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THE EFFECT OF PROBLEM-BASED LEARNING MODEL AND BLENDED LEARNING MODEL TO METACOGNITIVE AWARENESS AS A REFLECTION TOWARDS A NEW NORMAL ERA

Muhammad Kris Yuan Hidayatulloh[1], Aftoni[2], and Ömer Çobanoğlu[3]
[1]KH. A. Wahab Hasbullah University, Indonesia; [2] State University of Surabaya, Indonesia;
[3] Department of Civil Engineering, University of Gaziantep 27310, Gaziantep, Turkey
Email: krisyuan@unwaha.ac.id

ABSTRACT

This study aimed to determine differences in the level of metacognitive awareness and learning outcomes of students who learn through problem-based learning model-assisted blended learning on technical drawing material as a reflection towards new normal era education. This study used a test instrument and metacognitive questionnaire with the results of a validity level of 92.58% and the Alpha Cronbach reliability coefficient was categorized as high with a score of 0.876. The research sample was carried out at the state of vocational high school in two classes. Experimental classes learned with a problem-based model were aided by blended learning and a control class learned through a problem-based model. The results showed a significant difference in cognitive domain learning outcomes in the experimental class and metacognitive awareness of students in the two research classes so that this learning model could be used as a reflection in the learning activities of the new normal era.

Keywords: blended learning, metacognitive awareness, new normal era, problem-based learning

INTRODUCTION

Currently, the world of education is also affected by Covid-19 so that learning activities have decreased and the role of teachers in the classroom. The teacher as a facilitator provides learning experiences to students by expressing a problem or phenomenon that exists and is experienced by students in daily life. Learning activities become more meaningful if they present real problems as a stimulus for student learning. Learning technical drawings is more directed at the construction of broad knowledge and train students to solve a problem systematically. Therefore, to make it easier for students to find concepts independently, it is necessary to apply constructivism-based learning strategies to maximize students' thinking abilities. One alternative strategy needed to improve students' understanding to construct broad knowledge is to apply constructivist-based learning strategies [1]. Constructivist-based learning is problem-based learning (PBL).

Problem Based Learning is a learning model that presents authentic and meaningful problem situations that can foster students' curiosity to conduct investigations and inquiry [2]. Students are involved in solving problems through the stages of the scientific method by conducting investigations. PBL stages provide an opportunity for students to question existing phenomena and actively build an understanding of the concept of technical drawings more coherently, flexibly, and systematically. This is following the statement of Ward & Lee [3] which explains that PBL is a learning model that involves students to solve a problem through stages of the scientific method so that students can learn knowledge related to existing problems and at the same time have the skills to solve problems so it is expected to improve student learning outcomes. The

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teacher as a facilitator provides interesting teaching that helps students solve problems[4]. Technical drawings also have a wide range of material because many discoveries are found so that the use of internet technology in learning can be done to access the material. Therefore, it is necessary to apply technology-based teaching, one of which is internet-based blended learning.

Blended learning combines a variety of teaching methods and strategies that utilize virtual technology. Blended learning can be applied not only during the face-to-face learning process, but also when activities outside face-to-face, both in the school environment, at home, and in other places with internet access [5]. The use of learning with blended learning can increase student learning time, simplify and accelerate the communication process between teachers and students [6]. In addition, blended learning has other advantages, namely (1) students can control learning activities independently through direct feedback [7], (2) students have more opportunities to interact, get feedback directly to improve learning and performance independently [8], (3) higher learning outcomes compared to conventional learning [9]. Media applications that support are indispensable to the learning process of blended learning. Many learning media can be used by teachers to support teaching and learning activities when teachers and students cannot meet in person. This is needed by teachers and students because learning activities are implemented online as instructed by the Ministry of Education in Indonesia.

