Electronic Project Based Learning a Literature Review

Susi Evanita[1], Zul Afdal[2]*, Rino[3], Marwan[4]

[1234]*Universitas Negeri Padang, Padang, Indonesia*
Correspondence Author, email: zulafdal@fe.unp.ac.id

ABSTRACT

The world of education in Indonesia and even in the world has undergone a transformation from face-to-face education to online education, which is often referred to as an online learning system. Many of these significant changes are thought to be the impact of the Covid-19 pandemic. As a developing country, Indonesia has many internet users ranked 6th in the world in 2018, but 95% of users use the internet to access social networks, and in 2020 last year internet users in Indonesia increased by 40% of users using the internet to access learning systems. In higher education, universities have shown significant participation in promoting e-learning-based learning in lectures to their students. Although their internet facilities are not adequate. One form of online learning is learning using the Moodle learning management system (LMS). At the State University of Padang, LMS (Learning Management System) Moodle is better known as Elearning UNP. The learning strategies and methods that become the main performance indicators of this university are project-based learning. In this article, the author tries to explain what electronic project-based learning looks like. This study aims to test the effectiveness of developing electronic project-based learning media for Moodle Junior High School. For the initial stage in this research, it is deemed necessary to first examine the literature study on electronic project-based learning.

Keywords: Electronic, Project Base Learning, Literature, Review.

1. INTRODUCTION

The project can be defined as a job or a task that contains an empirical aspect in the environment in which this aspect is carried out. Students can use this environment as a medium of learning in achieving a more meaningful learning process [1]. Project-based learning also provides new experiences for students in translating the theories they have learned so far in class [2]. Project-based learning helps the process of translating these theories into a more practical level [3], [4]. A thorough understanding of project-based learning and its relationship with online learning management systems in order to create a meaningful learning process for students in the future [5].

1.1. Project-based learning characteristics

Project-based learning is learner-centered learning based on three constructivist principles: context-specific, active student involvement in the learning process, and achieving goals through social interaction, knowledge sharing and understanding. Project-based learning is an inquiry learning approach where students learn concepts by solving real-world problems to achieve meaningful learning [6]. In addition, project-based learning centers on providing opportunities for students to build their knowledge by solving real-world problems. Asking questions, developing and carrying out investigations, obtaining data, analyzing data, interpreting data, drawing conclusions, and writing results reports are examples of problem solving activities [7].

Other learning approaches, such as problem-based learning, have a close relationship with project-based

learning. Collaboration is key to achieving the goals of both approaches. Learners who participate in projects are better equipped to solve difficulties, as can be seen from the products made to answer the questions given [8]. In addition, problem-based learning emphasizes process, while project-based learning emphasizes results [7]. This is the fundamental difference between problem-based learning and project-based learning. Other pedagogical techniques such as experiential learning and collaborative learning have been equated with project-based learning. Project-based learning is a type of collaborative instruction in which all participants must achieve results. In addition, project-based learning includes important experiential elements such as reflection and active participation [5], [6], [8].

Several international studies on the advantages of project-based learning in the learning process have been carried out. The findings show that the presence of a problem solving process can increase the involvement of learners in planning and creating their projects by offering freedom and challenge [9], [10]. The challenge focuses on cognitive, affective, ethical, and aesthetic components to encourage students to create well-designed projects. Centrality, Driving Questions, Constructive Investigation, Autonomy, and Realism are the five fundamental features of the project [11]. Other studies show significant aspects of project-based learning, such as student participation, reflection, reorganization, and presentation [12]. The unique process of project-based learning is building the final product. It gives students a new understanding, knowledge, and attitude about the problem being investigated through investigative activities using videos, photos, sketches and reports [13]. Through systematic methods of documentation and commentary in learning, such procedures can stimulate independent learning and offer students conceptual understanding. Learners learn independently through goal setting, planning, and organizing, while also developing cooperative skills through social learning. They are motivated because they can achieve something based on their preferences and talents [14]. Project-based learning has been implemented in various settings and at many levels of education, from primary and secondary schools to universities.

