Development of Direct and Asyncronous Online Learning Models to Improve Student Learning Outcomes During Study From Home the COVID-19 Pandemic

Bachtiar Syaiful Bachri[1*], Andi Mariono[2], Fajar Arianto[3]

[1,2,3] Universitas Negeri Surabaya, Surabaya, Indonesia

ABSTRACT

The development of learning needs is increasing as the demand for competency improvement is not only oriented to mastery of the material but also to more complex competencies, namely holistic knowledge, attitudes and skills. At this time the world is being hit by a pandemic due to Covid-19 which hinders direct interaction in learning as usual. So that learning requires the use of communication and information technology (ICT) through learning in the network (online). Through this research, it will be studied to determine the right formula in the selection and use of the synchronous and asynchronous models. This research was conducted using a development research approach with the ADDIE model. conducted at the Educational Technology Study Program, Faculty of Education, State University of Surabaya in the period May – November 2021. The acquisition of learning outcomes in sychronous learning is better than asynchronous. The results of the analysis can be concluded that there is a difference in learning outcomes between the two models, asynchronous and synchronous.

INTRODUCTION

The development of learning needs is increasing as the demand for competency improvement is not only oriented to mastery of the material but also to more complex competencies, namely holistic knowledge, attitudes and skills. On the one hand, the development of science and technology can also facilitate increasingly diverse learning needs by providing a variety of learning resources needed, so that learning becomes much more meaningful (Christin, 2019; Montiel et al., 2020; Rapanta et al., 2020; Syaharuddin et al., 2022). These developments appear in the development of information technology that can be used for online learning or also known as online learning (Almaiah et al., 2020; Doherty et al., 2018; Fauzi et al., 2020; Palvia et al., 2018). Coincidentally, currently the world globally including Indonesia is being hit by a pandemic due to COVID-19 which is prone to spread through human contact. Therefore, learning is impacted by conducting face-to-face learning that utilizes information technology (ICT) (Abidah et al., 2020; Khalifa et al., 2021). The learning process is known as learning from home so that the learning process is carried out online by utilizing ICT.

On the one hand, the implementation of online learning above has solved one problem, namely reducing the risk of the spread of COVID-19. However, it turns out that there are still a number of problems, both regarding the learning process and the expected learning outcomes (Alten et al., 2019; Churiyah & Sakdiyyah, 2020; Diadjeng, 2021; Korkmaz et al., 2020). In online learning, direct and indirect systems are known or known as synchronous and asynchronous based on the quadrant of learning settings

that give rise to a variety of online learning that can be done according to learning needs (Nuyulis & Puspitasari, 2021). Synchronous online learning is learning that is carried out directly and together at the same time between students and students (Grammens et al., 2022; Khalil et al., 2020; Meulenbroeks, 2020). While asynchronous online learning is learning that is carried out indirectly in unequal time between students and students (Goksu et al., 2021; Sahin & Shelley, 2020; Satyarini & Setyaningsih, 2022; Yoon et al., 2021). Each model has its own advantages and disadvantages in achieving certain learning objectives. Therefore, learning with synchronous and asynchronous models is not just a matter of time together, but rather on the learning process and the goals that are expected to be achieved (Amiti, 2020; Luke & Kevin, 2022).

Online learning (on the network) is a term standardized in Indonesian from the original word, namely electronic learning (e-learning), which is a new way of teaching and learning that uses electronic media, especially the internet as a learning system. So in this case there is no difference in discussing online learning or e-learning. E-learning is the basis and logical consequence of the development of information and communication technology (Goksu et al., 2021). With the concept of e-learning or Distance Learning this teaching and learning system will not be limited by space and time. A lecturer/teacher can give lecture material from anywhere. Likewise, a student can attend lectures from anywhere. Even the process of test or quiz activities can be done remotely (Pratama et al., 2021; Simamora et al., 2020). A lecturer/teacher can make exam questions online very easily, and the exam or quiz process can be done online so it doesn't require the presence of students in one place. Students can take the exam at home, office, internet cafe even while traveling by bringing a laptop and internet connection support.

