A BIBLIOMETRIC ANALYSIS OF TECHNOLOGICAL-BASED EDUCATIONAL SUPERVISION RESEARCH USING VOSVIEWER

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Abstract

The purpose of this study was to analyse the development of research trends on technology-based educational supervision. The research method used is bibliometric analysis through three stages, firstly collecting data for publication of international journals through the Google Scholar database in 2000-2022 totalling 500 papers, secondly selecting data according to the criteria resulting in 461 papers, thirdly data analysis using the help of VOSviewer. The results of the study show that the highest trend of research development with the topic of Educational Supervision associated with technology occurred in 2020 with 38 publications. The results of the visualization overlay analysis are indicated by yellow circles indicating the themes most often used in recent research, namely supervisor, quality, principal, performance, school, information, engineering, and STEM. Meanwhile, based on network visualization, the topic of supervision has a relationship with the term technology, science, classroom, experience, engineering, mathematics, study, student, information, teacher, information, problem, school, effect, information, teaching, performance, education, educational technology, research, review, case study, educational process, process, educational system, principal, quality, university, implementation, impact, effectiveness, supervisor, practice, role, training, challenge. The results of this study illustrate that the topic of educational supervision can be developed by referring to the terms STEM, quality, and performance. So that the development of research on technology-based educational supervision is more directed toward the STEM approach.

Keywords: Bibliometric, Education supervision, Science, Technology, VOSviewer.

1.Introduction

Educational supervision helps in increasing teachers' professional competence in teaching and learning activities in class [1, 2]. However, teacher competence and expertise is one of the homework that has not been completed [3]. Supervision is not just an activity to supervise the process learning is only physical, such as the presence of the teacher, and the completeness of administration. It also leads to a control system for knowledge and value transfer activities and how the teacher teaches and manages students and classes. Then, it ends with information about the shortage, what causes it, and why the teacher does not maximally in carrying out their obligations. Supervision is not an activity carried out to observe the teacher's work, but to help teachers develop their skills [4]. Many studies discuss educational supervision. The educational supervision of school principals can assist, guide and motivate teachers in improving professional competence, especially in teaching and learning activities in class [1]. The teacher's efforts to develop competence and skills are not only the responsibility of the individual but are the responsibility of the leader. Sensitivity to developments in science and technology must also be followed by increased teacher competence and skills. Technology-based learning is now a trend [5]. For example, the use of technology in (i) lesson plans, (ii) learning resources (references), (iii) internet-based learning both synchronously and asynchronously, and (iv) assessment systems [3]. Teachers' abilities in managing classes and student-oriented learning develop along with skills in teamwork and getting to know students through individual psychological approaches and the school environment [6]. In addition, teacher performance in learning is influenced by academic supervision [7]. The supervision of school principals has a significant effect on teacher performance [8]. This research aims to analyse the development of research trends on technology-based educational supervision. Study of international journal publication data through the Google Scholar database from 2000 to 2022. Data analysis using bibliometric analysis with the help of VOSviewer [9]. The data used is the publication of international journals through the Google Scholar database in 2000-2022 with a total of 500 papers. The novelties of this study are (i) technology-based educational supervision, (ii) STEM is a topic that is rarely used in educational supervision research and (iii) educational supervision is related to school quality and performance.

2.Method

The research method used is bibliometric analysis through three stages, the first is data collection, the second is data selection, and the third is data analysis using the help of VOSviewer [10, 11]. There are many reports regarding bibliometric [12-23]. The description of the stages of the research is as follows:

(i)   The first stage: Data on international publications were taken from the Google Scholar database from 2000-2022 with the help of Publish or Perish. The keywords used in data collection are Educational Supervision, Science, and Technology.

(ii)   The Second stage: Data selection is carried out to obtain data that meets the criteria, namely the publication is a journal article and has been cited. Based on these criteria, 461 papers were obtained.

(iii) Third stage: Data analysis was carried out using VOSviewer to see three things, namely Network, Overlay, and Density Visualization. In addition, data analysis was carried out using the assistance of Ms. Excel to describe research trends.

3. Results and Discussion

The results of network visualization analysis on the development of research on technology-based educational supervision using VOSviewer are divided into 5 clusters (see Fig. 1).

(i) Cluster 1 is shown in red and consists of 18 items, namely training, clinical supervision, educational supervision, educational system, effectiveness, impact, implementation, information technology, knowledge, practice, principle, process, quality, role, supervision, supervisor, training, and universities. Supervision is the most frequently used item. The item has 46 relationships with other items with a relationship strength of 986 and occurrences of 280.

