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Development of Deeper Learning Cycle-Project Based Learning Model Based on Resource Sharing in Artificial Neural Network Courses

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Abstract: ***The aim of this study was to determine the development of Deeper Sharing Learning Cycle-PjBL model based on Resource Sharing in the application of information literacy to prepare the learning process and find out how students' learning abilities. Deeper Learning Cycle-PjBL Model based on Resource Sharing consists of Resource Sharing applications, model books, teaching module books, learning tools, the use of lecturer applications and the use of valid, practical and effective student applications. The method used in this research is the Borg and Gall research and development model with 10 stages which are then simplified into 5 stages of development. The validity of the model is analyzed using Aiken'V while the practicality of the practicality of the model is measured by the user. The effectiveness of the model is measured by using the model and measuring learning outcomes. Respondents were used in the experimental class and control class with 33 students and were analyzed by t-test. Research in the development of the model through scientific studies, and analysis is done by testing the Confirmatory Factor Analysis using the Lisrel application. The results of the construct test on the syntax after testing meet the criteria for goodness-of-fit-models with the value P.Value = 0.54750, while for the RSMEA value = 0.000, thus for the value of*** $x^2 / df \leq 2$***, thus the Deeper Learning Cycle-PjBL Model is based Resource Sharing is declared valid.***

Keywords: DELC, PjBL, Resource Sharing, Artificial Neural Network.

I. INTRODUCTION

An important role of Technology and Vocational Education is to enhance the role in strengthening the capacity of global competitiveness. Technology and Vocational Education is one of the platforms for developing research into technology products in tertiary institutions which can later be applied in society to improve welfare. The process of providing education with teaching and training forms productive students and is ready to continue their education to a higher level and is ready to work.

Philosophy of education as a special area of scientific work appeared in the 20th century in English-speaking countries and, first of all, in the USA. Inspirational work of J. Dewey (1859-1952) stimulated the acceptance of "philosophy of education" as mandatory measurement of competent and responsible practice in education. Before Dewey nobody had been proving so hard the need of teaching practice based on philosophical principles. None of the philosophers before and after him completed so many works dedicated to education (over 40 books and 800 articles). As a result, an idea appeared in the English-speaking world that practicing teachers should use educational philosophy as potential grounds for the whole of educational thought and practice [1].

During the study of the specifics of individual approach towards educating students we concluded that the results of this learning depend not only on the consideration of students' age and psychological traits, but also on positive learning motivation and a teacher's awareness of the level of creative activity activation in each of the students. All of this helps the teacher correctly selecting the pace of the lesson, method of material presentation and other technical means in order to eliminate the blank spots in students' knowledge and develop their creative activity [2].

Technology and Vocational Education is education to prepare and develop productive work. Vocational education can be classified into types of *specialized education* because the group of lessons or programs provided is only selected by people who have special interests to prepare themselves for future employment.[3]. In order for this special employment to be successful, vocational education is intended to prepare the skilled workers needed in the community to deal with technological development 4.0 [4]. In this disruption era, the world of education is demanded to be able to equip students with the appearance of the 21st Century Skills. These skills are the skills of students who are able to think critically and solve problems, are creative and innovative as well as communication and collaboration skills [5]. Besides the skills in finding, processing and conveying information and skilled use of information and technology. Some abilities that must be possessed in the 21st century include: *Leadership, Digital Literacy, Entrepreneurship, Global Citizenship, Problem Solving, Team-working*. Three issues of Education in Indonesia today are character education, vocational education, innovation.

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The Development of the Deeper Learning Cycle-PJBL Model based on Resource Sharing, is a learning model based on constructivism learning theory and connectivity. Constructivism is related to understanding related material in one subject while the theory of learning Connectivism has a role as a theory that integrates technology and learning strategies.

From the Resource Sharing Project section, the system tools used to be able to bridge between analysis understanding and understanding in designing Projects in the field of Resource Sharing.

This is in line with the concept of learning development which adopts several models, namely: (a) Deeper Learning Cycle, (b) Project Based Learning. From the perspective of the Deeper Learning Cycle, the research study conducted is how to develop interactive and creative learning models to improve students' creativity and learning abilities, where the learning theory adopted is the theory of connectivity. From the perspective of Project Based Learning, the research study that will be conducted is how students are able to solve a project-based problem, this is in line with the theory of constructivism learning.[6].

