Video-Based Blended Course for Computer Network Learning

Video-Based Blended Course for Computer Network Learning

S Pambudi, H D Surjono, T Sukardiyono and I Hidayatulloh
Electronics and Informatics Engineering Education Department,
Universitas Negeri Yogyakarta, Yogyakarta, Indonesia

Email: sigitpambudi@uny.ac.id

Abstract. This study aims to develop a blended course for computer network courses with video-based teaching materials. This research refers to the development model of Integrated Learning Design Framework. The development of this learning media product is based on a learning plan for a computer network course for one semester. Based on the results of product testing, this blended course is declared "good" and is suitable for learning. Paired sample t-test results show that the product developed is effective in improving student learning outcomes.

1. Introduction

Electronic learning or abbreviated e-learning is one of the innovations that combines learning activities with the use of electronics. The purpose of the integration is to improve the quality of education [1]. With the existence of internet technology, learning that is packaged in the form of e-learning can be done practically and effectively without being limited by the size of distance or time. Besides this e-learning can be accessed by many people at the same time at once, so that the learning process is also carried out more efficiently.

Internet users in Indonesia are classified as high and continue to increase from year to year. The Indonesian Internet Service Providers Association (APJII), through its official page at https://www.apjii.or.id, released data on internet users in Indonesia in 2018 totaling 171.17 million users from the total population of Indonesia, totaling approximately 264, 16 million people or around 64.8% of the total population [2]. This is a significant increase, where in 2017 Internet users in Indonesia are still at 54.68%. The high number of internet users is actually a potential in developing new learning technologies, for example e-learning. e-learning is a solution to overcome limitations or gaps such as distance, space and time which are often problems in the learning process. The internet makes e-learning have greater reach and benefits.

E-learning is widely used in various higher education institutions in Indonesia as a companion or substitute for conventional learning. One of the institutions that took advantage of electronic-based learning is Universitas Negeri Yogyakarta (UNY). UNY developed a Moodle LMS-based e-learning web called BeSmart intended to increase learning activities and can be accessed at *http://besmart.uny.ac.id/v2*. As one of the study programs in UNY, the Informatics Engineering Education study program also developed electronic learning. However based on observations, it was found that the use of BeSmart is still less than optimal. One of the subjects that is not yet optimal in using BeSmart is the Computer Networking course. These related problems arise when lecturer hours

course cannot be present, besides that students also often feel less understanding of the material presented so that it requires more learning duration. Students tend to have initiatives to look for other learning materials, such as learning videos. Based on data obtained from the UPT Puskom UNY, achievement of the semester achievement index for Computer Network courses occupies the fifth lowest position compared with compulsory courses in the Informatics Engineering Education study program, with a cumulative grade point average (GPA) of 3.1.

Based on the results of interviews with supporting lecturers in the Computer Network course, it was found that Problems which hampered the improvement of the quality of learning in the Computer Network course, such as the limited duration of lectures to deliver a number of subject topics, students find it difficult to access learning resource materials, lecture activities are disrupted if the lecturer is unable to attend, and the lack of learning media such as video contains only text and image media, resulting in students lacking in mastering the material specifically related to practical simulations.

This research has the aim to be achieved, namely to produce solutions in the form of video based blended courses for material in Computer Network courses that are effective and efficient for students of the Informatics Engineering Education Study Program, Universitas Negeri Yogyakarta. In addition, the product developed can be used as a means of independent learning and can be used as positive input to further increase the interest and activeness of students or users in the learning process.

2. Literature review

2.1. Blended Course

Some of the literature uses the terminology more blended learning than the blended course. Blended learning is known as learning that combines online learning with face-to-face learning [3]. Through blended learning students can still do online learning outside the classroom. Online learning can be used as a means of interacting between students and other students or teachers directly or indirectly through online discussions [4]. The statement is in accordance with the opinion of Staker & Horn which states that online learning in blended learning can provide students the opportunity to apply concepts that have been obtained with unlimited meeting time in class [5]. Blended learning has a basic framework of concept development based on a constructivist learning perspective by providing experience with investigations that ensure concepts are built and assimilated deeply and meaningfully [6]. Implementation of blended learning can increase interactions between students and the environment, students and teachers, students and students, students with material and students with daily life [7].