(ii) Cluster 2 is shown in green and consists of 10 items, namely effect, information, instruction, Nigeria, performance, problem, school, student, study, and teacher. Student and Teacher were the most frequently used items. Student items have 43 relationships with other items with a relationship strength of 361 and 88 occurrences. While the Teacher Item has 42 relationships with other items with a relationship strength of 333 and 81 occurrences.

(iii) Cluster 3 is shown in blue and consists of 8 items, namely case study, education, educational process, educational technology, learning, research, review, and teaching. Education was found to be the most frequently used item. The Education item has 46 relationships with other items with a relationship strength of 373 and 96 occurrences.

(iv) Cluster 4 is shown in yellow and consists of 7 items, namely classroom, engineering, experience, mathematics, science, STEM, and technology. In cluster 4, Technology is found to be the most frequently used item. Technology items have 46 relationships with other items with a relationship strength of 840 and occurrences of 254.

(v) Cluster 5 is shown in purple and consists of 4 items, namely China, development, management, and work. Development was the most frequently used item. Item development has 44 relationships with other items with a relationship strength of 266 and 65 occurrences.

Overlay Visualization is an analysis that aims to analyse the content, patterns, and trends of a collection of documents by measuring the strength of terms and counting the number of keywords that appear simultaneously in the articles under study. In this analysis, terms are the latest research topics, which are shown in yellow. Based on Fig. 2, the terms that appear in the yellow pattern are supervisor, quality, principal, performance, school, information, engineering, and STEM.

The development trend of research on technology-based educational supervision from 2000-2022 has experienced fluctuating developments. The highest number of publications occurred in 2020, namely 38 publications, after previously according to 2019 there were 20 publications from the previous year (2018) with 30 publications. This may be caused by the Covid-19 pandemic. Thus, various educational activities including educational supervision are increasingly using technology as the basis of their activities (see Fig. 3).
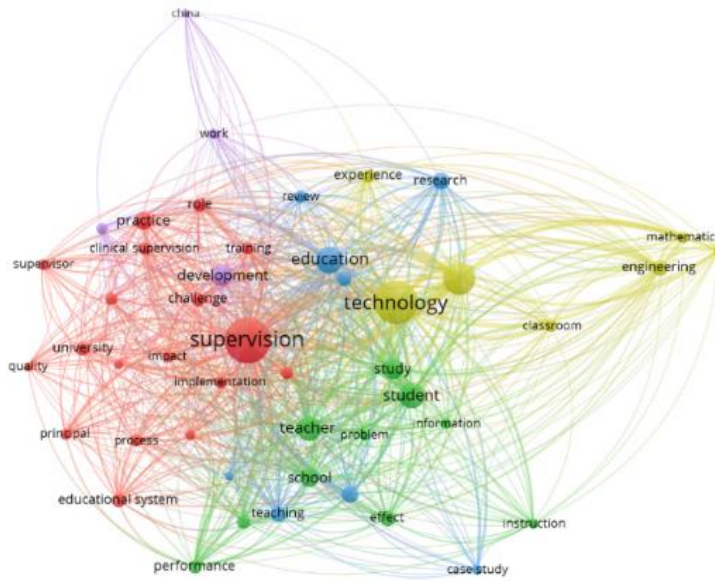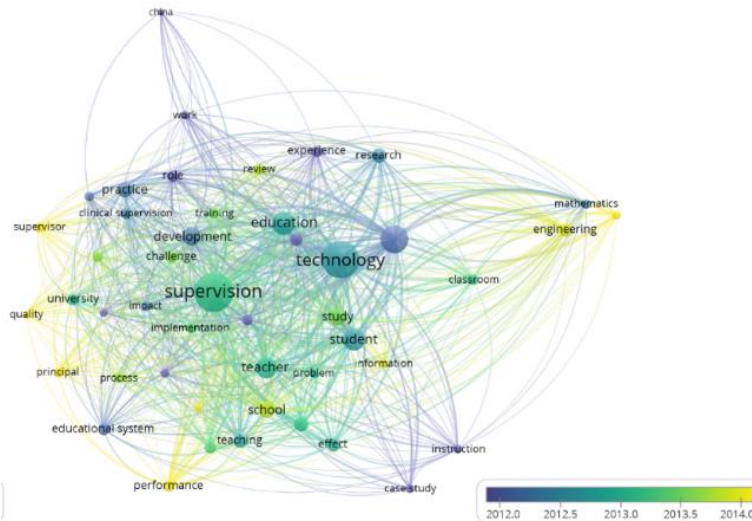
Fig. 1. Network visualisation.

Fig. 2. Overlay visualization.