The term online learning is often used interchangeably with other terms such as e-learning, web-based learning, computer-based learning, and technology-based learning. Other terms that are often used include virtual learning, internet-based learning, web-based education, and computer-assisted learning (Bhatta et al., 2018; Pratama et al., 2021). The terms e-learning, virtual schools, and cyberschools are mostly used by states in the United States (Almutairi & Albraithen, 2018). Confusion and inconsistency in the use of these terms are not only experienced by ordinary people, but also researchers. The three most commonly used terms inconsistently by researchers are e-learning, online learning, and distance learning (Almutairi & Albraithen, 2018; Batita & Chen, 2022; Singh & Thurman, 2019).

Referring to the definition of blended learning by Uwes A. Chaeruman (2011), namely learning that combines synchronous and asynchronous learning settings appropriately to achieve learning objectives, the characteristics of the blended learning model with a constructive approach have two learning settings, namely learning synchronous and asynchronous. Synchronous learning is learning activities carried out at the same time and the same or different places, while asynchronous learning is learning activities carried out at different times and places (Kerimbayev et al., 2020; Subandowo, 2020; Zhao & Watterston, 2021). Meanwhile, Wahyuningsih (2021), defines blended learning with a constructive approach. Blended learning by constructive approach (BLCA) consists of two terms, namely blended learning (mixed learning) and constructive approach (constructive approach). Several definitions from the experts above illustrate that blended learning is a combination of face-to-face learning with

online learning with the help of information and communication technology (Chaeruman et al., 2018; Hamid & Aras, 2020; Mahmud, 2020).

Learning outcomes are various abilities that students have as a result of learning actions and can be observed through the appearance of students. In the world of education there are various types/models of learning outcomes (Annala, 2022). There are 5 types or models of learning outcomes that are conveyed, including: cognitive strategy, Intellectual skills, motor skills, verbal information, and attitude (Aswar, 2020).

Learning outcomes can be used for alternatives in different circumstances and the influence that can provide a measure of the value of a method. Furthermore, student learning outcomes specifically are a performance that has an indication as a capability that has been obtained (Reigeluth et al., 2009). Learning outcomes are always manifested in the form of specific behavioral goals (performance). The division of learning outcomes into three, namely: 1) knowledge and direction; 2) skills and habits; 3) aspirations and attitudes. From some of the thoughts above, it can be concluded that learning outcomes are students' abilities in terms of skills and attitudes that students acquire after receiving treatment from the teacher as an effort to construct students' knowledge into life in the real world (Beemt, 2020; Brandt et al., 2021; Lotulung & Tumurang, 2018). Learning outcomes in this case are very closely correlated with learning or the learning process. Based on the objectives, there are two groupings of learning outcomes, namely knowledge and skills. Knowledge of learning outcomes consists of 1) knowledge of facts, 2) knowledge of procedures, 3) knowledge of concepts, and 4) skills.

Thus, online learning with synchronous and asynchronous modes certainly has a special rationale in use so that students can determine the right mode to achieve the appropriate goals. Therefore, the problems to be studied are: 1) What are the ideal conditions for implementing the synchronous model? 2) What are the ideal conditions for implementing the asynchronous model? 3) What are the advantages and disadvantages of implementing the synchronous model? 4) What are the advantages and disadvantages of implementing the asynchronous model? 5) What learning objectives can be achieved through the synchronous model? 6) What learning objectives are appropriate to achieve through the asynchronous model?

