

The Utilization of Multimedia Information Systems in the Education Sector: A Bibliometric Study Using Vosviewer

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Abstract

Research on the use of multimedia in the context of education in the era of society 5.0 is a relevant topic for research. The strategy of using multimedia in education has been widely applied as a way to convey material effectively. The aim of this research is to find out research trends in the use of multimedia over the last decade. The approach used to examine current trends is through a literature study using bibliometric analysis. Bibliometric analysis will uncover the main research, relevant authors, and their relationship to relevant publications. Publication data was taken from 2014 to 2024 regarding the use of multimedia in education obtained from international journals with the Google Scholar index. The Vostviewer application makes it easy to visualize research trends on the use of multimedia in education. The results of the study show that the trend of research on the use of multimedia in education in the last 10 years has been increasing and decreasing. However, from 2022 to 2023, the research trend will decline. There are 6 clusters consisting of Cluster 1 (11 items), Cluster 2 (10 items), Cluster 3 (8 items), Cluster 4 (6 items), Cluster 5 (6 items), Cluster 6 (4 items).

Keywords: Use of Multimedia in Education, Bibliometric, Vosviewer

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INTRODUCTION

One of the innovations in learning is the use of computers. Computers are currently the right teaching tools (Herman Dwi Surjono, 1995). The selection of multimedia as a medium in learning is because multimedia can combine various media elements to convey material (Ivers & Barron, 2010). Proper use of multimedia can aid psychomotor development and improve the visual processing of users. Multimedia uses several media to present information, such as text, graphics, animations, images, and sound.

Multimedia plays an important role in modern education. Multimedia, such as video, audio, and moving images, can grab students' attention and increase their motivation in learning. The use of interactive and engaging media can make learning more engaging, reduce boredom, and increase student engagement. In some cases, abstract or complex concepts can be more easily understood through the use of multi-media. Graphs, animations, and diagrams can help students visualize these concepts better, thus strengthening their understanding. The use of multimedia makes it easier for students to learn independently and adjust the pace of learning according to their own preferences.

With access to multimedia resources, such as learning videos or online tutorials, students can learn the material in a way that suits their own learning style. Multimedia also facilitates collaborative learning. Students can collaborate on multimedia projects, share ideas through online platforms, or engage in discussions and information exchanges. This can encourage active engagement, critical thinking, and cooperation between students. The use of multimedia in education can increase accessibility for students with a wide range of learning needs. For example, students with hearing impairments can access material through text or sign language

translation, while students with visual impairments can use screen reader software to access text.

In some fields, such as science and medicine, multimedia allows students to conduct virtual simulations or experiments. This gives them the opportunity to practice skills, observe results, and learn from the experience without the risks or costs associated with physical experiments. Multimedia is also important for designing and implementing well in the context of learning. Proper use, clear organization, and an approach that takes into account the needs of students are key to achieving maximum benefits from the use of multimedia in education.

STUDY LITERATURE

Various researchers have used bibliometric analysis in various fields of study. This method involves using statistics to analyze scientific publications in a quantitative way (Effendy et al., 2021). Bibliometrics integrates scientific, mathematical, and statistical principles to conduct a comprehensive analysis of knowledge (Ho, 2020). This method collects information related to publications and is used to conduct a literature analysis in a specific field.

One of the applications used for mapping in bibliometric analysis is VOSviewer. This tool helps collect various information related to science that has developed (Al Husaeni et al., 2023). VOSviewer is an application that allows the construction and visualization of bibliometric networks, including information in journals, titles, authors, and publications (Fitria, 2022; Gunawan, 2021; van Eck and Waltman, 2017).

The critical role of the VOSviewer application lies in the processing of data related to collection, management, analysis, and simulation (Soegoto et al., 2022). VOSviewer is able to produce map visualizations presented in three types of visualizations, namely visualizations such as network visualization, density, and overlay (Al Husaeni et al., 2023). VOSviewer helps researchers map different types of bibliometric analysis, create major biblio-graphic databases, and map better visualization of visual labels. VOSviewer helps researchers in identifying research variables that are still under-researched or that have been widely researched. Through analysis using VOSviewer using relevant keywords, the results can be used as a reference in research areas where their use is still limited. VOSviewer can be used as a reference source for analysis in a limited scope of research.

