 have been extracted, which counts 4885 documents. Following the english language filter, 4778 results were selected for further analysis. Biblioshiny has been utilised to analyse the retrieved data to determine the degree of relationship between the variables. Biblioshiny is an analysis tool for bibliometrics.[18] The command 'bibliometrix::biblioshiny' was entered into the terminal portion of RStudio, which opened a web interface for further analysis. Moreover, MS Excel has also been used for the tabulation of data. Regarding data visualisation, mapping was done using the indicators in the figure.

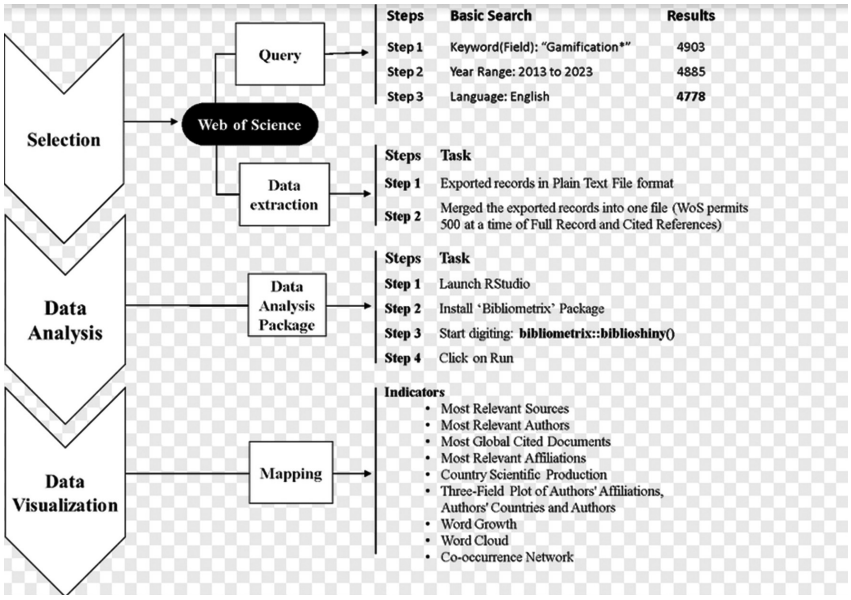


Figure 2. Methodology.

6. RESULTS

The table shows that data have been taken from 2013 to 2023. The total extracted documents are 4778. Among the total number of documents, different sources, including journals, books, etc., are 1564. It consists of 2327 articles in total, 180 articles; book chapter, 159 articles; early access and article; proceedings paper is 43. However, the article; publication with an expression of concern is only 1. Consequently, it contains 9 books, book reviews and 1 book review; early access. However, it contains 136732 references and 13861 authors in total. Out of which author appearances are 17992, authors of single-authored documents are 516, authors of multi-authored documents are 13345 and single-authored documents are 600. However, it contains 0.345 documents per author, 2.9 authors per document and 3.77 Co-authors per document. Through collaboration Index is 3.19. However, it contains six corrections of errors. The average year from publication is 4.09, the average citations per document are 11.91, and the AVERAGE citations per year per doc is 2.121. Simultaneously, it contains 63 total editorial materials. Among which editorial material; book chapter is 14, editorial material; early access is 1. There are 12 letters, 102 meeting abstracts and four news items. The total proceeding papers are 1537; one reprint and one retraction are shown. There are 278 reviews, out of which 3 are reviews; book chapters, and 22 are reviews early access.

The highest record count of 754 (15.781 %) were noticed in 2021, followed by 738 (15.446 %) in 2022. However, the lowest record count was noticed in 2013, i.e., 50 (1.046 %), followed by 55 (1.151 %) in 2023. Subsequently, in 2019, the record count was 697 (14.588 %), followed by 652 (13.646 %) in 2020. In 2018, the record count reached 556 (1.637 %), followed by 486 (10.172 %) in 2017. However, in 2016, it was 405 (8.476 %), followed by 231 (4.835) in 2015. Though in 2014, the record count was 154 (3.223 %).

