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Bibliometric Analysis of Hybrid Learning During Covid-19 in Physics Learning

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Abstract

This research aims to understand student perspectives and the most appropriate and effective learning approaches during the combined online and face-to-face learning period. The research method used is analyzing literature using bibliometric techniques which begins by defining the keyword 'Hybrid Learning' in the Publish or Perish application with Google Scholar as the data source. After reducing the scope of the search by focusing on specific aspects of 'hybrid learning', a total of 19 relevant articles were selected from a total of 50 articles found in the initial stage of the search. The collected data is managed using the Mendeley application, while the Vosviewer application is used to produce visualizations of related research. The research results show that physics learning became more effective when the Covid-19 virus outbreak broke out by implementing a hybrid approach, which helped improve students' technology skills. However, continued use of this approach in schools can have negative consequences for students. So, it can be concluded that hybrid learning is effective in physics learning when the Covid-19 virus is spreading. Because hybrid learning can improve students' abilities in using technology. However, it can also have a negative impact on students if it is applied continuously at school.

A. Introduction

Education is a series of activities to improve the attitudes and behavior of students, both individually and in the context of society. This is an effort to obtain, understand and apply knowledge according to needs on a rational basis. This process is an important stage towards maturity for young individuals which is guided by adults and always involves learning as an important part. The quality of education played a crucial role in past civilizations and amazing works, even determining the quality of civilization itself (Hidayat & Andira, 2019).

Responses to education development issues at the international level have been implemented in the 2013 curriculum, which has undergone several revisions. One of the improvements made is in terms of curriculum content, where irrelevant material has been reduced while relevant material has been expanded to meet students' needs to be able to develop critical and analytical thinking skills in accordance with international standards. The hope is that this evaluation of learning outcomes can help students improve higher order thinking skills (HOTS), because higher order thinking skills can encourage students to think deeply and holistically about the topics studied (Muharromah et al., 2023).

Learning involves a relationship between teachers and students where students act as learners while teachers act as educators. The learning process includes planning, implementation and evaluation stages. In

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accordance with Law number 14 of 2005, the teacher's task is to educate, direct, train, assess and evaluate, while the student's task is to follow directions and carry out instructions given by the teacher to achieve learning goals. These goals are reflected in indicators of competency achievement which are based on educational standards and the 2013 curriculum (Novianti & Syarkowi, 2022).

Physics is one of several basic sciences that studies natural behavior and the factors that control it. Skills in basic physics concepts are very important in understanding physics lessons, because this knowledge is the foundation for various branches of applied science and engineering. Advances in applied science depend heavily on a solid understanding of the fundamentals of physics. Learning physics is not only about understanding the theory, but also applying it practically so that students can explain various problems that arise (Hidayat & Andira, 2019). The aim of learning physics is to help students gain an understanding of physics, support them in solving physics problems, and introduce scientific attitudes and methods (Novianti & Syarkowi, 2022).

Since the outbreak of the Covid-19 virus in early 2020, Indonesia and the world at large have shifted to online activities or WFH (Work from Home). This change also has an impact on the student education system. Schools have an important role in evaluating a nation's progress through the educational process (Febnesia et al., 2021). The Covid-19 pandemic situation has forced students to undergo distance learning, encouraging teachers to change learning strategies in order to achieve learning goals. Field conditions that do not always match teachers' expectations of students have an impact on cognitive development, requiring increased learning strategies (Simangunsong & Panjaitan, 2022).