RESEARCH METHOD

This research was conducted using a development research approach with the ADDIE model. The analysis phase: 1) Carried out to obtain data regarding the need for online learning and its variety; 2) Combining synchronous and asynchronous and online systems, adapted to learning needs; 3) Develops an online learning model by utilizing an online learning system; 4) Implementation: tests the effectiveness of the online learning to answer the problems in this research (Ghani & Daud, 2018; Ramly, 2022). The research flowcharts are likely in Figure 1.
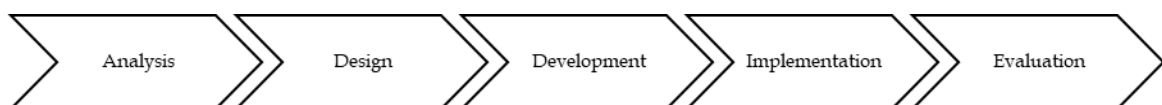

Figure 1. Research flowchart

This research was conducted at the Educational Technology Study Program, Faculty of Education, State University of Surabaya in the period May – November 2021. In this

research, for the first and second problems, data were collected using documents, interviews and Focus Group Discussion (FGD) (Hardhantyo et al., 2022). The instruments and validity used include interview sheets, test sheets, and learning tools for trials of synchronous and asynchronous models. Meanwhile, for the third and subsequent problems, it is carried out through tests and trials of synchronous and asynchronous models. Furthermore, the data obtained will be processed quantitatively and qualitatively to find answers to the problems.

RESULTS AND DISCUSSION

Advantages and Disadvantages of Implementing A Synchronous Model

E-learning can be implemented in the form of asynchronous, synchronous, or a mixture of both. Examples of asynchronous e-learning are often found in simple or integrated forms through e-learning protocols on campus systems or online learning service providers. While in synchronous e-learning, students and teachers must be in front of a computer or other smart device such as a smartphone or tablet, together because the learning process is carried out at the same time, either through video or audio conference. Two types of e-learning, namely synchronous and asynchronous. Synchronous means "at the same time", for example interacting with teachers via the web in real time. Asyncronous, meaning "not at the same time," which allows students to open and complete Web Based Training according to the schedule and time they have, without interacting directly with the teacher.

The Advantages and Disadvantages of Implementing The Asynchronous Model

The implementation of learning with asynchronous models can allow students to access digital materials and learning 24/7 by utilizing mobile devices. So that students can open the contents of learning materials repeatedly and at any time when they need it. Learners can take advantage of the facilities of various learning components making it easier for them to explore more about certain topics.

The asynchronous learning model can improve students' ability to manage study time well through task deadlines, allow students to contact their students online to ask questions and academic consultations without time restrictions, and get updates. immediately regarding learning and assessment activities. In addition, the asynchronous learning model can increase students' self-confidence in language learning using technology. Another advantage of the asynchronous model is that it allows for assessments with various methods and appropriate feedback evaluation mechanisms. This feedback mechanism is important for students to get follow-up on the learning they have learned.

In addition to some of the advantages of the asynchronous model, there are also some things that can be a drawback in using the asynchronous model. As stated by Brown and Green (2017), the asynchronous model of communication in delivering feedback between learners and learners is under effective. So that it can affect the achievement of learning objectives. Online learning can lead to student frustration caused by confusion about online instruction, not getting feedback in a short time from learners, and technical problems that may occur when utilizing online technology. The implementation of the asynchronous model, the learner and the learner do not communicate at the same time, so this increases the possibility of students committing fraud. Another thing that is an important factor in implementing asynchronous learning

activities is when students do not have technological facilities or the ability to use e-learning systems.

The Right Learning Objectives Are Achieved Through Synchronous and Asynchronous Models

The teaching and learning process is integrated with the important role of learning objectives in it. Learning objectives as instructional objectives or learning outcomes are expected to occur, be owned, or controlled by students after participating in certain teaching and learning activities. As well as the direction to be directed from a series of activities carried out in the learning process, that is the purpose of learning. Therefore, the achievement of learning objectives, one of which must use the right model in the implementation of a learning.

Through synchronous and asynchronous models, learning activities must be carried out on the right goals to be achieved later. To find out what learning objectives are appropriate to achieve through synchronous and asynchronous models, it is necessary to identify the suitability of the selection of learning methods selected from synchronous and asynchronous and then adjust to the characteristics of the learning objectives to be determined.

