

COMPUTATIONAL BIBLIOMETRIC ANALYSIS OF EDUCATION TECHNOLOGY USING VOSVIEWER APPLICATION WITH PUBLISH OR PERISH (USING GOOGLE SCHOLAR DATA)

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Abstract

Education is an activity that provides direction in the growth process that starts in childhood, aimed at developing one's self-potential and strengths in various ways to be able to carry out life tasks independently. The goal of this study is to perform bibliometric computational analysis by integrating mapping analysis with VOSviewer software and data collection using Publish or Perish software. The method used is a bibliometric and descriptive quantitative approach. The data was obtained by searching the term "Education Technology" on Google Scholar using Publish or Perish software, which yielded 989 articles published between 2017 and 2021. However, only 52 of these articles were found to be relevant to the research topic. Based on the research conducted during the period of 2017-2021, there has been a decline in the number of relevant articles published each year. For instance, in 2017, 295 articles were published, whereas in 2018, 274 articles were published, in 2019, 213 articles were published, in 2020, 164 articles were published, and in 2021, only 43 articles were published. This research highlights the importance of conducting bibliometric analysis, especially on the topic of "Education Technology". It is hoped that this research will serve as a reference for authors who wish to determine the theme to be studied in their research

Keywords: Bibliometric, Education technology, Publish or perish, VOSviewer.

1. Introduction

Education is one of the efforts to provide insight into humans that began from childhood to foster the power of mind in developing self-potential [1]. Education is one of the areas that reap the advantages of technological advancements, as online platforms enable teaching and learning activities to be conducted with greater ease and accessibility for students [2]. Various schools and universities have applied online learning, then learning with this method became rapidly developed when the beginning of the Covid-19 pandemic delivered by the World Health Organization (WHO) on March 11, 2020 [3, 4]. This technology-driven education can serve as a tool for students to enhance their knowledge and skills [5].

The emergence of technology-based education presents a chance for researchers to enhance their research focus on particular subjects they intend to investigate. To see how much study on selected themes, including education technology, must be studied bibliometrically [6]. Bibliometrics serves to classify a particular topic in the form of a bibliography and create an accurate summary derived from the topic that has been selected [7].

In raising certain research topics, researchers can use VOSviewer software. VOSviewer itself is software developed in creating and viewing bibliometric mapping analysis [8]. Previous research on Education Technology has been conducted by several researchers, including those conducted by Keser and Semerci published in 2019 in this study discussing how technology-based education developed in the era of 4.0 [9].

Another study conducted by Mattar published in 2018, which discusses active, located, authentic, experiential and anchored learning of a technology-based education [10]. Then in another study conducted by Code published in 2020 which discussed the perspective of education teachers during Covid-19 [11]. However, there is still a dearth of research on the subject of bibliometric analysis of Education Technology, particularly in the utilization of VOSviewer software as a tool for carrying out mapping analysis.

Therefore, this study aims to conduct bibliometric analysis on the topic of education technology by uniting mapping with VOSviewer software. Research using methods like this is important to do, which is useful in determining the quantity and novelty of data with the topic chosen by the researchers. This research is hoped to be a reference for researchers who want to conduct research and determine the theme to be studied in their research. Bibliometrics have been used in many areas of research [12-20].

2. Research Method

In this study, a quantitative bibliometric and descriptive approach was utilized, along with data collection from various journals accessible through the Google Scholar website. The website contains a vast selection of national and international journal sources available to all users. Additionally, a literature review was conducted using the Publish or Perish software, which allowed for data grouping based on keyword searches. The data collected was then stored in files for use in the VOSviewer 1.6.17 software. Both Publish or Perish and VOSviewer 1.6.17 applications were employed in this study to gather data and analyse the research topic.

3. Results and Discussion

3.1. Research developments in education technology

In the research that has been done, a graph has been created to visualize the condition of the number of related articles in the range of 2017-2021 (see Fig. 1).

