

# Development of Learning Gam Models to Optimize Learning in Disaster Areas

Heni Jusuf, Nurdin Ibrahim, Atwi Suparman

**ABSTRACT**--- *The purposes of this study was to develop instructional design for object-oriented programming using the Moodle Learning Management System (LMS), because moodle accommodates several features, namely course content, material that can be packaged in pdf, powerpoint, image, sound, video, animation, links to other sources, quizzes, assignments, performance assignments and examinations. This study uses the Integrative Learning Design Framework (IDLF) model. The research subjects were students who took object oriented programming courses. The data taken is feasibility in terms of material and media as well as student responses to instructional design that has been developed through questionnaires. The expert response shows that moodle-based instructional design is very feasible in terms of media and in terms of instructional design.*

**Index Terms**— *Instructional Design, LMS, IDLF Model, Moodle*

## I. INTRODUCTION

The emergence of the internet makes all the information needed easily and quickly obtained. Many individuals and agencies run business processes by utilizing computer and internet technologies. Information Technology has become an integral part of the life of modern society. The development of information technology, the need for human resources is higher, it encourages educational institutions to participate by opening informatics study program, the data of study program level of Bachelor Degree (S1) as of June 2017 at BAN PT shows the results as follows: there are 440 programs study of Informatics Engineering, 279 courses of Information Systems, 1 Informatics Management course, so that the total of S1 program of Informatics field there are 746 study programs.

In the world of higher education, the background of learners is very heterogeneous in the sense that learners come not only from high school graduates but also those who are already working. The existence of a very heterogeneous learner background, learning needs and learning styles also varied. Modification and variation in learning in higher education is the development of learning models based on computer technology and internet.

Learning is defined as a deliberate effort by educators to support student learning activities [1]. Learning is a system consisting of various components that are interconnected with each other. These components include: learning objectives, learning resources, methods, media and evaluation. When learning activities are designed,

implemented and managed more systematically, then the path to improve and improve the quality of human resources will be sustainable more clearly. One of them is hybrid learning. Hybrid learning is a learning approach that incorporates online instruction with face-to-face instruction.

The term hybrid learning has been now commonly used, particularly in corporate and higher education settings. The term itself is quite difficult to define since it is used in diverse ways by different people [2]. Littlejohn & Pegler [3] who perceive hybrid learning as an integration of face-to-face teaching and learning methods with online approaches. hybrid learning is not a mere combination of face-to-face and online learning. It is a combination of training methodologies, which uses the best delivery method for the successful achievement of the learning objective [4].

Today's technology support enables a wide range of learning facilities, with the support of today's information technology development (ease of access, cloud storage, large bandwidth, large storage capacity, hardware and online software, gadgets, social media) to enable information technology-based learning and communication is implemented. The concept of development of learning materials used is Hybrid model that is the form of printed learning materials in the form of books and ICT-based learning materials. Print learning in the form of a developed book is a module. The module is one type of printed learning media. the difference of the module with printed learning materials such as books or handouts lies in presenting the content of the material within the module itself. Smaldino et all [5] defines an instructional module is any selfcontained instructional unit designed for use by a single learner or a small group of learners without teacher's presence.

Hybrid learning model is now a trend that many developed as a model of learning in college, this model can be learning using the web, teleconference, video conferencing and others. In general Hybrid learning is a web-based learning technology with an open learning environment and can be accessed via the internet, with the aim to facilitate learning and build knowledge of learners through meaningful interaction.

Hybrid learning model can be applied in all courses one of them is a programmer course that aims to be able to learned students to become a programmer. A programmer is someone who is able to solve problems by using a programming language. They have many abilities consisting of various levels, they are reliable in writing code,

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understand algorithms and often work alone. the need for programmer power every year is increasing, along with technological advances, but this is not accompanied by informatics graduates who intend to become a programmer.

## II. LITERATURE REVIEW

Learning is one of the main components in a learning system, which includes learning materials are textbooks, learning sheets, worksheets, information sheets and printed and non-printed teaching materials. while learning resources are everything that can be used for learning, can include: people, objects, messages, materials, techniques and settings. from the description then it can be concluded that the teaching materials are part of the learning resources. Learning material includes more or less explicit descriptions or expectations of the learning situation. An ordinary textbook implicitly presupposes that the teacher will teach from a desk at the front of the room while the students will sit in rows and listen, and carry out the assigned tasks [6]. Learning materials are in adherence with the objectives and requirements of a regional or national curriculum [7]. In general in the learning activities, the use of learning materials can provide a variety of important contributions, among others:

- Make the content or subject matter to be standard or standard
- Reduce the occurrence of misperception in the learning process
- Increase individual learning interest
- Improved memory or retention of important aspects of the content or subject matter.