The Right Learning Objectives Are Achieved Through A Synchronous Model

In terms of two types of synchronous models, namely the synchronous live model and the synchronous virtual model. From each method and owned by the two synchronous models, it can be seen the appropriate learning objectives. Synchronous live model which often uses lecture learning methods, presentations, group discussions, practice, etc., is more appropriate if used in learning activities with learning objectives to achieve the ability to convey something, explain something, problem solving, attitude formation, collaboration, implementation. or practice, the creation of ideas and the creation of works by students.

While the Syncronous virtual model, which often uses video conferences, audio conferences, and text-based conferences, all of which tend to be done virtually without face-to-face contact, is more appropriate if used in learning activities with the aim of learning to achieve the ability to understand learning material, conclude something. , rationalize something conclude something and weigh something.

There are several appropriate learning objectives achieved through synchronous and asynchronous models of several studies. In the synchronous model, pressure can be added to students, so that they can immediately respond and they can monitor how deep their learning is when they have to respond immediately using the correct construction.

Synchronous communication can be integrated with asynchronous e-learning by rotating this approach in a weekly discussion in a study of two master's level programs in knowledge management in Argentina and Sweden. In the study it was found that students tend to use synchronous communication for social support. In this case, the synchronous model is appropriate in learning that aims to solve problems with the involvement of social assistance.

Synchronous virtual classrooms embedded in traditional global marketing management learning in five different schools in many countries over a one-year period. They found that learner and technology characteristics were significant

predictors, but student characteristics such as learning engagement and attitudes toward information technology did not predict learning effectiveness. In this case it is known that the virtual synchronous model is not appropriate if it is implemented in learning that aims to achieve the motor and affective abilities of students, it should be done directly.

Teaching online courses on derivatives, focusing primarily on course design issues. They administer the course using a synchronous chat format, and recommend increasing students' comfort level with chat before moving on to more difficult course topics. In this case, the synchronous model is appropriate in learning that aims to achieve students' ability to generalize. Based on the explanation above, it can be concluded that the right learning objectives are achieved through the synchronous model, including:

1) Learning objectives related to students' ability to construct their knowledge to respond in learning
2) Learning objectives related to problem solving with social assistance involvement
3) Learning objectives related to the achievement of students' motor skills and affective abilities
4) Learning objectives related to the achievement of students' generalization abilities

The Right Learning Objectives Are Achieved Through The Asynchronous Model
In terms of two types of asynchronous models, namely the self study asynchronous model and the asynchronous collaborative model. From each method and which is owned by the two asynchronous models, it can be seen the appropriate learning objectives. Self study asynchronous model is often carried out by students' independent learning. Namely learning e-materials independently in the form of text, audio, video, animation, simulation, more appropriate if used in learning activities with the aim of learning to achieve the ability to understand something, the ability to identify something, and everything related to student independence.

While the asynchronous collaborative model, where learning activities are often carried out in discussion forums, mailing lists, project work, is more appropriate if used in learning activities with the aim of learning to achieve students' abilities in observing, investigating, analyzing problems, designing things, manipulating things, creating something related to project work.

Designed asynchronous e-learning can keep students engaged and interested in this kind of learning environment to facilitate motivation, confidence, participation, problem solving, analytical, and higher order thinking skills. In addition to an independent system where students must be self-disciplined to stay active and interactive, discussion and blog forums keep students active. In his research, it was found that the asynchronous model can be useful because students can build their responses in learning by thinking and analyzing carefully.

Asynchronous communication is used to exchange information and develop ideas that are more cognitively complex. Based on the explanation above, it can be concluded that the right learning objectives are achieved through the synchronous model, including:

1) Learning objectives related to the active involvement of students in learning
2) Learning objectives related to the meaningfulness of learning bring out the attractiveness of the learning environment.

3) Learning objectives related to students' ability to solve problems

4) Learning objectives that can trigger students' ability to analyze something in learning

5) Learning objectives that can trigger students' ability to think at higher levels

6) Learning objectives that can develop students' abilities in developing and creating ideas

Development Results

This research develops synchronous and asynchronous learning models to improve student learning outcomes while studying from home during the Covid 19 pandemic. The development comes from the ADDIE model development steps, namely analysis, design, development, implement, and evaluate. The research steps are briefly presented in the Table 1.