Figure 4 shows that research on sustainability has 140 studies, followed by 80 papers on computers and human behaviour. JMIR Serious Games has 68 publications, whereas Frontiers in Psychology has 54. In contrast, IEEE Access has 49 publications, and the International Journal of Environmental Research and Public Health has 52. Forty-eight publications were published at the 9th International Conference on Education, New Learning Technologies, and Computers & Education. As there are just 45 publications, Edulearn18: 10th International Conference on Education and New Learning Technology has the least number of publications.

Table 1. Main information about the collection

	Description	Results		Description	Results
Main information about data	Timespan	2013:2023	Document Types	article; proceedings paper	43
	Sources (Journals, Books, etc.)	1564		article; publication with an expression of concern	1
	Documents	4778		book	9
	Average years from publication	4.09		book review	14
	Average citations per document	11.91		book review; early access	1
	Average citations per year per doc	2.121		correction	6
	References	136732		editorial material	63
Document contents	Keywords plus (ID)	3762		editorial material; book chapter	14
	Author's keywords (DE)	9626		editorial material; early access	1
Authors	Authors	13861		letter	12
	Author appearances	17992		meeting abstract	102
	Authors of single-authored documents	516		news item	4
	Authors of multi-authored documents	13345		proceedings paper	1537
Authors collaboration	Single-authored documents	600		reprint	1
	Documents per author	0.345		retraction	1
	Authors per document	2.9		review	278
	Co-Authors per documents	3.77		review; book chapter	3
	Collaboration index	3.19		review; early access	22
	article; book chapter	180			
	article; early access	159			

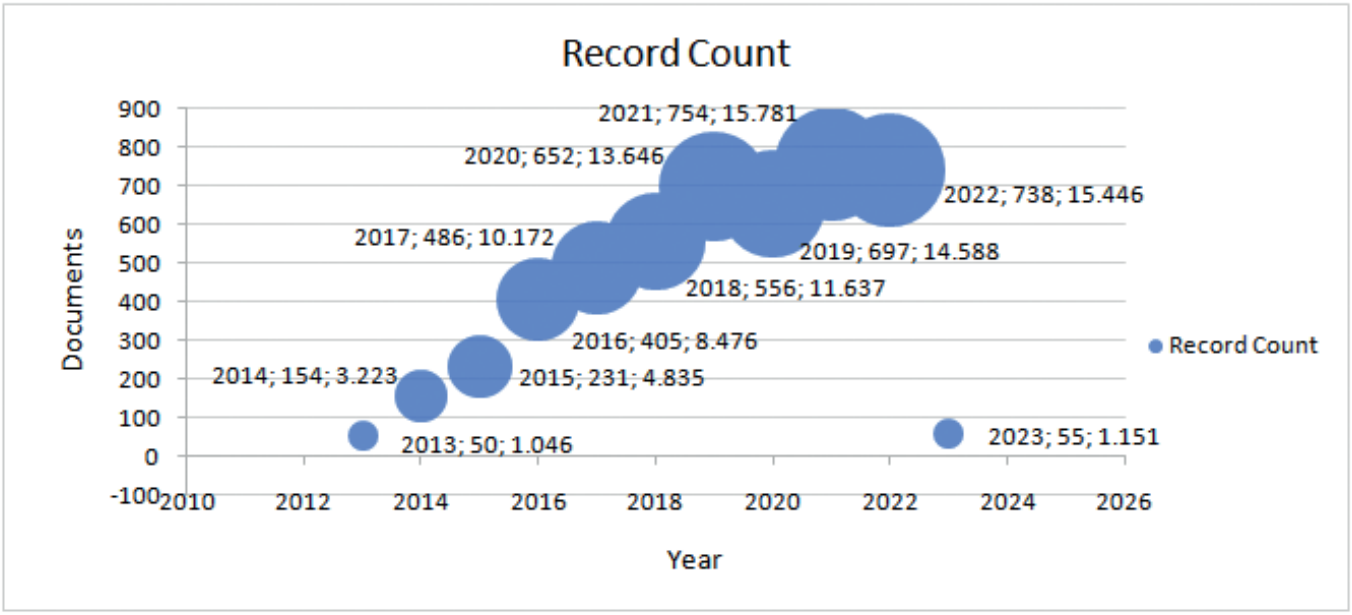


Figure 3. Year-wise research growth.

