Critical Review of Recent Papers in Learning Media: Advantages, Challenges, and Future Prospects

Gunarso[1]✉, Wahyudin[2], Alfaza Ranggana[3], Endah Permatasari[4], Vani Aprianto[5], Hesti Septiani[6]
(1) Pendidikan Ilmu Komputer, Universitas Pendidikan Indonesia
(2) Pendidikan Ilmu Komputer, Universitas Pendidikan Indonesia
(3) Pendidikan Ilmu Komputer, Universitas Pendidikan Indonesia
(4) Pendidikan Ilmu Komputer, Universitas Pendidikan Indonesia
(5) Pendidikan Ilmu Komputer, Universitas Pendidikan Indonesia
(6) Pendidikan Ilmu Komputer, Universitas Pendidikan Indonesia

✉ Corresponding author
(gunarso@upi.edu,)

Abstrak

Dengan perkembangan teknologi yang begitu pesatnya pada saat ini, penggunaan media pembelajaran sangat diperlukan untuk mendukung proses pembelajaran yang menarik dan dapat memotivasi siswa untuk mengikuti pembelajaran. Tujuan dari penelitian ini untuk melakukan tinjauan secara kritis penggunaan media pembelajaran termasuk didalamnya keunggulan media itu sendiri, tantangan yang dihadapi serta prospek penggunaan media pembelajaran pada masa yang akan datang. Metode penelitian yang digunakan adalah analisis bibliometrik, memanfaatkan machine learning untuk memetakan data. Penelitian ini terdiri dari empat tahapan analisis bibliometrik, yaitu: (a) pengambilan data melalui aplikasi Publish or Perish, (b) pengolahan data, (c) pemetaan data menggunakan machine learning, dan (d) analisis data pemetaan menggunakan bahasa pemrograman R. Jurnal yang menjadi acuan diterbitkan antara tahun 2019 sampai dengan 2023 dari database Google Scholer, Science Direct and DOAJ. Proses pencariannya menggunakan kata kunci learning media. Hasil penelitian menunjukkan bahwa analisis bibliometrik dan pemetaan 1000 publikasi menggunakan machine learning memungkinkan pemahaman yang lebih mendalam tentang perkembangan, tren, dan aspek penting penelitian di bidang learning media. Dengan menggunakan pendekatan analisis bibliometrik dan penerapan machine learning, penelitian ini berkontribusi perkembangan penggunaan teknologi dalam menerapkan media pembelajaran.

Kata Kunci: Media pembelajaran, analisis bibliometrik, pembelajaran machine

Abstract

With the rapid development of technology at this time, the use of learning media is very necessary to support an interesting learning process and can motivate students to participate in learning. The aim of this research is to critically review the use of learning media, including the advantages of the media itself, the challenges faced and the prospects for using learning media in the future. The research method used is bibliometric analysis, utilizing machine learning to map data. This research consists of four stages of bibliometric analysis, namely: (a) data collection using the Publish or Perish application, (b) data processing, (c) data mapping using machine learning, and (d) mapping data analysis using the R programming language. Journal which is a reference published between 2019 and 2023 from the Google Scholer, Science Direct and DOAJ database. The search process uses the keyword learning media. The research results show that bibliometric analysis and mapping of 1000 publications using machine learning allows a deeper understanding of developments, trends and important aspects of research in the field of learning media. By using a bibliometric analysis approach and applying machine learning, this research contributes to the development of the use of technology in implementing learning media.

Kata Kunci: *Learning media, bibliometric analysis, machine learning*

INTRODUCTION

Learning media is a tool that can be used to help the process of transferring knowledge from teachers to students so that learning is more effective. This literature study provides a comprehensive study of the benefits and role of learning media in mathematics learning. This systematic literature uses Preferred

Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) as a research approach (Muhaimin & Juandi, 2023).

The readiness of the world of education, especially the learning media used, needs to be understood. This research examines the readiness of technology-based learning media in the field of early childhood education to face the era of society 5.0. Two major conclusions emerged from the study's findings: first, a list of the qualities of the various kinds of technology 5.0 based learning materials that one needs to possess in order for them to be applicable in today's world (Maulidia et al., 2023).

