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COMPUTATIONAL BIBLIOMETRIC ANALYSIS ON ADAPTIVE GAMIFICATION USING VOSVIEWER

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Abstract

The goal of this study is to examine bibliometric literature reviews on the topic of adaptive gamification, utilizing VOSviewer software to unify mapping analyses. Nowadays, games are not just for entertainment, but can also serve as a learning medium, commonly referred to as gamification. In the fields of education and marketing, gamification is increasingly being implemented. This study includes VOSviewer mapping analysis, Publish or Perish tools, and Google Scholar. The data collection method used descriptive and qualitative approach to identify published studies and their findings. The search for data used the keyword "adaptive gamification" in Google Scholar through the Publish or Perish software. The results reveal 975 published articles from 2017-2021. The research on adaptive gamification peaked in 2019-2020 but decreased in 2021. Finally, this work stresses the significance of bibliometric analysis, particularly in the field of adaptive gamification, and seeks to serve as a resource for future research.

Keywords: Adaptive gamification, Bibliometric, Computational, VOSviewer.

1. Introduction

The advancement of information and communication technology is now underway, and it has begun to permeate the gaming industry. Gaming is an activity that is enjoyed by many people, regardless of age [1]. Thus, games have progressed from being only a source of amusement to being a medium for learning, a process known as gamification [2]. Gamification has been widely implemented not only in the field of education but also in the business and health sectors [3-5]. Many companies are utilizing gamification to increase employee engagement and interaction with consumers. With the advent of gamification, society can use it to improve its quality of life in the digital era [6].

The rise of gamification in people's life provides a chance for scholars to boost their research articles on specialized topics. Bibliometrics may be used to estimate the scope of this opportunity or the possibilities for researching specific topics such as adaptive gamification. Bibliometrics is an analytical or measuring approach used to categorize and provide an accurate overview of selected subjects in the form of a bibliography. To use the bibliometric method, VOSviewer software is required to visualize or create maps based on the data that has been obtained. VOSviewer can also analyse various types of bibliometric network data, such as collaborative bonds between researchers, scientific terminology bonds, and publication bonds.

Prior research did bibliometric analysis on the topic of gamification in education. This study was mainly focused on gamification in the field of education, and the findings revealed a consistent growth in gamification in education throughout a 7-year period. Effective research communication in this field was documented through the number of citations and maps [7]. Another study investigated gamification in the corporate environment, employing a systematic bibliometric literature review technique with a qualitative approach to comprehend the use of gamification in marketing and validate research topics and development patterns [8].

Previous research studies have only focused on gamification research in the world of education or business. In contrast, this research covers bibliometric analysis of adaptive gamification in general, including its application in the education, business, and health sectors. The analysis was conducted using visualization software such as VOSviewer, which is a crucial tool in the analysis. This form of study is critical for determining the amount and uniqueness of data. The outcomes of this study might help academics choose research participants, especially in the realm of adaptive gamification.

2. Research Method

The descriptive qualitative analysis method was applied in this study. Data and information were gathered from journals published on Google Scholar. The keyword "adaptive gamification" was entered into the Publish or Perish software. Based on these keywords, 975 studies relevant to adaptive gamification were published on Google Scholar between 2017 and 2021. The information and data were saved in the RIS format and viewed using the VOSviewer program. Researchers can map the data in bibliometric form using VOSviewer software. The VOSviewer program supports three forms of mapping: network visualization,

overlay visualization, and density visualization. While mapping the data, researchers might filter away phrases that are irrelevant to the subject.

3. Results and Discussion

3.1. Research developments on adaptive gamification

We collected data for this study using the publish or perish software program. This program allows us to get data from Google Scholar publications. We used the term "adaptive gamification" with a time span of 2017-2021. This search yielded 975 articles relevant to the subject. Figure 1 shows the development of research related to the theme of adaptive gamification.

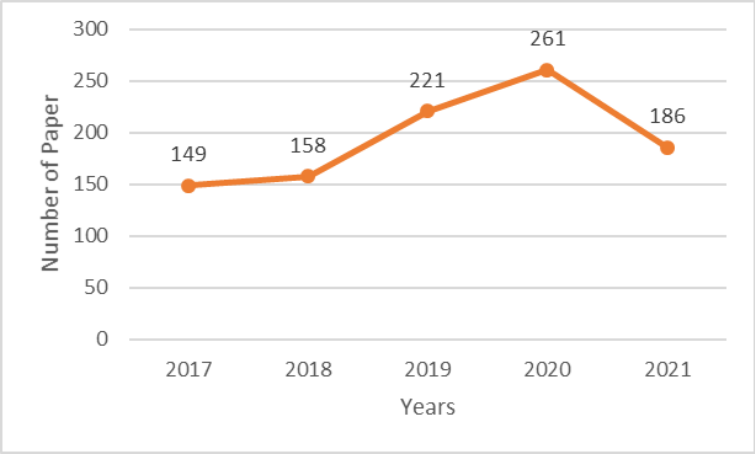

Fig. 1. Research on the topic of adaptive gamification.