METHOD

This study applies a qualitative descriptive approach to disseminate research data. The study in this study focuses on the analysis of articles contained in international scientific journals indexed on Google Scholar, using the keyword "Use of Multimedia in Education" in a span of 10 years, namely 2014-2024. The data obtained is then analyzed using the VOSviewer software. The steps taken are as follows:



Gambar 1. Langkah-Langkah Analisis Bibliometric

RESULT

Based on the search results through the *Publish and Perish* software, 83 articles were found related to the keyword The use of multimedia in education published in journals over the past 10 years, starting from 2014 to 2024. Table 1 below presents data on the most cited articles on the topic of multimedia use in education. The number of research topic keywords can be linked to the VOSviewer for further analysis. Next, data from the research articles were collected to see how the terms related to each other.

Tabel 1 Artikel Penggunaan Multimedia dalam Pendidikan

No	Cites	Authors	Title	Year
1	124	M Babiker, A Elmagzoub	For Effective Use Of Multimedia In Education, Teachers Must Develop Their Own Educational Multimedia Applications.	2015
2	47	YSuchyadi, NSafitri, OSunardi	The Use Of Multimedia As An Effort To Improve Elementary Teacher Education Study Program College Students' comprehension	2020
3	39	D Roberts	The Engagement Agenda, Multimedia Learning And The Use Of Images In Higher Education Lecturing: Or, How To End Death By Powerpoint	2018
4	23	N Maloshonok	How The Use Of Internet And Multimedia Technology In Education Correlates With Student Engagement	2016
5	22	M Lam, M Choi, Hr Lam, A Agarwal, R Chow	Use Of Multimedia In Patient And Caregiver Education For Cancer Pain Management: A Literature Review	2017
6	10	Wl Yap, N Neo, Tk Neo	Transforming From Conventional Teaching Environment To Learner- Centred Teaching Environment With The Use Of Interactive Multimedia Module In Tertiary Education	2016
7	8	Ki Valijonovna	Multimedia Technologies And Their Use In The System Of Preschool Education	2022
8	7	As Abdusakimovna	Use Of Multimedia Technologies In The Development Of Intellectual Skills Of Students Of Pedagogical Higher Education	2021
9	7	M Glatz, B Mišota, M Zatrochová	The Use Of Interactive Multimedia Didactic Means In The Education Of Students	2019
10	7	Ra Pratiwinindya, N Alfatah, R Nugrahani	The Use Of Interactive Multimedia To Build Awareness Against Animal Exploitation In Environmental Conservation Education For Children	2021

Based on table 1, it can be concluded that the most cited topic in the context of multimedia use in education is For Effective Use Of Multimedia In Education, Teachers Must Develop Their Own Educational Multimedia Applications. (M Babiker, A Elmagzoub: 2015) which was cited 124 times.