Technological developments are increasingly developing multimedia-based interactive media which can help teachers convey material to students and students also understand the material being taught more easily. Media development software that has an effective appearance, is easy and attractive to use is 3D Pageflip. This research is descriptive research with data analysis techniques using percentages which are then analyzed using descriptive techniques (Putra & Mufit, 2022)

The increasing trend of using technology nowadays can change students' behaviour towards participating in the learning process in the classroom (Supriadi et al., 2019). I. t is so easy for students to obtain, manage, and share information that teachers are asked to adapt learning by utilising technology (Pane et al., 2023).Interactive and interesting learning media are needed to arouse students' learning motivation so that students enjoy participating in the learning process (Hardiansyah, 2023).

Media is a container or place that contains the material to be conveyed, and the goal to be conveyed that is achieved is the learning process (Rahmatsyah & Dwiningsih, 2021). According to Hadza et al. (2020), media serves as a tool for conveying learning. Without using media, learning will be less effective because there is no support or example shown. So students will learn abstractly and find it difficult to understand learning (Cholik & Umaroh, 2023).

The learning process really needs learning media as a tool to help the teaching and learning process become more interesting (Satria et al., 2022). Something that can be used to stimulate thinking, emotions, attention, learning skills, or the learning process (Afdareza et al., 2020). These boundaries are very broad and deep and include an understanding of the sources, environment, people, and methods used for learning purposes.

The means of communication are print, visual, and auditory media, including hardware and software technology (Socrates & Mufit, 2022).Learning media is a learning tool that plays an important role in the teaching and learning process in both formal and non-formal learning (Meilindawati et al., 2023). Learning media is anything that is able to convey or channel information effectively and efficiently in the learning process (Sartika, 2023). Learning media can make abstract material more real, and media can be used as a link between material and natural findings by including content or images that are appropriate to the material so that students can more easily understand and remember the material (Rante et al., 2023).

The use of media can make it easier for students to understand the subject matter (Kusumaningrum & Masruro, 2022), because learning using media can be designed to be interesting and fun so that students do not get bored quickly and can motivate and stimulate students to be enthusiastic about learning, supporting the achievement of learning objectives. effective and efficient (Socrates & Mufit, 2022)Learning media plays a crucial role in ensuring the success of the learning process conducted by teachers in the classroom (Candi, 2023).

Effective learning is learning that can support the achievement of learning objectives and can support the learning process by having adequate facilities and infrastructure (Afdareza et al., 2020), so that students get an interesting learning experience and increase student activity in the learning process (Sitorus & Sadjiarto, 2022). One way to integrate technology into the learning process in the world of education is through the use of e-learning media or online-based learning (Panjaitan et al., 2023).Learning media is intended to deliver learning material through various electronic media such as the internet, intranet/extranet, satellite, broadcast, audio/video tape, interactive television (TV), compact disc read-only memory (CDROM), and computer-based (CBT) (Leny Dhianti et al., 2023).

With the existence of learning media, the learning process can take place anytime and anywhere, so it does not have to be in one dimension of space and time, meaning it can happen at any time. Moreover, learning media is combined with e-learning, which contributes to changes in students' learning activities because they no longer listen to material explanations from teachers in class (Fetra Bonita Sari, Risda Amini,

2020).Teachers popularly use learning media as a resource in the classroom learning process (Satria et al., 2022). There are so many different types of media available that some teachers have not yet optimally utilised them as alternative learning sources. This is due to various reasons, including the fact that sometimes learning media can make it difficult for teachers to use them.

However, there is still much to explore further regarding the use of learning media that adapts to the behavior and development of the students themselves. Good learning media is media that can provide opportunities to gain and enrich children's knowledge directly (Cholik & Umaroh, 2023). Can improve language skills, think critically and positively, help to get to know the environment and one's abilities, foster motivation, and increase attention to learning (Utami et al., 2023). The aim of this research is a critical review of the latest papers in learning media regarding advantages, challenges, and future prospects. This critical review aims to provide added value to the use of media in learning. This research differs from previous research in terms of the research method employed. In this research, data processing uses machine learning.