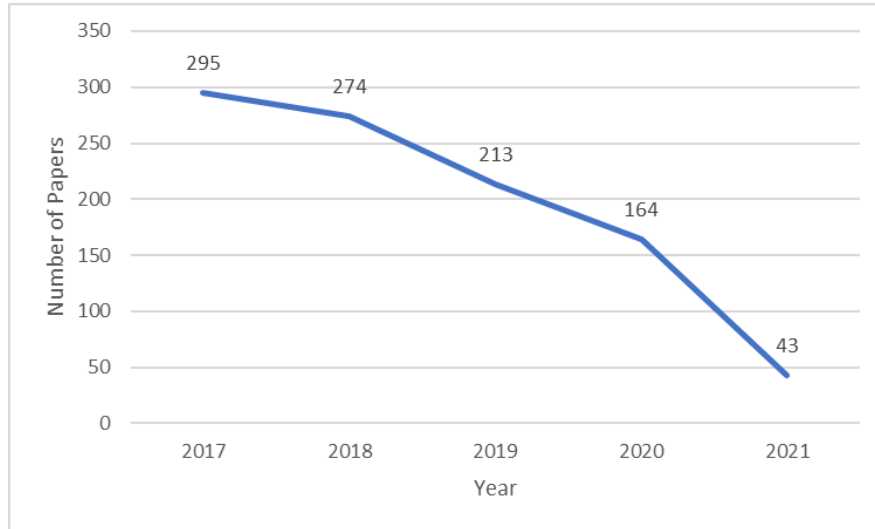


Fig. 1. Research on education technology.

Figure 1 shows the developments that occurred on the topic of Education Technology research from the period 2017-2021. Based on the graph above shows that the number of research on the topic of Education Technology every year has decreased. The evidence shows that the number of articles published has decreased each year. In 2017, there were 295 articles published, while in 2018, there were 274 articles published. The number further decreased to 213 articles published in 2019, followed by 164 articles in 2020, and 43 articles in 2021. Figure 1 shows that the number of studies obtained on Education Technology is 989 articles and there are 52 articles relevant to the topic. We selected 20 articles from multiple journals that had the highest citation count, based on data collected from Publish or Perish software (see Table 1).

Table 1 displays that data obtained from 20 journals relevant to related topics. From 20 selected articles. The highest quote on Education Technology is 360, while the lowest quote is 19. Based on Table 1 in 2017 there are 7 articles with the highest citations are 264, then in 2018 there are 9 articles with the highest citations are 360, then in 2019 there were 1 article with 53 citations, then 2020 there were 2 articles with the best citations is 86 and in 2021 there are no articles based on data obtained from Publish or Perish.

3.2. Visualization education technology using VOSviewer

The research focusing on Education Technology and mapped using VOSviewer is categorized into 5 distinct clusters, namely cluster 1 (see Fig. 2), cluster 2 (see Fig. 3), cluster 3 (see Fig. 4), cluster 4 (see Fig. 5), and cluster 5 (see Fig. 6)

Table. 1. Journal data in the field of education technology.

No.	Authors	Title	Year	Cites
1.	King and Nagasubra Mani	Impact of modern technology in education	2018	360
2.	Teräs et al.	Post-Covid-19 education and education technology 'solutionism': A seller's market	2020	286
3.	Bond et al.	Mapping research in student engagement and educational technology in higher education: A systematic evidence map	2020	264
4.	Mattar	Constructivism and connectivism in education technology: Active, situated, authentic, experiential, and anchored learning	2018	236
5.	Ratheeswari	Information communication technology in education	2018	225
6.	Nurdyansyah et al.	The Role of Education Technology in Mathematics of Third Grade Students in MI Ma'arif Pademonegoro Sukodono	2017	207
7.	Hashim	Application of technology in the digital era education	2018	129
8.	Lai and Bower	How is the use of technology in education evaluated? A systematic review	2019	121
9.	Cloete	Technology and education: Challenges and opportunities	2017	92
10.	Decuyper et al.	Introduction: Critical studies of digital education platforms	2021	90
11.	Goldin and Katz	The race between education and technology	2018	54
12.	Saharuddin et al.	Literation of Education and Innovation Business Engineering Technology	2019	53
13.	Bervell and Umar	Validation of the UTAUT model: Re-considering non-linear relationships of Exogeneous variables in higher education technology acceptance research	2017	50
14.	Karimov and Abdurakhmon,	Innovative information technology in education	2017	44
15.	Sunarya et al.	The Role of Blockchain as A Security Support for Student Profiles in Technology Education Systems	2020	41
16.	Zhumakulov	Education Technology of Primary Training Sport Wrestling	2017	40
17.	Alsop and Bencze	Reimagining science and technology education in the	2020	39

18.	Gardner-McTaggart,	Covid-19 portal Global citizenship education, technology, and	2018	36
19.	El Shaban and Egbert	Diffusing education technology: A model for language teacher professional development in CALL	2018	29
20.	Shaheen and Lazar	K-12 technology accessibility: The message from state governments	2018	19

Cluster 1 is marked with a red net and has 19 items including access, assistive technology, attitude, barrier, benefit, child, engagement, innovation, literature review, mobile technology, motivation, pedagogy, physical education, policy, relation, teacher education, technology adoption, technology enhanced learning, technology integration.

