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## THE BIBLIOMETRIC ANALYSIS: RESEARCH DEVELOPMENT OF TECHNOLOGICAL BASED LEARNING MANAGEMENT USING VOSVIEWER

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### Abstract

The purpose of this study is to analyze the development of research trends in the management of technology-based learning. The method used is bibliometric analysis through three stages, namely the first theme of data collection using publish or perish from 2018-2022 to obtain 200 paper data, the second is data selection to choose according to the research objectives, namely by referring to two criteria where the paper is an international journal publication and has been cited to get 118 paper data, the third data analysis using the VOSviewer application. The results of the study show that the highest trend of research development with the topic of learning management associated with technology occurs in 2020 and 2021, namely 30 publications. The results of the visualization overlay analysis are indicated by yellow circles indicating the themes most frequently used in recent research, namely higher education, learning, websites, and students. In addition, in terms of authorship, it is known that the contribution of three authors with a total of 52 papers (44%) has been mostly done in the last five years. The results of this study illustrate that research on technology-based learning management leads to the term higher education, websites, and student. This has the impact that research on technology-based learning management is related to increased higher education and websites.

Keywords: Bibliometric, Learning management system, School management, Technology, VOSviewer.

## 1. Introduction

Technological-based learning management is one of the learning activities by utilizing technology. One form of education management in schools includes planning, organizing, directing, and supervising schools to achieve predetermined educational goals [1]. The form of using technology in learning is the Learning Management System (LMS). The Learning Management System (LMS) also helps its users, especially students, to be able to discuss learning topics online using the forums provided [2]. LMS was developed with the aim that learning management can be carried out effectively and efficiently by utilizing technology.

Many studies have discussed technological-based learning management. Learning management is influenced by various important factors. Thus, it can support the achievement of learning objectives, namely modules, facilities, and collaboration between teachers [3]. One of the technological media used to discuss learning topics in online learning is the Learning Management System (LMS) [2]. The results of the study also showed that there was a positive response from students using LMS in online learning [4], it was recognized that LMS provided an increase in their speaking, reading, listening, and writing skills [5]. The success of using LMS in online learning is largely determined by the understanding and supporting factors of its users [6].

The purpose of this study is to analyze the development of research trends in the management of technology-based learning. Study of international journal publication data through the Google Scholar database in 2018-2022. Data analysis used bibliometric analysis with the help of VOSviewer [7]. The results of the research describe the development trend of research on the management of technology-based learning and look for relationships with other terms. Thus, terms can be found that should not be used as a research topic on the management of technology-based learning. The novelties of this study are (i) technology-based learning management, (ii) there is a strong link between LMS and higher education, and (iii) the term higher education is a topic that is rarely carried out based on density visualization.

## 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 [8, 9]. The description of the stages of the research is as follows:

- (i) The first stage: Data collection in this study was carried out using the Google Scholar database with the help of the publish or perish application. Researchers searched by entering the keywords "Technology, Learning Management System, School Management", and found 200 publications from 2018-2022.
- (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, 118 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 also carried out using the assistance of Ms. Excel to describe research trends.

Publish or perish (PoP) is designed to help individuals academically be able to carry out analysis on the impact of research. PoP can describe citation metrics in various forms [10]. PoP will make it easier for authors to find previous research that is comparable to their current work [11]. VOSviewer is used to visualize bibliographies, or data sets that contain bibliographic fields (title, author, author, journal name, and so on). VOSviewer is used for bibliometric analysis, looking for topics that still have research opportunities, looking for the most widely used references in certain fields, and so on [12]. Detailed information for the use of VOSviewer and PoP has been explained elsewhere [13] and the examples are in previous studies[14-25].

### 3. Results and Discussion

The results and discussion of this article will be divided into 4 topics to show the contribution of research in the last 5 years on the development of technology-based learning management.

The results of the analysis using VOSviewer there are four-part relationships (red, green, blue, yellow) that are interrelated between one topic and another. VOSviewer can display three different screens: network visualization (Fig. 1); overlay visualization (Fig. 2); and density visualization (Fig. 3). In this application, keywords are marked with colored circles. The size contained in the image is closely related to the keywords that appear in the title and abstract. Thus, the size of the circles and letters is determined by the frequency that occurs. The more often keywords appear, the larger the size of the letters and circles.

Figure 1 shows the groups in each of the studied fields. It can be seen that the keywords learning management student, student, LMS, study, use, factor, and higher education are in the same cluster, namely the red area. This shows that there is a strong relationship between them.