RESEARCH METHODS

The present study falls under the category of systematic literature review, as its objective is to do a thorough investigation of related subjects. The goal of this paper's discussion is to offer recommendations for more research based on the findings of this study. Because it stimulates particular interest in a study endeavor utilizing certain approaches and procedures, literature reviews are a discipline of research. Some of the sources used in this study were online resources like Science Direct, DOAJ, and Google Scholar. To find the documents, searches were conducted using keywords, abstracts, and titles. The type of learning media utilized as keywords is examined in the content analysis study.

Bibliometric analysis research using machine learning consists of eight stages, namely defining research questions, identifying literature sources, utilising applications such as Publish or Perish for data retrieval, collecting data, importing and cleaning data, text processing, literature analysis, data visualisation, and interpretation of results (S. Kaymak et al., 2021). To enhance clarity, the methodology is described as follows:

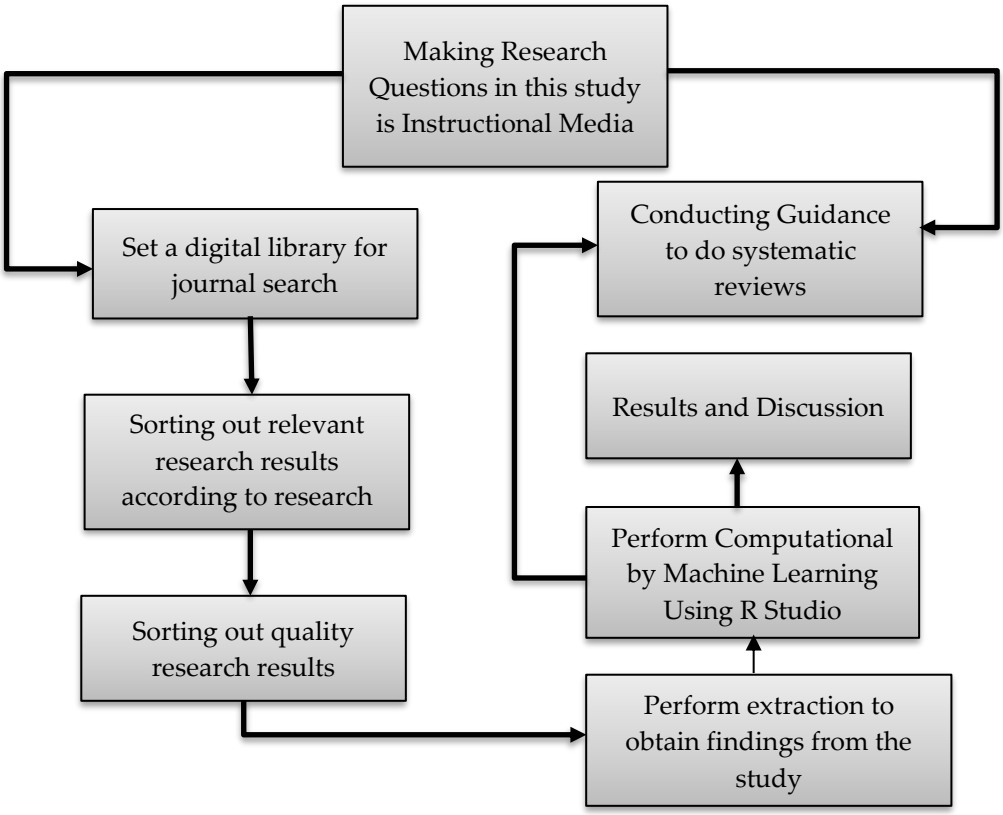

Figure 1 Stages of bibliometric analysis.

RESULTS AND DISCUSSION

In the academic and scientific fields, the quality of scientific publications is assessed, among other things, by measuring the number of times a work is cited by other researchers. A work cited shows its significance and impact in its respective field. In this research, a total of 1000 articles were found with specified keywords from 2019 to 2023. Furthermore, a citation analysis was carried out which showed that the number of citations per year from 2019 to 2023 was 8,062 with an average citation of 2015.50 per year. The H-Index for all papers related to this theme was found to be 46, while the g-index was 73.

Table 1 Publications on learning media with the highest number of citations.