In the learning media application, there are several menus including text, graphics, animation, simulation, audio, and video so that it can help teachers and students to collaborate, share ideas, communicate and interact. Media that can display video is media that can reduce difficulties for students to receive learning material [10]. Conceptual visualization in the form of pictures, animations, videos, and analogies helps students in understanding technical drawings. Based on the 2013 curriculum, one of the competencies students must possess is being able to apply logical, critical, systematic, and innovative thinking in the context of developing or implementing science and technology and being able to carry out a process of self-evaluation of workgroups under their responsibility, and managing the development of work competence independently.

Competence in education today is the ability to work together in groups, the ability to solve problems, the ability to direct oneself, think critically, master technology, and be able to communicate effectively [11]. According to Bishop in Rusman & Riyana [12], future education will be flexible, open, and accessible to anyone who needs it regardless of type, age, or educational experience. This is in line with Mason's opinion in Rusman & Riyana [12] that future education will be more determined by information networks that allow for interaction and collaboration. The influence of information and communication technology in the world of education is increasingly felt in line with the shift in learning patterns from conventional face-to-face towards more open and media education. Students need to be equipped with knowledge, skills, attitudes, and self-systems to achieve learning goals to improve learning outcomes[13]. The main thing that must be grown in students is their metacognitive abilities so that students know how much desire or interest is in themselves

to make learning decisions and achieve good understanding to improve learning outcomes.

METHOD

This type of research included in experimental research with a research design is a quasi-experimental post-test in two groups (quasi-experimental posttest). The sample selection is done by a convenience sampling technique for vocational students. To obtain two research classes, namely experimental class students learning with problem-based learning models assisted by blended learning (N=31) and students in control classes learning with problem-based learning models (N=31).

The metacognitive awareness research design uses inventory developed by Schraw [8], namely the Metacognitive Awareness Inventory. The questionnaire used was a closed questionnaire in the form of a Likert attitude scale, in the form of a question or statement whose answer was in the form of a descriptive scale. Alternative answers using the Likert scale consist of five alternative answers, namely strongly agree (SS), agree (S), neutral (N), disagree (TS), and strongly disagree (STS). Each answer score from the question provided is SS = 5, S = 4, N = 3, TS = 2, STS = 1. The maximum score for the metacognitive awareness questionnaire is 150 out of 30 questionnaires.

RESULTS AND DISCUSSION

The students' metacognitive awareness results were analyzed from the metacognitive awareness questionnaire adapted by Schraw [8] given to students in the experimental and control classes. The metacognitive awareness questionnaire aims to find out the metacognitive ability of students to find information on how much desire or encouragement is in students to make decisions in their learning to reach an understanding of technical drawing properly. Recapitulation of students' metacognitive awareness data in the experimental class and the control class is presented in Table 1.

Table 1. Recapitulation of Student Metacognitive Awareness Data

Class	Students	Total	Mean	Criteria
Experiment class	31	3765	119.43	Well developed
Control class	31	3582	113.87	Well developed

The average value of metacognitive awareness of experimental class students (119.43), which means students have metacognitive awareness that has been well developed. Meanwhile, the average value of metacognitive awareness of control class students (113.87), which means students have metacognitive awareness that has developed. Based on the average score, it can be seen that both classes have a well-developed metacognitive awareness average. The maximum average score of metacognitive awareness is 150 with very good development criteria. Based on the prerequisite test results consisting of the test for distribution normality and homogeneity of variance, it is found that the test requirements have been met so that an independent sample t-test can be performed.

Table 2. Independent t-test Result

	Levene's test		t-test for equality of means		
	F	Sig.	t	df	Sig. (2-tailed)
Equal variances assumed	0.00	0.987	2.180	60	0.043
Equal variances not assumed			2.180	54.78	0.043

Hypothesis test results with the Independent Sample t-Test have a

significance value of 0.043 which is smaller than 0.050, then H_0 is rejected. Therefore, it can be concluded that the metacognitive awareness of the experimental class taught by the problem-based learning model assisted by blended learning is significantly higher than the control class taught by the problem-based learning model. This can be used as a reference in learning models in the new normal era.