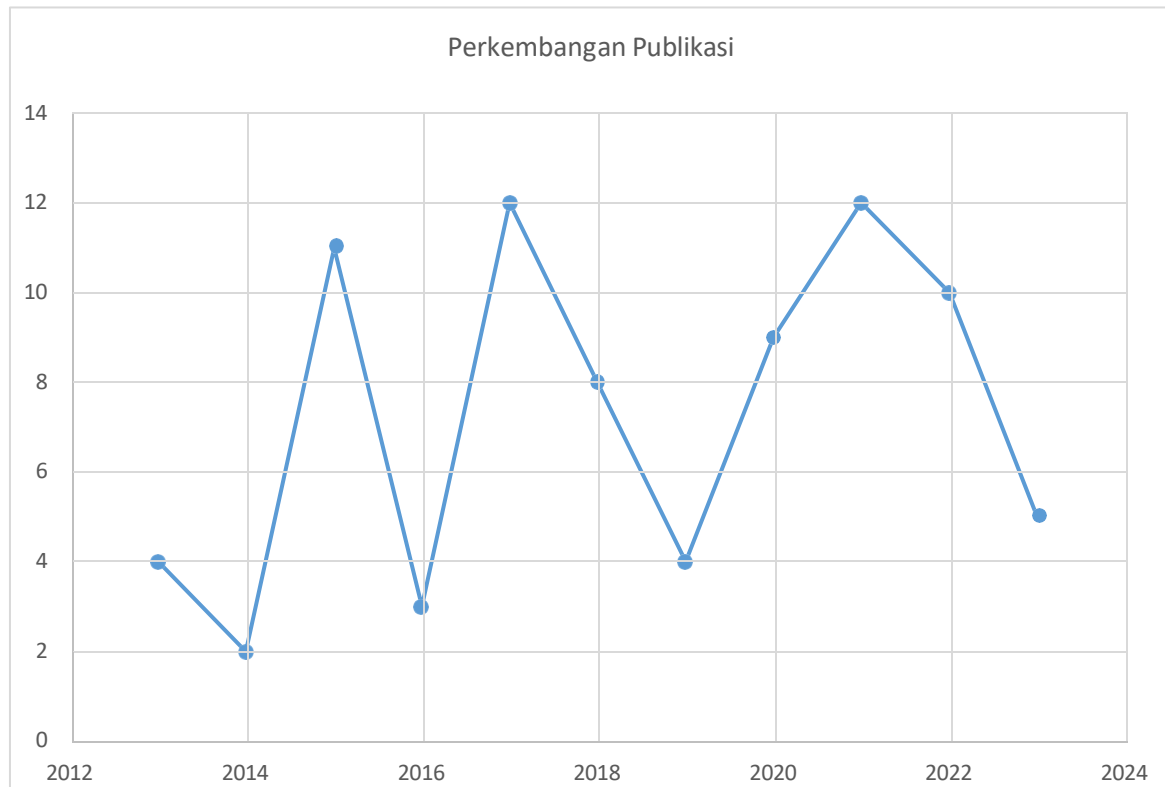
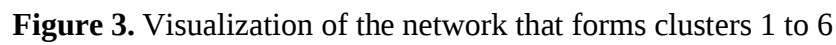


Figure 2. Development of Publications on the Use of Multimedia in Education

Figure 3 shows a map of publication development and the relationship between terms based on search keywords on Google Scholar. Lines or networks represent the relationship between terms (Al Husaeni et al., 2023). Analysis of research fields related to the use of multimedia in education revealed the existence of 6 clusters formed. More information on the analysis of the multimedia use cluster in education can be found in Table 2 as follows:

Table 2 . Results of Cluster Analysis of the Use of Multimedia in Education

Cluster	Cluster Networks
Cluster 1 (11 items)	Development, effectiveness, interactive multimedia, learning, mathematics, medium, model, multimedia learning, principle, student
Cluster 2 (10 item)	Cognitive load, effect, environment, meta analysis, motivation, multimedia, outcome, performance, systematic review, type
Cluster 3 (8 item)	Application, cognitive theory, ctml, eye tracking, framework, instruction, theory, tool
Cluster 4 (6 item)	Experiment, learner, mayer, perspective, present study, study
Cluster 5 (6 item)	Impact, memory, modality, picture, role, text
Cluster 6 (4 item)	Emotion, emotion design, positive emotion, process



