A Bibliometric study on Gamification and its Role in Users Engagement

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Abstract

Gamification is an innovative marketing tool and emerging trend that is helpful in engaging, motivating and modifying the user's behavior towards desired attitude. It is a technological trend used by most organizations for gaining user's engagement in desired tasks/activities. Engagement refers to an individual's response towards a product or service, which is vital for the survival of every organization. The aim of this study is to examine the relevance and progress of the "gamification" and "user engagement" concept on literature available in the Web of Science database and retrieved 259 articles from time period (2013-2022) by searching the keywords gamification and user engagement in Title, Keywords and Abstract field as well. This study has been based on bibliometric analyses and identified a total of 911 authors, in which Hamari J. was the most prominent author. The maximum number of publication exists in the year 2021. The most productive three main countries were the U.S.A, Portugal, and the U.K. The most relevant journal was "Computer in Human Behaviour". Analysis and Visualization is done with the help of R Cloud and VOS Viewer software. This bibliometric study provides an inclusive overview of gamification used as an innovative tool for user engagement in every sector, which helps researchers, practitioners, and Marketers to better understand the importance of gamification and its implication. Gamification is new concept and exists in its infancy stage. Hence, Indian research output on gamification is quite low in the global context.

Keywords: Gamification, Game mechanics, User engagement, and Bibliometric analysis.

Introduction

Many years ago games were only used for fun and entertainment purposes but due to advent of technology and easy availability of internet access, a new term originates "gamification". Or you can say now a day's online gaming is used not to just entertain people but to engage them in particular activity and to enhance their experience. So, the term "gamification" became popular among corporations or

businesses because they faced problem in gathering customers due to cut throat competition. Gamification was originated in 2008 as an emerging technology among business concerns especially in marketing (Deterding et al., 2011), but this concept was invented by Nick Pelling in 2002 (Prasad, 2021). In fact, it gained popularity in 'non-gaming context' in the year 2010 (Zichermann& Cunningham, 2011). Now days, gamification strategies are not restricted to only marketing sectors but it gained popularity among health sector, education, recruitment, human resource, learning & development, training centers and research institutes (Prasad, 2021 and Seaborn & Fels, 2015). Gamification is valued at $12 billion currently and predicted to grow 30% annually to hit $31 billion by 2024(economictimes.com).

Gamification is an innovative marketing tool and emerging trend that is helpful in engaging, motivating and modifying the user's behavior towards desired attitude. Many business firms launch gamification techniques time to time because gamification can influence and motivate users by awakens curiosity, foster competition and creates a sense of control like "Myntra" the popular e-commerce application. In 2019, they adopt gamified elements to boost customer acquisition and retention and promote their "End of Reason Sale" campaign. Users play games like spin the wheel and quizzes within the app, for collecting points and join loyalty program to win rewards. Like this, there are various examples of firms which use gamification mechanics for user engagement and to change their behavior. Various researchers also supported the above statement like, Seaborn & Fels, (2015) describe the gamification as an interactive system that aim to motivate and engage end-users through the use of game elements.

Gamification mechanics has the potential to benefit organizations by influencing and modifying the behavior and attitude of people (Yang et al., 2017). As Garter (2011) stated that 70% world's largest public companies will adopt at least one gamified application in upcoming years. At the same time, Garter (2012) predicted that 80% gamified applications fails to meet business objectives because inappropriate implementation of gamified techniques. The reason behind this, gamification mechanics are integrated with the psychological concepts like perception, attitude, and personality of users (Prasad, 2021). The behavior, attitude and culture of user can influence gamification. So, there is need to explore the individual differences or consumer attitude to better implementation of gamification mechanics.

Literature Review

Gamification

It has been inferred from the extensive literature review that the term gamification came into existence in 2002 by Nick pelling, though the trend of applying game elements into non-gaming contexts in real environment had been introduced long time ago, when a student of elementary school got stars in his notebook and appreciated for getting maximum stars. In 2010, the term 'gamification' became renowned due to widespread of internet all over the world and after that it introduced in corporate sector in the year 2011(McCormick, 2013). According to Deterding et al. (2011) gamification is applying game elements in non-gaming contexts.

