Bibliometric Analysis of Hybrid Learning Research Trends in Schools

iD Rantika Emiliyanti

Universitas Bengkulu
Bengkulu, Indonesia
✉ rantikaemiliyanti949@gmail.com *

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Abstract

The aim of this research is to examine how research onhybrid learning in schools. This research method uses a literature review using a bibliometric analysis method approach starting from entering the keyword "*pembelajaran hybrid*" by setting the search year 2018-2023 and journals using the Publish or Perish (PoP) software application. The database used is Google Scholar, after searching Initially by selecting the keyword "hybrid learning" the maximum search allowed in Google Scholar is 1000 journals and we could enter a value of less than 1000. This research utilizes Publish or Perish (PoP) and VOSviewers software to analyze the data. Based on the findings, results and discussion, it was found that the highest number of scientific publications on the Google Scholar site from 2018-2023 occurred in 2020 and 2021. The results of research based on overlay visualization and density visualization in 2018-2023 centered on hybrid learning variables, meaning that there was a lot of research carried out by other researchers.

A. Introduction

Industrial revolution 4.0, is a projected implementation of modern technology in Germany in 2020 used through industrial technology, strategic frame construction, plus other items. Education is connected to the industrial revolution 4.0 which is used to motivate children's learning and thinking habits to foster their innovation (Kahar et al., 2021). Education for industrial revolution 4.0 outlines how to incorporate tangible and intangible cyber technologies into the classroom. Aspects of educational learning during the industrial revolution 4.0 include the use of creativity, critical thinking, communication skills and character qualities by students in the learning system (Alcácer, 2019). The skills required to implement Industry 4.0 technologies must be to be able to use them efficiently. By equipping people with the necessary knowledge and skills, education plays an important role in preparing them to face the needs of Industry 4.0.

Although there are obstacles that must be overcome, such as limited internet access, inadequate technological proficiency, and data security issues, technology can be a useful tool for improving student learning outcomes. Technology in education also creates new problems, such as a lack of comprehensive student learning and a lack of social interaction between lecturers and students. Apart from that, using technology can also improve students' learning experience, the use of online learning platforms and innovative learning software (Purwosetiyono et al., 2022). Current technological developments in Indonesia require teachers to be able to adapt to the era of industrial revolution 4.0. Mastery of the skills to utilize existing technology in learning to support the implementation of an effective and innovative student teaching and learning process.

This country places great importance on education. A person's abilities can be developed through education at school. Students' intelligence, which can be classified as kinesthetic, intellectual, emotional, social or spiritual, can be developed through education. Education is expected to change society's perspective and encourage national progress. The process of conveying knowledge through learning communication in the

form of text, sound, images or video is known as online learning. You can send messages, photos, audio files and instructional videos via the Whatsapp Group feature which is part of the application, for online learning. Google Meet and Zoom are applications with discussion rooms and face-to-face knowledge transfer capabilities. By using this application, educators and students can communicate digitally. Hybrid learning is a combination of two different learning approaches online and face to face with the main help of technology. Half of the students in this hybrid learning system will study in person, while the remaining 50% will study online.

Hybrid learning arises from the impact of using internet-based technology in education. The internet provides the ability and makes it easier to present material. Teachers can encourage creativity or provide examples that are not possible with internet technology. Hybrid learning, sometimes known as blended learning, is a type of learning that combines today's in-person learning possibilities with the use of the internet. Hidayat & Andira (2019) stated that hybrid learning can use a global network to provide the material it teaches and utilize interactions between teachers and students. The learning technology of hypermedia, multimedia, and the use of LMS/LCMS are examples of content display patterns that can be understood as learning tools. Schoology application in the learning and teaching process of Free Campus CMS for Indonesian educational needs. Similar to Facebook, Schoology is a social media platform that facilitates classroom learning and is user-friendly. Schoology can be used to manage grades, tests, quizzes, assignments, and student attendance. This can also be utilized on social networks.

