



Implementation of Blended Learning in Higher Education during the COVID-19 Outbreak

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Abstract

In the current COVID-19 transition period, effective learning model innovations are needed in all fields of education, especially higher education. This study aims to empirically verify the blended learning model applied in higher education during the covid 19 pandemic. Systematic literature review and Meta-Analysis (PRISMA) were used as methods to conduct this research. The articles reviewed were 30 latest articles from 2019 to 2021. All articles were classified by author, year of publication, type of journal or conference, research methods used and supporting applications used in developing blended learning models. The results of the study are presented as follows. The results of the study found that the use of Moodle in the blended learning model is the most widely used in higher education today. The results of the study also prove an increase in the number of articles published from 2019 to 2020 and the most widely used research method in the current blended learning development model is literature review.

A. Introduction

Coronavirus Disease (COVID-19) is already familiar to the world community, Indonesia in particular. COVID-19 is rapidly spreading throughout the world and its impact is very dangerous for the survival of mankind. The death rate from COVID-19 continues to increase [1]. COVID-19 has also affected the world of education around the world without exception. The COVID-19 pandemic has had a serious impact on learning processes around the world, around 1.8 billion students worldwide were affected because educational institutions were closed due to the COVID-19 pandemic [2].

Teaching and learning process which was previously carried out with the face-to-face method in the classroom, due to the COVID-19 pandemic, educational institutions made a rule that the teaching and learning process was carried out using the distance learning method [3], [4], this was done to suppress the spread of COVID-19. The learning process from home is carried out through online or distance learning using information and communication technology [5], [6].

It also raises new challenges and opportunities for the world of education. COVID-19 has created many obstacles as well as opportunities for educational institutions to strengthen and update their learning technology infrastructure [7], [8]. Currently, there are several information and communication technologies that can be used as distance learning models, including the use of e-learning. Utilization of e-learning is currently increasingly popular [9]. In addition to being popular, the delivery of material with e-learning is currently faster and of course more convenient because it can be used in various conditions, especially the current COVID-19 pandemic era [10], [11].

The learning model is one of the important factors that determine the achievement of educational goals. However, the implementation of e-learning was not entirely successful. The current reality in the field reveals that taking formal education through home learning schemes is very challenging [12], [13], many educators, learners and parents, especially in developing countries, have difficulty accessing and providing information technology tools [14].

This obstacle is exacerbated because not all schools and teachers have experience in implementing e-learning [15], [16], and the obstacle for students is the availability of electronic devices and unequal internet network access. Face-to-face learning should not be abandoned completely [17], considering that there are still many advantages of face-to-face learning compared to current e-learning [18].

The application of fully online learning or relying entirely on the internet is not suitable for all conditions [19], [20], so a suitable temporary solution is the application of blended learning [21]. Blended learning is a combination of the best version of online learning and face-to-face learning [22]. On the basis of this rationalization, this study focuses on reviewing the literature on blended learning learning models that were applied during the COVID-19 pandemic from 2019 to 2021. This becomes an urgency to immediately conduct further research due to the lack of learning innovation and finding inhibiting factors. learning in higher education. The results of this study will later become material for proposals and references as an anticipatory step for teachers in higher education in designing suitable learning (Rohanai et al., 2020). The objectives of this study are to find and verify examples of blended learning models during the COVID-19 pandemic and to

uncover and analyze the inhibiting factors of blended learning models in higher education.

B. Method

This study is designed to investigate three research questions: RQ1 - 'In the last three years, 2019 to 2021 where the pandemic started and is ongoing until now. In what year was research on the application of blended learning done?', RQ2 - 'What supporting technologies or applications does higher education use in implementing blended learning models?', RQ3 - 'What methods are often used in research on blended learning model?'. To fully understand, this research explored or knowledge discovery [23] the recent source as the primary source for answering research question.

The method used in writing this article is a systematic literature review, which is an international literature search conducted using the ScienceDirect and Springer databases as well as additions from several other sources. This literature review was conducted using the PRISMA method. The PRISMA method is a method used to carry out literature review and meta-analysis activities to make it easier to review the structure of the roadmap of research objectives [24].

