

Development of Blended Learning for Optimization Courses in Education Technology Master Program

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Abstract-*The purpose of this study is to develop blended learning in order to optimize the Instructional Design courses in the Educational Technology Master's Study Program. The use of appropriate learning model is absolutely necessary so the optimal learning results can be achieved properly. The methodology of this study is using research and development approach. The development of learning products are using the Integrative Learning Design Framework (ILDF) model which has three stages: exploration, enactment and evaluation. in the enactment phase particularly, the PEDATI model were integrated into the framework with five development stages: the formulation of course achievements, organizing the material synchronously or asynchronously, selecting and determining synchronous and asynchronous learning activities, designing asynchronous learning activities, designing synchronous learning activities. The results of the study are in the form of a blended learning design for Instructional Design Courses that are integrated between face-to-face and online learning. This model is different from other blended models, because it was developed systematically with a development model specifically for blended learning, namely PEDATI model*

Keywords: Blended Learning, PEDATI, Integrative Learning Design Framework, Instructional Design.

I. INTRODUCTION

The industrial revolution has affected various sectors of human life, changing how humans live and work. At this time the industrial revolution has entered the fourth stage, where artificial intelligence (artificial intelligence), digitization and automation are becoming the main reason of the revolution, expanding rapidly and has been used in various industrial and human life. Klaus Schwab in Kruger said the Industrial Revolution doesn't change what we are doing, but it changes us (Krueger, 2018).

One of the impacts of the industrial revolution 4.0 is the need for labor and human resources with special skills and expertise. The machines have replaced limited human labor. Human works that require power, accuracy or high speed will be carried out by robots. In the future, many people will lose their jobs, especially workers who do not have special skills (Peters, 2017).

Universitas Negeri Jakarta as one of the State Universities in the center of the Indonesian capital has 3 levels of programs, namely Bachelor (S1), Masters (S2) and Doctoral (S3), where the Masters and Doctoral Programs are known as postgraduate programs. From the results of interviews with Administration Staff and Postgraduate Students, the majority of students are employees and professionals who have limited time between work and lecture activities. The barrier to follow the lecture is increasing when the Non-Regular students should take the classes early, because of regulatory changes. The regulation affects student participation which is getting lower than usual. Therefore, it is necessary to have a learning model that can facilitate student learning problems. According to Laine et. al, Blended Learning with relevant learning materials allows flexibility in study participation for student workers or adults with a variety of activities (Laine, Myllymaki, & Hakala, 2015). The characteristic of postgraduate students who are adults and workers make blended learning become a suitable method for use in teaching at the Postgraduate programs in Universitas Negeri Jakarta.

As one of the best educational institutions in Indonesia, it has taken steps to respond to the challenges of the Industrial Revolution 4.0 era by developing introductory Big Data and Programming courses. In addition, the application of Blended Learning models that emphasize the ability of innovation and creativity will continue to be developed so that in the end Universitas Negeri Jakarta will be able to produce graduates, who are able to compete in the era of industrial revolution 4.0 (Larasati, 2019).

A learning environment where students study with a mixed model that combined face to face teaching method with a teacher or lecturer and technology-based learning to meet student's the educational needs. As long as a technology-based learning takes place, with supervision from the teacher or lecturer, students can manage the time, place, learning material they want to learn by themselves to form an integrated learning approach (National Education Association, 2011).

McKinsey & Company research in 2017, based on data from the Program for International Student Assessment (PISA), has finding that students who got mixed learning based on teacher-directed instruction and inquiry-based instruction got the best learning outcomes. Teacher-directed instruction is a learning model where the teacher explains and demonstrates ideas, answers questions and leads discussions in class. While an inquiry-based instruction, students are given a more prominent role in their own learning. The use of information and communication technology in inquiry-based instruction greatly helps students to master the lessons that has been given (Mourshed, Krawitz, & Dorn, 2017).