Table 1. Steps for developing synchronous and asynchronous learning models to improve student learning outcomes.

ADDIE Steps	Development Process	Development Results
Analysis	Needs	Analysis of the characteristics of student participants.
		Learning Outcomes according to lesson plan.
		Sorting and selecting materials and teaching materials.
		Selection of methods, media, and techniques in the learning process.
	Tasks	Components in learning: preparation, teaching materials, student participation, feedback, assessment, and follow-up activities.
Design	Gathering	Theoretical study of learning planning with synchronous and asynchronous models.
	Supporting Research	Several previous studies related to synchronous and asynchronous models.
	Mapping	Mapping learning outcomes according to learning outcomes in lesson plan.
Development	Preparation of Learning Planning	Preparation of synchronous and asynchronous model learning plans.
	Revision and Validation	Revision and validation of lesson plans.
	Product	Preparation of product validation results.
Implement	Product Implementation	Implementation of synchronous and asynchronous models for students of education

ADDIE Steps	Development Process	Development Results
		technology study program.
Evaluate	Product Eligibility	The instrument used for data collection is validated.
	Product Practicality	Lecturers can use synchronous and asynchronous models.
	Product Effectiveness	Student learning outcomes are in accordance with the specified learning outcomes.

This research was conducted in the Bachelor of Educational Technology study program, Faculty of Education, State University of Surabaya in the Introduction to Curriculum course which was programmed by two classes 2021st students. To meet the principle of sample homogeneity, synchronous and asynchronous implementation is carried out as shown in Table 2.

Table 2. Research implementation.

Meetings	Topic	Classes	Model
4th	Educational Orientation as the Foundation of the Curriculum Concept Model	2021-A	Synchron
		2021-B	Asynchron
7th	Sociology Curriculum	2021-A	Asynchron
		2021-B	Synchron

Table 2 shown student learning outcomes data obtained from the application of synchronous and asynchronous models were analyzed using Levene's homogeneity test and t-test. The results of calculating the data on the implementation of learning with asyronous and sychronous in two activities show that the average learning outcomes obtained by students are higher in syronous learning. The calculation is based on the level of significance in both meetings, at the 4th meeting it shows $p = 0.003$ (<0.05) which means that there is a difference between the two learnings. And at the 7th meeting, it showed $p = 0.137$ (> 0.05) meaning there was no difference in learning outcomes in the two lessons. Observed on average, syronous learning (82.5217) was higher than Asyronous (82). Calculation of data to determine the effect of the application of the two learning models, asynchronous and synchronous in this study based on data analysis with t test, obtained $p = 0.013$ (< 0.05) which means that there is a positive effect of combining asynchronous and synchronous learning on learning outcomes.

CONCLUSION
The acquisition of learning outcomes in sychronous learning is better than asynchronous. The implications of this research can be concluded that there is a difference in learning outcomes between the two models, asynchronous and synchronous. Recommendations for further research are online learning as much as possible synchronously because it is proven to provide better learning outcomes. Also, the implementation of synchronous learning is carried out by utilizing all of its advantages as discussed in the previous description. Asynchronous learning can be done by utilizing its advantages to achieve more optimal results as discussed in the

previous description. This research are limited to Faculty of Education, State University of Surabaya. Hence, future research can conduct research to other university or other lower stage of education.

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* Dr. Bachtiar Syaiful Bachri (Corresponding Author)
Educational Technology Study Program, Faculty of Education,
State University of Surabaya,
Lidah Wetan, Surabaya, East Java, 60213, Indonesia
Email: bachtiarbachri@unesa.ac.id

Dr. Andi Mariono
Educational Technology Study Program, Faculty of Education,
State University of Surabaya,
Lidah Wetan, Surabaya, East Java, 60213, Indonesia
Email: andimariono@unesa.ac.id

Dr. Fajar Arianto
Educational Technology Study Program, Faculty of Education,
State University of Surabaya,
Lidah Wetan, Surabaya, East Java, 60213, Indonesia
Email: fajararianto@unesa.ac.id