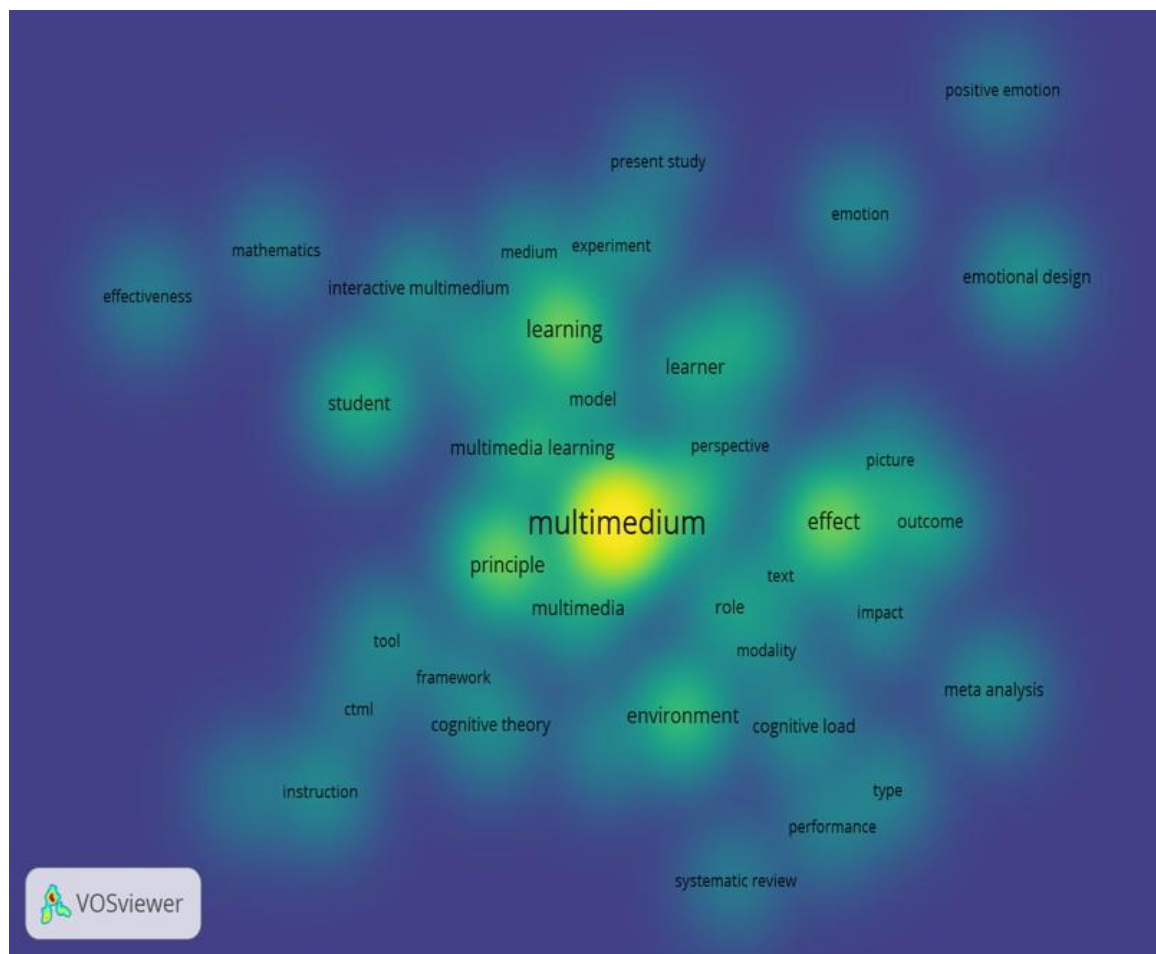


Figure 5 Density Visualization of the Use of multimedia in education

Figure 4 is a visual representation of research trends regarding the use of multimedia in education from year to year. The analysis is based on publications related to the use of multimedia in education in the last 10 years, from 2014 to 2024. Meanwhile, Figure 5 shows a visualization where the lighter yellow color and the larger circle indicate denser keywords. This indicates that the research topic has been extensively researched. On the other hand, if the colors are reduced and mixed with a green background, then it shows that the topic has not been researched much. Therefore, this subject can be used as a reference for further research.

CONCLUSION

This study analyzes the items of multimedia use in education to analyze research trends. Over the past 10 years, research on the use of multimedia in education has been analyzed through a bibliometric approach. "Bibliometrics" is a term that refers to the use of mathematical and statistical techniques for scientific publications, such as papers, books, and other communication sources, to analyze research trends and evaluate the results of research that have been published before. The results of the analysis show that the number of publications regarding the use of multimedia in education has fluctuated from year to year, but has begun to decline since 2021. Through analysis using VOS viewer in 83 related journals, one cluster was found that was the focus of the main research. Some of the keywords that were widely studied in this cluster included "development, effectiveness, interactive multimedia, learning,

mathematics, medium, model, multimedia learning, principle, and student."

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