Figure 1 illustrates the growth of articles published on Google Scholar with the theme of adaptive gamification from 2017 to 2020, which peaked in 2019 with 221 articles and in 2020 with 261 articles. However, the number of articles decreased in 2021 to 186 articles. Data was obtained using the publish or perish technique, which resulted in 975 papers relevant to the subject. The researcher then filtered the data to find the top ten publications with the most citations from various journals (see Table 1). Table 1 exhibits data from the selected ten articles and shows that the largest number of citations is 717, while the lowest number of citations is 131.

3.2. Visualization adaptive gamification using VOSviewer

There are three forms of mapping available in the VOSviewer application: network visualization, overlay visualization, and density visualization. In the adaptive gamification study, 36 elements were gathered and classified into 5 groups using visualization mapping analysis. Adaptive gamification research is organized into five groups, namely:

i. Cluster 1 has 9 items, the items are adaptive learning system, concept, design framework, gamification approach, gamification system, gamification technique, gamified system, knowledge, user engagement (see Fig. 2).

ii. Cluster 2 has 8 items, namely case study, effectiveness, gamification concept, gamification design, gamification strategy, gamified activity, gamified application, gamified environment (see Fig. 3).

iii. Cluster 3 has 8 items, namely, adaptation, adapting, adaptive system, gamified learning, interaction, personalization, serious game, web (see Fig. 4).

iv. Cluster 4 has 7 items, namely, adaptive learning, artificial intelligence, assessment, higher education, implementation, literature review, systematic review (See Fig. 5).

v. Cluster 5 has 4 items, namely, adaptive, e learning, information, researcher (see Fig. 6).

Table 1. Article data on the topic of adaptive gamification.

No.	Author	Title	Cites	Years
1	Koivisto & Hamari	The rise of motivational information systems: A review of gamification research [9]	717	2019
2	Sardi et al.	A systematic review of gamification in e-Health [10]	541	2017
3	Liu et al.	Toward Meaningful Engagement: a framework for design and research of Gamified information systems [11]	475	2017
4	Looyestyn et al.	Does gamification increase engagement with online programs? A systematic review [12]	279	2017
5	Sailer and Homner	The gamification of learning: A meta-analysis [13]	262	2020
6	Buckley & Doyle	Individualising gamification: An investigation of the impact of learning styles and personality traits on the efficacy of gamification using a prediction market [14]	257	2017
7	Morschheuser et al.	Gamified crowdsourcing: Conceptualization, literature review, and future agenda [15]	248	2017
8	Mora et al.	Gamification: a systematic review of design frameworks [16]	231	2017
9	Morschheuser et al.	How to design gamification? A method for engineering gamified software [17]	218	2018
10	Almeida & Simoes	The role of serious games, gamification and industry 4.0 tools in the education 4.0 paradigm [18]	131	2019

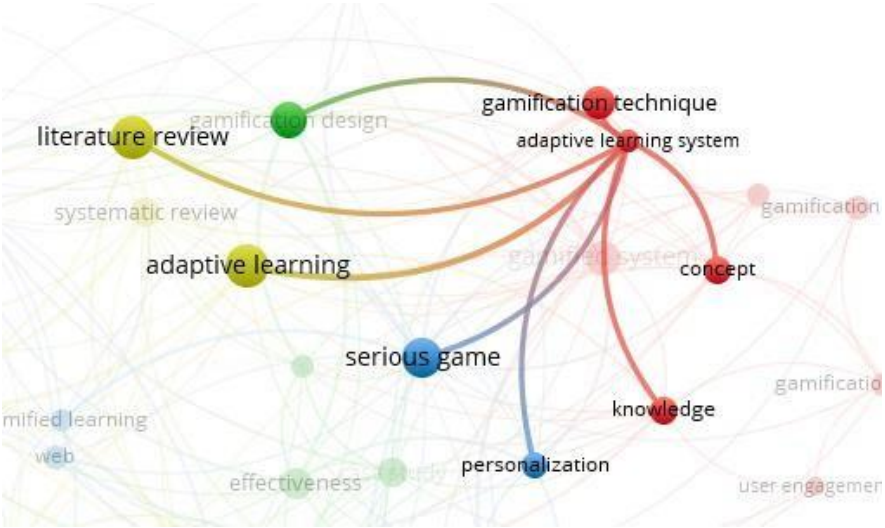

Fig. 2. Cluster 1 network visualization on adaptive gamification.