The important thing to observe in the design of blended learning is to pay attention to the balance between online learning and face to face [8]. Blended composition that is often used is 50/50, meaning that the allocated time is 50% for face-to-face learning activities and 50% is done online computer-based learning (online and offline) [9]. The Sloan Consortium, the proportion of time division between learning in class and online learning determines what type of course or lesson is used, as explained in Table 1

Table 1. The Prototypical Course Classifications [10]

Proportion of Content Delivered Online	Type of Course	Typical Description
0%	Traditional	Content is delivered orally and in writing face to face
1 to 29%	Web Facilitated	Content is inserted on the web to support face-to-face learning such as for the dissemination of materials or the task collection container.
30 to 79%	Blended/Hybrid	Content delivered online and face-to-face. The technique can be alternately, or a combination of both.
80+%	Online	All content is presented online

2.2. Video for Media Education

Literally, the media has an intermediary or introduction meaning [11]. In the context of learning, the media are all forms of intermediaries whose role is to convey information from the teacher to students. As a conduit of information, the media is important in the learning process. The selection of media should be based on (1) Students' needs, (2) Compliance with learning objectives, (3) Compliance with learning material, and (4) Compliance with learning methods. These four points must be the basis for selecting a learning media, because the media will play an optimal role as an introduction to information if the media is a medium that is liked by students, in accordance with the learning objectives, in accordance with the material to be delivered, and in accordance with the methods determined by the teacher.

As the development of education, the media currently used by teachers varies greatly. Today there are many studies that develop learning media, one of which is video. Video is a type of audio visual media, which means learning media that can be seen using the sense of sight and be heard using the sense of hearing. As a learning media, effective video is used for mass learning processes, individuals and groups [12].

Edgar Dale with Dale's cone of experience theory describes the level of student understanding in a cone [13]. In Figure 1, the video is located in the middle and belongs to the "Television" category. This position means that video is better than image media and audio media.

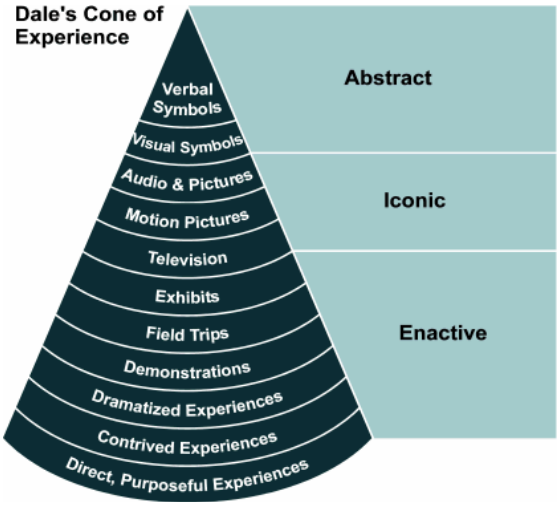

Figure 1. Dale's Cone of Experience [13]

Using video as a solution to overcome the low ability of students to understand a concept. The ease of presenting videos that can be repeated during the learning process makes it easier for students to understand the contents of the video, besides the presentation of a structured material also makes it easier for students to understand the material specifically about concepts [14]. Both of these advantages mean that video is an effective media used to improve the ability of elementary school students to understand concepts.

Many studies have concluded that video can increase student motivation [15] and have a positive contribution to student learning outcomes [16]. The results of the study of Supryadi et.al. stated that learning activities using video can provide a pleasant atmosphere and not boring for students so that students' attention is focused [17]. Besides video can also present events that are not physically possible, so students can find out more about these events. Video can satisfy all students who have different learning characteristics, ranging from audio, visual or audio-visual. This has an impact on improving student-learning outcomes, so it can be said that the use of video as a learning medium is effectively applied to the learning process.

3. Materials and Methods

This research is a Research and Development (R&D) where products developed in the form of video-based blended courses as media teaching courses Computer Networks. The stages of development used in this study adopted the Integrated Learning Design Framework (ILD). ILD Framework, consists of three stages, namely (1) Informed Exploration, (2) Enactment, (3) Local Evaluation, and (4) Broad Evaluation. At each stage the Integrated Learning Design is explained in Figure 2.

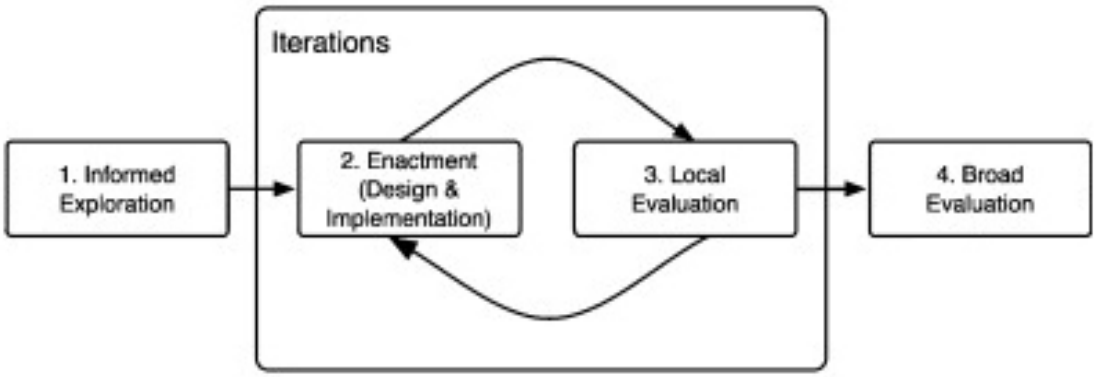

Figure 2. Integrated Learning Design Framework [18]

