EFFECTIVENESS OF COMPETENCY BASED LEARNING MODELS IN COMPUTER NETWORKS LEARNING

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ABSTRACT

Based on the studies and preliminary studies that have been conducted, the research problems are as follows: The personality (needs) of lecturers and students in the learning process of computer networks shows that they have high expectations of the learning process. Where are their expectations of the learning process that is able to improve 21st century competencies (critical thinking, communication, collaboration, creativity). The process and achievements of computer network courses have not been optimal. The purpose of developing a learning model of competency based learning is to help educators realize the learning process that is able to optimize the role of students in constructing their knowledge, through real experiences students get in the learning process. The design of the development of this competency based learning model uses the ADDIE model. Data was collected by questionnaires, observations, interviews and tests. Data is analyzed using quantitative and qualitative methods (mix method) so that learning is obtained through empirical and comprehensive studies. Based on the analysis carried out all products are declared valid, practical, and effective. The results of this study can be used by lecturers, and learning designers in developing or realizing the learning process that is able to optimize the role of students to be creative and innovative in building students' knowledge and competencies in the learning process.

Keywords: Competency Based, Learning Model, Computer Network

INTRODUCTION

Technological developments and advancements allow automation in almost all fields. New technologies and approaches that combine the physical, digital, and

biological worlds will fundamentally change the pattern of life and human interaction, as well as in a very dynamic world of education where curriculum and learning processes must be in line with the development of known information technology with the industrial era 4.0 as part of the technological revolution will change the way human activities in scale, scope, complexity, and transformation from previous life experiences. In the world of education in the industrial 4.0 revolution era we can see from two different perspectives, including this era can be seen as an opportunity, and can also be seen as a threat. various opportunities such as; the birth of new business units in the community that are able to penetrate boundless space by utilizing information technology, and vice versa, one of the threats is the result of the automation of many human works carried out by robots resulting in the loss of human work and the emergence of efforts new that was not done by humans before.

Increasing the competitiveness and quality of education is closely related to the process of education itself. Quality education can be seen from the side of the process, if the learning process takes place effectively and innovatively and students experience a meaningful learning process, supported by human resources, facilities, adequate infrastructure. Quality learning process will certainly produce graduates who are also qualified and competent in their field. in line with that Tjalla revealed that the low quality of each type and level of education is one of the educational problems faced by Indonesia. In general, it can be understood that the low quality of Indonesian human resources at this time is due to the low quality of education. and quality education can only be achieved through improving the learning. The classroom learning process is one component of the educational situation that is important in realizing quality education, effective learning requires professional commitment among lecturers and students. Learning must be carried out as well as possible through careful planning.

Related to learning aspect 21, besides referring to scientific field competencies but also in line with innovation skill competencies such as; Critical thinking, Communication, Collaboration, Creativity. Depdiknas states that competency-based learning has the following five characteristics: (1). Emphasize on the achievement of student competencies both individually and classically; (2). Oriented to learning outcomes and diversity; (3) Submission in learning uses various approaches and

methods; (4). Learning resources are not only lecturers but also other learning resources that fulfill educational elements; (5). Assessment emphasizes the process and learning outcomes in efforts to gain mastery or achievement of competencies.

The characteristics of competency-based learning require lecturers to always innovate and improvise in determining appropriate learning methods and strategies. Based on the many obstacles experienced in the learning process, the lecturers are required to find and find new approaches that are effective and efficient. This Competency based learning (CBL) learning model is a combination of Problem Based Learning learning model and Jigsaw type collaborative learning model. It is hoped that this model will be able to respond to current needs that are in line with the development of 21st century learning. Collaboration has become a trend of 21st century learning . The community's need to think and work together on issues of critical concern has increased, shifting the emphasis from individual efforts to group work. Slavin revealed that the existence of a team of origin and a team of experts in Jigsaw would stimulate cooperation between students so that it was effective in providing an understanding of learning content / material and creating a better learning atmosphere besides having a positive effect on academic achievement. This is because Jigsaw is a flexible and varied learning model.

The development of Competency Based Learning (CBL) is important to be used to overcome the problem of low student achievement, this is supported by the results of Effendi who argued that the application of Competency Based Learning (CBL) showed a positive influence on student learning aspects and ability to think.Efendi states, seeing the experience of students in Competency Based Learning (CBL), generally shows students are more satisfied and happy to study with CBL compared to conventional learning. The role of the lecturer in learning uses the Competency Based Learning (CBL) model as a facilitator and guide. Based on studies that have been carried out comprehensively through the study of literature, observation and analysis of current learning needs, it can be assumed that a renewal and development of learning models are needed that are able to respond to current needs, especially in this era of industrial revolution. including; Critical Thinking, Communication, Collaboration, Creativity.

