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A Bibliometric Analysis of Instructional Technological Leadership Research Using VOSviewer

R. Siti Pupu Fauziah[1], Irman Suherman[2], Abdul Kholik[3], Muhammad Rendi Ramdhani[4], Zahra Khusnul Lathifah[5]
Islamic Educational Management, Universitas Djuanda, Bogor, West Java, Indonesia
E-mail: siti.pupu.fauziah@unida.ac.id[1], irman.suherman@unida.ac.id[2], abdul.kholik@unida.ac.id[3], muhammad.rendi.ramdhani@unida.ac.id[4], zahra.khusnul.latifah@unida.ac.id[5]

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Abstract:

This study aims to analyze the development of research on technology-related instructional leadership. The research method used is bibliometric analysis. The articles used in this study were sourced from the Google Schooler database with the help of the Publication of Perish from 2015-2022; 498 papers were found. Data analysis using the VOSviewer application. The results showed that the number of publications decreased yearly, where the most occurred in 2015, namely 102 publications. The results of the density visualization analysis shown in yellow circles indicate the themes most frequently used in recent research, namely instructional technology, technology integration, instructional leadership practice, school leader, transformational leadership, covid, time and student. Meanwhile, based on network visualization, the topic of instructional leadership has a relationship with the term development, effect, effectiveness, instructional leader, instructional leadership, instructional leadership practice, leader, leadership, model, principal, research, school, school leader, school leadership, school principal and transformational leadership. These results illustrate that technology-based instructional leadership can be developed by referring to instructional technology, technology integration, as a term rarely used based on visualization overlay.

Keywords: *Instructional Leadership, Technology, VOSviewer*

Abstrak:

Penelitian ini bertujuan untuk menganalisis perkembangan riset tentang kepemimpinan intruksional yang berhubungan dengan teknologi. Metode penelitian yang digunakan adalah bibliometric analysis. Artikel yang digunakan dalam penelitian ini bersumber dari database google schooler dengan bantuan publisch of perish dari tahun 2015-2022 ditemukan 498 paper. Analisis data menggunakan aplikasi VOSviewer. Hasil penelitian menunjukkan bahwa jumlah publikasi setiap tahunnya mengalami penurunan, dimana publikasi terbanyak terjadi pada tahun 2015 yaitu sebanyak 102 publikasi. Hasil analisis density vizualitation yang ditunjukkan dengan bulatan berwarna kuning menandakan tema yang paling sering digunakan dalam penelitian terbaru, yaitu instructional technology, technology integration, instructional leadership practice, school leader, transformational leadership, covid, time and student. Sedangkan berdasarkan network vizualitation topik instructional leadership memiliki hubungan dengan term development, effect, effectiveness, instructional leader, instructional leadership, instructional leadership practice, leader,

leadership, model, principal, research, school, school leader, school leadership, school principal dan transformational leadership. Hasil ini menggambarkan bahwa topik instructional leadership berbasis teknologi dapat dikembangkan dengan mengarah pada instructional technology, technology intergration sebagai term yang masih jarang dilakukan berdasarkan overlay vizualitation.
Kata Kunci: *Instructional Leadership, Tekhnologi, VOSviewer*

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INTRODUCTION

Instructional leadership is a research that focuses on teacher leadership which is described by the teacher's ability to manage classes and determine the direction of learning (Abonyi, 2021; Gümüş et al., 2021). According to Hallinger and Murphy (1985) in Munna (2021), instructional leadership is a vital concept focusing on curriculum and learning processes. Instructional leaders are the people who bring about the effectiveness of the institution, especially in terms of teaching and learning. Meanwhile, Shaked's research (2021) states that instructional leadership is carried out for two reasons: first, the relationship between the school principal and parents of students (the community) focuses on monitoring and control, and second, the characteristics of parents who want learning and achievement.

Instructional leadership focus on how teachers can lead in class, especially in learning activities (Shaked, 2021; Walker, 2022; Bellibaş, 2021). Instructional leadership is critical to be applied in the world of education because, based on research results, if a school principal/teacher uses instructional leadership, this leadership has a significant influence on student achievement (Logoho, 2016; Ma, 2021; Shaked, 2021). The role of leadership Instructional services in improving teacher professionalism has long been recognized as an essential factor in school organizations, especially regarding their responsibility to improve the quality of learning in schools (Mintardjo, 2015). Research states that students can have a study plan for their future education influenced by instructional leadership (Lambrecht et al., 2022). Other research results found that students who were taught by teachers who had leadership had succeeded academically. Non-academic compared to students taught by teachers who lacked leadership in and outside the classroom (Warren, 2021).