Game mechanics

Game mechanics are the game design elements that are included in the games. Deterding defined game design elements as basic building blocks of gamification application (Deterding, et al., 2011; Dixon, et al., 2011; Werbach & Hunter, 2012). They are equivalent to game design patterns (Bjork & Holopainen, 2005; Kelle, Klemke & Specht, 2013). Many researchers proposed several game design elements in gamification context (Kapp, 2012; Robinson & Bellotti, 2013; Werbach & Hunter, 2015; Zichermann& Cunningham, 2011; Zichermann& Linder, 2010). "Ten ingredients of great games" identified by Reeves and Read, (2009) includes narrative context, avatars, feedback, competition and team. Similarly, Werbach and Hunter, (2012) found 15 elements, in which avatars, badges, leaderboards, points and teams were more important among all but they stressed upon "PBL triad" that includes points, badges and leaderboard. In addition, Nasirzadeh & Fathian considered 18 elements in their study (Nasirzadeh & Fathian, 2020). In spite of this, all authors have some similar and different gaming elements, yet there

is a big difference in their list. This difference shows that the selection and implementation of game design elements is arbitrary and subjective.

User engagement

Through an extensive literature, it was identified that there were various researches which discussed on gamification in general and found various elements of gamification. Several other studies have focused on user's engagement through gamification in various domains like education (Dreimane, 2019; Doherty et al., 2017; Christy & Fox, 2014; Filsecker & Hickey, 2014; Mattke & Maier, 2021; Simoes et al., 2013); healthcare (Alahäivälä & Oinas-Kukkonen, 2016; Goh et al., 2017; Hamari & Koivisto, 2015; Jones et al., 2014; Muangsrinoon & Boonbrahm, 2019; Zhao et al., 2016); Tourism (Shouk & Soliman, 2021; Cuadra et. al., 2019); Banking (Rahi & Ghani, 2018); marketing management (Huotari &Hamari, 2017; Lucassen & Jansen, 2014; Xi &Hamari, 2019); science (Morris et al., 2013; Sørensen et al., 2016). Engagement is necessary to meet the objectives of any task or activity. Hence, corporations are more interested to engage customers and employees to meet the objectives of business.

Research gap and Objectives

The primary objective of this study is to examine the relevance and progress of the "gamification" and "user engagement" concept on the available literature on Web of Science (WoS). The concept of gamification and user engagement is highly projected in literature, but still, a bibliometric perspective of this concept is not sufficiently addressed by researchers. Therefore, this exploratory research has been conducted to reduce the gap in the literature related to the terms. In addition to this, this research will be helpful in upgrading the knowledge on this concept.

Therefore, this study has the following objectives:

- To know the Annual scientific production in WoS on "gamification" and "user engagement."
- To determine the most important journals in WoS about "gamification" and "User engagement."
- To identify the most relevant authors in WoS about

"gamification" and "User engagement."

- To identify the Country's scientific production in WoS on "gamification" and "User engagement."
- To examine various collaboration networks on "gamification" and "User engagement."

Material and Method

Research design

Bibliometric analyses with R studio and VOS viewer have been used as the research methodology. A bibliometric analysis is commonly used in several disciplines to help with systematic literature reviews. A systematic literature review refers to "a process to summarize in an explicit way, what is known and not known about a specific practice-related question" (Briner et al., 2009). The basic aim of this study is to identify the role of gamification in enhancing the user's experience and engagement and to provide the theoretical structure for the concept as mentioned earlier. A bibliometric analyses method is efficient, reproductive, and scientifically reliable. Therefore, the researcher chooses this method for this study.
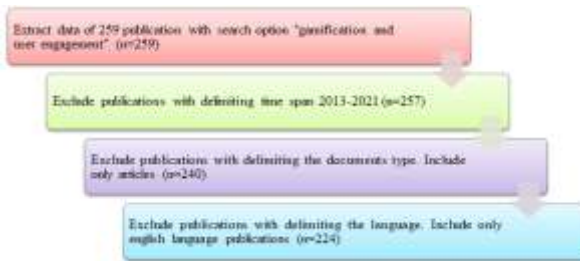
Data collection and analysis

The Web of Science (WoS) database is used for the search and analysis of the articles (www.webofscience.com). It is the search platform provided by Thomson Reuters. Various researchers often use the Web of Science (WoS) repository to do bibliometric analysis due to its database quality.