Cluster 2 is characterized by a green net and has 9 items including acceptance, application, higher education institution, learner, system, technology acceptance, technology acceptance model, term, virtual reality.

Cluster 3 is indicated with a blue net and has 9 items including communication technology, country, e-learning, education system, evidence, individual, life, systematic review, world.

Cluster 4 consists of 8 items which are highlighted with a yellow net and include the following keywords: Covid, distance education, example, implication, medical education, online education, pandemic, and training.

Cluster 5 is characterized by a purple net and has 7 items including engineering, importance, problem, quality, science, secondary education, technology education.

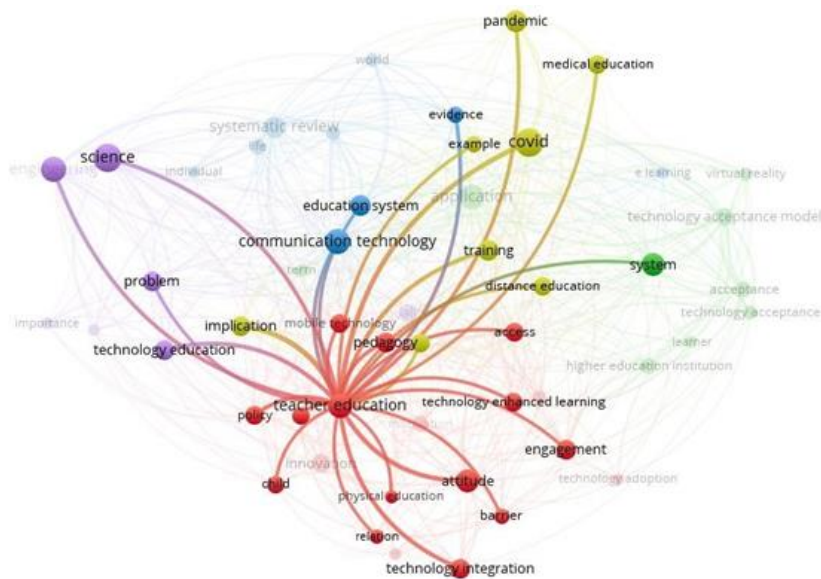


Fig. 2. Cluster 1 network visualization of education technology.

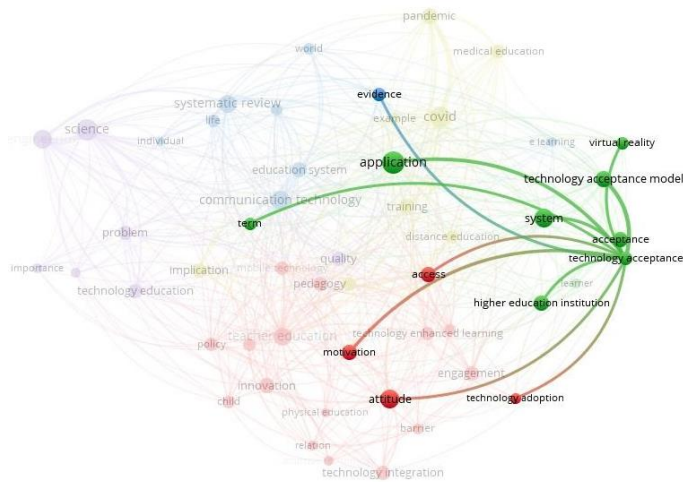


Fig. 3. Cluster 2 network visualization of education technology.

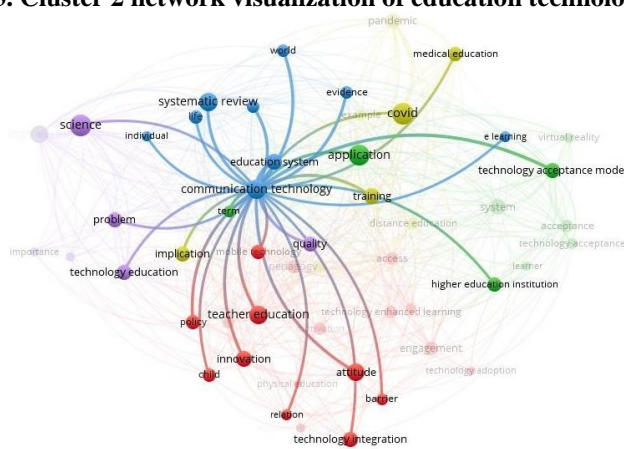


Fig. 4. Cluster 3 network visualization of education technology.