The model chosen to develop the learning materials using 3 models as follows:

- Making learning materials in general using procedural Dick and Carey model by adding one process from Borg and Gail model that is Research and information collecting because Instructional Design Dick and Carey has got legitimacy as research development model of R and D by borg and gail.
- Preparation of printed learning materials using the model Derek Rowntree, which consists of 3 processes of Planning, Preparing for writing and writing and re-writing.
- Making Non-print learning materials using Hanafin and Pack model.

Hybrid learning, which is alternately referred to as mixed learning, in the most general sense, is an educational approach that incorporates online instruction with face-to-face instruction. Blended learning course is an effective way to teach the skill and promote an evidence-based approach to practice in this area [8].

Hybrid learning according to The Sloan Consortium 2007 (Online Learning Consortium):, divides the 4 parts proposition, ie :

- 0% for traditional learning, no material submitted online, but delivered orally and in writing.
- 1-29% for face-to-face learning using web-based facilities, for example to deliver syllabus and assessment

- 30-79% for blended learning that combines face-to-face with online. The material is delivered in online discussions and several face-to-face meetings.
- 80% for online learning without face-to-face meetings.

E-learning can be defined as the technology used to enhance or facilitate the learning process through interaction with digital services, help or content [9]. Dawley [10] opined that e-learning encouraged learners to seek information, evaluate it, share it collaboratively and, ultimately, transform it into their own knowledge. E-learning helps learners to take responsibility of their learning, becomes autonomous and selfconfident. It enables introvert students to interact more freely, provides diversification of activities, fosters their intrinsic motivation and permits the acquisition of valuable study and time management skills [11]. Hybrid learning can be defined as the incorporation of technology with traditional methods in the process of classroom-based education.

## III. METHOD

The research conducted is R & D research, Borg and Gall [12] define R & D research as a series of processes that must be carried out in developing and validating educational products and how steps for development research in the field of educational technology. R&D is an important means for achieving future growth and maintaining a relevant product in the market. There is a misconception that R&D is the domain of high tech technology firms or the big pharmaceutical companies [13].

Learning materials are materials or subject matter that are arranged systematically, which are used by lecturers and students in the learning process. If books or audio, video and computer programs contain learning material that is intentionally designed systematically for the needs of a learning process even though it is sold in the free market, it can be said that these books and programs are learning materials. Educational technology is a complex and integrated process that involves people, procedures, ideas, tools, and organizations to analyze problems, find ways to solve them, implement, evaluate, and manage problem solving involving all aspects of human learning.

## IV. RESULTS OF STUDY

The results of the development of this study are in the form of instructional design in object oriented programming using the LMS Moodle platform in the learning process.

In this study, it was carried out until the seventh step, namely "doing formative evaluation". After the product development process is complete, the next step is to try out the product development trial. This trial is divided into two parts, namely: expert testing / validation and field trials. Expert trials / validations consisted of content expert trials, media expert trials, and expert design trials, while field trials consisted of: "one on one" trials with students, small group trials, and field trials . Validation results from Experts Content from approved object-oriented courses development



products are feasible to apply in learning. Content experts assess hybrid learning material as fulfilling the criteria as a medium of independent learning and face-to-face learning about linguistic content or material, and presentation material with excellent qualifications. Content eligibility is feasibility about 97.93% structure content for online learning materials, excellent specifications. After completing the trial with expert content, follow the next steps to get suggestions for improvement. Improvements in the first revision included (1) mechanical repairs of errors in spelling and (2) replacement of images in the context of programming learning. The second validation in the initial validation is the validation of the learning media expert.

a. Exploration, at this stage the following results are obtained:

**Table 1. Results of the Learning Materials Evaluation Questionnaire**

No	Indicator	Skor Phase I	Skor Phase II
1	Clarity of learning objectives	4	5
2	Relevance of learning objectives with competence	4	4
3	Compatibility of material with learning objectives	3	4
4	Contextuality and actuality	3	4
5	Completeness and quality of instruction design	4	5
6	Depth of material	3	4
7	Ease of understanding material	3	4
8	Systematic, continuous and clear logic flow	5	5
9	Explanation clarity, discussion and example	3	5
10	Innovation in material presentation in learning media	4	4
Total Score		40	44
% Feasibility		70	90
Criteria		Good	Very Good

b. Enactment, this stage involves making instructional strategies that are in accordance with the learning theory and learning context.

The design of the Learning Management System design, which contains the design of what will be done at each meeting. Preliminary view, the subject contains the Profile and Lecturer Profile. Course profile contains information on oriented object, namely: Competence of graduates, Concept Map of Object-Based Learning, Instructional Design, Lecture Structure, Assessment Model, Assessment Weight, One-semester Lecture Design, and provided discussion forum if there are things that need to be asked in the course profile. then a description of each meeting is made. In this section, in the form of a description of each meeting, if one of the meetings is clicked, it will appear as shown below.