Based on the explanation above, the author argues that it is necessary to develop a Blended Learning model in the Postgraduate Faculty of Universitas Negeri Jakarta to answer the challenges of the fourth industrial revolution, so that it can produce human resources who are capable to compete, locally and globally

II. METHOD

This study uses research and development approach in order to produce a product. The development model used in this study are Integrative Learning Design Framework (ILDF) and the PEDATI model. The development model of Integrative Learning Design Framework (ILDF) consists of three stages, namely exploration, enactment and evaluation, which will later produce a blended learning model (Chaeruman, 2017). At the enactment stage, the PEDATI model was used to design learning strategies. The PEDATI learning design model consisting of 5 stages: first, formulating learning outcomes. Second, mapping and organizing material. Third, selecting and determining learning settings. Fourth, designing asynchronous learning activities, Fifth, designing synchronous learning activities.

The development steps using the Integrative Learning Design Framework (ILDF) model as cited from the book *Online Learning: Concepts, Strategies, and Application*, Dabbagh and Bannan-Ritland are as follows (Dabbagh & Bannan-Ritland, 2005):

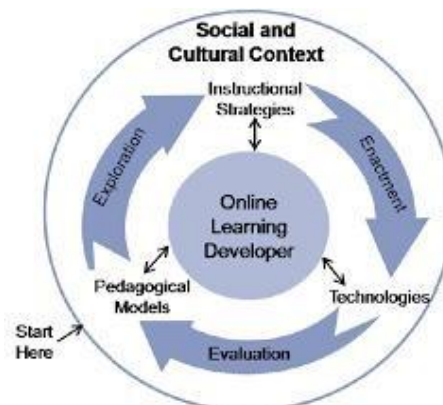


Figure 1 ILDF Model

a. Exploration Stage

Particularly, the activities carried out at the exploration stage are collecting the information, such as documents that can be observed, context of learning or training; examine individual perspectives or the perspectives on the learning process; institution publications related to learning process; scientific or expert viewpoints, content and online delivery methods. In particular, the activities carried out are an needs analysis and characteristics of students.

b. Enactment Stage

In this stage, all of information gathered during the exploration phase regarding to learning process are mapped, the existing pedagogical content and models was being identified in order to apply an effective online learning strategies. At the enactment stage, all information gathered from previous stage was considered, and pedagogical foundation or models will be chosen accordance to the learning characteristic. In particular, the activities to be carried out at this stage was using the PEDATI design model. The steps for developing the Blended PEDATI model can be seen from the following chart:

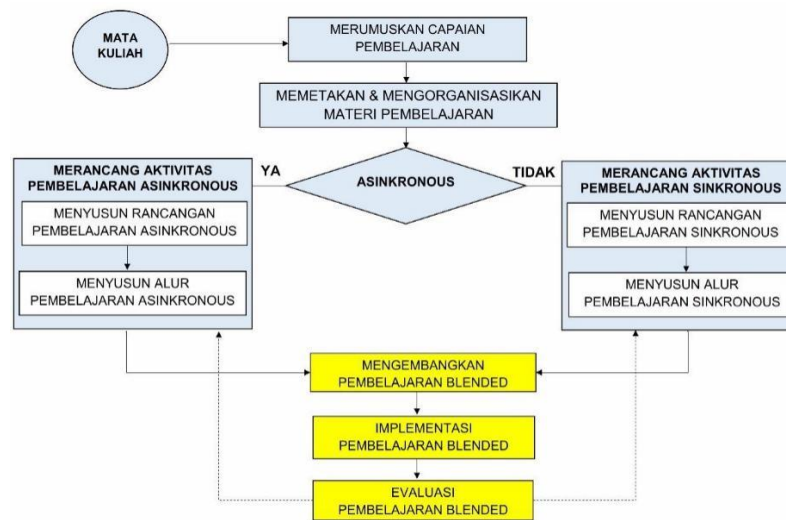


Figure 2. PEDATI Model

1. Formulate learning outcomes
At this stage, learning outcomes are formulated. The learning outcomes referred to the level of the course. Learning outcomes is a statement of performance expected to be achieved by students after attending certain lecture.
2. Mapping and organizing material.
Mapping and organizing learning material is an effort to determine and grouping learning material into course subject, sub-topics and subject matter in accordance to learning outcomes that have been determined.
3. Select and determine learning settings.
At this stage, the learning outcomes, certain subjects and sub-topics will be determined and selected, which one will be delivered through asynchronous or synchronous learning strategies. To select and determine synchronous and asynchronous learning strategies, certain criteria are needed, namely the selection of relevant learning strategies as a guide.
4. Designing asynchronous learning activities.
The next step is designing an asynchronous learning activity, consisting of 2 steps:
 - a. Draft an asynchronous learning design as an outline of the design.
 - b. Assembling the flow of asynchronous learning as a more detailed learning path for each subject matter as an object of learning (learning object).
5. Design synchronous learning activities.
Arranging synchronous learning activities also consists of 2 steps:
 - a. Develop a synchronous learning design as an outline of the design.
 - b. Assemble the flow of synchronous learning as a more detailed learning path for each subject matter as an object of learning (learning object).
- c. Evaluation Stage
The evaluation stage is evaluating the design of blended learning that has been done. The evaluation stage can improve the process and practice of the online learning design that has been developed. Formatively, evaluating design and development before launching online learning, revising online material in accordance with the results of formative evaluation applies the online learning experience and evaluates the results according to the objectives identified. The design generated from this development then being validated by material experts, media experts and instruction experts to determine the feasibility of the design.

III. RESULTS

Blended learning is developed based on problems and student needs, so the products will become an alternative problem solving.

1. Exploration Stage

a. Needs Analysis

At the needs analysis stage, the questionnaire is shared among students to find out their problems and needs in learning. The results will be provided several conclusions. Students complain about sufficient amount of time to learn all the learning material, also the traffic condition in Jakarta that makes students waste more time on trips to campus than study. Collaborative methods or lectures that are often done in learning are not very effective. Furthermore, the use of limited learning media makes learning less optimal.

Based on those problems, Learning Design courses can be designed in the form of blended-learning to solve the problems. Therefore, the implementation of blended-learning which combines the delivery of face-to-face learning with online learning can be ideal solutions to be applied. The blended-learning development is not merely chosen as an intervention in the course of Learning Design. The development of blended-learning is based also on the availability of facilities and infrastructure that support the implementation of e-learning in the Universitas Negeri Jakarta at Educational Technology Master program.

b. Student Characteristics Analysis

The results obtained from this step are profiles of students who take the Learning Design course. At this stage, researchers spread questionnaires through the Google Forms platform that was distributed to respondents. The results, Students of the Universitas Negeri Jakarta Postgraduate Program in Educational Technology Study Program aged 20-50 years, that age can be said to be mature, so it is considered that they have the ability to study independently which is quite high compared to younger ages. In addition, the distance between the house to campus is quite far and congested in the capital city of Jakarta, which makes many times wasted only for trips, and also students condition who are married and work makes lectures often overlooked. These things encourage the development of learning that can be done anywhere and anytime, one of which is Blended learning. In addition, Universitas Negeri Jakarta Postgraduate students, especially Educational Technology Program, are considered to have been able to apply Blended Learning using the Web because the facilities and infrastructures, both institutionally and privately, have met the requirements, such as the severity of laptops and smartphones coupled with adequate internet service.

2. Enactment Stage

The next stage in the development of blended learning for Learning Design courses is the enactment of blended learning products design. At this stage, the information that has been obtained in the previous stage, namely the exploration stage is used as a reference for compiling the product so that it is in accordance with the conditions in the field. The details of the steps at this stage are:

a. Learning Design

During the learning design stage, the development of the PEDATI model was used to design blended learning with the following stages:

1) Formulate Learning Outcomes.

At this stage, the developer formulates learning outcomes based on the results of the discussion with the lecturers in the course of Learning Design.