METHOD

The type of research that will be carried out is research and development (R & D) with a qualitative and quantitative approach. In the research development of the Competency Based Learning learning model, the experimental research method was applied, namely "the research method used to find the effect of certain treatments on others in controlled conditions". So that it can be seen whether the development of this learning model is good for improving the quality of Computer Network learning. The ADDIE instructional development model consists of 5 steps, namely analysis, design, development, implementation and evaluation. Data collection techniques in the form of questionnaires. Questionnaire is a technique of data collection conducted by giving a set of questions or written statements to the respondent to answer. The questionnaire can be in the form of a multiple choice form questionnaire and can also take the form of an attitude scale.

RESULTS AND DISCUSSION

Presentation of trial data consists of validity test data by experts, practical tests by students and lecturer, effective testing of assignments, student learning outcomes, and success factors in applying computer network learning using competency based learning models. The following is presented data and analysis of data from the results of testing the learning model of competency based learning and learning devices on computer network courses.

Validation data was obtained from five experts consisting of language experts, learning media experts and material experts. The experts assessed the research products consisting of learning models, modules, learning media, RPS and SAP on computer network courses. The validation was asked to provide an assessment and suggestions for improvement of the learning model and learning tools that had been designed. From all validated aspects in the model of competency based learning in the form of models, modules, learning media, RPS and SAP, the average rating of five validation was 0.86 with valid categories. Based on the value of validity obtained from the validation, it can be concluded that the product-based learning model developed is in accordance with the construction requirements of the learning model. It can be concluded that the product

development model competency based learning with this competency based learning learning model is valid and can be used in computer network learning in higher education.

Assessment of effectiveness is done through formative and summative evaluation of the implementation of learning computer networks with a competency based learning model. Formative evaluation is done by evaluating learning in each product-based learning syntax. During one semester of implementation, researchers looked at the development of student activities from each meeting and conducted an assessment of all activities carried out in each learning syntax. In addition to measuring the use of teaching guidelines such as modules, learning media, and RPS and SAP, researchers also conduct effectiveness assessments through formative evaluation and summative evaluation of the implementation of computer network learning using competency based learning models. The results of the assessment will be explained as follows.

Formative evaluation is carried out by evaluating and seeing the development of student competencies from 4 topics discussed during 1 semester. Reports on student activity in each topic of learning can be described in figure 1.
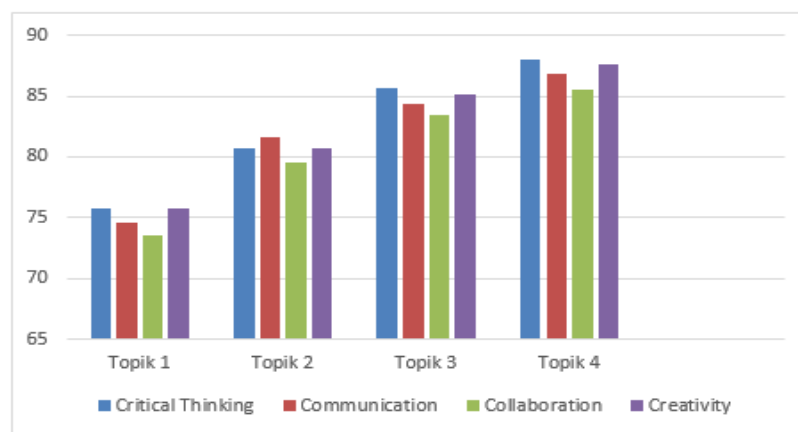
Figure 1. 21st Century Competency Assessment Using the CBL Model

Based on Figure 1, it can be assumed that on each learning topic for one semester there was a significant increase in student competencies. It can be assumed that the learning model of competency based learning is able to improve the critical competencies of students' thinking, communication, collaboration, and creativity. simultaneous. So that with the learning process that is able to improve 4C competencies

students can explore their abilities in the learning process. The 4C competency assessment analysis of students experienced an increase in the 4C average competency value (critical thinking, communication, collaboration, and creativity) on each topic.

Before conducting a summative evaluation, a pretest was conducted to determine the students' initial abilities. The pretest was conducted aimed at knowing that the trial subjects had the same competencies and abilities, and came from the same sample. Analysis of the pretest learning outcomes of students using SPSS shows that the control class learning outcomes data (S1 Information System students) and experimental classes (S1 Bachelor of Informatics Engineering) are normally distributed with a sig value of 0.189 / 0.256> 0.05 for the control class, and sig value 0.127 / 0.148> 0.05 for the experimental class.

The homogeneity test results obtained sig value 0.256> 0.05, which means that the data has the same or homogeneous variance. Based on the results of the analysis, it can be concluded that the control class and experimental class came from the same sample. The learning outcomes (experimental class) are then compared with class learning outcomes that do not use learning tools that are developed based on the principle of competency based learning (control class). It aims to see whether the competency based learning model influences student cognitive learning outcomes. The t test was used to see the level of difference in the learning outcomes of the experimental class with the control class in this study. Before the t test is carried out, the analysis requirements test is carried out, namely the test for normality and homogeneity. The results of the t test can be presented as follows:

Based on the results of SPSS presented in table 4.18, it can be stated that; Control class, sig value 0,200 / 0,846> 0,05 which means that data is normally distributed, experimental class, sig value 0,200 / 0,491> 0,05 which means the data is normally distributed. So, it can be concluded that both data are normally distributed.