In situations like this, educators must be able to adapt to face learning challenges during the COVID-19 pandemic. This pandemic condition has disrupted the teaching and learning process, causing student learning performance to be not optimal. As a result, educators need to use various methods, including modifying learning methods, to overcome this (Febnesia et al., 2021). The government has issued several policies to overcome learning challenges during the Covid-19 pandemic, such as the Four Ministerial Decree No. 03/KB/2021 which regulates how to carry out learning during the COVID-19 pandemic. During the Corona Virus Disease 2019 (COVID-19) pandemic, learning can be done through limited face-to-face learning by implementing health protocols or online learning. Current conditions change the way of interaction in learning from face-to-face in class to being limited to virtual spaces. Teachers must create optimal learning conditions and bring creativity and innovation in using learning media to ensure understanding of the material and achieve learning goals. Students' learning motivation also plays an important role in the success of online learning. However, studying at home with limited network access makes it difficult for teachers to develop learning strategies that are appropriate to the pandemic situation, requiring creativity in involving students even in distance learning (Sulthoniyah et al., 2022).

During the COVID-19 pandemic, teachers and students faced various challenges. Starting from changing the learning system from face-to-face to online in March 2020. Initially, teachers as educational staff in schools experienced difficulties, such as finding appropriate learning methods for Distance Learning (PJJ), improving skills in using digital technology, managing classes online, as well as evaluating student learning outcomes.

In this context, teachers are expected to restore the learning situation so that the learning process can run as it should. To overcome this problem, it is necessary to apply appropriate learning models or methods, either by combining certain methods and models or integrating the model with media that can support the teaching and learning process in the classroom. One of the learning models suggested by researchers is the hybrid learning or blended learning model (Hidayat & Andira, 2019).

One learning strategy that supports freedom of learning is the use of a blended learning model. Blended learning is a combination of face-to-face (offline) and online learning methods. This approach aims to create a balance between easy access to information through electronic learning and human interaction found in conventional methods (Siboro et al., 2022). According to Oliver and Trigwell in their critical analysis, they concluded that the concept of blended learning actually only requires combining two or more different types of things. They argue that a very broad interpretation of this concept means that almost anything can be considered a form of blended learning.

Hybrid learning is an effective learning method with collaboration between physical and online classes. This system not only minimizes the gap between students and teachers, but also increases interaction between the two. In essence, hybrid learning is a combination of conventional online and face-to-face learning. However, its implementation requires adaptation depending on the school situation and the student's location of residence. The main goal of hybrid learning is to provide opportunities for various

characteristics of students to learn independently, sustainably, and continue to develop throughout their lives. This is expected to increase effectiveness, efficiency and attractiveness in the learning process. With this hybrid learning approach, it is hoped that learning outcomes can be improved and strengthen communication relationships in three learning models, namely the classroom learning environment, a combination of face-to-face and online learning, and fully online learning (Aziz et al., 2022).

Hybrid Learning is an education system that combines face-to-face learning methods with learning via e-learning platforms. The development of information and communication technology has inspired various innovations in education, including the concept of e-learning. The Hybrid Learning learning concept aims to provide the most optimal and simple learning experience possible by combining direct meetings in class with wider use of e-learning (Indriani & Pasaribu, 2022).

Hybrid learning is a learning process that basically involves social interaction which can be disrupted if the entire learning process is carried out without human interaction. This hybrid learning model is a combination of face-to-face learning in the classroom with online learning carried out online. The role of the teacher is as a facilitator in the student learning process, organizing learning tasks, guiding them in formulating problems, and formulating hypotheses (Nasution & Lubis, 2021). A hybrid or blended learning method is an approach that combines both direct and online learning. Blended learning is an effort to integrate various sources and appropriate learning activities, where learning participants can interact and develop each other's ideas.

Education that uses a mixture of hybrid learning has started since the era of the discovery of computers, although previously there were also combined learning methods. Learning initially occurs through face-to-face interactions between educators and students. After the invention of the printing machine, educators began to use print media in the learning process (Verawati & Desprayoga, 2019).

One way to integrate the internet in the learning process is through the application of Hybrid learning. Utilizing Hybrid learning in teaching physics lessons using a website-based learning platform can improve students' ICT literacy (digital literacy) skills. For this reason, a learning system that uses a blended learning (Hybrid learning) approach is still highly recommended for implementation in Indonesia so that it can be more managed traditionally (Rahayu et al., 2019).