Problems of hybrid learning in the era of school technology (Rahayu et al, 2022). Technology and digitalization are developing rapidly. in society forces schools in Indonesia to adapt their learning processes to keep up with technological advances. This provides challenges for teachers and students, because they are required to be proficient in using technology for learning purposes. The integration of technology as a learning medium in 21st century education requires teachers to become facilitators and motivators for students to explore and utilize digital resources for learning. Shifting the teacher's role from being the only source of information to being a guide in the digital era can be a challenge. Hybrid learning that combines online and offline learning requires teachers to be inventive and imaginative in implementing various learning strategies that can build student understanding. This may be a challenge for teachers who may need to acquire new skills and adapt their teaching methods to effectively engage students in a hybrid learning environment.

Solutions to hybrid learning problems in the era of school technology (Ulfa & Puspaningtyas, 2020). Implementation of a well-designed Learning Management System (LMS) that integrates online and offline learning activities can provide a seamless hybrid learning experience. Leveraging video conferencing tools and virtual classrooms can facilitate real-time interaction and collaboration between students and teachers, bridging the gap between face-to-face and online learning. Providing access to digital resources and online libraries can enhance independent learning and allow students to explore and engage with content outside of the traditional classroom setting (Utari et al., 2020). Hybrid learning, which combines face-to-face and virtual teaching, has several challenges in the technological age. The variety of media required for blended learning can be difficult to implement without adequate infrastructure and resources. Unequal access to facilities such as computers and the internet can hinder students' ability to participate in online learning. Limited knowledge about learning resources and technology among teachers, students, and parents can also pose challenges to implementing blended learning. Teachers need to take the time to develop and manage online learning, including creating materials, preparing assessments, and engaging in online discussions with students. The abstract nature of certain subjects, such as biology, requires hands-on activities such as experiments and practical work, which cannot be completely replaced by online delivery. Overall, addressing this and ensuring equal access to resources and support is critical to the successful implementation of hybrid learning in the technology era.

Blended learning combines face-to-face and online learning components, taking advantage of the benefits of both. However, Rasheed (2020) stated that challenges exist in the blended online learning component. Students face challenges and self-regulation challenges in using learning technology. Teachers face challenges in using technology to teach and providing appropriate instructional technology. They also struggle with effective training support. Challenges for educational institutions include providing appropriate and efficient training aids instructional technology for educators. Teachers in blended asynchronous classes face challenges such as focusing on remote students, solving technical problems, and managing students in both modes. Lack of immediate support to fix technical problems and lack of electronic equipment are challenges that hybrid teachers often face. According to Aziz et al (2023), hybrid learning utilizes technology for the learning process. It aims to be the most effective and efficient form of

learning, allowing students to access learning materials via the internet and allowing teachers to connect student activities online. Hybrid learning integrates a variety of teaching approaches, delivery methods, and a variety of technological media, Providing students with the opportunity to learn continuously, independently, and develop lifelong learning skills. It is expected to improve learning outcomes and improve communication between students and teachers in different learning environments, including in-class, blended, and fully online settings (Batubara et al., 2022). Hybrid learning model, one solution is to use a platform such as Google Classroom, which provides a digital space for teachers to deliver instructional material and interact with students.

Blended learning in higher education is influenced by the increasing use of information communication technology (ICT) which approaches several aspects of the human thought process(Dziuban, 2018). The effectiveness of blended learning is measured based on students' access, efficacy, and perceptions of their learning environment. Student grades based on course modality were recoded into Binary variables with a grade of C or higher had a value of 1, and all other values were 0. Mixed impacts should be converted carefully in specific learning contexts (Putri, 2022). Researchers have conducted a meta-analysis to explore the application of the blended learning model in the technological era. This meta-analysis examines several research papers on blended learning in the context of the 5.0 era in Indonesia. The research aims to determine whether the blended learning approach is useful in fostering higher-order thinking skills, critical thinking, creativity and problem-solving abilities. Analysis reveals that blended learning models are widely used in research to assess their impact and effectiveness. The findings show the efficacy of the blended learning paradigm in improving learning outcomes in the 5.0 era, especially in increasing critical thinking standards. Combining online and face-to-face collaborative learning in a blended learning model makes it an innovative, technology-based approach to education.Investigations were conducted for this research. with the title "Bibliometric Analysis of Hybrid Learning Research Trends in Schools" and the aim of this research is to examine how research onhybrid learning in schools.