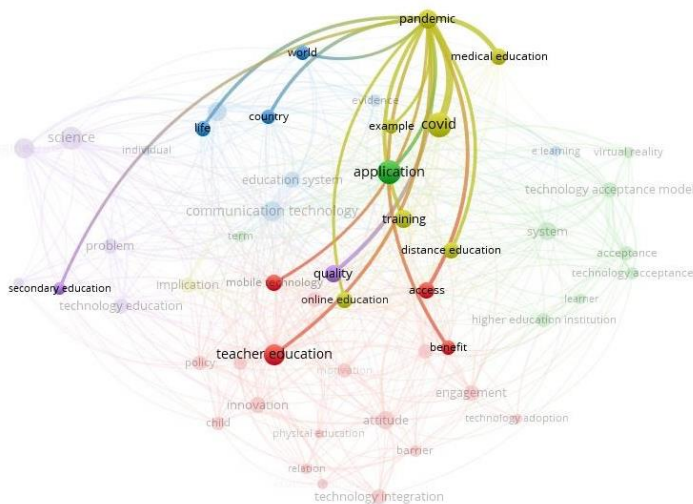


Fig. 5. Cluster 4 network visualization of education technology.

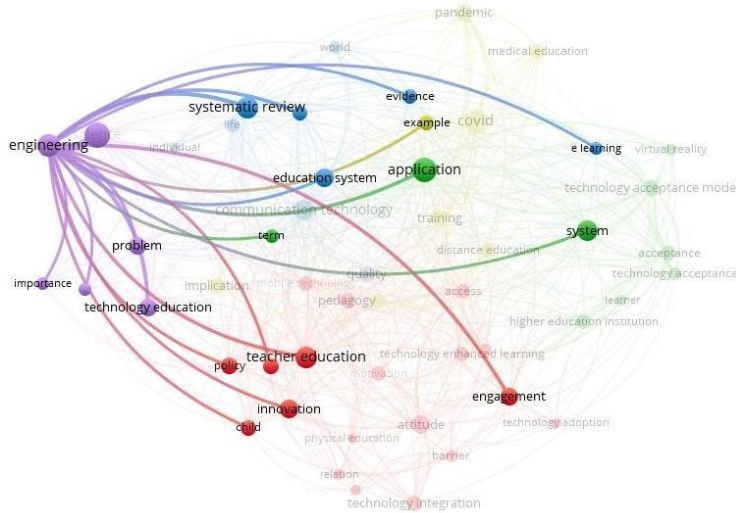


Fig. 6. Cluster 5 network visualization of education technology.

3.3. Network visualization education technology using VOSviewer

VOSviewer software offers three types of mapping analysis, one of which is the Network Visualization method, which uses the keyword "Education Technology." (see Fig. 7).

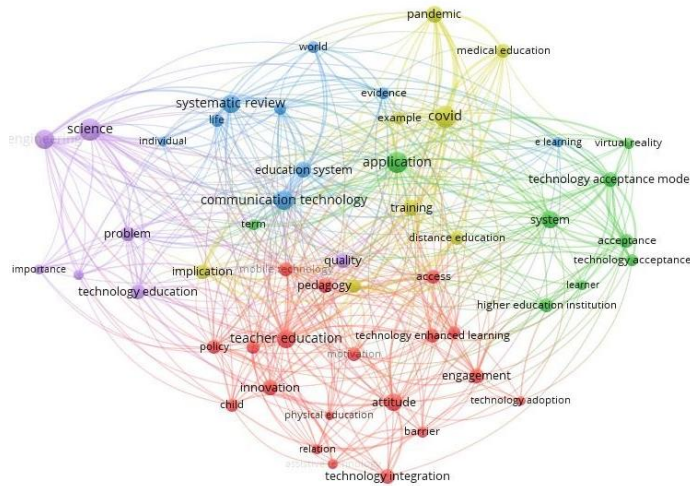


Fig. 7. Network visualization in education technology.

VOSviewer software includes network visualization as one of its features, which is used to illustrate various interconnected topics on the map. Network visualization is depicted in the form of a network that moves from one option to another. Based on Fig. 7 it can be seen that the available network visualizations are related to the research topic. It can be described by each network related to the research topic one example is in communication technology that has a relationship

with education system, evidence, systematic review, individual, e learning, technology acceptance model, higher education institution, training, application, covid, medical education, life, science, term, problem, implication, technology education, quality, teacher education, policy, innovation, attitude, relation, burner, and technology integration.

3.4. Overlay visualization education technology using VOSviewer

The second type of mapping analysis is overlay visualization using the keyword "Education Technology" (see Fig. 8).