Through problems in the learning process, critical thinking skills can be taught, because students will begin to be trained to analyze the problems of learning. High-level thinking is a cognitive operation that is needed in the thinking processes that occur in short-term memory. To involve the process of student analysis requires tests that test the cognitive abilities of critical thinking. However, to provide tests that can test the cognitive abilities of critical thinking requires proper and deep learning. One of the Artificial Neural Network learning models that suits these problems is the Development of a Deeper Learning Cycle (DELC) Model that is combined with Project Based Learning (PjBL) based on Resource Sharing, is a learning model that produces a project, and combines the brain, standards, and individual learning differences.

II. MATERIAL AND METHODS

Some data processing parts of the definition of learning experts argue and state the concept of learning methods part of learning activities carried out by educators in learning in the classroom and outside the classroom. [7] "Method is a method used to implement a plan that has been prepared in real activities so that the objectives that have been prepared are achieved optimally".

Philosophy can be interpreted as a sense of confidence in worldview by thinking well and right, and the truth is accepted by many people. Philosophy according to experts includes the elements among it:[8].

Efforts in a speculative way in order to present a systematic and complete conceptual problem of reality.

1. Efforts to summarize the deepest and true basic concepts of reality.
2. Efforts in setting boundaries and scope of knowledge.
3. Critical investigation of hypotheses.
4. Knowledge to help someone to understand (purposefulmeaning) what is expressed and what is seen and what is done.

Deeper learning cycle is one of the learning models that is based on a new cycle of skills and abilities with an unchanging domain. DELC is also more focused learning so that deep understanding occurs as in a system or organizational structure. Eric Jensen and Leann Nickelsen describe a Deeper Learning Cycle, a teaching model that blends research on the brain, standards, and differences in individual learning, to help educators teach deeper understanding and critical thinking.[6]

Deep project-based learning model [9] (*Project Based Learning*) explain that. Learning models that directly involve students in the learning process through research activities to work on and complete a particular learning project. This project-based learning model is actually not a new model in learning. Although MPBP can be said as an old model, this model is still widely used and continues to be developed because it is considered to have certain advantages compared to other learning models. [10]. One of these advantages is that MPBP is considered as one of the excellent learning models in developing various basic skills that students must possess, including thinking skills, decision making skills, creativity skills, ability to solve, and at the same time considered effective for developing self-confidence and management students themselves.

Resource sharing is the sharing of computer resources owned in one group for project-based learning in blended learning in order to overcome the limitations of the availability of e-learning facilities owned. Project based learning is learning that focuses on thinking creativity, problem solving, and interaction between students. Students have a relatively long time in working on this project independently in this research development carried out in groups which in the end the project results will be presented. [11] states that the conceptual framework will connect theoretically between research variables, namely between the independent variable and the dependent variable. In summary, the conceptual framework that explains the factors that influence auditor performance with auditor motivation as a moderating variable. [12]

In learning technology, descriptions of development research procedures and steps have been developed. *Borg & gall* (1983) states that the development research procedure basically consists of two main objectives, namely: (1) developing the product, and (2) testing the effectiveness of the product in achieving its objectives.

The concept used for this framework will produce a picture of the direction of the goal that addresses variables as research concepts. In the conceptual framework produces instructions for researchers to formulate problems in research. It is expected that later researchers can use the conceptual framework in accordance with the predetermined arrangement of questions which are the main task of research, so get an empirical procedure used as a concept in order to produce answers to these questions.

III. RESULT

Deeper Learning Cycle-PjBL Model based on Resource Sharing is inseparable from the concepts of learning constructivism and connectivity. Constructivism is related to understanding related material in one subject while the theory of learning Connectivism has a role as a theory that integrates technology and learning strategies.

Judging from the concept of Resource Sharing, system tools are used to be able to bridge the understanding between analysis and understanding in designing projects in the field of information technology.

Basically the concept built in Resource Sharing is an element for the achievement of the learning process with software. The device used can later provide problem solving in evaluating the learning outcomes to produce a project.

A. *Design*

The application design is part of the application display that has been designed as a tool in the learning process.

The results of the design of the application which is used as a learning medium based on e-learning for the learning process conducted online based on resource sharing by students, can be seen as shown below:

Figure 1. Main Display Learning Neural Network

Figure 2. Login Menu

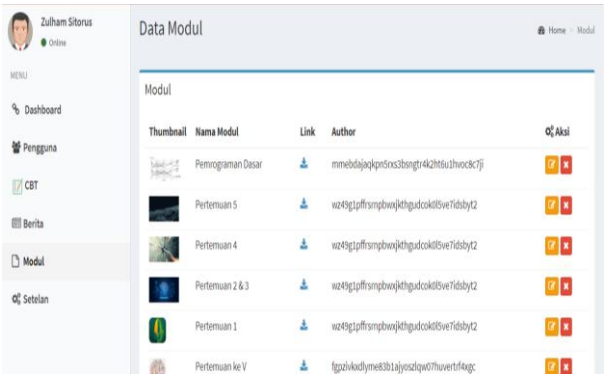

Figure 3. Dashboard Module based on Resource Sharing

B. Validity

The concept used in developing the model used is based on the Deeper Learning Cycle and Project Based Learning models based on the Resource Sharing system, to carry out the validity process by using Aikens' V in terms of the structure of the model including products produced consisting of (1) Model Books, (2) Module Books, (3) Learning Tools Books (4) Lecturer Guidebooks, (5) Student Guidebooks.