Meta-analysis in the literature review is used as a source of empirical evidence, where researchers can summarize and analyze the content of articles [25]. Meta-Analysis can also define articles according to their qualifications, playing an important role in solving problems by explaining, synthesizing, and assessing quantitative or qualitative evidence as reporting material.

The systematic literature review process was carried out in three stages, consisting of searching and retrieving articles, filtering and sorting, and analyzing. In the early stages of searching for journal articles related to blended learning models in higher education, 324 journal articles were obtained from January 2019 to 2021. The results were identified using the keywords "Higher Education", "Blended Learning Model" and "COVID-19".

At the stage of sorting articles, they are uploaded to the Mendeley reference management application. Some Articles were later deleted due to duplication. Furthermore, the selection of articles is carried out more specifically by filtering articles based on inclusion criteria

Exclusion criteria are articles that do not meet the selected criteria such as book chapters, theses, short reports, studies or non-empirical articles. Only international conference proceedings and journal articles were deemed to fit the inclusion criteria [25].

Table 1. Inclusion and Exclusion Criteria

No	Inclusion Criteria	Exclusion Criteria
1	Time: Range from 2019 to 2021	Before 2019
2	Language: English	Not english
3	Empirical research that published via international conference and international journals	Books, Thesis, and Dissertation
4	Associated with learning model in higher education	All levels of education (except for the learning model in higher education)

The remaining articles are then re-filtered with the aim of finding journals that are relevant to the problem formulation. All articles are read and discussed at a glance about what part is being researched, the scope of the problem being researched, where the research focus is, and how the results of the research are. Finally, 14 articles were deleted because they were not fit for purpose. So we get 30 complete articles. In the end, 30 articles were thoroughly analysed, synthesized to extract and summarize the basic findings needed to answer the research objectives. In the discussion chapter, it was criticized by giving ideas about the application of the blended learning model in higher education during the COVID-19 pandemic. In order to better understand the PRISMA flow diagram is presented in Figure 1.

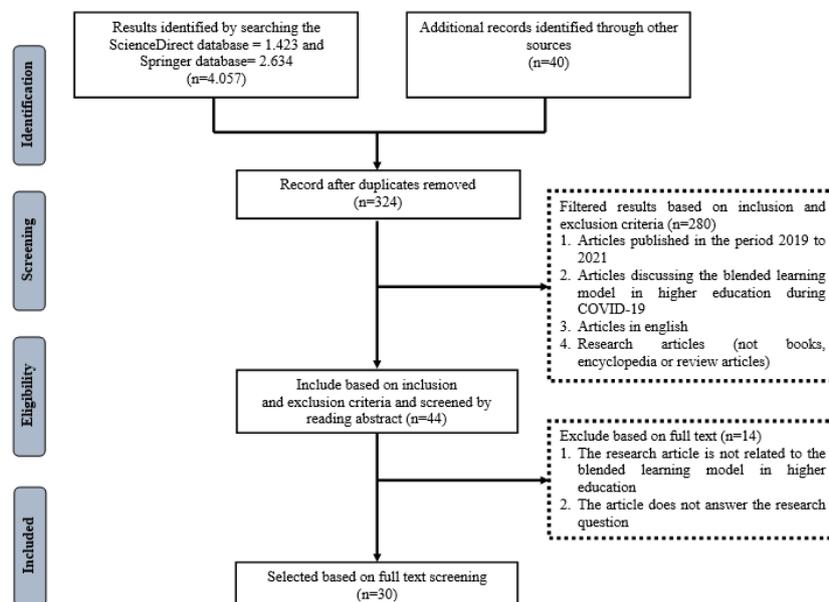


Figure 1. Search protocol based on the PRISMA

C. Result and Discussion

The results of the meta-analysis of various articles discussing blended learning in higher education during the COVID-19 period have been studied in

depth. To make it easier to read the research results, the presentation is arranged in the form of a mind map as shown below:

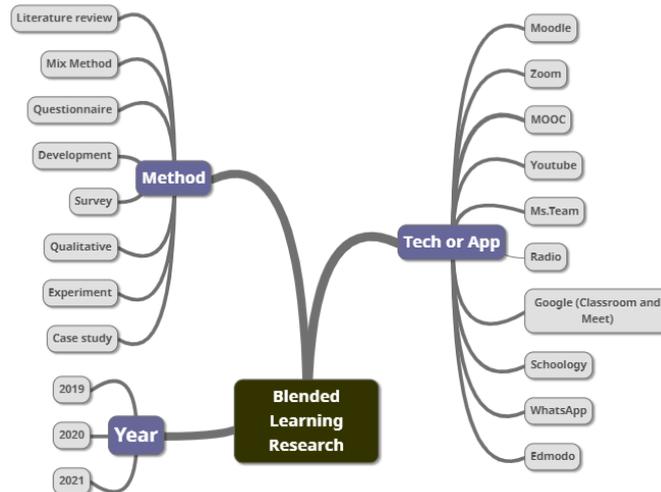


Figure 2. Results of the research mind map

RQ1 - Blended learning articles by year of publication

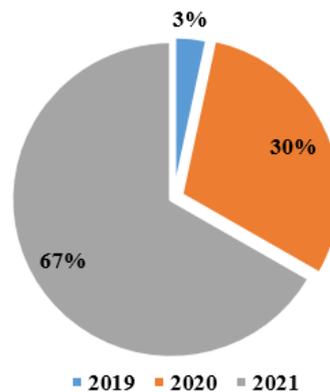


Figure 3. Year of the Article

Figure 3 shows that there is an increase in articles from 2019 to 2021. Of the 30 articles, in 2019 the percentage of articles published was only 3%. Meanwhile, in 2020 the number of articles published increased by a percentage of 30% and peaked in 2021, articles discussing the application of blended learning were in the percentage of 67% of all articles reviewed. This number is predicted to increase until the end of 2021.

This is because in 2019 the blended learning model in higher education has not been widely used because it is still carried out with face-to-face conventional learning so that there are still few articles related to blended learning published. In contrast, in 2020 and 2021, many research articles on blended learning models were published due to the COVID-19 outbreak, which required limited learning to be conducted, both face-to-face and limited distance learning.

The articles in this literature review were taken from 30 international scientific journals and international conferences from 2019 to 2021. The distribution of articles by type of publication is presented in Figure 4.

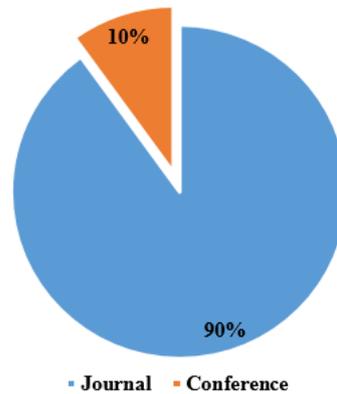


Figure 4. Article publishing

As shown in Figure 3 above, articles published in international scientific journals are much more dominant by 90% compared to articles presented at international conferences by 10%. So it can be concluded that the difference in the percentage of scientific journals and international conferences is too far.

RQ2 - Blended learning articles based on applications and supporting technologies.

Distribution of articles based on the use of technology or supporting applications, found several technologies or applications that support blended learning models, such as: Moodle, Edmodo, WhatsApp, Schoology, Google (Classroom and Meet), Zoom, Ms.Team, Youtube, MOOC and Radio. Presented in the image as follows:

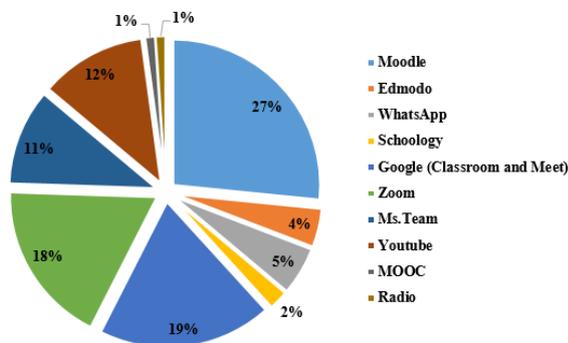


Figure 5. Technology and App used

The picture shows that Moodle is still the main choice for implementing online models in blended learning by controlling more than 25%. Moodle is a free web application for educators and one of the most popular free Learning Management System (LMS) on the market today [26], [27]. Moodle is an open source LMS software so it is constantly being improved and developed. Moodle is backed by a large and active community with thousands of plugins and options to customize it to your exact specifications.

The Moodle platform provides advantages for its users such as easy use of the platform [22], [28], a simple interface, and a community that is ready to help and even become a place for consultation. The use of technology and applications in the blended learning model in the articles analyzed does not only use one

technology and application, but many use combined features, for example using Moodle, Zoom and Youtube in one learning scheme. [29], [30].

RQ3 - Blended learning articles based on the research method used

Based on the type of data or method used in each article analyzed, several methods were found that are often used in the study, such as: literature review, case studies, experiments, qualitative, surveys, development of mix methods and questionnaires.

Table 2. Methods found in article analysis

Method	Study
Literature review	Rully et al. [20], Ifijeh and Felicia [7], Fatime et al. [4], Elledge et al. [16], Santiago et al. [29].
Case study	Ahmad et al. [9], Ralph [19].
Experiment	Tang et al. [15], Romero et al. [26], Julia et al. [13], Debajyoti and Vajirasak [31].
Qualitative	Yusuf et al. [30], Lorico et al. [6], Freddy et al. [32], Wafika et al. [10], Elham et al. [33].
Survey	Potu et al. [34], Mutasem et al. [35], Raihana et al. [36], Lorico et al. [6], Choi et al. [11], Maqableh and Alia [3].
Development	Wilson et al. [37].
Questionnaire	Peter et al. [8].
Mixed Method	Mishra et al. [28], Dafydd and Hyoungjoo [38], Angel et al. [27], Avijit et al. [5].

The method that is often used in research is the mix method. Mixed Method Research is a research method that is applied when researchers have questions that need to be tested in terms of outcomes and processes, and involve a combination of quantitative and qualitative methods in one study. The distribution of articles by data type or method is presented in Figure 6.

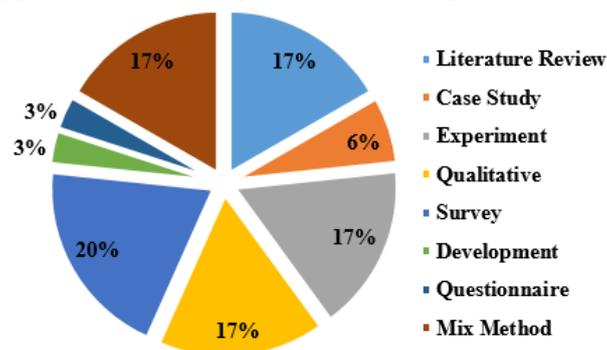


Figure 6. Methodology on the article

Mixed method research produces more comprehensive facts in researching research problems, because researchers have the freedom to use all data collection tools according to the type of data needed. While quantitative or qualitative is only limited to certain types of data collection tools.

D. Conclusion

This systematic literature review help lecturers and stakeholders at the higher education level to assess what learning model which is suitable to be applied in the transition period of COVID-19. The results of the study prove that

increase in the number of articles published from 2019 to 2021. The results also show that the blended learning model using e-learning components in the form of Moodle is the most effective widely used in higher education.

Blended model developed for education must be able to measure student competency outcomes and easy to use. Obstacles that can identified are; difficulty adapting teachers and students in change learning during the COVID-19 transition from conventional to online, lack of interaction of students in learning during online learning; infrastructure problems and uneven distribution of the network especially in difficult remote areas internet access can be overcome by using a blended learning model.

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