1.2. The evidence of project-based learning effectiveness

Most of the results of project-based learning research use design to measure the success of research in the classroom. Assuming this research also has weaknesses in terms of data collection techniques without comparing it with the comparison class. Several other studies have tried to use standardized tests that have been widely used to compare the average

achievement of students. With the existence of many scientific studies on project-based learning, the effectiveness of this learning method increases the level of trust in the use and transfer of its functions by educators.

A study on the effectiveness of previous research on project-based learning was carried out. The results obtained: most project-based learning research does not use random sampling techniques for the control class and experimental class, so the causal relationship between project-based learning and positive learning achievement of students cannot be seen with certainty. On the other hand, sample selection using a randomized technique is very important for research to obtain more substantial and more reliable project-based learning research results [15].

1.3. Electronic Project-based learning

Electronic Project-based Learning is a teaching strategy that involves students in the inquiry process through complex activities in a learning management system. Specific problems and questions as well as product/task design to gain knowledge and learning skills of students, make them more competent in a scientific study. By combining it in the form of an electronic model, students have new skills in selecting and sorting phenomena that are suitable to support their projects [16]. This method aims to promote the learning of knowledge, skills, and character by increasing the involvement of students in the learning process and by emphasizing the practical dimensions of learning and its relevance to the lives of students and the communities in which they live. Of course, this is supported by an electronic learning management system [17].

Electronic Project-based learning has almost the same characteristics as other electronic learning methods, which distinguishes it in the implementation of project work, students interact more with learning technology. In contrast to methods that are centered on learning such as the independent inquiry method. Students will shift most of their responsibilities to the learning process and the results they have worked on. Electronic Project-based Learning has several important characteristics that make it unique. that is in-depth investigation. It demands to apply a rigorous academic approach to research and to be involved in the whole process of inquiry including formulating questions, finding sources, gathering information, analyzing and synthesizing findings, and applying information [18].

Authenticity. Projects should include a realistic component beyond a hypothetical simulation or exercise and link the project to the real world. These components include, for example, the final product, the project's quality criteria, the tools used throughout the project, or the audience the project serves [19].

High learning enthusiasm makes students creative partners in building and applying knowledge [20]. Freedom and Autonomy. Student decisions related to the content and means of learning and project implementation are taken independently by students [21].

Challenging questions or problems. Learning based on questions or problems and searching for answers will motivate the instructional process to carry out the project. In-depth inquiry and authenticity requirements, questions and problems must be structured to provide opportunities for learning that is holistic, engaging for learners, and relevant to their world. For this reason, learners should participate in formulating questions or problems [22].

Collaborative learning. Although theoretically, electronic project-based learning work can be done individually, a strong preference is for collaborative learning in small groups. This preference is connected with the view that learning is a social process. It further presupposes that collaborative work encourages learners to be more involved and responsible and helps them improve their social learning skills [23].

Product presentation. Each project must produce final products that must be presented and explained to an audience, preferably those who are interested in the project and that transcend class boundaries. The range of product possibilities is extensive and includes, for example, presentations, short films, exhibitions, programs to increase efficiency, games and instruments. Although the learning generated throughout the process is the main goal of the project rather than the final product [24].

The latter is undoubtedly an important component of this method, giving it a task-oriented quality by utilizing a variety of digital technologies in a practical and unique way and can help to make a meaningful difference from other learning methods [25].

1.3 Electronic Project-Based Learning in Higher Education

As noted above, electronic project-based learning is not systematically integrated into higher education. Its integration can mainly only be found in various fields of engineering learning. We can identify institutions that are interested in educational innovations that use electronic project-based learning, such as universities that have engineering majors or study programs and other independent engineering training institutions. Some academic institutions have adopted project-based learning, but it is still conventional [26].