According to government directives, face-to-face learning is now only permitted on a limited basis, a maximum of 50% of room capacity. These limitations encourage schools to use creative and innovative approaches in designing effective learning strategies, one of which is through the application of blended learning. Blended learning is a learning method that combines elements of face-to-face learning with distance learning (Rofingah, 2021). Blended teaching is considered the most effective and sought after learning method by educational institutions because it is considered effective in providing flexible, timely and continuous learning. Blended learning, which combines face-to-face teaching with teaching via technology, is considered the optimal approach (Rasheed et al., 2020).

Therefore, in this study research will be carried out with the title "Bibliometric Analysis of Hybrid Learning During Covid-19 in Physics Learning" which aims to explore student learning experiences, understand student perspectives and the most appropriate and effective learning approaches during the online combination learning period. and face to face.

B. Research Methods

The method used in this research is reviewing various literature sources (literature review) with a bibliometric approach. The literature review process is carried out using a systematic, detailed and replicable method, or using an idea mapping method that emphasizes the boundaries of knowledge. The bibliometric approach is a way to observe the development of a research field, including topics and authors, by paying attention to the social, intellectual and conceptual structure of that field of science. Bibliometric analysis is generally applied in various scientific disciplines and focuses on quantitative studies of journal articles, books and other written communications (Nurfauzan & Faizatunnisa, 2021). The research began by defining the keyword 'Hybrid Learning' in the Publish or Perish application with Google Scholar as the data source. After reducing the scope of the search by focusing on specific aspects of 'hybrid learning', a total of 19 relevant articles were selected from a total of 50 articles found in the initial stage of the search. The collected data is managed using the Mendeley application, while the Vosviewer application is used to produce visualizations of related research.

C. Results and Discussion

The research results show that the article written by (Hidayat & Andira, 2019) entitled "The Influence of Hybrid Learning Models Assisted by Media School on the Learning Outcomes of Class XI MIA MAN Pangkep Students" which was published in Brand: Physics Education Journal, received the highest number of citations 3 times in research regarding Hybrid Learning in Physics Learning. The article that occupies second place in the number of citations is (Febnesia et al., 2021), with the title "The Influence of Hybrid Learning Model Using the Peer Tutor Method on Welding Outcomes in Yabhinka Vocational School Students" and (Novianti & Syarkowi, 2022) with the title "Comparison of Student Satisfaction with Full Online Physics Learning System with Hybrid System Physics Learning" with each quote 2 times.

Analyzing the output from the PoP application is applied to the VOSviewer application to identify keywords that regularly appear. VOSviewer is used to create bibliometric maps in three different visualization types, such as network visualization, overlay visualization, and density visualization.