B. Research Methods

Bibliometric techniques were included in the literature review methodology of this study (Shen, 2020). The bibliometric analysis method is a research method that involves the analysis of quantitative scientific publications to gain insight into various aspects of research, such as author productivity, journal impact, and trends in a particular field. Stages The initial part of the bibliometric analysis involves collecting papers related to hybrid learning with the Publish or Perish (PoP) program. The data is then processed and evaluated simultaneously, and VOSviewer is used to view the article data in network form. Initially, the keyword hybrid learning was entered into the PoP software, with a search year of 2018–2023 and a maximum number of results of 1000. For ease of search and access, a database was selected and used to search for related research articles on Google Scholar. similar to figure 1.
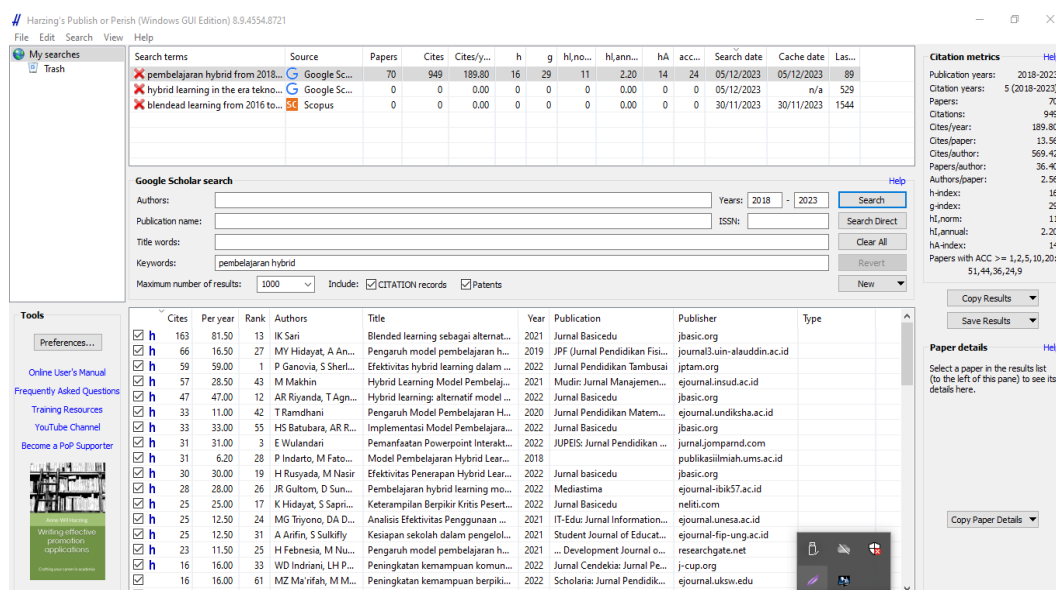

Figure 1. Search in Google Scholar Database

Based on Figure 1, there is a maximum search limit on Google Scholar of 1000. A less comprehensive map will be produced if we enter a value lower than 1000. Quotation mark information is taken from Figure 1 and is used to explain the data quantitatively, which is displayed in full in Table 1.

Table 1. Quotation Marks

Results	Explanation
Keywords	Hybrid learning
Year of Publication	2018-2023
Year of Citations	5 (2018-2023)
Articles	70
Number of Citations	949
Annual Citations	189.80
Article Citation	13.56
Article Writing	2.56
H index	16
G Index	29
Individual H Index	11
Annual H Index	2.20
h/A index	14

After obtaining data from Figure 1, it is saved in the required format, such as RIS, and processed using VOSviewers software to create networks and maps.

The development map of hybrid learning scientific articles based on problem solving was analyzed using the VOSviewers program. Network visualization, overlay visualization, and density visualization are the results of data processing. Network visualization maps are used to show relationships and groups of study themes associated with certain keywords. An overlay graph is used to pinpoint the year of completion of the related study topic. Meanwhile, density visualization is used to examine study topics that are rarely and too widely explored

C. Results and Discussion

Data Collection Results Published or Expired

Table 1 shows the results of collecting articles from 2018 to 2023 using PoP software and the Google Scholar database. Seventy publications with a total of 949 citations, 189.80 citations annually, 13.56 citations per article, 2.56 authors per article, 16 H and 29 G indices, 11 individual H indices, 2.20 H index annually, and 14 Ha indeces have been published on hybrid learning based on problem solving.