We should have started to gradually move towards electronic project-based learning as the main teaching method. However, some institutions have not adopted

it, and other universities are used on a limited and irregular scale. The limitations of implementing Electronic Learning in the academic field are contrary to the expectations of educators, especially considering the tremendous benefits it offers for the world of education [27, 28]. The following are some of the most prominent benefits mentioned by the researchers, including (1) Increased motivation of students with the development of the times and digital technology, students are expected to be able to choose topics and work methods that they like and utilize technology in obtaining study resources. In addition, it is about the authenticity of the work that is related to the real world and can contribute to increasing motivation [29]. (2) Learn new skills, thanks to an emphasis on in-depth investigation, independent work (individual and group), and tangible results. All of these require learners to integrate and develop their learning, collaboration, and execution skills. (3) Thanks to the experience of authentic situations and the opportunity to establish contacts with the community and professional partners that shape the work environment and future careers of students [30]. (4) Suitability for various learners and learning styles, thanks to the relative autonomy in choosing learning methods and the possibility of dividing work among group members. (5) Suitability for the information age, this method encourages students to use various modern information and communication technologies. These technologies offer access to information and data, provide the foundation for a variety of possible products, and expand communication between groups, between group members, and between students and lecturers. general [31].

2. METHOD

This research design is Literature Review that examines or reviews knowledge, ideas, or findings containing in the academic literature and formulates theoretical and methodological contributions to specific issues. Descriptive analysis was adopted in this study with the regular breakdown of the obtained data, giving understanding and explanation to make the reader understood well.

3. RESULT AND DISCUSSION

From the description above, technology, information and communication are not only used in project-based learning, but also must be used as learning tools so as to obtain various types of content that are more interesting as an example of electronic content and as a means to promote independent, active learning goals that oriented to a social environment that is centered on the learner himself.

What's more, information and communication technology can serve the core purpose of real-life experience by offering learners a point of contact with

the real world, both by becoming truly modern tools of work and living and by connecting learners to the continuous flow of contemporary life far beyond space. their class.

The application of electronic project-based learning in the learning process must involve factors such as students, teachers or lecturers, curriculum, types of assignments, workshop needs, equipment and materials, as well as information and communication technology facilities. This factor is in line with the effectiveness of learning that involves three factors, namely the nature of the peer interaction process. Projects are implemented to achieve the highest value or quality products; there are bound to be obstacles and challenges. Likewise, the impact on the students involved, sometimes there are various kinds of perceptions among educators on the effectiveness of the learning process outcomes using electronic project-based learning, this often causes problems.

One of the important components of electronic project-based learning is students. During the implementation of electronic project-based learning sometimes the attitude of students becomes a problem that causes its effectiveness to raise questions. The implementation of electronic project-based learning in the learning process is often associated with assessment, meaning that the project results will be evaluated and assessed as part of the assessment. Limited knowledge about current technological changes has prevented them from generating good ideas. Students are also faced with difficulties in drawing sketches, drawing pictures, designing buildings and getting materials to build models. With the help of electronic project-based learning, such obstacles will be more easily minimized. Their process of creating a product is complex and sometimes becomes a problem for some students. Many studies say that getting to the creative process is very complicated and not easy to communicate. Approach methods and strategies help to deal with creating problem solving so that they can give the effect of thinking, creativity, self-confidence and effective work methods among students.

Learners can act creatively and innovatively to modify and create an appropriate and interesting project. The things mentioned above are some interesting issues regarding the need for implementing electronic project-based learning in the learning process, where there are different views on the strengths, weaknesses and challenges that must be faced during the implementation process.

In addition to these problems, the time to interact and discuss with colleagues and lecturers is not enough because the curriculum content is too dense and time is limited. Lack of time for teachers to complete the syllabus because the size of Living Skills is too wide and the number of students sometimes exceeds 30 people for one class makes practical learning cannot be carried out perfectly, so it is rarely applied. The problem of time to do electronic project-based learning will be easier to manage, because learning can be done anytime and anywhere.

4. CONCLUSIONS

Electronic project-based learning is the main solution focus for the implementation of project-based learning where the learning process involves complex techniques so far. The level of effectiveness and efficiency is more highlighted from this model. So that students have longer time involved in project-based tasks, the process of students to find meaning contained in project assignments, making project work meaningful for their own experiences and in real life. They will integrate components or aspects of the task into a unified whole and relate findings to past knowledge. They also try to build personal theories and hypotheses from assignments; the learning is a deep learning approach. While the product stage involves the experience of complex interactions.

ACKNOWLEDGMENTS

REFERENCES

[1] Y. Gülbahar and H. Tinmaz, "Implementing project-based learning and E-portfolio assessment in an undergraduate course," *J. Res. Technol. Educ.*, vol. 38, no. 3, pp. 309–327, 2006, doi: 10.1080/15391523.2006.10782462.