The following procedure was carried out to conduct this study: -

- Select the Web of science repository for documentary analysis.
- Pick the keywords "Gamification and user engagement."
- Search the keywords in All Fields of registered documents on WoS.

The actions mentioned above extracted the data of 259 Web of Science (WoS) publications. Different criteria have been adopted for refining the document search. The process chart below shows the criteria for including and excluding the publications

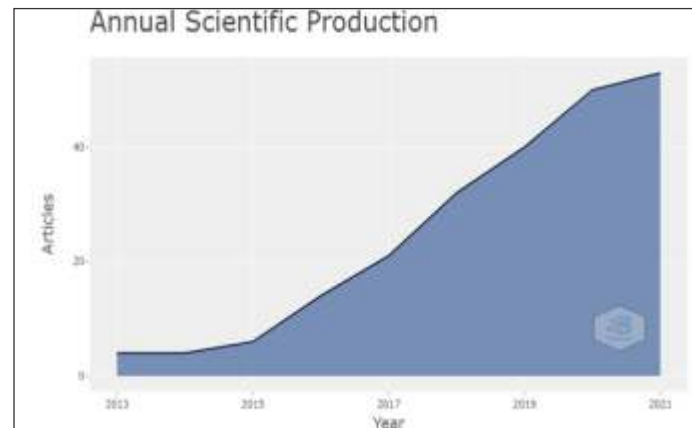*Figure 1 : Yearly Publication*

Results

Main Information

The information of the data which was extracted from Web of Science (WoS) shown in below mention Table 1. A total of 224 publications from the time span of 2013- 2021 were retrieved for final analysis. There were 835 keywords from 911 authors worked on term gamification in relation to user engagement. Total references were 10621 from 125 sources. Average Citation was recorded 20.74 per document. And finally collaboration index of this topic is 4.23. Collaboration index shows the collaborative practices among different nations and authors.

Publications growth on the gamification increased over the period investigated (Figure 2). Gamification identified as a user engagement tool by various researchers. The first study was published in 2013 and after 2015 showed significant growth in average publications. Maximum number of publications exists in the year 2021 with 53 publications.

Most Relevant Journals

Table 1 : Highlight of Data

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2013:2021
Sources (Journals, Books, etc)	125
Documents	224
Average years from publication	3.12
Average citations per documents	20.74
Average citations per year per doc	3.542
References	10621
DOCUMENT TYPES	
article	220
article; book chapter	2
article; proceedings paper	2
DOCUMENT CONTENTS	
Keywords Plus (ID)	524
Author's Keywords (DE)	835
AUTHORS	
Authors	911
Author Appearances	989
Authors of single-authored documents	10
Authors of multi-authored documents	901
AUTHORS COLLABORATION	
Single-authored documents	11
Documents per Author	0.246
Authors per Document	4.07
Co-Authors per Documents	4.42
Collaboration Index	4.23

Number of articles published each year

Table 2 : Relevant Journals

Sources	Articles
COMPUTERS IN HUMAN BEHAVIOR	15
JMIR SERIOUS GAMES	12
SUSTAINABILITY	10
JMIR MHEALTH AND UHEALTH	8
INTERNATIONAL JOURNAL OF HUMAN-COMPUTER STUDIES	6
INTERNATIONAL JOURNAL OF INFORMATION MANAGEMENT	6
COMPUTERS & EDUCATION	5
GAMES FOR HEALTH JOURNAL	5
IEEE ACCESS	4
JOURNAL OF BUSINESS RESEARCH	4
JOURNAL OF MEDICAL INTERNET RESEARCH	4
ACM JOURNAL ON COMPUTING AND CULTURAL HERITAGE	3
FRONTIERS IN PSYCHOLOGY	3
IEEE TRANSACTIONS ON LEARNING TECHNOLOGIES	3
INFORMATION AND SOFTWARE TECHNOLOGY	3
INTERNATIONAL JOURNAL OF ENGINEERING EDUCATION	3
JMIR MENTAL HEALTH	3
SENSORS	3
USER MODELING AND USER-ADAPTED INTERACTION	3
ACM TRANSACTIONS ON COMPUTING EDUCATION	2