No	Cites	Author	Title	Years	Source
1	829	YD Puspitarini, M Hanif	Using Learning Media to Increase Learning Motivation in Elementary School.	2019	Anatolian Journal of Education
2	350	NM Dwijayani	Development of circle learning media to improve student learning outcomes	2021	Journal of Physics: Conference Series
3	121	A Syakur	The effectiveness of english learning media through google classroom in Higher Education	2020	Britain International of Linguistics Arts and Education
4	120	R Darmayanti, R Sugianto, B Baiduri	Digital comic learning media based on character values on students' critical thinking in solving mathematical problems in terms of learning styles	2022	Al-Jabar: Jurnal Pendidikan Matematika
5	114	M Sholihin, RC Sari, N Yuniarti, S Ilyana	A new way of teaching business ethics: The evaluation of virtual reality-based learning media	2020	The International Journal of Management Education
6	109	N Lestari	Improving the speaking skill by vlog (video blog) as learning media: The EFL students perspective	2019	In Education Management: Teaching, Learning
7	108	B Williamson, J Potter, R Eynon	New research problems and agendas in learning, media and technology: the editors' wishlist	2019	Learning, Media and Technology
8	105	S Sahronih, A Purwanto, MS Sumantri	The effect of interactive learning media on students' science learning outcomes	2019	Proceedings of the 2019 7th
9	95	I Fuady, MAS Sutarjo	Analysis of Students' Perceptions of Online Learning Media During the Covid-19 Pandemic (Study of E-learning Media: Zoom, Google Meet, Google Classroom, and LMS)	2021	Randwick International of Social Science (RISS) Journal

No	Cites	Author	Title	Years	Source
10	95	EE Rohaeti, M Bernard, RB Primandhika	Developing interactive learning media for school level mathematics through open-ended approach aided by visual basic application for excel.	2019	Journal on Mathematics Education

Table 2 Publications on learning media with the highest rank

No	Rank	Author	Title	Years	Source
1	200	H Syamsul, RA Sholikhakh, NS Bina	Effect of application smart circuit learning media to mathematics learning outcomes: a case study of islamic school students	2019	Journal for the Education of Gifted Young Scientists
2	199	H Elmunsyah, WN Hidayat	Interactive learning media innovation: utilization of augmented reality and pop-up book to improve user's learning autonomy	2019	Journal of Physics: Conference Series
3	198	W Anggraini, S Nurwahidah, A Asyhari	Development of pop-up book integrated with quranic verses learning media on temperature and changes in matter	2019	Journal of Physics: Conference Series
4	195	Wahyu Nur Aprianto, Irvan Sir, Atmam Amir	Practice of Audio-Visual Learning Media to Grow the Motivation of MI Kenongomulyo Students' Learning	2022	Indonesian Journal of Research and Educational Review
5	193	F Daryanes, D Darmadi, K Fikri, I Sayuti, MA Rusandi	The development of articulate storyline interactive learning media based on case methods to train student's problem-solving ability	2023	Science Direct Heliyon