Figure 5 shows that Hamari has the highest number of published documents, i.e., 52, followed by Kim with 28 documents and Isotani (26 documents). However, Chu and Bittencourt have 12 publications each which Rapp, Landers and Hew least follow with 13 documents each.

Figure 6 depicts that 'Seaborn K, 2015, Int J Hum-Comput St' has the highest number of global citations, i.e. 894, followed by 'Dominguez A, 2013, ComputEduc' with 785 and 'Hanus MD, 2015, ComputEduc' 724 global citations. However, 'Koivisto J, 2014, Comput Hum Behav' is having least global citations with 383.

The discovered sample's most relevant gamification-related research affiliations are shown in figure 7. The University of Pennsylvania, with 86 publications, comes first on the list, followed by the University of Granada, with 77 articles. However, with only 43 papers, the

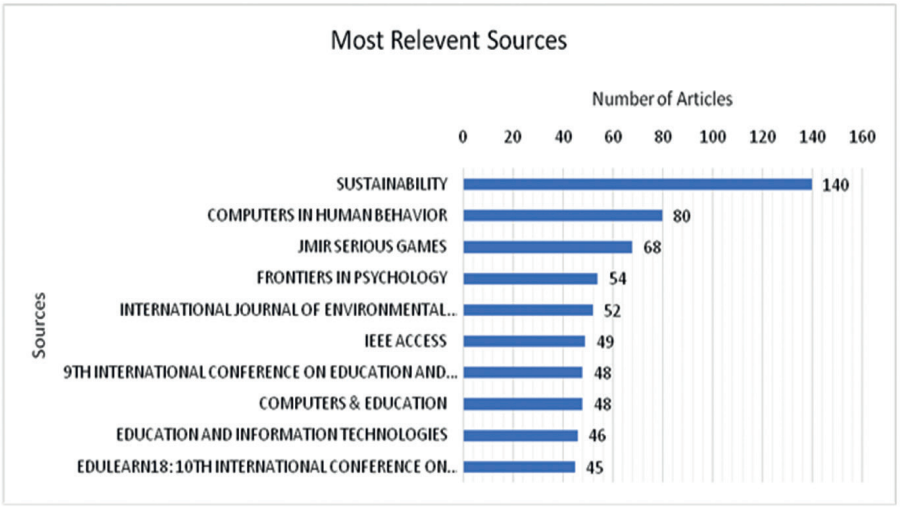


Figure 4. Most relevant sources.