This study has identified the top 20 prolific journals in the field of gamification, which is owned by different publishers. The journal with the most significant production is the "Computers in Human Behaviour," which has 15 and is 6.69% of the total published articles within the period below evaluation. This is followed by the "JMIR serious games," which has 12 complete publications, and this stands at 5.35% for the journals. "Sustainability" has ten articles published which stand as 4.46%. The least number of articles published in "ACM Transactions on Computing Education" has only two and is 0.89% of the total published articles shown in Table 2.

Most Relevant Authors
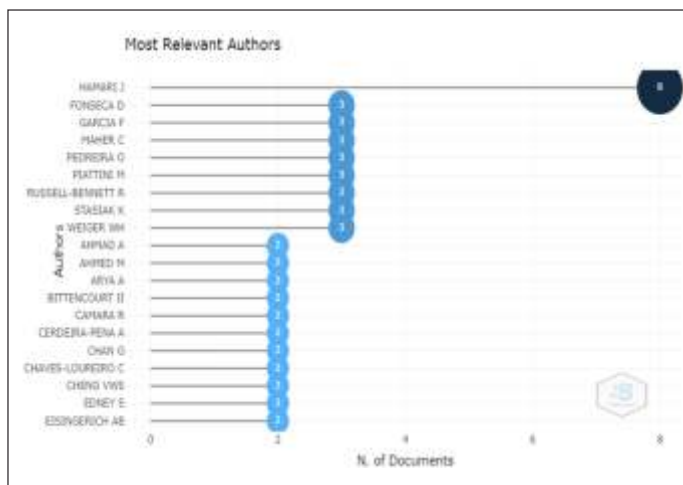
This study also identified the 20 topmost productive authors in the field of gamification, which identified gamification as an effective way to engage users. The most prominent author is Hamari J. He topped the list with the highest number of articles with the highest citation. He authored 08 numbers of articles from 2013 to 2021 with the 729 TC (Total Citation). The next most prominent author is De-Morcos L, who published a single paper with 652 citations. Further, Fonseca D is another author who published three numbers of articles from 2019 to 2021, but he has significantly fewer citations, i.e., 10 TC (total Citation). There are many more renowned authors in this field, the list of top 20 in numbers of articles shown in figure 2 and numbers of citations given in the table 3.

Table : Most relevant Authors

Element	h_index	g_index	m_index	TC	NP	PY_start
HAMARI J	6	7	0.600	729	7	2013
DE-MARCOS L	1	1	0.100	652	1	2013
DOMINGUEZ A	1	1	0.100	652	1	2013
FERNANDEZ-SANZ L	1	1	0.100	652	1	2013
MARTINEZ-HERRAIZ JJ	1	1	0.100	652	1	2013
PAGES C	1	1	0.100	652	1	2013
SAENZ-DE-NAVARRETE J	1	1	0.100	652	1	2013
REDONDO RD	1	1	0.100	341	1	2013
SIMOES J	1	1	0.100	341	1	2013
VILAS AF	1	1	0.100	341	1	2013
GARCIA F	3	3	0.375	209	3	2015
PEDREIRA O	3	3	0.375	209	3	2015
PIATTINI M	3	3	0.375	209	3	2015
BRISABOA N	1	1	0.125	164	1	2015
FLEMING TM	2	2	0.286	154	2	2016
LAU HM	2	2	0.286	154	2	2016
HASSAN L	2	2	0.400	120	2	2018
ASAAD Y	1	1	0.167	113	1	2017
DWIVEDI Y	1	1	0.167	113	1	2017
YANG Y	1	1	0.167	113	1	2017