The development of science and technology impacts the use of technology in every form of learning activity. In addition, if you look at technological developments in the era of the industrial revolution 4.0, namely manufacturing technology, it has entered the automation and data exchange trend, which is its trademark. This includes cyber-physical systems, the internet of things (IoT), cloud computing, and cognitive computing. In addition, these activities impact teachers' perspectives in organizing, managing and implementing learning activities inside and outside the classroom. Mainly if we refer to one of the themes of long-term educational development, referring to Law Number 17 of 2007 concerning the 2005-2025 National Long-Term

Development Plan (RPJPN). In the fourth period, the 2020-2024 RPJMN has the main focus, namely realizing Indonesian people who are independent, advanced, just and prosperous through accelerating development in all fields with a solid economic structure based on competitive advantage, with the theme of educational development, namely international competitiveness.

There have been many studies that examine Instructional leadership, such as Webster's research (2017), with research results that as leaders deal with their perceived experience of the inevitability of technological change and their concern for preparing students for a technological future, the core category Keep up with technology (or being left behind) is given the greater weight in technology decision making. Daffin (2022) states that the factors that most influence the use of learning technology in integrating technology in classroom practice are high teacher self-efficacy resulting from support from school leadership, access to resources, and a clear intention to achieve learning success for students. Research by Bellibaş et al. (2020); Boyce and Bowers (2018); Gümüş et al. (2021); Liu and Hallinger (2018) state that the idea of the principal's instructional leadership plays a vital role in the success of the school.

The teacher's leadership style in teaching is the main thing that needs to be done. So the study of instructional leadership becomes essential in adapting to rapid technological developments. It cannot be denied that technology in education is essential. One of the spearheads that can address this is how a school principal develops leadership skills that lead to technological literacy.

This study aims to analyze research trends on technology-based instructional leadership. Study of international journal publication data through the Google Scholar database in 2015-2022. Data analysis used bibliometric analysis with the help of VOSviewer. The results of the research are expected to describe trends in the development of research on technology-based instructional leadership and look for relationships with other terms so that terms are found that are rarely used as research topics on instructional leadership related to technology.

RESEARCH METHODS

The research method used in this research is bibliometric analysis. Operationally this research was carried out through three stages, namely, 1) data collection, 2) data selection and 3) data analysis using the help of VOSviewer, as Figure 1.

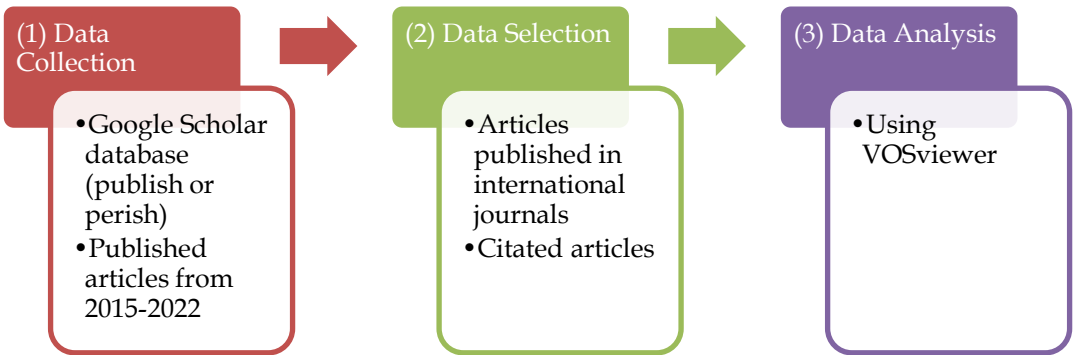

Figure 1. Research Stages

The first stage, data collection collects the Google Scholar database with publish or perish. Publish or perish is designed to help individuals academically be able to carry out analysis on the impact of research. Publish or perish can describe citation metrics in various forms (Immawati, 2022). Publishing or perish will make it easier for authors to find previous research comparable to their current work (Bellour, 2021). The researcher conducted a data search by entering the keywords "instructional leadership, technology and science"; 500 papers were collected.