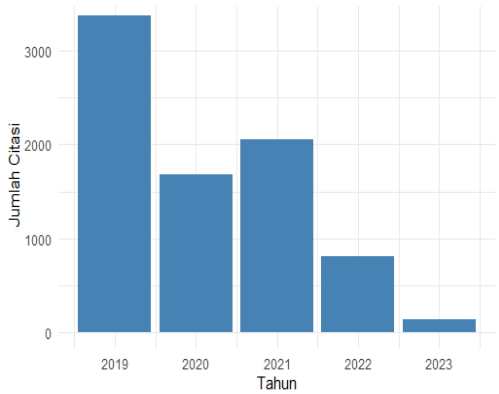

Figure 2 The Highest Number Of Citations

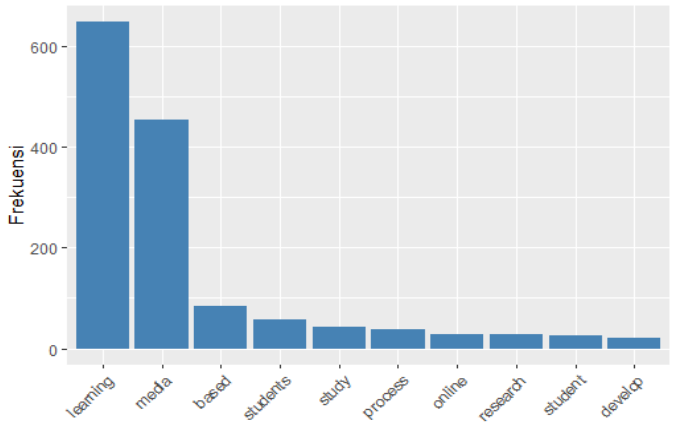

Figure 3 Development of Publications Based on General Keywords

From Figure 3 it can be concluded that the analysis of general keywords related to learning media reveals several findings. Based on positive sentiment analysis, there is a strong correlation in the use of learning media related to the learning process that occurs in the classroom between teachers and students. On the other hand, negative sentiment analysis shows that the existing learning media is not yet up to date. This shows that there is a gap in the use of contemporary digital tools and technology to improve student learning experiences. From the results of this analysis, it can be concluded that there is still wide open research related to learning media related to renewable technology.

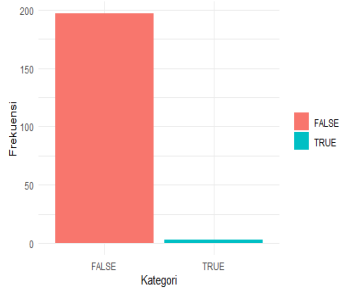

Figure 4 frequency of appearance of keywords in the abstract

After filtering the abstract with the latest learning media keywords such as virtual reality, augmented reality and artificial intelligence, it can be concluded from Figure 4 that this term appears only once, namely virtual reality. Meanwhile, other terms in the 1000 papers were not found. This analysis highlights the importance of these words in the context of the relationship between the latest technological developments that can be applied in education, especially implementation in learning media. Additionally, the presented bar chart provides a clear comparison of each term, which is relevant to the given data. This visual representation provides a more easily understood overview of the frequency of occurrence of these words and allows a more comprehensive understanding of their relative occurrence.

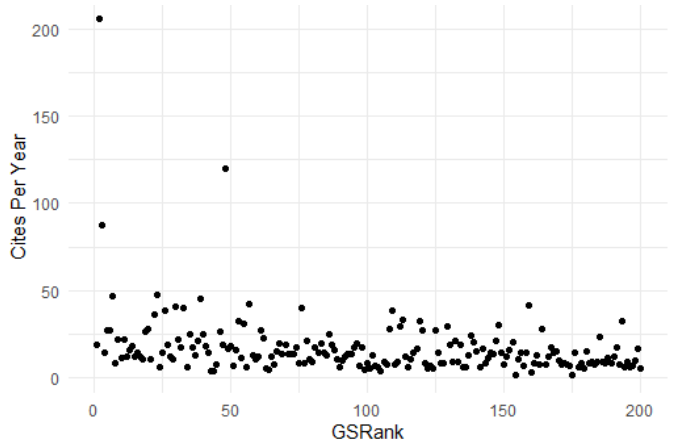

Figure 5 Relationship between GSRank and Cites Per Year

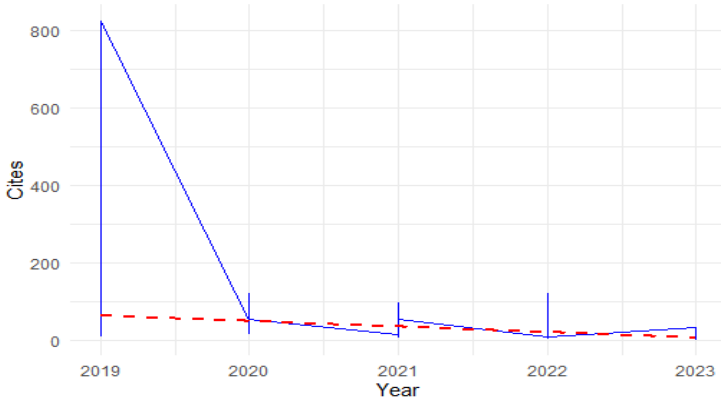

Figure 6 Trend Analysis Time Cites

Distinguishing itself from previous research, this research marks major progress in terms of the use of learning media. According to the literature review, there are several important differences caused by the methodological methods we used in this study. This research fills the knowledge gaps that still exist in this field by specifically examining certain elements that have not received sufficient attention previously.This research also changed the focus and goals. We hope to make a valuable contribution to the advancement of knowledge through the use of learning media by discovering knowledge gaps that remain unfilled. This research not only provides a deeper understanding of the topic but also offers a new perspective through careful analysis and a well-planned machine learning approach, which makes it unique and relevant within the framework of scientific studies.