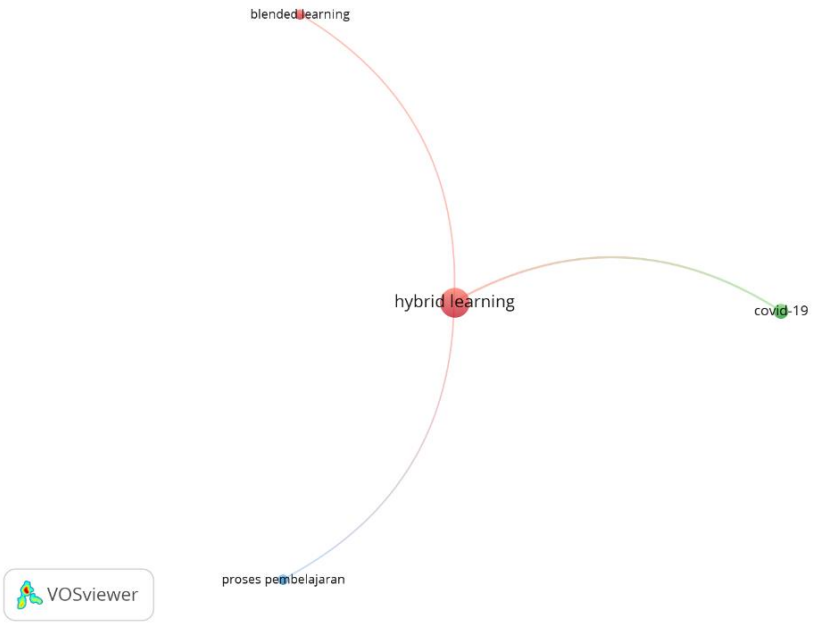

Figure 1. Hybrid Learning Map Visualization

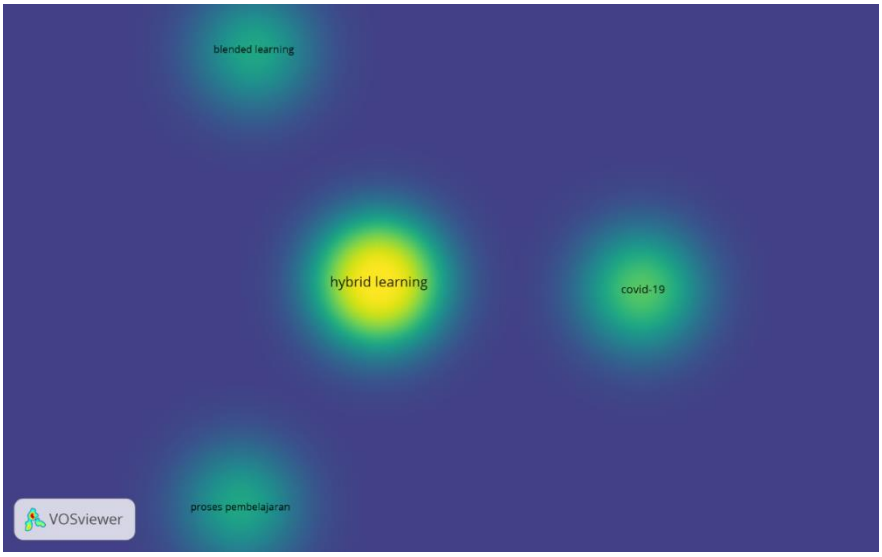

Figure 2. Visualization of Hybrid Learning Depth

After conducting research, it was found that the learning process was delayed due to the Covid-19 virus outbreak which broke out at the end of 2019. All teachers had used various learning methods so that the learning process at school could run as usual. So that the learning process can take place optimally, the teacher applies a hybrid learning method. The government has also directed all schools in Indonesia to carry out the teaching and learning process using hybrid learning methods. Hybrid learning is learning that combines face-to-face learning methods and online learning. Since the invention of computers, hybrid learning has begun to be implemented, but the teaching and learning process face to face is considered more effective.

According to several experts, when the Covid-19 virus was spreading, implementing hybrid learning was a very effective learning method. For example, in physics learning, with the hybrid learning method, physics learning can be carried out more effectively. Because there are several media or applications that can be used via a computer. By implementing the hybrid learning method, it will also increase students' abilities in using technology such as computers.

However, if schools continue to implement hybrid learning methods, it will have a negative impact on students. Students will no longer be lazy about studying at school, and will not be able to control themselves from using computers or cellphones, which should only be used for studying.

When conducting research, researchers are very limited in time in carrying out the research. For further research, researchers must be able to allocate time to conduct research so that the results obtained are better.

D. Conclusion

Based on the research that has been conducted, this research reviews 19 articles with themes related to hybrid learning in physics learning. Articles were collected from the Google Scholar database using PoP software. 19 articles were the result of screening from 50 articles in the initial search. In this research, it can be concluded that hybrid learning is effective in physics learning when the Covid-19 virus is spreading. Because hybrid learning can improve students' abilities in using technology. However, it can also have a bad impact on students if it is applied continuously at school.

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