The second stage is data selection, where the results of the data obtained through a publish or perish search are then selected according to the criteria. Namely, the publication is a journal and has received a citation. Based on these criteria, 498 papers were obtained.

The third stage is data analysis using the VOSviewer application. VOSviewer is used to visualize bibliographies or data sets that contain bibliographic fields (title, author, author, journal name, and so on). In the world of research, VOSviewer is used for bibliometric analysis, looking for topics that still have research opportunities, the most widely used references in specific fields and so on (Immawati, 2022).

RESULTS AND DISCUSSION

Network Visualitation

The results of network visualisation analysis on the development of research on technology based instructional leadership using VOSviewer are

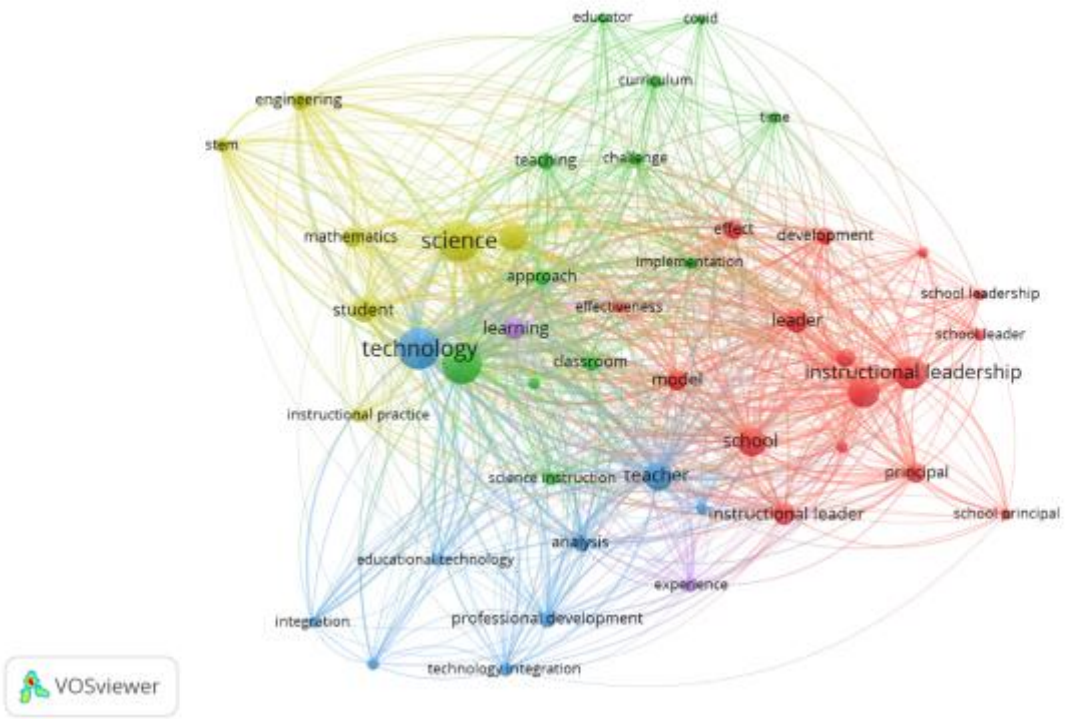

Figure 2. Network Vizualitation

Cluster 1. Shown in red. The term most often used is Instructional leadership. This term has 42 relationships with other terms, a relationship strength of 380 and occurrences of 114. Sixteen items appear in cluster 1: development, effect, effectiveness, instructional leader, instructional leadership, instructional leadership practice, leader, leadership, model, principal, research, school, school leader, school leadership, school principal and transformational leadership.

Cluster 2. is shown in green. The term most often used is instruction. This term has 44 relationships with other terms, has a relationship strength of 609 and an accuracy of 167. Twelve items appear in cluster 2: approach, challenge, classroom, covid, curriculum, educator, implementation, instruction, science instruction, science teacher, teaching, and time.

Cluster 3. is shown in blue. The term most often used is technology. This term has 42 relationships with other terms, a relationship strength of 724 and an accuracy of 186. Seven items appear in cluster 3: analysis, educational technology, instructional technology, integration, professional development, relationship, teacher, technology, and technology integration.