Table-I Validity Results in Resource-Based DELC-PjBL Learning Products

No	Product Aspect	Validity Value
1	Model Book	0.92
2	Module Book	0.94
3	Learning Tools Book	0.84
4	Lecturer Handbook	0.90
5	Student Handbook	0.96

$$V = \sum s / [n(c-1)] \quad (1)$$

$S = r - lo$

Lo = low validity rating points (e.g. 1),

C = highest validity rating (e.g. 5)

R = the score given by the assessor.

The results of the statistical data show the average *Aikens'V* value obtained from the aspect of product valuation from the validation value of 0.84 to 0.96 with the *Aikens'V* rating range between 0 to 1, where an assessment is declared valid with the *Aikens'V* value criteria must be above 0.60 then the content at Above is declared high enough (valid). Therefore, the results of the validation related to the Deeper Learning Cycle-PjBL based on Resource Sharing Book is learning products produced means more than> 0.60, so they can be categorized valid.

C. Practicality

To measure the practicality of the Deeper Learning Cycle-PjBL Model based on Resource Sharing Book be observed on several aspects. The aspects of the practicality assessment are as follows: (1) Attractiveness, (2) The development process, (3) Ease of Use, and (4) Functionality and Significance of the model.

In testing, practicality uses practical analysis with a Likert scale approach using the following formula:

$$P = \frac{\sum f}{N} \times 100\ \% \quad (2)$$

Information:

P = Final Value

F = Number of Score Achievements

N = Maximum Score

Table-II Results of Practicality of the DELC-PjBL Learning Model Book based on Resource Sharing

No	Practicality Assessment Aspects	Average value	Percentage Value
1	Attractiveness	4.6 - 4.8	92% - 96%
2	Development Process	4.4 - 5	88% - 100%
3	Ease of Use	4.2 - 4.6	84% - 92%
4	Functionality and Meaningful Models	4.4 - 5	88% -100%

Based on the practicality test of the Deeper Learning Cycle-PjBL Model based on Resource Sharing Book by educators related to the Model Book, it was declared "*Very Practical*"

D. Effectiveness

Model and analysis of the effectiveness test of the control class and experiment from the amount of data of 33 students with a frequency distribution of pre-test scores to the control and experiment class, explained in the following table below:

Table-III Pre-Test Analysis Results of Control Classes

No	Information	Value
1	Valid Value	33
2	Missing value	0
3	The mean	62.0303
4	Std. Deviation	7.69531
5	Std. Error of Mean	1.33958
6	Maximum	47.00
7	Minimum	76.00

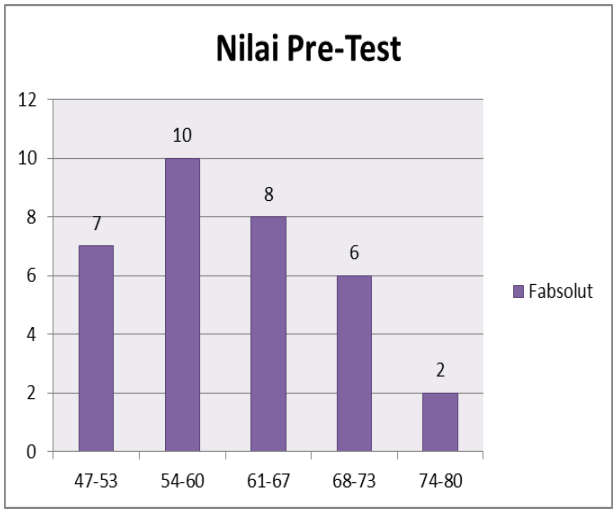

Figure 4. Histogram Pre-test Value in the Control Class

Based on Figure 4 the histograms it can be explained that there are pre-test values in the control class by having their respective values for the class, intervals, absolute frequencies and relative frequencies detailed in the below

Table-IV Pre-Test Analysis Results of Control Classes

No	Class Interval	Frequency Absolut	Frequency Relative
1	47 - 53	7	21
2	54 - 60	10	30
3	61 - 67	8	24
4	68 - 73	6	18
5	74 - 80	2	6
Amount		33	100

From the statement table of the pre-test results analysis on control class by evaluating the interval class, absolute frequency and relative frequency that the test results are declared valid.