As the scope of the product development study, an identification process is needed from the Semester Learning Plan of Computer Network Courses in the Informatics Engineering Education Study Program, Universitas Negeri Yogyakarta. Product trials developed in this study include expert validation and trials on a larger scale. Expert tests carried out included material and media validation with the examiner being a material expert lecturer, a computer network lecturer, and a media validator competent in his field. Broad Evaluation was carried out with all respondents, as many as 39, which second semester students of the Informatics Engineering education program in Universitas Negeri Yogyakarta who were conducting a Computer Network course during the research. This study also compared the pretest and posttest values and conducted a t test to measure the effectiveness of a product.

4. Result and Discussion

Video-based Blended Course to support the delivery of Computer Network course material has been completed and successfully installed on Be-Smart. Be-Smart is a Universitas Negeri Yogyakarta e-learning web developed with Moodle LMS. The appearance of the blended course is designed so that students and lecturers as users can easily learn how to use the product. In developing a blended course, the material delivered during lectures is divided into two activities, namely synchronous and asynchronous. Synchronous learning is carried out in real-time, whereas Asynchronous is learning that is carried out online. The order of learning materials is adjusted according to the order of material contained in the Computer Network Semester Learning Plan.

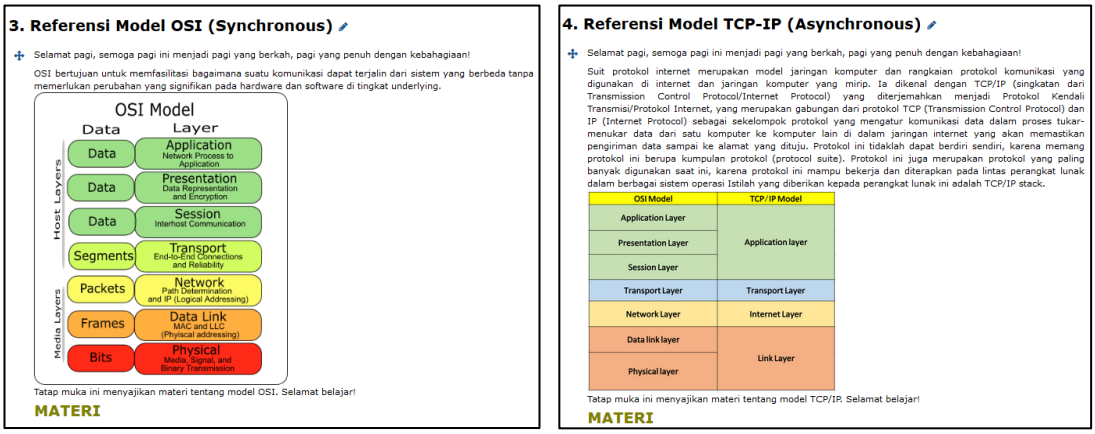

Figure 3. Synchronous & Asynchronous Page

In the learning video developed, there are two techniques presented, namely real shot and animation. With the variations in video presentation, it is expected that students will not get bored easily and will listen to the contents of the material presented..

Figure 4. Real Shot & Animation Video

The results of material expert testing on the quality of video-based blended courses as a product of research results obtained a value of 3.8 in terms of material content. This value is included in the "very good" category. While from the aspect of quality of learning the average value given is 3.6 or included in the category of "very good". Media expert test results on product quality viewed from the aspect of the display interface (interface) get an average score of 3.2 or included in the category of "very good". While from the pedagogy aspect, media experts gave a final score of 3.6 (very good). The results of the assessment in the beta test showed that respondents gave an average value of 2.85 or included in the category of "Good". Noting some of the results of the assessment can be concluded that the product is suitable for use in the learning process.

To measure the effectiveness of a product, it is necessary to do a t test. From the t paired sample t-test, it was found that the t value was -6.089 with a probability of 0.000 because the probability/ 2<0.025, the two population averages were not identical (the mean pretest and posttest values were significantly different). Based on the data, the students' competency improvement towards understanding the concept by comparing the pretest and posttest scores and t test analysis shows the pretest scores are lower when compared with the posttest scores. This shows that the video-based blended learning model has succeeded in increasing students' competence or understanding of Computer Network material or in other words video-based blended learning has proven to be effective in improving student learning outcomes in Computer Network courses.