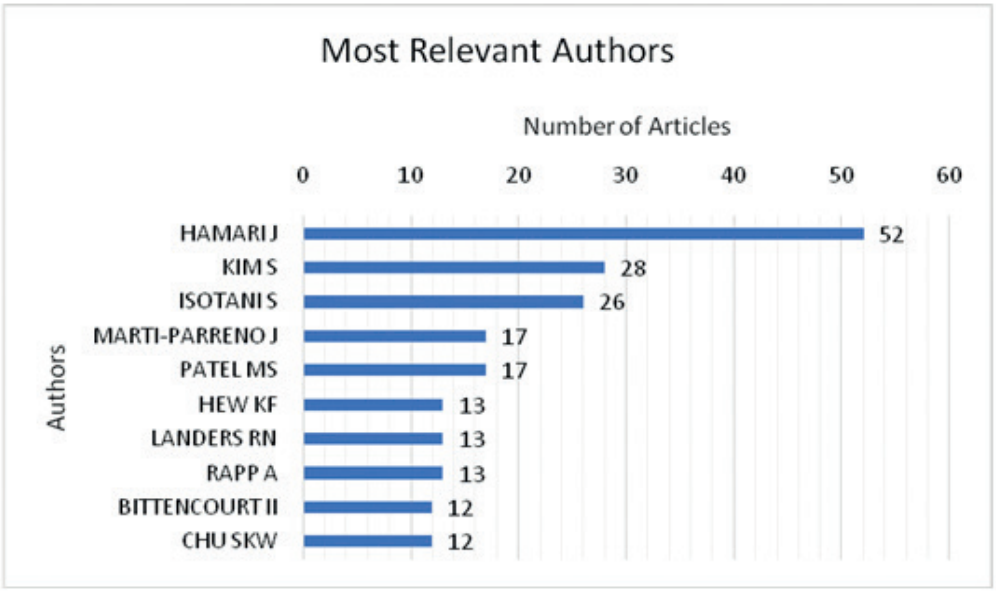


Figure 5. Most relevant authors.

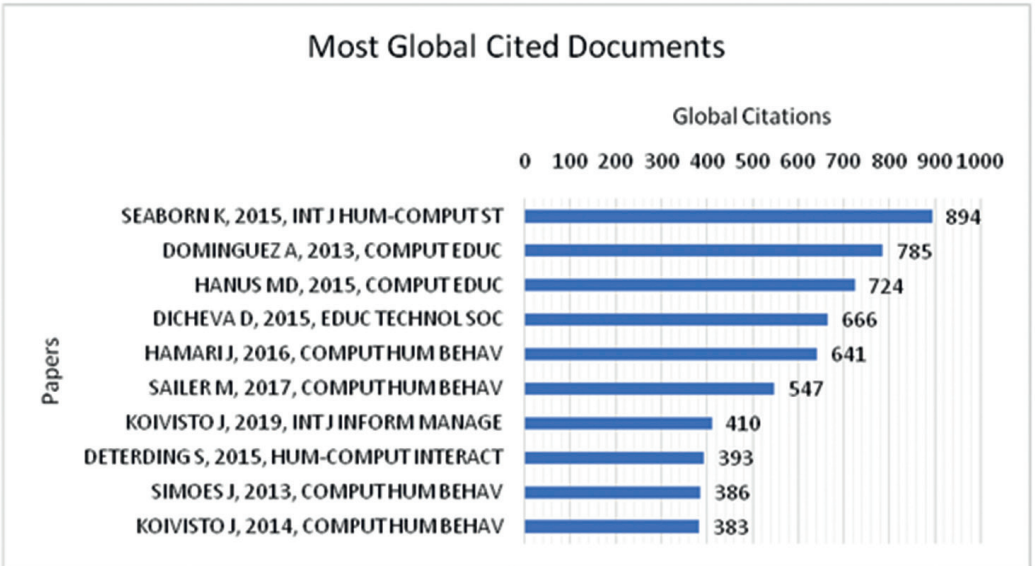


Figure 6. Most globally cited documents.