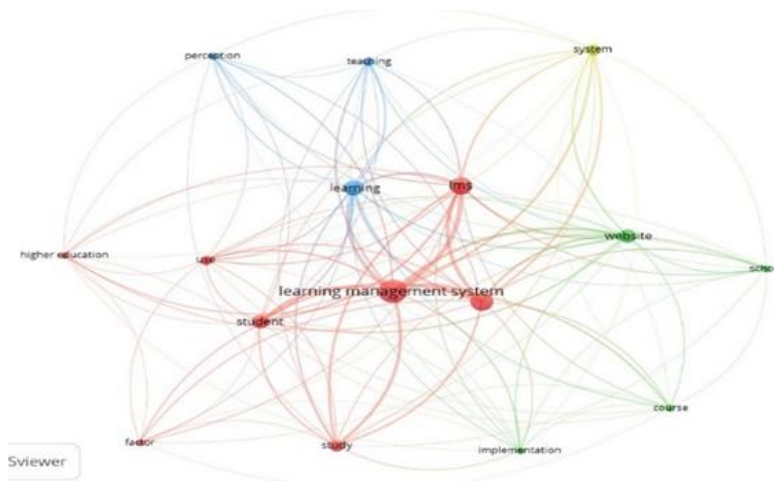


Fig. 1. Network visualization.

Figure 2 shows the trend from year to year regarding this research. The trend of LMS research in 2018 is still lacking. There are only 14 research journals and the number is fast in the following year, increasing by around 25%. Furthermore, Fig. 3 shows the depth of research, answering that the more concentrated the colors that appear, the more research is done.

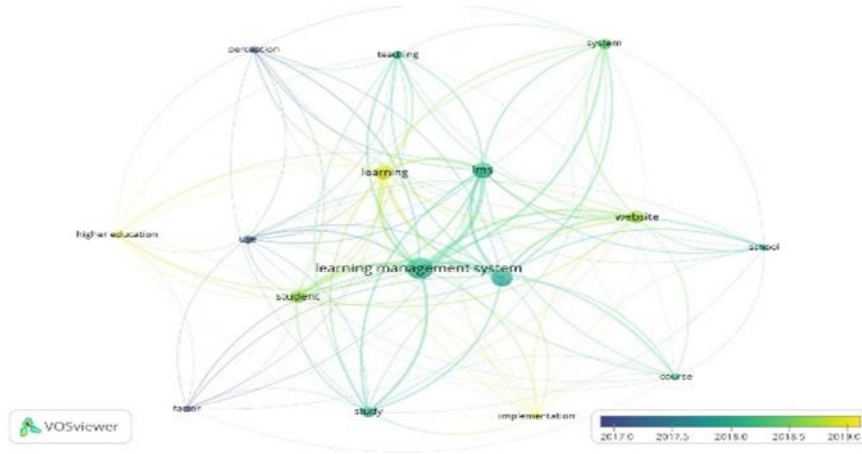


Fig. 2. Overlay visualization.

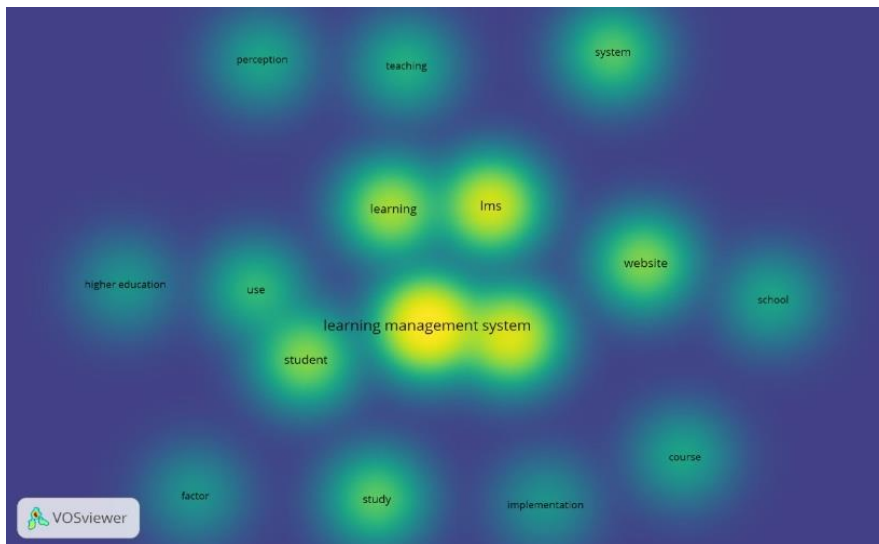


Fig. 3. Density visualization.