Density visualization explains the density of the keywords Educational Supervision, Science, and Technology. Several colours appear in the picture, namely the yellow colour illustrates that the research topics that are most often carried out are supervision, technology, and education. Meanwhile, the yellow colour which is getting dimmer illustrates that this topic is rarely used as a research topic related to educational supervision. Several topics include academic supervision, engineering, STEM, performance, mathematics, educational systems, university, quality, and clinical supervision (see Fig. 4).
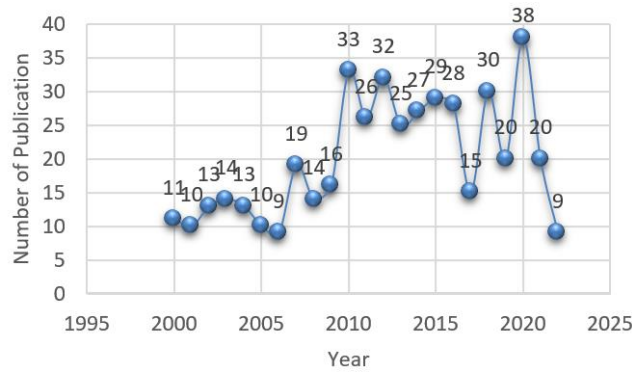
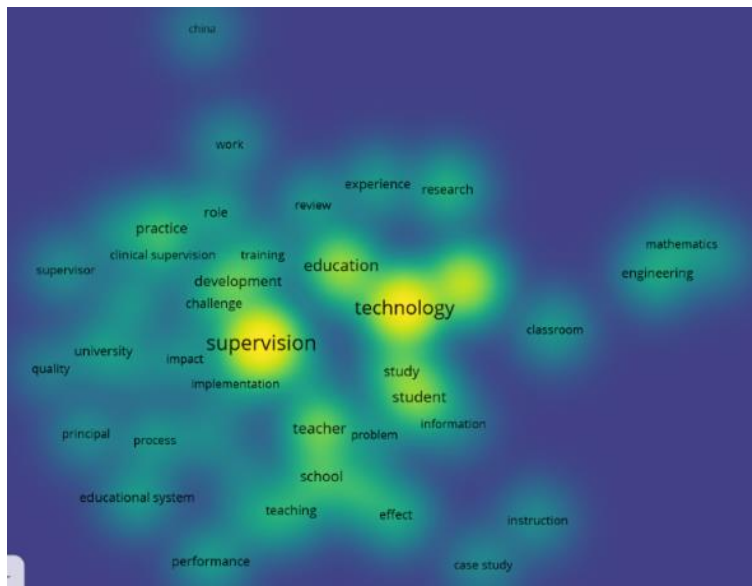**Fig. 3. Research trends on technological educational supervision.**

Fig. 4. Density visualisation.

Data on publications that have been cited by other studies exceed 120 citations, reaching 16 papers. The most citations are papers written by Zawacki-Richter et al. 2019 with the title "Systematic review of research on artificial intelligence applications in higher education–where are the educators?". The top 10 publication data with the most citations are in Table 1.

Table 1. Number of citations per paper.

Cites	Author	Title	Year
556	Zawacki-Richter et. al.	Systematic review of research on artificial intelligence applications in higher education–where are the educators?	2019
326	Jang	Identifying 21st century STEM competencies using workplace data	2016

231	Nadelson and Seifert	Integrated STEM defined: Contexts, challenges, and the future	2017
226	Harper and Milman	One-to-one technology in K–12 classrooms: A review of the literature from 2004 through 2014	2016
208	Renata et al.	The influence of headmaster's supervision and achievement motivation on effective teachers	2018
199	Roberts-Mahoney et. al.	Netflixing human capital development: Personalized learning technology and the corporatization of K-12 education	2016
193	Olayinka	Effects of Instructional Materials on Secondary Schools Students' Academic Achievement in Social Studies in Ekiti State, Nigeria.	2016
164	Aidinopoulou and Sampson	An action research study from implementing the flipped classroom model in primary school history teaching and learning	2017
158	Irmayani et al.	The strategy of SD Pusri in improving educational quality	2018
142	Bischoff et al.	Stakeholder collaboration in entrepreneurship education: an analysis of the entrepreneurial ecosystems of European higher educational institutions	2018

4. Conclusions

Based on the results and discussion above, it can be concluded that from international journal publication data through the Google Scholar database in 2000-2022, there were 461 papers analysed using VOSviewer assistance, the themes most often used in recent research were supervisor, quality, principal, performance, school, information, engineering, and STEM. Meanwhile, based on network visualization, the topic of supervision has a relationship with the term technology, science, classroom, experience, engineering, mathematics, study, student, information, teacher, information, problem, school, effect, information, teaching, performance, education, educational technology, research, review, case study, educational process, process, educational system, principal, quality, university, implementation, impact, effectiveness, supervisor, practice, role, training, and challenge.

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