The combination of Blended Learning with Problem Based Learning has a theoretical foundation. Blended Learning and Problem Based Learning to support each other in face-to-face learning and online learning [14];[15];[16]. Problem Based Learning follows the principles of constructivism learning theory that uses a learning approach centered on student learning activities [17]. This can be used as a basis for a theoretical blend of blended learning and PBL, evidence that the two support each other in creating a learning environment that can attract students' interests so that they can improve student learning outcomes.

Based on Table 2, the results of hypothesis testing with the Independent Sample t-Test have a significance value of 0.043 less than 0.050, it can be concluded that there are differences in the metacognitive awareness of students who are taught with problem-based learning models assisted by blended learning and problem-based learning models. This means that the problem-based learning model assisted by blended learning has a significant impact on students' metacognitive awareness compared to the problem-based learning model. These results are in line with research by Roebers [18] and Nederhand et al [19] which is caused by learning by using the internet which is often called e-learning or blended learning.

Blended learning is a combination of face-to-face and online learning to maximize the learning process. Blended learning assisted learning is not only applied during the face-to-face learning process in the classroom but can also be applied when activities outside face to face with internet access. Online learning prioritizes interactions between students and students or teachers by online discussions conducted by students in small groups or online discussions with all students in large groups to allow students to apply concepts that have been obtained with unlimited time in-class meetings. According to Islam [20], the atmosphere of online learning can train students to be more active in learning, students make designs and look for materials with their efforts.

Students who have metacognitive awareness can control their cognitive activities such as developing a learning environment and choosing strategies to solve problems, monitor the problem-solving process, and evaluate their overall performance. These conditions help students in the process of understanding construction. Anderson also reported that metacognition abilities possessed by students can increase meaningful learning capacities and help students construct understanding [21]. Metacognitive awareness plays a role in improving student learning outcomes so that with high metacognitive awareness shows good academic ability, conversely students with low metacognitive awareness show poor academic abilities [22].

Based on the average score, it can be seen that both classes have a well-developed metacognitive awareness average. The metacognitive awareness of the experimental class and the control class is well developed. This is because the experimental class and the control class both use problem-based

learning. The problem-based learning model can develop students' metacognitive awareness. Problem-based learning models produce more coherent and systematic cognition products by carrying out a series of procedures before constructing knowledge, such as finding important information, summarizing main ideas, formulating problems, making hypotheses, finding solutions to problems, and describing the flow of concept acquisition. Procedural habits that are trained continuously when students work on problems and assignments.

Metacognitive awareness is an important part of teaching and learning with problem-based learning models. In technical drawing learning, metacognitive awareness is needed when students solve and find solutions to problems that are given. The important role of metacognitive in solving problems, for example, when students are confronted with a problem, then students with metacognitive awareness ask themselves what strategies will be taken to answer the problem? What are the possible strategies for solving the problem? And why choose the strategy? If the metacognitive awareness has grown, students are helped in solving the problem at hand. This shows the existence of thought processes in students to achieve goals in learning.

Blended learning in Problem Based Learning can help students to solve a problem topic easily. Students get information not only from the teacher's manual and explanation but can be accessed from various sources using the internet network. So students in groups are more critical in finding the right solution to problems. Students have metacognitive awareness to be able to control their cognitive activities, such as developing learning environments and choosing strategies for solving problems, monitoring problem-solving processes, and evaluating their entire performance. These conditions help students in the process of understanding construction found in each phase of the problem-based learning model. Metacognitive abilities possessed by students can increase learning capacity that is meaningful and helps students construct understanding.

CONCLUSION

Based on the results of this study it can be concluded that the application of problem-based learning models assisted by blended learning can increase students' metacognitive awareness. Metacognitive awareness of students learning with problem-based learning models assisted by blended learning is significantly higher compared to students learning with problem-based learning models. This can be used as a reflection and readiness towards a new normal era in learning activities that will be carried out in the following semester. Based on the average score, it can be seen that both classes have a well-developed metacognitive awareness average.

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