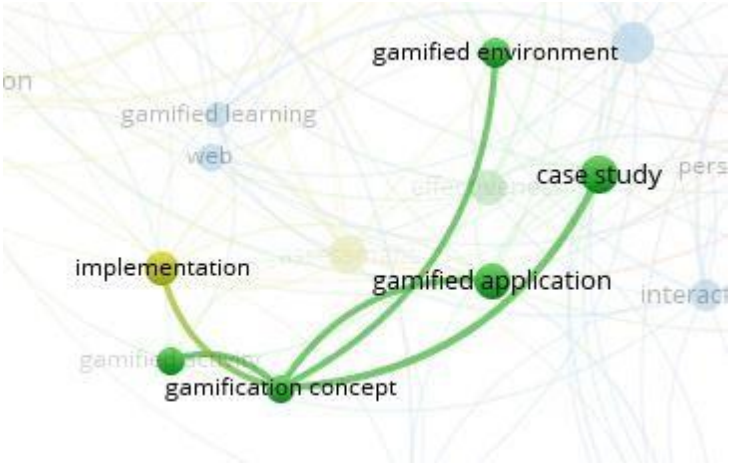

Fig. 3. Cluster 2 network visualization on adaptive gamification.

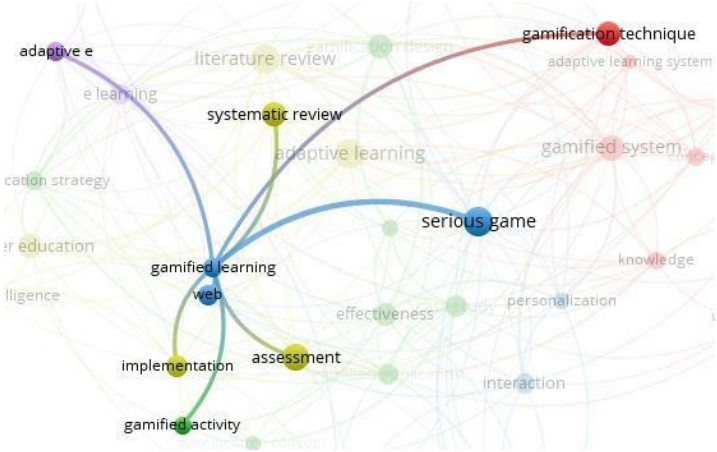

Fig. 4. Cluster 3 network visualization on adaptive gamification.

Fig. 5. Cluster 4 network visualization on adaptive gamification.

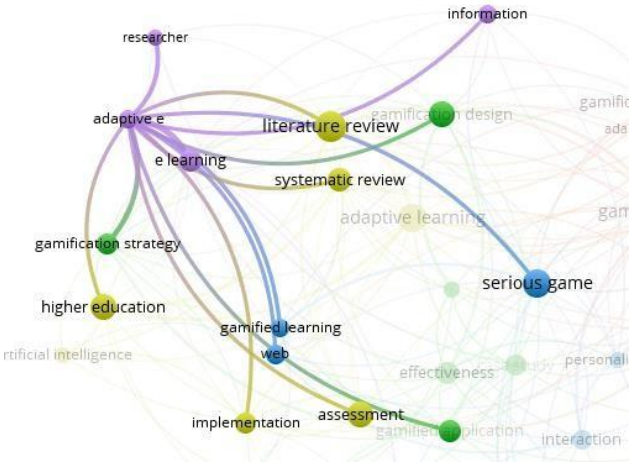

Fig. 6. Cluster 5 network visualization on adaptive gamification.

3.3. Visualization of adaptive gamification topic area network using VOSviewer

One of the mapping kinds accessible in the VOSviewer program is network visualization, which illustrates the relationships between elements on the map [19-24]. The network in the graphic is represented by interconnected lines connecting one object to another. Figure 7 depicts the network visualization for the keyword "adaptive gamification," as shown in VOSviewer.