Countries Scientific Production
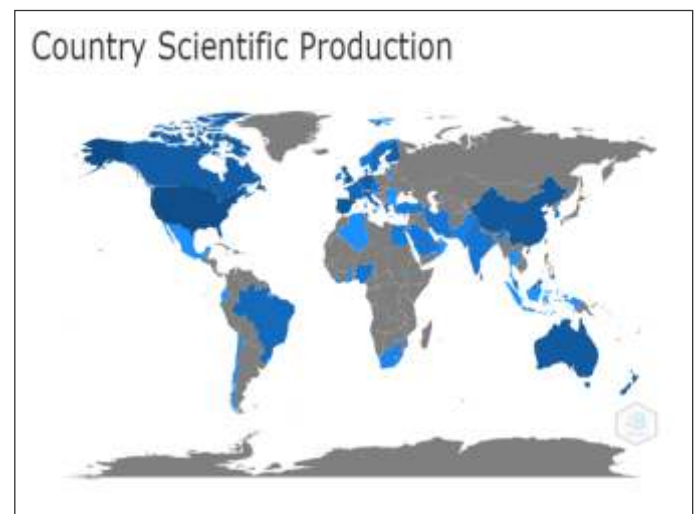
Figure 2 : Country Scientific Production

The above graph (Figure 3) shows more dark blue in color reflects more number of publications from that specific country and visa-a-versa. The U.S.A is most significant in number of publication on gamification. It published 95 articles, highest in numbers among all countries. The second most significant country is Portugal with 79 publications. The list is followed by U.K with 50 numbers of publications. Even, India published only 6 articles and doesn't fall under top 20 lists of significant countries.

Word Cloud

Figure 3 : Most Frequent Word

The magnitude of a number of topics and field covered by gamification proved that it is still in its infancy stage. The above-shown figure 4, formed by using word cloud from R software, shows that the word which is more significant in size is the most frequent word, i.e., engagement, followed by health, among the 835 author's keywords. In this regard, other words, such as motivation, games, mobile apps, serious games, user engagement, user experience, and virtual reality, demonstrate the extension of the scope of gamification in every sector for engaging users or players.
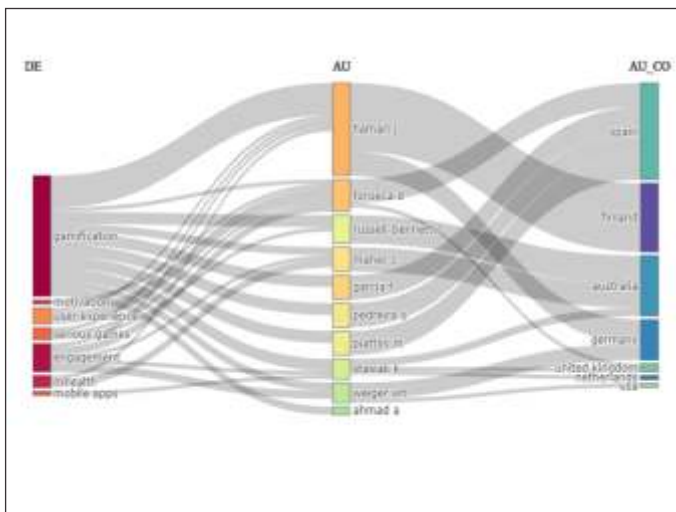
Three Field plot