Display of one meeting contains a description of the learning materials at the intended meeting, relevance and benefits, specific instructional objectives, initial knowledge tests, material descriptions, examples and non-examples, discussion forums, assignments, video references, evaluations / post tests and meeting quizzes in question.

Video appearance, displays the learning video, in LMS. The learning material is not only in the form of pdf, but there are also videos for certain materials that can be seen or tried by students many times when they are independent. The following is a table design of LMS:

**Table 2. Design of Instructional Design LMS**

Date	Topic	Subtopic	Learning Activities With Due Dates					Lab Session	Exam
			Reading Assignment/ Video Presentation	Homework	Self Evaluation Quiz	Synchronous Session			
Week #1	#1	1#	Vol 1 #P Video #	HW #1 Book Vol 1 #p	Quiz #1	In / off Class Session Discuss about#	-	-	
		2#							
		3#							
Week #2	#1	1#	Vol 1 #P Video #	HW #1 Book Vol 1 #p	Quiz #2	In / off Class Session Discuss about#	-	-	
		2#							
		3#							

Validation results from media experts provide excellent opinions on multimedia learning about MOODLE design, text elements, video elements, and hyperlink elements. Learning media for online learning materials are suitable for use as learning media. (1) Add the word "Welcome to the main page / home to be interesting, (2) Change the navigation menu sideways view, (3) Change the appearance of learning material in the form of submenus, Learning material online learning materials, Estimated online learning increase, and very fulfilling After completing the trial with media experts, follow the next revision 2, follow the revised revisions from the media experts, the revisions are updated: (1) try the word "Welcome," (2) improve the navigation menu display, (3) Material appearance learning into submenus Validation of experts from design learning Expert design studies are very good and suitable for use in learning Learning to support learning design using instructional learning design The highest percentage for 92% hybrid learning material and in excellent qualifications.

After completing the test to the design expert, follow the next steps to improve the design accordingly. Revisions are as follows: (1) replacing several main page titles into Indonesian, (2) replacing the term "learning material" into "Learning Tools", and (3) increasing "time allocation" to fit the learning outcomes. After completing the initial trial / expert validation, the first field of testing is conducted, namely for each student. Individuals were performed on three students who had high, medium and low abilities. The results obtained from individual hybrid learning material collected 81 percent of achievement levels and were in excellent qualifications. The second trial was a total of six students with two high achieving students, two moderate learning students, and two low achieving students. The results of small hybrid teaching materials can reach an achievement level of 79.17% and in the right qualifications. Four field trials are field trials (ten students). The number of results for hybrid teaching materials is 83.17% and the right qualifications. After completing the field trials, the final step in the design of this development is revision 3, or improvement of operational products. Improvements were made based on input from respondents during the field trials.



## V. DISCUSSION

Information communication and technology (ICT) has brought about numerous benefits within the educational settings for students and teachers alike [14]. Hybrid learning is also capable of enhancing cooperation among members, between educational and learning programs according to their individual needs: using hybrids. The use and implementation of E-learning is broad and complex; However, El-Ghareeb [15] proposes three recognized educational models: traditional learning, distance learning, and hybrid learning. The hybrid learning material developed in this study is expected to have a level of effectiveness and efficiency that is very suitable to be used as a learning supplement on subjects.

The benefits of hybrid learning are increasingly being realized as an escalating number of courses demonstrate the blended format to be a viable, even exemplary, mode of instruction. Enrollment in hybrid courses remains high, and the reported rates of student satisfaction indicate that learners by and large view such courses favorably [16]. Hybrid learning environments have been shown to address the frustrations and limitations resulting from the separation of tutor and tutee commonly found with fully online education [17]. Shetlar [18] cited the importance of student attitudes toward technology as a significant determining factor in the educational benefits of online learning resources and experiences.

This research is an R and D development research, using the IDLF method which consists of three phases, namely: Exploration, Enactment, Evaluation. In this study, due to time constraints, the product trial was only conducted one-to-one, at the stage of product validation assessment, media material assessment and student response. The results of evaluation on instructional design stage I are good and the score of stage II is very good. The results of the evaluation of LMS stage I scores are moderate and score stage II is very good.

## VI. CONCLUSION

This research is a research on the development of R and D, using the steps of obtaining a system. Based on the results of the evaluation, then: Hybrid learning materials can be used for object oriented programming subjects; The subject of object-oriented programming is material that is a hybrid learning material that can be supplemented by independent learning and face-to-face learning; Hybrid learning material is developed based on competency units in SKKNI Software development; this is a postgraduate program, students are ready to take object-oriented competency tests, one of the programming skills. Moodle-based media development can be further developed with additional features in the form of a graph progress that has been followed by students and assignments that have been done.

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