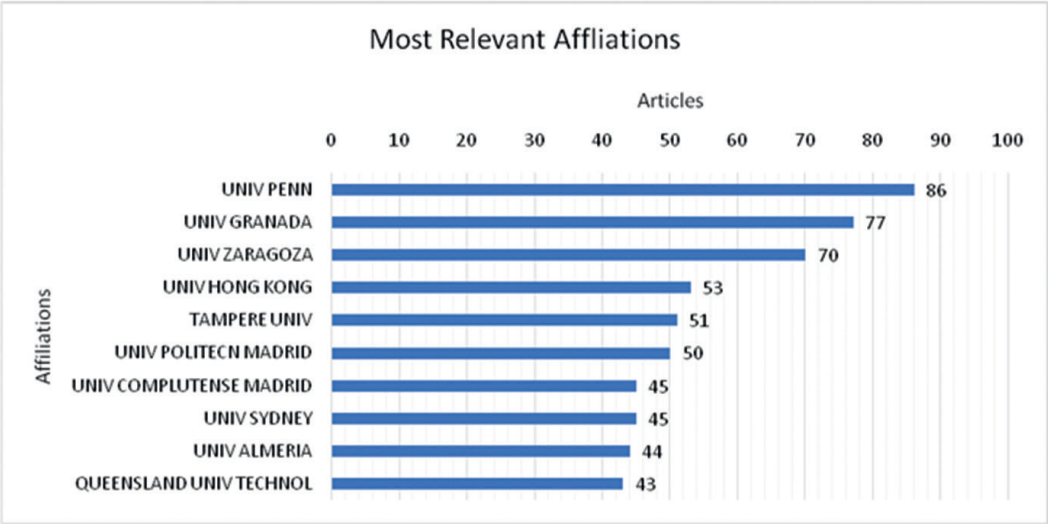


Figure 7. Most relevant affiliations.

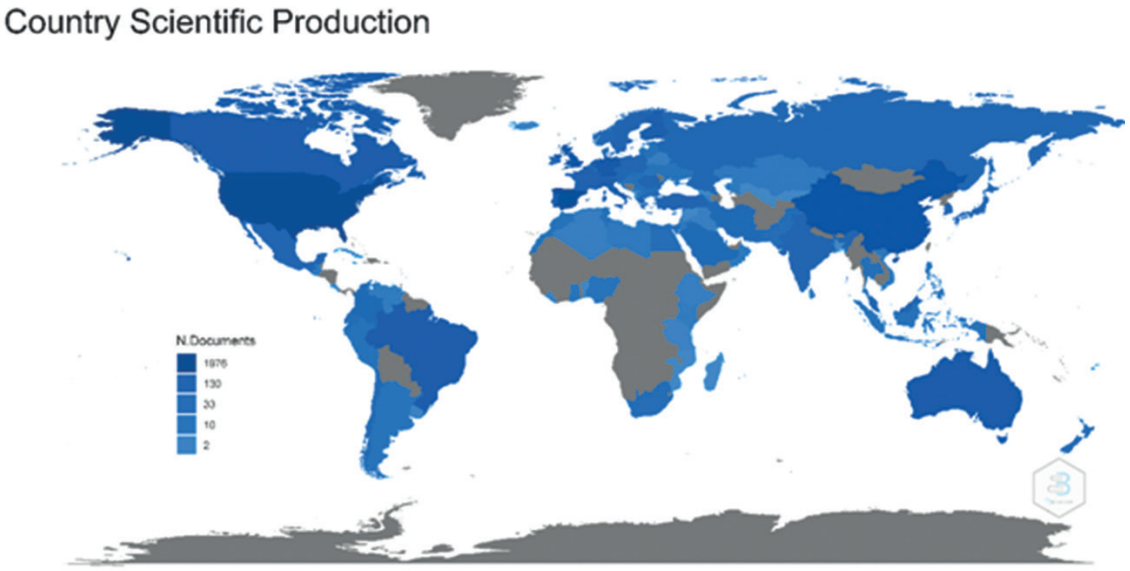


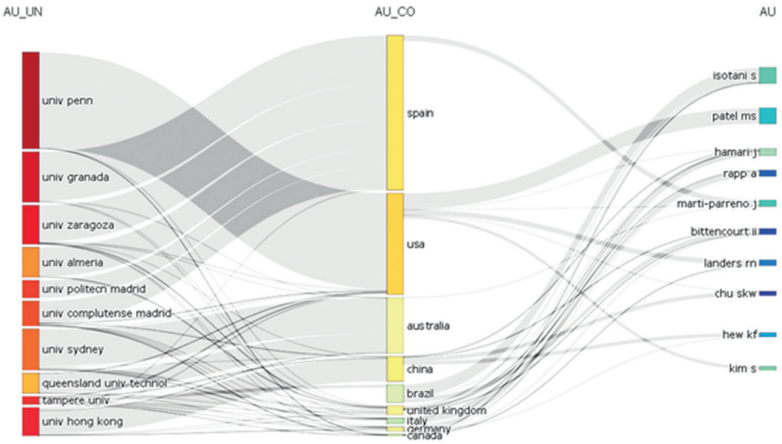
Figure 8. Scientific production of country.