Cluster 4. Shown in yellow. The term most often used is science. This term has 45 relationships with other items, a relationship strength of 706 and an accuracy of 183. Seven items appear in cluster 4: education, engineering, instructional practice, mathematics, science, STEM, student, and student.

Cluster 5. ditunjukkan dengan warna ungu. Item yang paling sering digunakan adalah learning. Item ini memiliki 39 hubungan dengan item lain, memiliki kekuatan hubungan sebesar 209 dan accurances 55. Ada 2 item yang muncul pada cluster 5, yaitu experience dan learning.

Overlay Vizualitation

Overlay Visualization is an analysis that aims to analyze the content, patterns, and trends of a document set by measuring the power of terms and counting the number of keywords that appear simultaneously in the article under study. In this analysis, we find out which terms are current research topics, shown in yellow. Based on Figure 3, the terms appearing in the yellow pattern are instructional technology, technology integration, instructional leadership practices, school leaders, transformational leadership, covid, time and students.

The development trend of research on technology-based instructional leadership from 2015-2022 has decreased yearly. The highest number of publications occurred in 2017, namely 102 publications, then after that, it continued to decline until 2022 there were only 13 publications. This may be because the topic of instructional leadership has started to get saturated, so it is necessary to find out which themes are rarely used about instructional leadership (see figure 4).