Table 1. Postest Normality Test of Control and Experimental Classes

		Tests of Normality					
	Kelompok	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Nilai	Eksperimen	.100	27	.200[*]	.966	27	.491
	Kontrol	.123	25	.200[*]	.978	25	.846

[*]. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

The homogeneity test was carried out on the value of student learning outcomes using the leven test with SPSS software with the data criteria being said to be homogeneous if the significance level was greater than 0.05. The test results can be seen in table 2.

Table 2 Test of Homogeneity of Postest Control and Experimental Classes

Test of Homogeneity of Variances			
Levene Statistic	df1	df2	Sig.
3.177	1	50	.081

From the results of SPSS presented in table 4.19, the value of sig 0.081> 0.05 is obtained which means that the data has the same or homogeneous variance. Test that is done is a different test of two independent means. The t test was carried out using SPSS software with a significance level of $\alpha = 0.05$. The test results can be seen in table 3.

Table 3. Posttest t Test Control Class and Experimental Class

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Nilai	Equal variances assumed	3.177	.081	2.836	50	.007	3.93696	1.38806	1.14897	6.72496
	Equal variances not assumed			2.868	47.882	.006	3.93696	1.37258	1.17703	6.69690

Based on the results of SPSS presented in table 3, the equal variaces assumed (homogeneous sample) has a sig value of 0.007 <0.05, which means there are differences in the learning outcomes of the control class with a significant experimental class. So it can be concluded that there are differences in learning outcomes between students using the competency based learning model compared to students who do not use the competency based learning model on computer network courses.

CONCLUSION

Based on the results of the study, it can be concluded that the learning model of competency based learning which in the development process has gone through the

stages of validation, practicality and effectiveness. The Competency based learning model is an active learning model. This learning model is also equipped with supporting components such as SAP, modules, lab worksheets and usage guidelines and model usage guidelines. The learning model of competency based learning developed is included in the effective category. Suggestions for lecturers to be able to use the competency based learning learning model as an alternative learning model in computer network lectures. In learning computer networks, lecturers are expected to be able to direct students to be able to configure network equipment and overcome troubleshooting, which can later be adjusted to developments in the cases faced. Suggestions for future researchers so that the competency based learning model can be tested on a larger number of trial subjects so that the use of this competency based learning model is much broader.

REFERENCES

R. R. Tjandrawinata. 2016. Industri 4.0: revolusi industri abad ini dan pengaruhnya pada bidang kesehatan dan bioteknologi. No. February, pp. 0–12, 2016.

A. Tjalla. 2010. Potret Mutu Pendidikan Indonesia Ditinjau dari Hasil-Hail Studi Internasional. Semin. Nas. FKIP-UT, no. 3, pp. 1–22, 2010.

Dimyati and Mudjiono. 2006. Belajar dan pembelajaran. Jakarta: Rineka Cipta : Departemen Pendidikan & Kebudayaan, 2006.

D. A. Jacobsen, P. Eggen, and D. Kauchak. 2008. Methods for Teaching: Promoting Student Learning in K-12 Classrooms, 8th ed. Old Tappan, United States: Allyn & Bacon, Incorporated, 2008.

Depdiknas, Reposisi Pendidikan Kejuruan Menjelang 2020. 2023. Jakarta: Depdiknas, 2003.

R. Efendi. 2017 Implementation of Project Based Learning : Research Overview. Appl. Sci. Technol., vol. 1, pp. 280–285, 2017.

M. Laal, M. Laal, and Z. K. Kermanshahi. 2012. 21st Century Learning; Learning in Collaboration. Procedia - Soc. Behav. Sci., vol. 47, pp. 1696–1701, 2012.

R. Slavin. 2011. Psikologi Pendidikan : Teori dan Praktek, Jilid II E. Jakarta: PT. Indeks, 2011.

K. Doymus. 2015. Teaching Chemical Equilibrium with the Jigsaw Technique. no. November, 2015.

R. Efendi. 2019. Implementation Competency Based Learning Model Of Learning Computer Network Courses At Vocational Education. J. Adv. Res. Dyn. Control Syst., vol. 11, no. 5, pp. 501–505, 2019.

R. Efendi and A. Yulastri. 2019. Effectiveness of Collaborative Problem Based Learning Model of Learning Computer Network Courses BT - 5th UPI International Conference on Technical and Vocational Education and Training (ICTVET 2018). in 5th UPI International Conference on Technical and Vocational Education and Training (ICTVET 2018), 2019.

Sugiyono. 2011. Metode Peneltian Kuantitatif, dan R&D. Bandung: Alfabeta, 2011.