Synchronous or asynchronous? Various online learning platforms studied in Indonesia 2015-2020

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Abstract. Online learning occupies an important position as an indicator of improving the quality of learning in Indonesia. This paper aims to identify the online learning platform studied in Indonesia in 2015-2020. This is to determine the potential for developing the quality of online learning in Indonesia. There are 178 articles studied in this paper as research population using systematic literature review method. Systematic literature review method is used to list, filter, classify, and identify learning approaches that used in each learning platform. This study used secondary data from the IOP database, especially for articles conducted in Indonesia in 2015-2020. It was found that asynchronous online learning is more widely used about 68 articles. Meanwhile, there are 57 research conducted without specific learning approach. Also, the number of research on online learning conducted in Indonesia is increased by 178 articles in total during 2015-2020. The most widely studied platforms in Indonesia were Edmodo, Moodle, MOOC, and Google Classroom. However, there are tendencies that social media which are not learning platform are treated like learning platforms. This has implications for educators' to apply online learning using various forms of media and platforms, so that it is starting to be widely accepted.

1. Introduction
Online learning in Indonesia is on an increasing trend. Various studies on this are gaining popularity to be researched, along with the increasing use of the internet and the digitization of services in various sectors, one of which is in the field of education. One example is the application of LMS in the teacher professional education program since 2017. Teachers from various levels of education units, both primary and secondary schools, are included and trained in the online teacher professional education program. This raises another potential in terms of teacher competence in recognizing and using digital learning platforms such as Edmodo, Google Classroom, Ruang Guru, and Moodle [1,2]. No less important, high schools and universities are competing to make lecture facilities and academic services online, especially after the Ministry of Education and Culture published SPADA [3].

The variety of online learning platforms has led to trends in the terms blended learning, hybrid learning, online learning, flipped learning, and the like [4]. In fact, there are also emerging learning approaches, asynchronous and synchronous [5]. It appears that these two learning approaches are becoming increasingly popular in scientific publications examining learning in Indonesia. However, the increasing number of studies on online learning in Indonesia also creates a random picture of the quality of online learning being carried out. So far, research on online learning design has been discussed more than the description of its implementation nationally [6]. In fact, improving the quality of online learning in Indonesia requires a comprehensive and precise analysis. For this reason, this
paper will discuss a systematic review of the application of online learning in Indonesia during 2015-2020 to explain how the development of it can be better realized in the future.

2. Methods
This study uses a systematic review method [7]. The subjects of this research are articles and papers published and recorded in the IOPscience database. The research object is the approach, method, platform, media, and learning outcomes that are studied in the articles and papers. This study took a population of 178 articles that were sorted on specific themes for online learning that were studied in Indonesia during 2015-2020. The data collection and analysis is described in Figure 1.

This research went through a general phase and a specific phase, followed by analysis in each phase. In the general phase, a list and filter process is carried out to find relevant articles and papers using keywords. Meanwhile, in the specific phase, a classification and identification process is carried out regarding the approaches, methods, outcomes, and online learning platforms being studied. The findings in these phases then become material for further discussion and draw conclusions.

3. Results and discussion
3.1. General phase
In this phase, the data searched is based on the keyword "online learning in Indonesia" with a limit for the publication year of 2015-2020. There were 227 articles in total, and then some articles were eliminated based on research themes related to education. Therefore, we got 178 articles about "online learning in Indonesia". These data are presented in detail in the Figure 2.

It was found that there was a significant increase every year in the number of articles discussing online learning in Indonesia. In 2015 the article was not found, because it is still in the process of publishing. Several articles conducting research in 2015 were published in the following years. However, there was a decrease in the number in 2020 compared to 2019 by 5 articles. So far, 2019 data is the highest position in terms of the number of articles on online learning in Indonesia.

3.2. Specific phase
In this phase, the search results for 152 articles are then refined using the keywords "synchronous" and "asynchronous". As it turns out, there are several articles that use both types of learning. So the researchers came up with a category of combined asynchronous and synchronous learning approaches into one study as a whole research process, based on its research aims and problems.

Synchronous learning raises the keywords of online discussion learning, blended learning, flipped learning, and mentoring. Asynchronous learning raises the keywords learning media, teaching
materials, surveys, and website-based. Based on the number of articles, it was found that learning using asynchronous and synchronous simultaneously took the first position, as shown in Figure 3.