Queensland University of Technology has the lowest number. However, the University of Sydney and the University of Complutense Madrid have 45 articles each.

Figure 8 depicts a globe map divided into five blue colour categories representing countries and their research output. It demonstrates that the majority of documents are published in the United States (1976 documents), Spain (1372 documents), and China (819 documents). Furthermore, numerous research has been published in the United Kingdom, Germany, and Australia. Italy (309 documents) and Finland (307 documents) are modest document producers among the top ten countries.

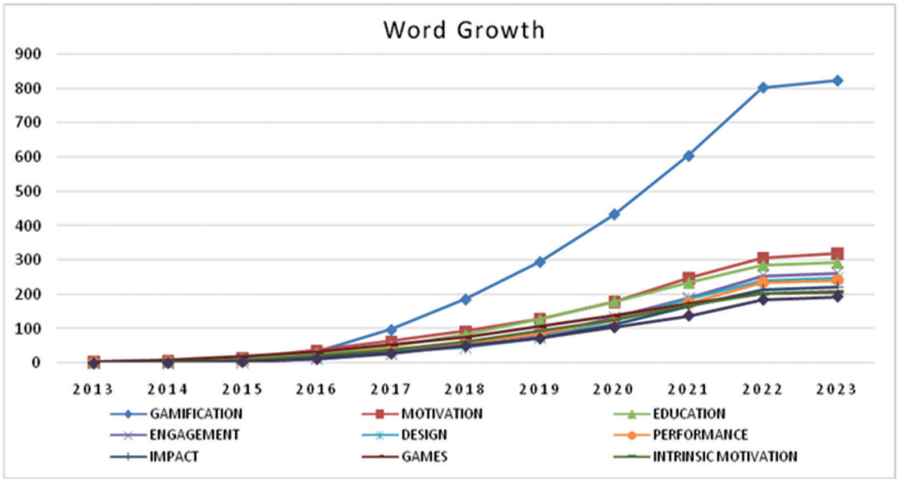
Figure 9 depicts the three indicators: the authors, their affiliations, and their nations. It depicts the top scholars who have contributed the most to research on the chosen topic, 'Gamification.' According to the data, the University of Pennsylvania in the United States makes the most significant contributions, followed by the University of Granada in Spain and the University of Sydney in Australia (Australia). When it comes to country studies, Spain has the most (864 documents with six affiliations), followed by the US (565 documents) and Australia (310 documents). In contrast, the United States has seven incoming and six outgoing flows, while China has five entering and four outgoing flows. Isotani S and Patel MS have the same points in the author field; however, Isotani S has higher incoming flow counts (4) than Patel MS (1).

Using keywords plus, the top ten words were selected. Figure10 shows that, out of 10 words, 'Gamification' has steadily increased over the previous ten years. The term 'Gamification' is becoming increasingly popular, particularly since 2016. After the phrase 'Gamification,' the word 'Motivation' comes in second. And the remaining words are close to the word 'Motivation'. Notably, there is a three-times difference between 'Gamification' and other words.



Three-Field Plot:AU= Authors; **AU_UN-**Authors' Affiliations; **AU_CO=**Authors' Countries

Figure 9. Three-field plot.



Top 10 Keywords Plus: Field= Keywords Plus; Occurrence= Cumulative

Figure 10. Yearly word growth.

WordCloud: keywords Plus: 50; Word occurrence measure= Frequency

Figure 11. WordCloud.