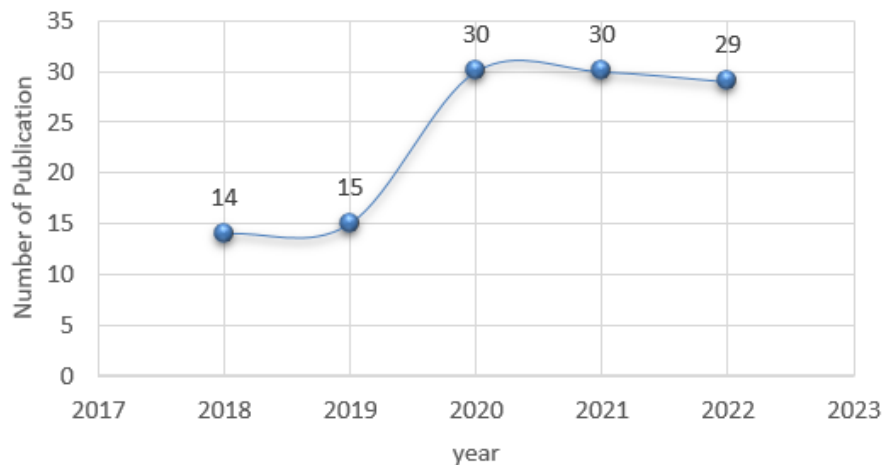
In Figs. 1-3, the keywords that often appear are Learning management system, learning, LMS, website, student, and study. From this data, we can look for research on the new learning management system. For example, research related to the application of learning management systems in school management is still relatively conducted by other researchers. In addition, the availability of information on each topic area can be searched by entering more specific keywords.

For example, the use of learning management systems in technology-based learning, or other examples. The analysis that will be carried out on the topic of using technology in learning can also be seen from the many studies conducted by other researchers. Figure 2 shows that higher education and application show relatively small numbers compared to systems and teaching (these two topic areas are shown in figure 1). For this reason, we can provide support in implementation through the use of technology in digital-based learning. Other researchers have shown that the use of technology for learning media can be beneficial for activity time, which becomes more flexible and can be adapted to student/student time [26].

Table 1 and Fig. 4 show the percentage of the number of journals that issue titles about LMS. In the last 5 years, in 2018, it showed a total percentage of 12%, then in the following year 2019 it increased by around 1% from the previous year. In 2020, with a significant increase, the percentage almost doubled, an increase of around 25%. In 2021, it shows the same amount of 25%. In 2022, it is still at the same rate of around 25%.

**Table 1. Number of publication per year.**

Year	Number of Publication	%
2018	14	12
2019	15	13
2020	30	25
2021	30	25
2022	29	25

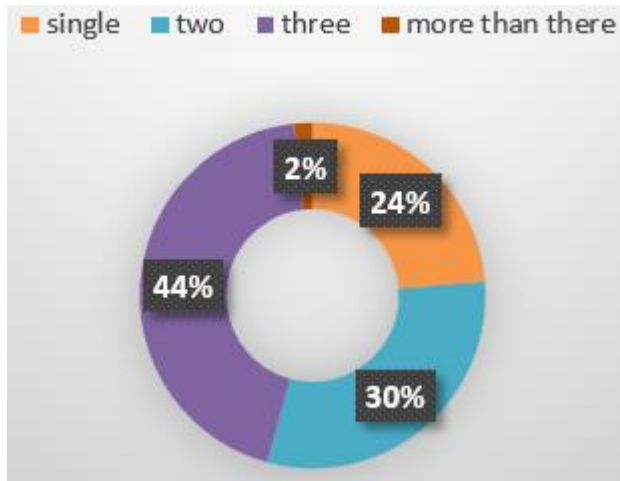


**Fig. 4. Overlay vizualitation.**

Table 2 and Fig. 5 show that the first publication was addressed by the contribution of 3 authors with a total of 52 papers (44%), the second is with the contribution of 2 authors with a total of 36 papers (30%), the third is by the contribution of 1 author of about 28 papers (24%), and the contribution of more than 3 authors are at the end with a total of 2 papers (2%).

**Table 2. Author pattern.**

Authorship Pattern	2018	2019	2020	2021	2022	Num.
Single	5	4	4	8	7	28
two	5	7	8	6	10	36
three	4	3	18	16	11	52
more than there		1			1	2

**Fig. 5. Number of percentage of authorship pattern.**

#### 7 4. Conclusions

Based on the results and discussion, it can be concluded that there are 118 papers published in international journals through the Google Scholar database in 2018-2022 and analyzed using VOSviewer. The most frequently used themes in research are learning management systems, learning, LMS, websites, students, and study. The trend of research development with the theme of learning management systems tends to increase every year. Apart from that, from an authorship point of view, the contribution of three authors with a total of 52 papers (44%) was the most made in the last five years.

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