DISCUSSION

From the analysis it can be seen that articles about learning media receive an average of 2015.50 citations per year, with an average of 40.31 citations per article. These findings are important because they reflect the scientific impact and recognition of this field of research. The results of this research underline the importance of bibliometric analysis and data mapping using machine learning techniques in gaining a deeper understanding of developments, trends and important aspects of research in this field. Through this method of analysis, we gain insight into how this academic field has developed over time, and citation density indicates the influence and relevance of the topic.

The advantages of using learning media that are interesting, relevant and in accordance with curriculum guidelines are a positive aspect during the learning process in the classroom. Of the many advantages, learning media that is interesting, motivating and fun (Basuki & Hidayati, 2019) makes students more enthusiastic and creates a sense of confidence to participate in learning activities from start to finish. In addition, the processed articles offer numerous other benefits. Learning media can help students develop 21st century skills such as creativity, problem solving and communication. Students can be involved in tasks that emphasise the development of these skills (Leny Dhianti et al., 2023).

However, another thing that must be considered in building learning media is the challenges in implementation, and we all know that there are many problems faced in education, especially learning media that is built using the internet. Not all educational institutions and schools have adequate internet access facilities, which results in gaps in learning. Not to mention that only a few teachers have received training to build effective learning media, which has become an obstacle to implementing learning media. Paying attention to the challenges that have been mentioned is the first step in developing effective and inclusive solutions for implementing quality learning media. With a holistic approach, solutions can be sought that suit each educational context and need.

For future prospects, learning media promises various innovations and significant changes in response to technological developments, evolving curriculum demands, and changes in the way students learn. Renewable technologies such as virtual reality (VR), augmented reality (AR), and artificial intelligence (AI) are alleged to allow students to better understand learning material (Hakim, 2018). This development creates great opportunities to improve the quality of education and make learning more accessible (Cholik & Umaroh, 2023).

However, challenges such as access gaps and data security also need to be considered when initiating changes in learning media. From a broader research perspective, these findings confirm the increasing importance of learning media used in the educational domain, driven by the increasing integration of digital technology in learning. Additionally, this research has broadened our understanding of the evolving research landscape in these fields. In the context of previous research and working hypotheses, our findings validate the increasing scholarly attention to the application of instructional media. The high level of citations indicates that these topics are of great importance in contemporary educational research and have stimulated substantial academic discussion.

It is important to remember that our results cover a limited time period and may be influenced by source availability and current digital technology trends at the time of conducting the research. Future investigations should continue to track and evaluate this domain as it develops, perhaps delving into newer data beyond 2023. This research has a variety of ramifications, from how it may influence the creation of media that is more relevant to curriculum objectives to how important it is in determining how developed learning media will develop in the future. It is becoming increasingly important for educators and researchers to understand as the field of education continues to adapt to advances in technology. Educators and researchers can use the findings of this study as a foundation for other research and interventions, thus supporting the continuous improvement of teaching methods in the digital era.

CONCLUSION

Bibliometric analysis is carried out on research related to learning media, utilizing data visualization using machine learning. A total of 1000 highly relevant articles were obtained from the search results. This research aims to identify various research trends related to predetermined keywords and analyze them from various points of view. From the total number of articles identified from 2019 to 2023, it was found that articles related to learning media received an average of 2015.50 citations per year, with an average of 40.31 citations per article. Through the analysis of 1000 publications, the results show that bibliometric analysis and data mapping using machine learning enable a deeper understanding of developments, trends and important aspects of research in this field. By using bibliometric analysis and applying a machine learning approach, this research contributes to the understanding of learning media, while providing an overview of research trends.

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