Figure 4 : Three Field Plot

Figure 5, shows the three fields plot network map of Keywords, authors name and author' countries name, by R Studio software. This three field plot network has also shown the collaborative work of authors with different concepts. All of 10 most frequent keywords used by most productive 10 authors with their respective countries. Gamification is most frequent keyword and Hamari J. is the most prominent author who mostly worked on this keyword.
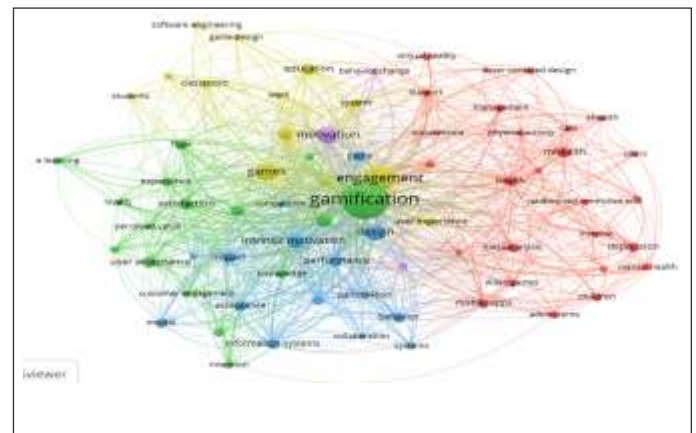
Co- Occurrence Network

Figure 5 : Co-Occurrence Network

The figure 6 shows the co-occurrence network map of all keywords analyzed by VOS viewer software. Default parameters were used for the analyses and creation of network maps. From all 1322 keywords, only 73 keywords meet the threshold by fulfilling the condition of keywords that were used at least five times. "Gamification" keyword used maximum times. The size of the circle represents the number of articles in which each keyword appears, and different colors show the other clusters in which the keyword is co-appeared. In general, the bigger a circle, the more often the keyword is used. Two words are closer to each other if they are more often agreed in the assessed publications. Five different clusters represent five different areas of gamification used for user engagement
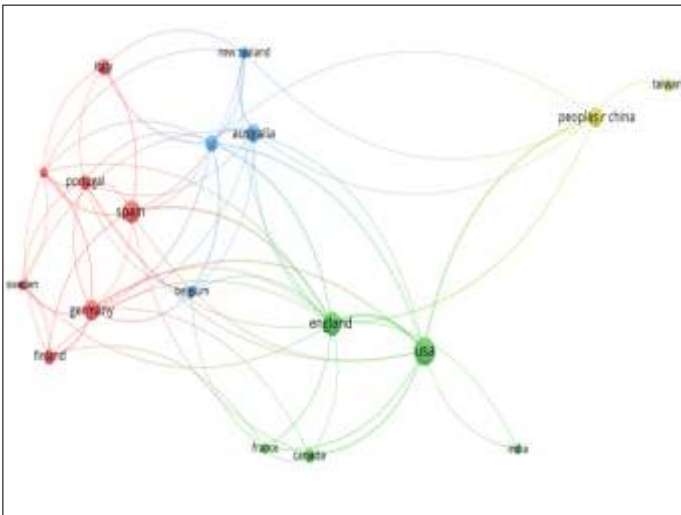
Country Co-authorship Network

Figure 6 : Country Co- Authorship Network

The degree of communication between different nations is shown by the country co-authorship network. In addition, it also represents the significant countries in a particular subject field, i.e., gamification. By using VOS viewer software, the researcher developed the international country collaboration through the help of a co-authorship network by exploring the systematic works of co-authorship among different nations. In the above Figure 7, different countries are denoted by different circles, and the size of a circle represents the number of articles of a country. A line between two countries has shown a collaborative connection between them. The depth of each line shows the strong cooperation and the more number of partnerships among countries. For the creation and analyses of country co-authorship network, we used default parameters. Of the total 55 countries, only 19 meet the threshold. The VOS viewer software divides these 19 circles into 4 clusters. According to the figure, Cluster 1 is red and includes seven countries such as Finland, Germany, Italy, Portugal, Spain, Sweden, and Switzerland. Cluster 2 includes five countries, green in color, like Canada, England, France, India, and U.S.A. Cluster 3 has four counties such as Australia, Belgium, and New Zealand. Finally, cluster 4 has only two countries, including People in China and Taiwan.
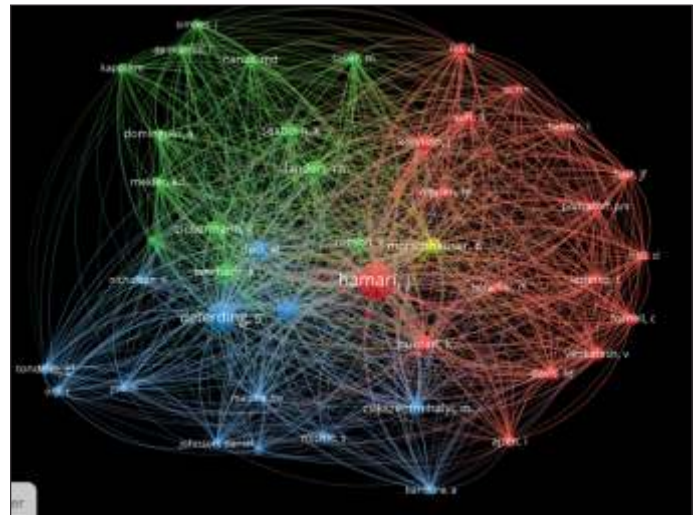
Author Co – Citation Network