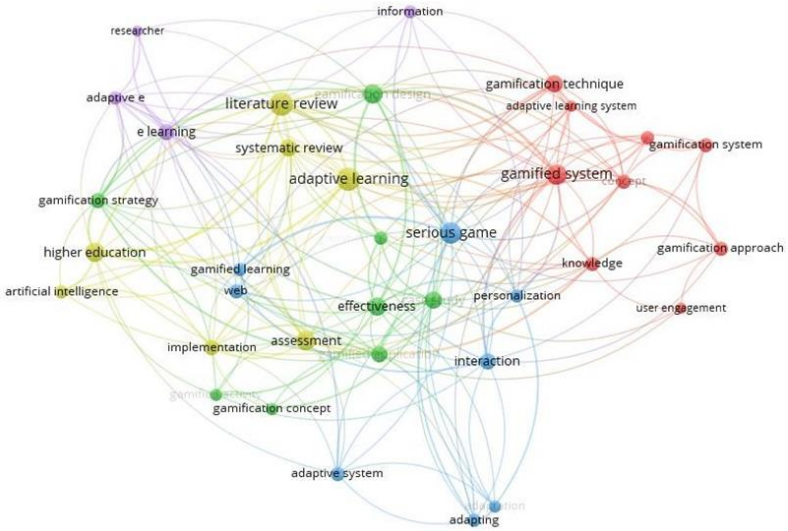

Fig. 7. Network visualization on adaptive gamification.

Several colours are utilized in the display of the green supply chain network to indicate the links between words. Each color represents a different cluster of related terms, which are connected by lines.

3.4. Overlay visualization on adaptive gamification

Overlay visualization is a way for delivering research topic data spanning several years in order to acquire the most recent topic mapping from the investigated theme. This visualization technique is an innovation in the field of adaptive gamification and covers a time span of 2017-2022 (see Fig. 8).

The dark blue items on the figure indicate that the research was conducted in 2018, while the bright yellow items represent research conducted recently, approaching 2021.

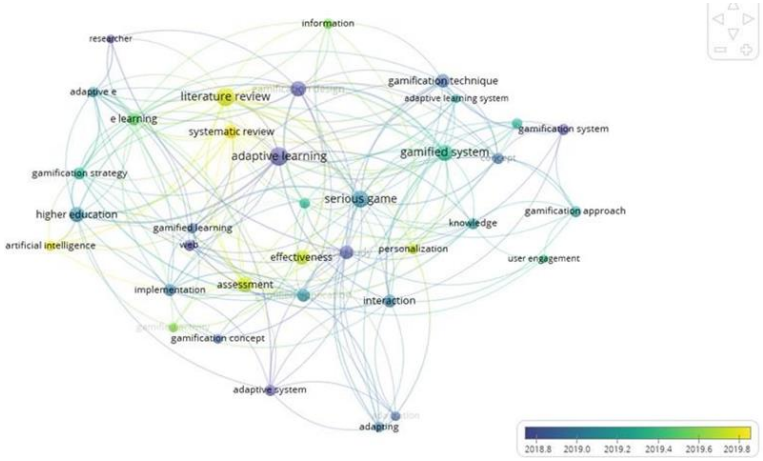

Fig. 8. Overlay visualization on adaptive gamification.

3.5. Density visualization on adaptive gamification

The VOSviewer program includes density visualization as a form of mapping. It classifies goods according to their popularity. The dark or faded hues in Fig. 9 suggest that research on those objects is limited. On the other hand, a bright yellow color indicates frequent usage of the term.

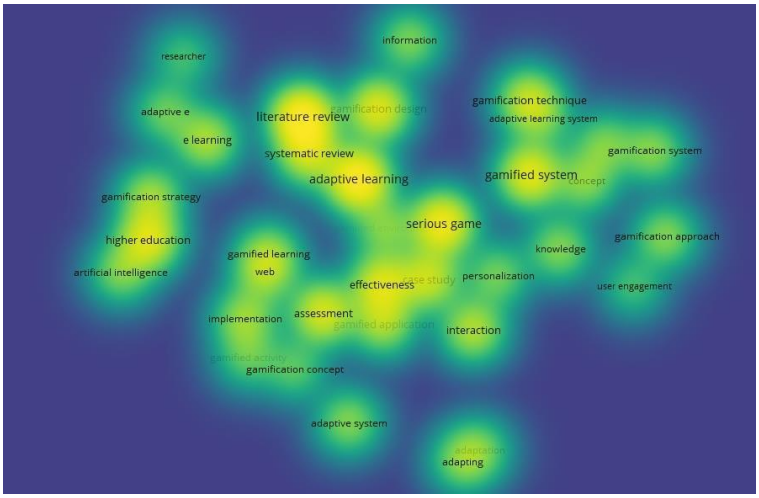

Fig. 9. Density visualization on adaptive gamification.

4. Conclusion

In conclusion, the study sheds light on an emerging research trend in adaptive gamification. The use of the publish or perish program and the VOSviewer tool to analyse bibliometric literature has allowed academics to acquire a better knowledge of the evolution of research in this discipline. According to the findings, there has been a large surge in adaptive gamification research, with a peak in 2019 and 2020. These data can be used as a resource by academics, educators, and practitioners interested in investigating and applying adaptive gamification tactics in a variety of sectors.

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