After testing with the control class, the next test is also carried out with the experimental class. For the data analysis of the effectiveness of the experimental class conducted by processing the data analysis of 33 people the number of students with a frequency distribution of pre-test scores to the experimental class, explained in the following table below:

Table-V Results of Experimental Class Pre-Test Analysis

No	Information	Value
1	Valid Value	33
2	Missing value	0
3	The mean	61.6667
4	Std. Deviation	8.86590
5	Std. Error of Mean	1.54335
6	Maximum	82.00
7	Minimum	47.00

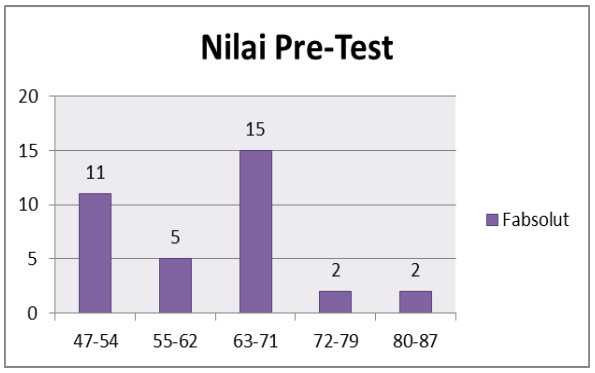

Figure 5. Histogram Pre-Test Value in Experiment Class

Based on Figure 5 the histogram can be explained that there is a pre-test value in the experimental class in the table below.

Table-VI Pre-Test Analysis Results of Experimental Class

No	Class Interval	Frequency Absolut	Frequency Relative
1	47 - 54	11	31
2	55 - 62	5	14
3	63 - 71	15	43
4	72 - 79	2	6
5	80 - 87	2	6
Amount		33	100

From the data table above shows the numbers calculated by frequency analysis of the results of the pre-test analysis of the experimental class with the value of the class interval, absolute frequency and relative frequency that the test results are declared valid.

E. T-Test (Comparing Group Means) Pre-Test Results of Control Class and Experiment Class

At the stage of using the t-test (Comparing Group Means) to measure the value of each class, both the control class and the experimental class with the Pre-Test results, so that the values of the two classes can be seen in detail in processing the data against the hypothesis tested in accept or valid.

The t-test processes of the pre-test results from both the control class and the experimental class can be seen from the table below which is the result of processing from the SPSS IBM.22 software Following is a picture of the results of the t-test in the control and experimental classes below.

	Kelas	N	Mean Rank	Sum of Ranks
Nilai	Eksperimen	33	38.38	1266.50
	Kontrol	33	28.62	944.50
	Total	66		

Test Statistics[a]

	Nilai
Mann-Whitney U	383.500
Wilcoxon W	944.500
Z	-2.082
Asymp. Sig. (2-tailed)	.000

Figure 6. T-Test (Comparing Group Means) Pre-Test

From the t-test table the *Asymp* value. Sig. (2-tailed) it is 0 means less than 0.05 (<0.05) then the hypothesis or Ha is "Accepted". Thus students have almost the same academic skills without any other difference.

IV. CONCLUSION

Based on data analysis and discussion described from the development of the Deeper Learning Cycle model based on Resource Sharing, it can be concluded as follows:

1. Based on the results of study conducted on models developed that the Deeper Learning Cycle-PjBL Model based on Resource Sharing produces supporting products in the form of model books, module books, learning tool books and media usage books for lecturers and students in Artificial Neural Network courses.
2. From the results of the study to test the validity of the development of the Deeper Learning Cycle-PjBL Model based on Resource Sharing, it was stated with valid results using *Aiken'V* and Confirmatory Factor Analysis based on a review of aspects of content and construct validity.
3. Based on the results of study conducted on the development of Deeper Learning Cycle-PjBL Model based on Resource Sharing stated to consist of syntax (1) Formulating Problem Solving, (2) Design a Plan for The Project, (3) Project Analysis of Device Support System, (4) Pre Assessing, (5) Evaluation of Feasibility Testing Project, and (6) Assets the Outcome.
4. For the results of practicality testing in the sections related to the development of the Deeper Learning Cycle-PjBL Model based on Resource Sharing, it Usage Guidebook, Learning Tools, Learning Media and Teaching Modules stated Very Practical both the practicality testing is carried out by the lecturer and college student.
5. The Deeper Learning Cycle-PjBL model based on Resource Sharing from the results of testing the effectiveness associated with the control class and the experimental class can be declared effective based on the t-test (Comparative test).

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