[2] J. Voogt and N. P. Roblin, "A comparative analysis of international frameworks for 21 st century competences: Implications for national curriculum policies," *J. Curric. Stud.*, vol. 44, no. 3, pp. 299–321, 2012, doi: 10.1080/00220272.2012.668938.

[3] M. Frank and A. Barzilia, "Integrating alternative assessment in a Project-Based Learning course for pre-service science and technology teachers," *Assess. Eval. High. Educ.*, vol. 29, no. 1, pp. 41–61, 2004, doi: 10.1080/0260293042000160401.

[4] J. Choi, J. H. Lee, and B. Kim, "How does learner-centered education affect teacher self-efficacy?The case of project-based learning in Korea," *Teach. Teach. Educ.*, vol. 85, pp. 45–57, 2019, doi: 10.1016/j.tate.2019.05.005.

[5] S. Bell, "Project-Based Learning for the 21st Century: Skills for the Future," *Clear. House A J. Educ. Strateg. Issues Ideas*, vol. 83, no. 2, pp.

39–43, 2010, doi: 10.1080/00098650903505415.

[6] A. Karim, M. Campbell, and M. Hasan, "A new method of integrating project-based and work-integrated learning in postgraduate engineering study," *Curric. J.*, vol. 31, no. 1, pp. 157–173, 2020, doi: 10.1080/09585176.2019.1659839.

[7] P. C. Blumenfeld, E. Soloway, R. W. Marx, J. S. Krajcik, M. Guzdial, and A. Palincsar, "Motivating Project-Based Learning: Sustaining the Doing, Supporting the Learning," *Educ. Psychol.*, vol. 26, no. 3–4, pp. 369–398, 1991, doi: 10.1080/00461520.1991.9653139.

[8] L. Darling-Hammond, L. Flook, C. Cook-Harvey, B. Barron, and D. Osher, "Implications for educational practice of the science of learning and development," *Appl. Dev. Sci.*, vol. 24, no. 2, pp. 97–140, 2020, doi: 10.1080/10888691.2018.1537791.

[9] L. C. Larson and T. N. Miller, "21st Century Skills: Prepare Students for the Future," *Kappa Delta Pi Rec.*, vol. 47, no. 3, pp. 121–123, 2011, doi: 10.1080/00228958.2011.10516575.

[10] R. Sanft and K. Ziegler-Graham, "Mathematics Practicum at St. Olaf College: Project-Based Learning through Academic Civic Engagement," *Primus*, vol. 28, no. 4, pp. 335–349, 2018, doi: 10.1080/10511970.2016.1249319.

[11] C. Lin, "The Development of an Instrument to Measure the Project Competences of College Students in Online Project-Based Learning," no. 178, pp. 57–69, 2018, doi: 10.1007/s10956-017-9708-y.

[12] J. Choi, J. H. Lee, and B. Kim, "How does learner-centered education affect teacher self-efficacy?The case of project-based learning in Korea," *Teach. Teach. Educ.*, vol. 85, pp. 45–57, Oct. 2019, doi: 10.1016/j.tate.2019.05.005.

[13] P. Hernandez-Ramos and S. De La Paz, "Learning history in middle school by designing multimedia in a project-based learning experience," *J. Res. Technol. Educ.*, vol. 42, no. 2, pp. 151–173, 2009, doi: 10.1080/15391523.2009.10782545.

[14] B. J. S. Barron *et al.*, "Doing with Understanding: Lessons from Research on Problem- and Project-Based Learning," *J. Learn. Sci.*, vol. 7, no. 3–4, pp. 271–311, 1998, doi: 10.1080/10508406.1998.9672056.

[15] S. Kaldi, D. Filippatou, and C. Govaris, "Project-based learning in primary schools: Effects on pupils' learning and attitudes," *Educ. 3-13*, vol. 39, no. 1, pp. 35–47, 2011, doi: 10.1080/03004270903179538.

[16] L. Li, "European Journal of Engineering Project-based learning in electronic technology : a case study," no. January 2015, pp. 37–41, 2014, doi: 10.1080/03043797.2014.987650.

