

Bibliometric Analysis and Visualization of Blended Learning Research Trends with PoP and VOS Viewer

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Abstract:

Technological progress affects the choice of learning model. Blended learning integrates face-to-face learning online using several devices/applications with the help of the internet. Bibliometric analysis has been carried out to understand the active authors, the form of the research method, and the countries involved in the "blended learning" research domain. All published articles related to "blended learning" from Scopus indexed articles using Publish or Perish, were analyzed using the VOS viewer to develop analysis tables and visualization maps. This article has set the goal of consolidating the scientific literature on "blended learning" and also finding out the trends associated with it. The most active country is the United States. The survey, Quasy experiment, Case Study are the most widely used methods in blended learning research. K Mccutcheon became the researcher with the most citations with 158 citations.

Keyword: Blended learning, Bibliometric analysis, VOS viewer.

1. Introduction

Educational institutions take advantage of advances in digital technology to engage their students with various models of teaching and learning. One such model is in the form of mixed learning according to Porter (2014) which integrates technology into the learning delivery process and is expected to overcome some of the limitations of face-to-face learning classes. Blended learning enables students to study anytime, anywhere and in the way they want.

Blended learning can take the form of various models, so Prescott, JE, Elise, J., Bundschuh, K., and Kazakoff, E.R (2017) argue that blended learning allows users to adapt programs to suit their pedagogical goals as well as physical settings. available. According to Christensen, Horn, and Staker (2013), blended learning can include station rotation, lab rotation, flipped classroom, and following a sustainable hybrid innovation pattern.

The implementation of blended learning is currently being influenced by the existence of smartphones. Smartphones take over most of the personal computer functions because of their ease and effectiveness in using them. The emergence of learning-based applications and games has also contributed to the expansion of the implementation of blended learning. One of them is the Kahoot! Application.

A small-scale study conducted by Ryan Dellos (2015) explores how blended learning is through the game-based platform Kahoot! Can be used to improve the learning experience offered to students with a blended learning approach. Maria (2018) states the use of Kahoot! has also led to a significant increase in the overall grade and the number of students graduating.

The flexibility of the high definition of blended learning, both as a model and its implementation, has made blended learning attract many researchers. The emergence of the Covid-19 pandemic has made the trend of using blended learning increase, especially in developing countries, especially during this new normal period. Good mapping is needed to determine research trends and accompanying variables in blended learning.

Bibliometric analysis is useful for future researchers who will become the best platform to embody top researchers, organizations, and countries who are involved in research on blended learning. This article is organized into four parts. The first part is an introduction, followed by a discussion about the research methodology that has been carried out. The third part discusses the results and discussion. The fourth section deals with conclusions. The research objectives and the following research questions were posed to carry out this bibliometric analysis in a systematic manner.

1.1 Research Objectives

- a) To consolidate the literature on blended learning
- b) To determine trends associated with blended learning research

1.2 Research Questions

- a) Who are the active researchers working on blended learning?
- b) The main country working on blended learning?
- c) Which are the main journals related to blended learning?
- d) What methods are often used in blended learning research?

2. Research Methodology

The Scopus file has been used for this article with the help of the Publish or Perish application. All tables in this paper were created using Microsoft Excel and VOS Viewer. Grammarly is used for spelling and grammar checking. Mendeley is used for the review and citation of articles. This article is inspired by bibliometric analysis in the style of presentation, analysis, and methodology of work (Kolkailah, 2019; Tran, 2019; Ullah, 2019).

3. Results and Discussion

3.1 Results

With the help of Publish or Perish, 200 articles indexed by Scopus were obtained in the range published in 2015-2020, with a total of 2857 citations and an average of 476.17 citations/year, 14.29 / paper. The results of Publish or Perish also present data on scores of h-index 24 and g-index 40. K McCutcheon is the researcher with the most citations, namely 158 citations in his article entitled "A systematic review evaluating the impact of online or blended learning vs face-to-face. learning of clinical skills in undergraduate nurse education ”which was published in 2015 as shown in Figure 1.