Table 2. Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretest - Posttest	-14.4872	14.85876	2.37931	-19.3038	-9.67053	-6.089	38	.000

5. Conclusion

Video based Blended Course for learning Computer Network material has been successfully developed using a framework model from Integrated Learning Design (ILD). Alpha test results by material experts and media experts obtained "Very Good" results, while the results obtained from the beta test obtained "Good" results. So that the product is suitable for use in learning Computer Network courses. Based on the pretest and posttest competency test results and paired sample t-test t test analysis shows that the product is effective in improving student-learning outcomes in Computer Networking courses.

Learning innovations in the world of education will always develop following existing technology. At present, the presence of the internet is certainly a breath of fresh air that needs to be utilized as optimal as possible. Blended courses can be used as solutions to problems that often arise. The benefits that can be taken from a blended course make students able to study more independently and efficiently. While the presence of learning videos in the blended course will add to the variety of learning media in lectures, not only for Computer Network courses, but also for other courses. Suggestions for further development related to this research are improvement in terms of interactivity, such as the use of video conferencing and so on.

6. References

[1] Dewi P E D M, Tripalupi L E and Irwansyah M R 2019 The Effect of Blended Learning Method Toward Enterpreneurship Learning Activity and Learning Outcome of Economics Undergraduate Students *International Conference on Tourism, Economics, Accounting, Management, and Social Science (TEAMS 2018)* (Atlantis Press)

[2] APJII 2018 Penetrasi Dan Perilaku Pengguna Internet Indonesia 2018

[3] Baum E 2013 Creating a Blended Cooperative-Learning Classroom *The International HETL Review* 28–36

[4] Sendag S and Duran M 2012 Comparing preservice teachers perceptions of online problem-based learning and online instructor-led learning *Procedia-Social and Behavioral Sciences* **31** 212–7

[5] Staker H and Horn M B 2012 Classifying K-12 blended learning. *Innosight Institute*

[6] Garrison D R and Vaughan N D 2008 *Blended learning in higher education: Framework, principles, and guidelines* (John Wiley & Sons)

[7] Stacey E and Gerbic P 2007 Teaching for blended learning—Research perspectives from on-campus and distance students *Education and information technologies* **12** 165–74

[8] Akkoyunlu B and Yilmaz-Soylu M 2008 A study of student's perceptions in a blended learning environment based on different learning styles. *Educational Technology & Society* **11** 183–93

[9] Dwiyogo W D 2014 Pengembangan Model Rancangan Pembelajaran Berbasis Blended Learning (PBBL) untuk Meningkatkan Hasil Belajar Pemecahan Masalah *ASEAN Comparative Education Research Conference (ACER-N), Institut KWSP Kajang: Universiti Kebangsaan Malaysia*

[10] Allen I E, Seaman J and Garrett R 2007 Blended in: the extent and promise of blended education in the United States *Sloan-Consortium, Needham, MA*

[11] Heinich R, Molenda M, Russell J D and Smaldino S E 2005 Instructional technology and media for learning *New Jersey, Columbus. MULTI MEDIA PEMBELAJARAN* **141**

[12] Daryanto D 2010 Media pembelajaran *Yogyakarta, Gava Media*
[13] Dale E 1946 The cone of experience *Audio-visual methods in teaching* **1** 37–51
[14] Sudiarta I G P and Sadra I W 2016 Pengaruh Model Blended Learning Berbantuan Video Animasi terhadap Kemampuan Pemecahan Masalah dan Pemahaman Konsep Siswa *Jurnal Pendidikan dan Pengajaran* **49** 48–58
[15] Choi H J and Johnson S D 2005 The effect of context-based video instruction on learning and motivation in online courses *The American Journal of Distance Education* **19** 215–27
[16] Sarnoko S, Ruminiati R and Setyosari P 2016 Penerapan Pendekatan Savi Berbantuan Video Pembelajaran Untuk Meningkatkan Aktivitas dan Hasil Belajar IPS Siswa Kelas IV SDN I Sanan Girimarto Wonogiri *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan* **1** 1235–41
[17] Supryadi P E, Jampel I N and Riastini P N 2013 Penerapan Media Video Pembelajaran Sebagai Aplikasi Pendekatan Contekstual Teaching Learning Untuk Meningkatkan Hasil Belajar IPA Siswa Kelas V *MIMBAR PGSD Undiksha* **1**
[18] Alvarez C, Alarcon R and Nussbaum M 2011 Implementing collaborative learning activities in the classroom supported by one-to-one mobile computing: A design-based process *Journal of Systems and Software* **84** 1961–76

Acknowledgments
This research was Supported by Universitas Negeri Yogyakarta, Indonesia funded by DIPA LPPM UNY.