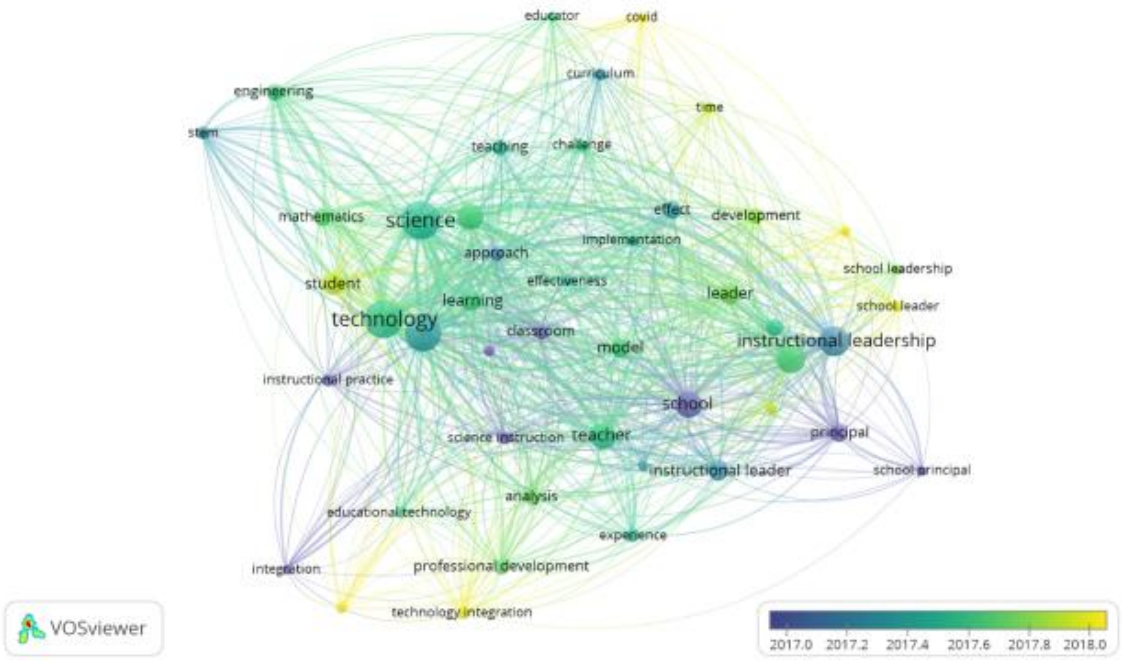

Figure 3. Overlay Vizualitation

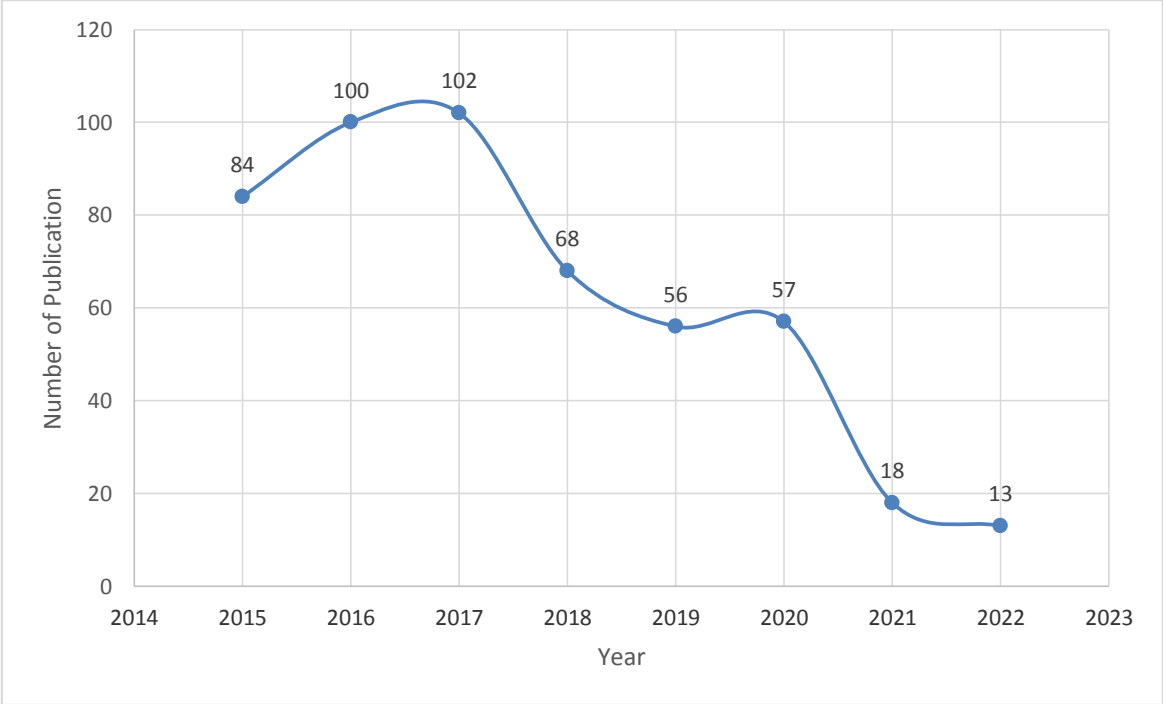

Figure 4. Development of Number of Publications

Density Vizualitation

Density visualisation explains the density of the keywords Instructional Leadership, Science and Technology. Several colours appear in the picture. Namely, the yellow indicates that the research topic is most often carried out in science, technology and instructional leadership. At the same time, the yellow colour, which is getting dimmer, illustrates that this topic is rarely used as a

research topic related to instructional leadership. Several topics include instructional practice, school principal, educational technology, integration, time, and STEM (see figure 5).