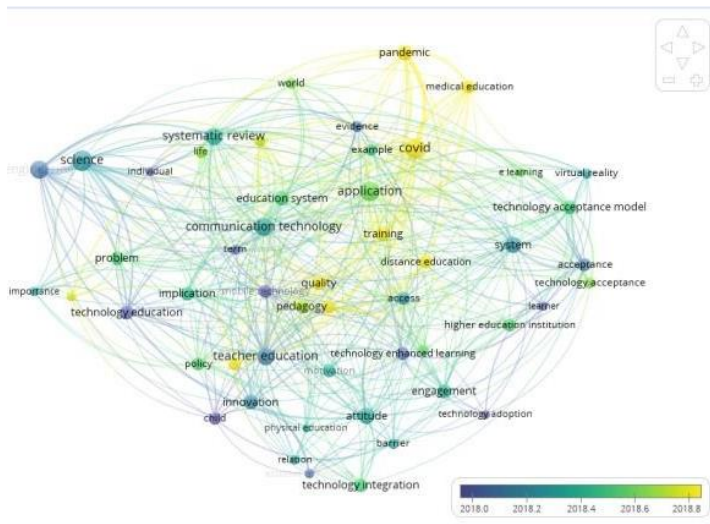


Fig. 8. Overlay visualization on education technology.

The purpose of this overlay visualization is to create a bibliometric map that depicts new elements in a study through overlaying. By observing the publication years displayed on the right bottom of Fig. 8, one can identify the updated elements in VOSviewer software, to find out the element of a newness by paying attention to the colour listed with the colour of the year is getting lighter shows a newness in the research, otherwise if the colour is getting darker then shows the number of this study has been researched a lot. One example of a theme that has an element of novelty in this overlay visualization is "distance education".

3.5. Density visualization education technology using VOSviewer

The final type of mapping using VOSviewer is represented by density visualization and can be seen in Fig. 9, where the keyword "Education Technology" is used.

This type of mapping will be grouped according to the number of studies. This type of visualization can be represented by the colour associated with each term. By referring to Figure 9, we can observe that the colour of the term indicates getting lighter than the topic, which is a topic that has an element of fragrance that can be researched by researchers; on the contrary, when the colour of the term is getting darker than the topic, it is a topic that is rarely re-examined.

Based on Fig. 9 shows that the term with a lighter colour is characterized by a yellow colour that has a large diameter size. Topics that have an element of novelty include science, engineering, systematic review, covid, application, communication technology, etc. On the contrary, topics that have begun to be rarely discussed are marked with dark green. Examples of topics that have been rarely discussed based on the image above are assistive technology, technology adoption, e learning, learners, mobile technology, etc.

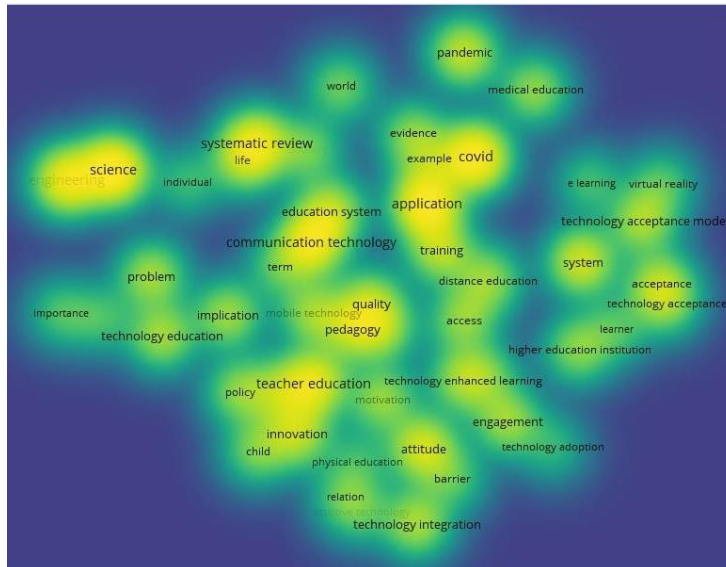


Fig. 9. Density visualization in education technology.

4. Conclusion

In conclusion, in the research that has been done to discuss the literature of bibliometric computational analysis education technology. In this study we used the keyword "Education Technology". Based on the data obtained using these keywords, 989 articles were obtained and there were only 52 articles relevant to related articles. In this study we used 2 software to perform bibliometric computational analysis namely Publish or Perish and VOSviewer to collect data related to the topics agreed. Based on the studies that have been made, it can be observed that research on Education Technology in the range of 2017-2021 has decreased every year. In this study we used bibliometric computational analysis to identify previous research. This research is anticipated to serve as a guide for scholars, enabling them to identify fresh and innovative research topics for future investigation.

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