Diagram illustrating the Development of Scientific Publications
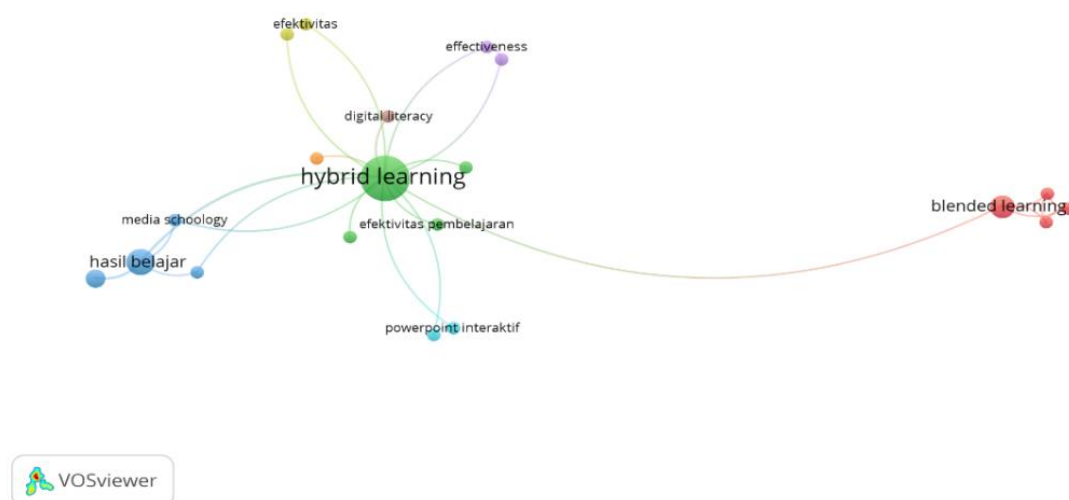

Figure 2. Network Visualization with VOSviewers

Four clusters with related issues were identified through network visualization analysis, with particular emphasis on the interaction between media schoolology and hybrid learning. Researchers can find connections and patterns in their research by using visualization, which provides a visual depiction of the relationship between various concepts and themes in the field of hybrid learning. Because the points in the network representation indicate authors and delimit the relationships between them, this helps in understanding the collaborative character of the research. The number of variables collectively evaluated is indicated by the size of the nodes in the figure; Larger nodes indicate a greater number of variables. All things considered, network visualization provides a comprehensive picture of the hybrid learning research landscape, emphasizing the connections between diverse concepts and the collaborative aspects of field research.
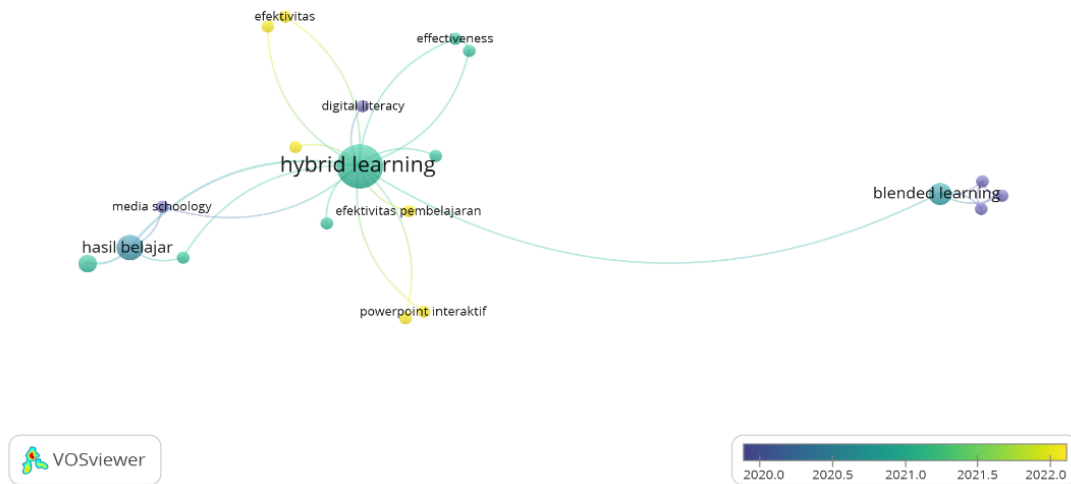