Figure 7 : Author Co- Citation Network

The frequency with which two authors cited together has been shown by author co- citation network. Figure 8, Shows author co-citation network map, Default parameters were used for creation and analyses of this network. From 8998 authors, only 44 meet the threshold by fulfilling the criteria of minimum number of citation of an author is 20. The VOS viewer software divides the 44 authors into 4 clusters. Cluster 1 includes 17 authors, Each Cluster 2 and cluster 3 includes 13 authors. Finally cluster 4 includes only 1 author.
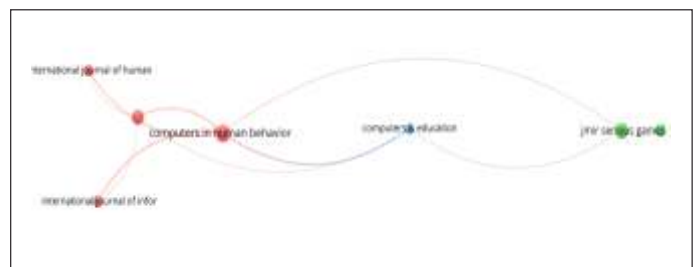
Source Citation Network

Figure 8 : Source Citation Network

Figure 9, Shows source citation network map, Default parameters were used for creation and analyses of this network. From 135 sources, only 8 meet the threshold by fulfilling the criteria of minimum number of documents of source is 5. The VOS viewer software divides the 8sources into 3 clusters. Cluster 1 includes 4 journals, Cluster 2 includes 2 sources and finally cluster 3 includes only 1 source.

Conclusion

This bibliometric study analyzed the total number of 224 publications related to gamification which enhances the user engagement in different sectors. Data were extracted from the Web of Science database. The analysis of data presents some novel findings. First, this study found that gamification is in its early infancy stage, as shown by figure 2 that gamification is used as a user engagement tool by 2013 only. After 2015 per year, publications increased drastically. The highest number of publications is in the year 2021, i.e., 53. Second, the maximum number of publications published in the journal "Computer in Human Behavior" so it is the most relevant journal in this field. Third, Hamari J is the most relevant author, who published the maximum number of articles and got a maximum citation in this area. Fourth, the U.S.A appears to be the most collaborated country, produced maximum number of articles regarding gamification, and even India produced only six articles which are significantly less in number. Fifth, gamification keyword is occurring maximum times and followed by keyword engagement. In summary, the number of articles related to gamification and user engagement has grown year by year, and this trend is expected to continue. Significant variations were observed across different countries in publishing the articles.

Limitations and Future Scopes of Study

This research is conceptual, not empirically tested, and uses gamification to enhance user engagement. In addition, this study focused only on the Web of Science (WoS) database, delimiting the time span from 2013 to 2021. Moreover, this study mostly used default parameters for making collaborations networks about gamification and user engagement. Future bibliometric analysis should consider other repositories with different keywords and methodologies for analysis. In addition to this, investigators ought to conduct specific sector evaluations with standardized approaches. Moreover, the software used for this research, allowed us to determine the scientific production, significant authors and countries, co-authorship, and nationalities. Still, a more in-depth analysis may provide a more detailed and comprehensive view of this concept.

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