[17] G. G. Mosier, J. Bradley-Levine, and T. Perkins, "Students' Perceptions of Project-Based Learning within the New Tech School Model," *Int. J. Educ. Reform*, vol. 25, no. 1, pp. 2–15, 2016, doi: 10.1177/105678791602500101.

[18] L. J. ChanLin, "Technology integration applied to project-based learning in science," *Innov. Educ. Teach. Int.*, vol. 45, no. 1, pp. 55–65, 2008, doi: 10.1080/14703290701757450.

[19] Ü. Çakiroğlu and T. Erdemir, "Online project based learning via cloud computing: exploring roles of instructor and students," *Interactive Learning Environments*, vol. 27, no. 4. pp. 547–566, 2019, doi: 10.1080/10494820.2018.1489855.

[20] K. and J. T. Dearnley, C. A., Coates, C., Dransfield, M., Fairhall, J., Haigh, J., Hennessy, S., Parks, M., Riley, "Using Mobile Technologies for Asessment and Learning Practice Setting Outcome of Five Case Studies," *Int. J. Learn.*, vol. 8, no. 2, pp. 193–207, 2009.

[21] J. Dewey, "My Pedagogic Creed," *Sch. J.*, vol. LIV, no. 3, pp. 77–80, 1897.

[22] M. Donnelly, R. and Fitzmaurice, "Collaborative Project-Based Learning and Problem-Based Learning in Higher Education: A Consideration of Tutor and Student Role in Learner-Focused Strategies," *G. O'Neill, S. Moore B. McMullin, eds., Emerg. Issues Pract. Univ. Learn. Teach.*, vol. Dublin: AI, pp. 87–98, 2005.

[23] L. Tolsby, H., Nyvang, T. and Dirckinck-Holmfeld, "A Survey of Technologies Supporting Virtual Project Based Learning," in *The Third International Conference on Networked Learning*, 2002, pp. 572–581.

[24] M. Lehmann, M., Christensen, P, Du, X. and Thrane, "Problem-Oriented and Project-Based Learning (POPjBL) as an Innovative Learning Strategy for Sustainable Development in Engineering Education," *Eur. J. Eng. Educ.*, vol. 3, no. 3, pp. 283–295, 2008.

[25] J. Srba, "An Experiment with Using Google Tools for Project Supervision at Tertiary

Education," in *The 11th International Conference on Computer Systems and Technologies and Workshop for PhD Students in Computing on International Conference on Computer Systems and Technologies*, 2010, pp. 430–435.

[26] D. Ponta, G. Donzellini, and H. Markkanen, "Electronic systems design: an experiment of project-based learning on network," *Eur. J. Eng. Educ.*, vol. 26, no. 4, pp. 375–390, 2001, doi: 10.1080/03043790110068675.

[27] Z. Afdal, D Disman, M. Munir, "Blogspot-Based Learning Model to Improve Economic Self Directed Learning", in the 1st Global Conference on Business, Management and Entreupreuneurship (GCBME-16), Advances in Economics, Business and Management Research, volume 15 pp.248-253, 2016.

[28] A. Febliza, O. Oktariani & Z. Afdal, Kebutuhan Mahasiswa Terhadap Video Kontekstual sebagai Media Pembelajaran Pada Masa Pandemi COVID-19. Jurnal Basicedu, 5(3), 1130 - 1138, 2021

[29] A. Utulu, S. C. and Alonge, "Use of Mobile Phones for Project Based Learning by Undergraduate Students of Nigerian Private Universities," *Int. J. Educ. Dev. using Inf. Commun. Technol. (IJEDICT),* vol. 8, no. 1, pp. 4–15, 2012.

[30] H. Weenk, W., Govers, E, and Vlas, "Training in Project-Based Education: Practice as You Preach," *Eur. J. Eng. Educ.*, vol. 29, no. 4, pp. 465–475, 2004.

[31] T. A. Saulnier, B.M., Landry, J.P., Longenecker, H.E. and Wagner, "From Teaching to Learning: Learner-Centered Teaching and Assessment in Information Systems Education.," *J. Inf. Syst. Educ.*, vol. 19, no. 2, pp. 169–174, 2008.