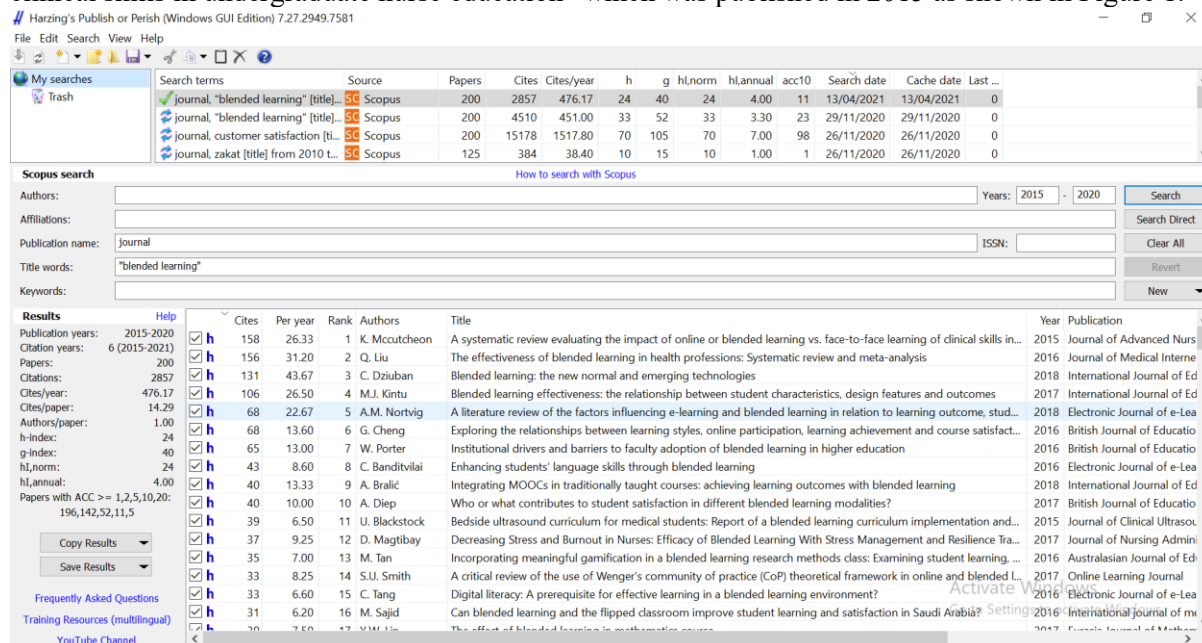


Figure 1 Publish or Perish results with the keyword blended learning

In the co-event analysis, we have used all keyword analysis, keeping the minimum number of occurrences of the keyword as 3. This combination maps a map of 39 items, in seven clusters. Visualization overlay A keyword co-occurrence analysis has been shown in Figure 2.