- a) Explain learning principles
- b) Explain instruction as a system and instructional system and development models.
- c) Identify needs and formulate common instructional goals.
- d) Analyze instructional and the characteristics of students.
- e) Formulate specific instructional goals.
- f) Develop TAP and instructional strategy
- g) Compile course syllabus (RPS)
- h) Develop learning material
- i) Trials dan formative evaluation
- j) Compile Instructional Design Course

2) Mapping and Organizing Learning Materials

Next, the developer maps and organizes learning materials based on the results of the formulated learning outcomes. Produce syllabus or "Rancangan Pembelajaran Semester" (RPS) of courses in learning design where there are lectures, strategies, media and evaluation of learning outcomes.

3) Select and Determine Synchronous and Asynchronous Learning Activities

The developer identifies the results of mapping and organizing learning material, whether learning material requires direct practice or not (concept).

Table 1. Learning Activity Design

Learning Outcomes	Subject	Topic	Learning Setting		
			Sync Direct	Maya	Async
Explain learning principles	learning principles	The philosophy foundation of learning principles			√
	learning principles	Learning strategy			√
Explain instruction as a system and instructional system and development models.	instruction as a system and instructional system and development models.	instructional system and development models.			√
Identify needs and formulate common instructional goals.	needs and formulate common instructional goals.	Identifying needs and formulate common instructional goals process.			√
Analyze instructional and the characteristics of students.	Analyzing instructional and the characteristics of students.	Analysis instructional and the characteristics of students process.	√		
Formulate specific instructional goals.	Formulating specific instructional goals	Formulating specific instructional goals process			√
Develop TAP and instructional strategy	Developing TAP and instructional strategy	TAP and instructional strategy development process	√		
Compile course syllabus (RPS)	Compiling course syllabus (RPS)	Compiling course syllabus (RPS) process	√		
Develop learning material	Developing learning material	Developing learning material prototype process	√		
Trials dan formative evaluation.	Protoype trials dan formative evaluation.	Protoype trials dan formative evaluation process	√		
Compile Instructional Design Course	Compile Instructional Design Course Portofolio	Compiling Instructional Design Course Portofolio Process	√		

4) Designing Asynchronous Learning Activities

Next, the developer designs an asynchronous learning activity by choosing the right media and learning materials for the determined learning material.

Table 2. Asynchronous Learning Activities Design

Subject	Topic	Independent of aSynchronous			Collaborative of aSynchronous
		Digital Media	Test	Online Discussion	Online task
learning principles	The philosophy foundation of learning principles	Slide Ebook	Long Answer	Discussion of The philosophy foundation of learning principles	Discussion of The philosophy foundation of learning principles in classroom activities
learning principles	Learning strategy	Slide Ebook	Long Answer	Discussion learning strategy	
instruction as a system and instructional system and development models.	instructionals system and development models.	Slide Ebook Video	Short and Long Answer	Discussion instructional system and development models.	Discussion instructional system and development models in classroom activities
needs and formulate common instructional goals.	Identifying needs and formulate common instructional goals process.	Slide Ebook Video	Short and Long Answer	Discussion Identifying needs and formulate common instructional goals process.	Discussion Identifying needs and formulate common instructional goals process
Formulating specific instructional goals	Formulating specific instructional goals process	Slide Ebook Video	Short and Long Answer	Discussion Formulating specific instructional goals process	Discussion of samples for Formulating specific instructional goals process

3. Evaluation Stage

The results of the development design evaluation from the beginning to the end, instructional design course with the Blended Learning Method developed has passed the expert review stage of experts consisting of material experts, Instruction experts, and Media experts showing good results.

V. CONCLUSION

This development research resulted in a blended learning in the form of overall Blended learning design for Learning Design courses for the master Program. This study uses a development method with the ILDF (Integrative Learning Design Framework) model developed by Bannan & Ritland and PEDATI from Uwes Anis Chaeruman. In general, the results of this study are indicated by the results of formative trial design products that are categorized good through expert reviews.

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