Figure 3. Overlay Visualization

This research overlay visualization shows that variables related to hybrid learning were the focus of research from 2018 to 2023, thus indicating that most of the research was carried out by other academics. The overlay visualization highlights progress and patterns in the field of understanding mathematical concepts by making it easy to identify the years relevant research was conducted.

It provides scholars with full knowledge of the relationships between various concepts and themes in the hybrid learning domain by enabling them to visualize the grouping and interconnection of research subjects. Researchers can determine future research directions by using overlay visualization to help them find areas that have been thoroughly investigated and areas that still require further investigation.
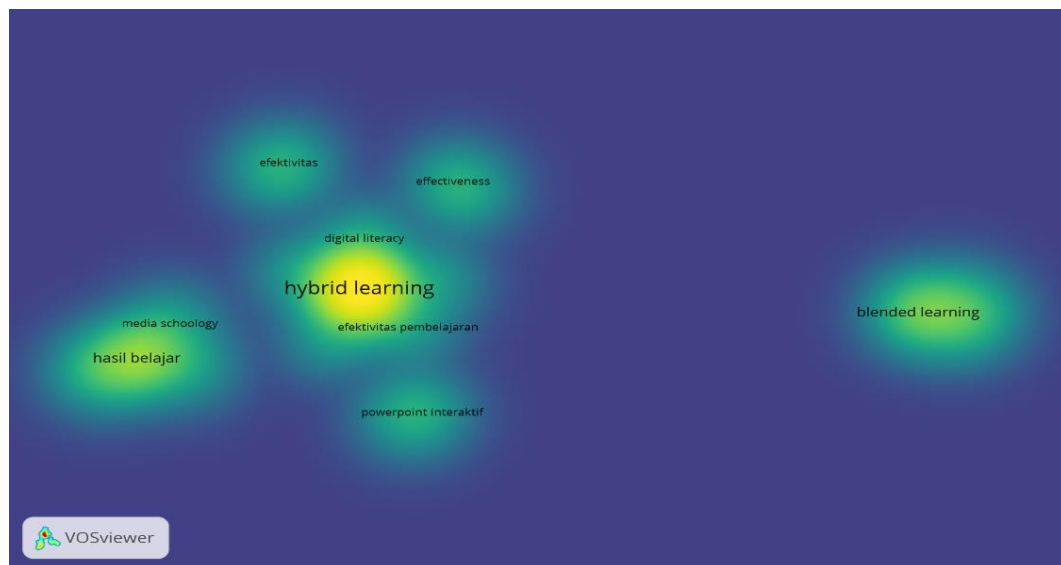

Figure 4. Density Visualization

Differently colored areas, such as yellow, green, and blue, indicate various research findings related to the idea of hybrid learning, according to the density visualization analysis. The concept of hybrid learning has been well researched, as evidenced by the yellow areas which also show strong links between many disciplines. The hybrid learning capacity intersection is represented by the yellow-green area, indicating that further study and development in this area is still needed. Powerpoint, media literacy, and digital literacy are represented by blue boxes; these topics have not been well studied and offer prospects for further study. Researchers can identify areas that require more research and possible innovation by using density visualization, which provides a visual representation of the saturation and scarcity of research in various sectors.

D. Conclusion

Many researchers have conducted research on hybrid learning in schools, this can be seen from the large number of scientific papers on Google Scholar from 2018 to 2023, with the highest number of publications occurring in 2020 and 2021. Teachers experience problems when using teaching tactics different ways to effectively engage students in a hybrid learning environment, which combines online and face-to-face learning. To meet hybrid learning expectations, educators may need to change their teaching strategies and learn new skills. Various parts of hybrid learning, such as delivery of teaching materials, student assessments, and teacher-student contact, can be managed using platforms such as Google Classroom and Schoology.

E. Acknowledgment

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