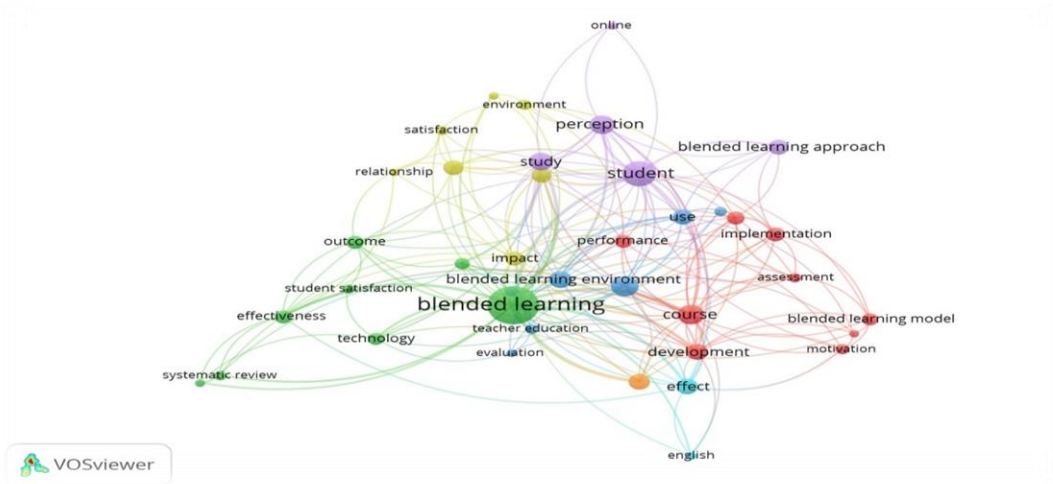


Figure 2 The output results of the Vos Viewer Network visualization of blended learning

Based on Figure 2, there are 7 clusters with 190 links and a total link strength of 300. The clusters are presented in table 1 below:

Table 1 Clusters based on Vos Viewer output

Cluster	Item	Total items
1	Assessment, blended learning model, course, design, development, Edmodo, implementation, motivation	9
2	Blended learning, effectiveness, factor, meta-analysis, outcome, student satisfaction, systematic review, technology	8
3	Blended learning environment, evaluation, model, practice, self, teacher education, use	7
4	Approach, blended learning course, environment, impact, relationship, satisfaction, team teaching	7
5	Blended learning approach, online, perception, students, study	5
6	Effect, english	2
7	Higher education	1

The results of Table 1 can help researchers to observe items that have a network in each cluster that is formed as well as provide ideas for further research. For example, blended learning research for middle schools and elementary schools has not been done much.

From the Publish or Perish (PoP) output in Figure 1, the research method obtained is 50 articles with the highest number of citations in Figure 3 below:

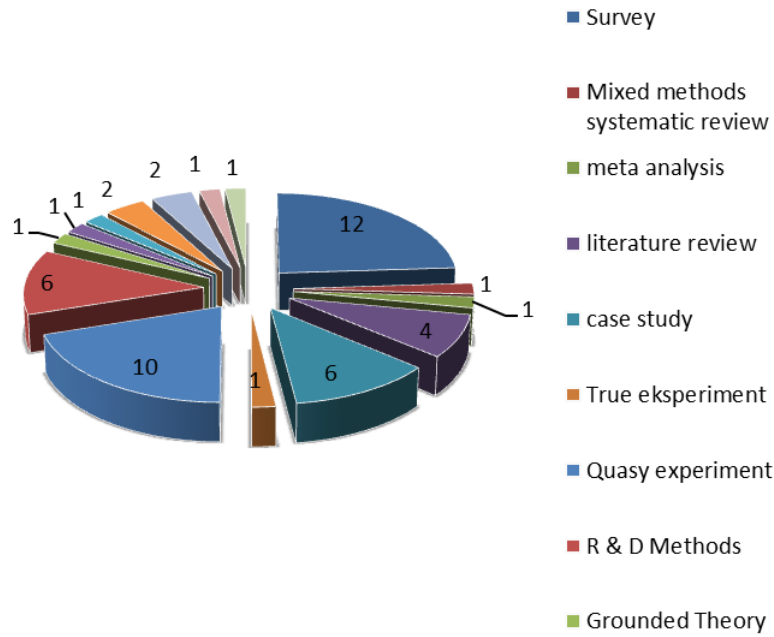


Figure 3. The research method used in blended learning

Figure 3 shows 12 (24%) articles using the survey method in their research. The quasi-experiment became the second choice of researchers as many as 10 (20%), followed by case studies and research and development methods as many as 6 (12%) of the 50 articles with the most citations. This provides an opportunity for the types of research methods that have not been carried out by many researchers in blended learning.