WordCloud illustrates technical terminology based on 'keywords Plus' that are generated automatically by a computer algorithm. It shows that Gamification is the most often used term in the texts, appearing 889 times. In contrast, the term "education" was used 343 times, followed by 'motivation' (303).

The above figure primarily generates three co-occurrence networks. 'Gamification' is the primary term that creates a network with 'intrinsic motivation' and 'behaviour.' In another way, 'Gamification' creates a semantic link with two other cluster groups.

About 200 documents were found in the library and information discipline. Based on the extracted data, three figures were obtained. The figure contains three significant illustrations: annual scientific production, sources' production, and most cited documents globally in the library and information science discipline. The figure shows that since 2013, there has been an increasing pattern in research production. The highest number of documents was published in 2017, which slightly decreased in 2018, but increased again in the remaining years with slight differences. The figure also shows the number of publications in five different academic journals related to gamification research from 2013 to 2023. The sources are 'International Journal of Information Management', 'Gamification: Using Game Elements in Serious Contexts', 'Information Technology & People', 'European Journal of Information Systems', and 'Information & Management'. The first document was published in 2015 in 'International Journal of Information Management'. The publications increased each year and peaked in 2023, with 61 documents across all five sources. The paper "KOIVISTO J, 2019, INT J INF MANAGE" is at the top with 429 citations globally, followed by "HAMARI J, 2015, INT J INF MANAGE" with 263 citations. The remaining papers have fewer citations. The least cited paper in the figure is "CHEN Q, 2020, INF PROCESS MANAGE", with 75 citations.

7. CONCLUSIONS

Around 5,000 study records published in the last ten years were included for the analysis. Most of the results are research articles. The majority of the documents were published in 2021. However, the investigation found that the number of studies have been increasing in the selected era, which reflects the selected topic's expanding trends. Sustainability, a journal published by MDPI, has the most documents in the area. Hamari has the biggest number of documents among the most relevant authors. Similarly, the University of Pennsylvania produces the most articles among the affiliations. The study done by Seaborn is one of the most cited documents in the world. Additionally, the United States is a major producer of studies on Gamification. Isotani is a prominent author with a wide range of collaborations. Since 2016, the term gamification has been used extensively, ranking first among other significant topics in digital humanities. Furthermore, the study found that Gamification was the most popular during the decade.

Regarding library and information science, it contains around 200 studies among the extracted data. The publication peak was seen in 2017, with the highest number of studies reported in the International Journal of Information Management. The paper by KOIVISTO J, titled 'INT J INF MANAGE', is the top-cited document across the publications.

Gamification (game-based learning) has undoubtedly gained popularity during the pandemic, but its relevance in education cannot be belittled. The recent trend in using gamification tools, such as interactive quizzes, digital badges, and virtual escape rooms, has opened a new dimension to attract patrons and popularise their information products. The developing nations have yet to explore the opportunities of Gamification to enhance educational tools, including libraries, for optimum use .

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For this work, he conceived the idea of global research mapping on 'gamification' and extracted the relevant data from select databases.

Dr M MasoomRaza is a Professor in the Department of Library and Information Science at Aligarh Muslim University, Aligarh. With extensive experience, he has supervised nearly 100 Master's dissertations and eight PhD dissertations. He has completed three major research projects funded by UGC. He has also actively participated in numerous national and international conferences and has published 65 articles in various professional journals and books related to Library and Information Science. His contribution includes the idea of integrating gamification with libraries and providing continuous guidance throughout the study.

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Dr Keshwar Jahan is an Assistant Professor in the Department of Library and Information Science at Aligarh Muslim University (AMU). She holds a PhD in Library and Information Science from the same department. She has about seven years of experience in teaching and research. She has a considerable number of publications to her credit. Her research interests include User perception and satisfaction and Knowledge resource sharing. Her contributions to the work include proofreading, technical corrections and drafting the final manuscript.