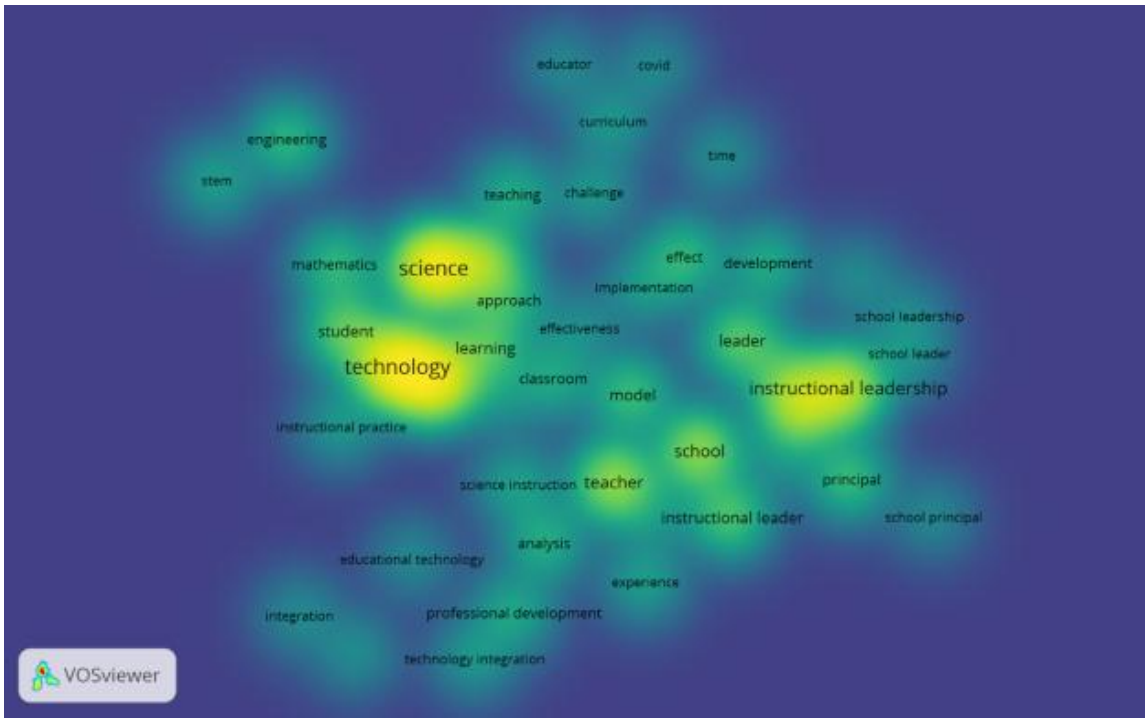

Figure 5. Density Vizualitation

Table 1 is data on publications that other researchers have cited. The data is the ten publications with the highest citation. The most citations were a paper written by GJ Hwang, CL Lai and SY Wang in 2015 entitled "Seamless flipped learning: a mobile technology-enhanced flipped classroom", where the citations reached 1442 citations. The details of the ten most-cited publications are as follows:

Table 1. Number of Citations Per Paper in the Google School Database (Publication 2015-2022)

Cites	Authors	Title	Year	Source
1442	GJ Hwang, CL Lai, SY Wang	Seamless flipped learning: a mobile technology-enhanced flipped classroom with effective learning strategies	2015	Journal of computers in education
836	KR Clark	The effects of the flipped model of instruction on student engagement and performance in the secondary mathematics classroom.	2015	Journal of Educators online
642	M Tschannen-Moran, CR Gareis	Faculty trust in the principal: An essential ingredient in high-performing schools	2015	Journal of Educational …
630	R Goddard, Y Goddard, E Sook Kim…	A theoretical and empirical analysis of the roles of instructional leadership, teacher collaboration, and collective efficacy beliefs in support of student learning	2015	American journal of …

605	TR Kelley, JG Knowles	A conceptual framework for integrated STEM education	2016	International Journal of STEM education
507	K McKnight, K O'Malley, R Ruzic…	Teaching in a digital age: How educators use technology to improve student learning	2016	… on technology in …
497	DJ Leu, CK Kinzer, J Coiro, J Castek…	New literacies: A dual-level theory of the changing nature of literacy, instruction, and assessment	2017	Journal of …
458	S Andriani, N Kesumawati, M Kristiawan	The influence of the transformational leadership and work motivation on teachers performance	2018	… Journal of Scientific & Technology …
433	AA Shahroom, N Hussin	Industrial revolution 4.0 and education	2018	… Business and Social Sciences
423	AA Fernandez, GP Shaw	Academic leadership in a time of crisis: The Coronavirus and COVID-19	2020	Journal of leadership Studies

Density visualization analysis illustrates that research on technology topics in implementing classroom learning still needs to be carried out. The yellow, increasingly dimmer, indicates a theme rarely used in recent research, namely instructional technology, technology integration, instructional leadership practice, school leader, transformational leadership, covid, time and student. This also aligns with what is described in the overlay visualization analysis. Namely school leaders and technological integration being the most recently used topics in research related to instructional leadership.

Hwang et al. (2015) state that is using technology causes classroom learning to be carried out more effectively in the Seamless flipped learning model. In addition, Clark's research (2015) states the same thing, where the flipped learning model becomes effective when learning changes by utilizing technology. Even research on the use of technology in learning is a new topic, likewise with the development of technology-based learning models where the teacher determines success.

CONCLUSION

Based on the results and discussion above, from the published data of international journals through the Google Scholar database in 2015-2022, there were 498 papers analyzed using VOSviewer. The development trend of research on technology-based instructional leadership has decreased. There is a saturation of studies on instructional leadership. The themes most often used in recent research are instructional technology, technology integration, instructional leadership practice, school leader, transformational leadership, covid, time and student. The theme recommendations rarely used in this study are based on analysis using VOSviewer by looking at density visualization, namely educational technology, integration, time, and STEM.

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