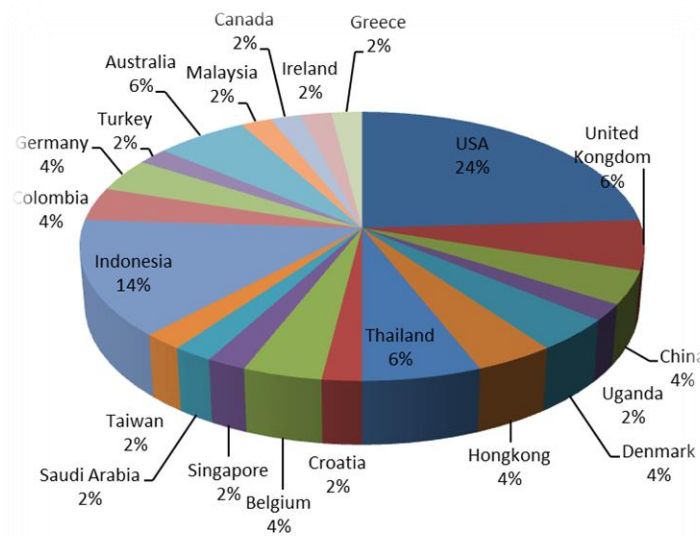


Figure 4: Co-authorization analysis by country

An analysis of the top country citations has been shown in figure 4, along with the co-author's link. The United States of America was the country of origin for the most researchers (24%) cited, followed by Indonesia (14%), United Kingdom, Australia, and Thailand (6%) as the top 5 countries whose articles were cited. The number of documents and the total citations is shown in table 2.

Table 2. Highlights of Active Countries based on the most 50 citations

Description	Country	Documents	Citation
The country with the	United State of	12	449

highest publication, documents and citations	America		
	Indonesia	7	149
	United Kingdom	3	211
	Australia	3	50
	Thailand	3	87

Figure 4 and Table 2 provide an analysis of the top countries researching blended learning showing the United States is the leading country in terms of the number of publication citations, the highest co-authoring links of the top journals of this research domain are identified as the Journal of Advanced Nursing with the highest number of publications, citations, and links. Based on these broad sources of information, prospective researchers can focus on top journals where they can identify the most relevant and widely cited articles on blended learning.

4. Conclusion

Blended learning is an interesting research domain and the most active journal associated with this research is the Journal of Advanced Nursing. The United States of America is the country of origin for the most active researchers and many articles are cited. The most active author who has made valuable contributions related to blended learning is K McCutcheon and the survey method most widely used in this blended learning research.

Reference

1. Christensen, C. M., Horn, M. B., & Staker, H. (2013). *Is K-12 Blended Learning Disruptive? An introduction to the theory of hybrids* (Nomor May).
2. Dellos, R. (2015). Kahoot! A digital game resource for learning. *International Journal of Instructional Technology and Distance Learning*, 12(4), 49–52.
3. Kolkailah, A. A. et al. (2019). Bibliometric Analysis of the Top 100 Most Cited Articles in the First 50 Years of Heart Transplantation. *American Journal of Cardiology*, 175–186. <https://doi.org/10.1016/j.amjcard.2018.09.010>
4. María, A., Jesús, M., & Javier, F. (2018). Results of the use of Kahoot ! gamification tool in a course of Chemistry. *4th International Conference on Higher Education Advances (HEAd'18)*, 1215–1222.
5. Porter, W. W., Graham, C. R., Spring, K. A., & Welch, K. R. (2014). Computers & Education Blended learning in higher education : Institutional adoption and implementation. *Computers & Education*, 75, 185–195. <https://doi.org/10.1016/j.compedu.2014.02.011>
6. Prescott, J. E., Bundschuh, K., Kazakoff, E. R., Elise, J., Bundschuh, K., & Kazakoff, E. R. (2017). Elementary school-wide implementation of a blended learning program for reading intervention. *The Journal of Educational Research*, 0(0), 1–10. <https://doi.org/10.1080/00220671.2017.1302914>
7. Tran, B. X. et al. (2019). The current research landscape of the application of artificial intelligence in managing cerebrovascular and heart diseases: A bibliometric and content analysis. *International Journal of Environmental Research and Public Health*, 16(15). <https://doi.org/10.3390/ijerph16152699>
8. Ullah, S. et al. (2019). Publication trends of Pakistan Heart Journal: A bibliometric study. *Library Philosophy and Practice*.