![Figure 3. Learning approach.](image)

At this stage, we also analyse each article based on the abstract and content of the article to get a deeper study. This analysis uses criteria in the form of learning platforms, learning outcomes, learning media, and teaching strategies. Learning platforms that studied, including Edmodo [8], Moodle [9], MOOC [10], Google Classroom [1], school or university LMS [6], Facebook [11], Schoology [12], Argueweb [13], Guru Pembelajar [14], other mobile phone application [15], Quizziz [16], Ruang Guru [2], and Twitter [17]. The number of articles that discuss learning platforms is shown in Figure 4.

![Figure 4. Learning platforms.](image)

Meanwhile, the learning outcomes including concept mastery and understanding [18], critical thinking skill [19], learning process skill [20], language skill [21], local wisdom [22], student behaviour [9], argumentation skill [13], computational skill [23], and spatial skill [24]. Learning outcomes also include special skills and competencies in certain subjects, such as mathematics, English, physics, and others [25]. The number of articles that discuss learning outcomes is shown in Figure 5.

![Figure 5. Learning outcomes.](image)

Moreover, learning media that studied including website or web-based media [26], digital media such as video, animation, audio-book, e-book, image, and interactive learning media [27], online learning media such as online quiz, search engine, video streaming, online modules, online tutorial, Wikipedia, Visual Basic, and other [28]. The articles that discuss web-based media is 13, digital and interactive media 17, while online media is 19 articles. Learning strategies that studied including blended learning [4], e-learning [17], online learning [29], problem-based learning [30], hybrid learning [3], project-based learning [6], online discussion [10], flipped learning [29], discovery learning [31], and collaborative mind mapping [32]. The number of articles that discuss strategies is shown in Figure 6.
3.3. Discussion

The learning approach researched during 2015-2020 in Indonesia was mostly asynchronous. It appears from a number of studies discussing the development and application of digital and online teaching materials. This learning also demands independence in learning, so that the role of the teacher as the only learning resource begins to shift to various online and digital learning sources [5]. Meanwhile, the synchronous approach has not been widely studied. It can be seen from the limited teaching materials and platforms. Teachers are more aware of the diversity of media and teaching materials as independent learning opportunities, which are required in asynchronous learning [3]. However, the emergence of research that combines these two approaches is related to the research process carried out as a whole, so that in each complete study it allows the emergence of a whole learning process and includes various learning strategies.

The learning platforms that were most widely used and researched in Indonesia during 2015-2020 were Edmodo, Moodle, MOOC, and Google Classroom. This shows that these platforms are better known by educators, students and researchers in Indonesia. However, there are interesting things where social media like Facebook and Twitter are not actually learning platforms, but are implemented and treated like it [11]. This role shift occurs because learning is actually an interaction between students, educators, and learning resources. Thus, this shift is the result of a changing communication style from face-to-face to online interaction [31].

The teaching strategies that are most widely used and researched in Indonesia during 2015-2020 are blended learning. This is an indication of a shift in strategy from face-to-face to online, even though it is not completely online. In this regard, Indonesia is still in the process of moving towards full online learning, but the majority has not yet released face-to-face learning strategies. Thus, blended learning is a solution to mediate the needs and demands of online learning at nowadays and future.

4. Conclusion

The asynchronous online learning approach in terms of quantity occupies the largest number of studies in Indonesia during 2015-2020. However, there are still many studies that do not include a specific learning approach, because they describe the whole study as a complete process between asynchronous and synchronous. The most studied online learning platforms in Indonesia during 2015-2020 were Edmodo, Moodle, and Google Classroom. This implies that these three platforms are better known among educators in Indonesia. The majority of the learning outcomes were studied on the subject matter specific skills. Meanwhile, the media developed is relatively balanced between web-based, interactive, and online media. Blended learning occupies the most researched learning strategy. This suggests that it has the potential to shift learning from face to face to online learning.

As like in other studies, this research is limited to a systematic review which only describes the trends of online learning that are developing in Indonesia. This research has not been able to answer the wider problem of online learning, for example in character education. There needs to be a broader study regarding the effectiveness of the online learning approach towards other educational goals, especially in accordance with the needs of the internet of things era.
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