



Project-Oriented Self-directed Learning as a Learning Model to Improve Learning Outcomes

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Abstract. In the Web Programming course at STMIK Methodist Binjai, this study aims to pinpoint the key differences between the experimental class's project-oriented self-directed learning model and the control class' traditional models in terms of student learning outcomes. Quasi-experimental research is employed in this study, with STMIK Methodist Binjai professors and students as the study's subjects. The study's research objective is to determine how the Project-Oriented Self-Directed Learning model affects student learning outcomes in Web Programming courses. 60 STMIK Methodist Binjai students who took web programming courses made up the study's population. 30 students were employed as the experimental class in this study, while 30 students were used as the control class. Simple random sampling was not used to determine the experimental and control classes. Tests and documentation were employed as data collection techniques. The three data analysis techniques employed in this work are the prerequisite analysis test, the prerequisite test using the normality test using the Lilliefors method, and the homogeneity test using the Bartlett method. The normality test and homogeneity test are used to test data. A two-party independent sample t-test is then used for the balance test. The Hypothesis Test uses a one-sided t-test as its final step. A preparatory test on the balancing t-test is run before the t-test is run. According to the calculations, the experimental class's average learning score was 82.2, whereas the control group was 72.5. In the STMIK Methodist Binjai Web Programming course, there is a substantial difference between the learning results of the experimental class students utilizing the Project-Oriented Self-Directed Learning model and the learning outcomes of the control class using traditional models.

Keywords: Self-Directed Learning · Project-Oriented · Web Programming · Quasi Experiment

1 Introduction

According to the results of interviews with lecturers of the Web Programming course on September 5, 2022, and interviews with several STMIK Methodist Binjai students

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who took the Web Programming course on September 9, 2022, it was found that there were several obstacles experienced in the edification and cognition process of Web Programming, especially on the material for making web application projects. Constraints or difficulties for students are 1) the arduousness of students to analyze quandaries, celebrating critically to understand the concept of programming algorithms, 2) the arduousness of celebrating ingeniously to engender web-predicated applications, 3) the arduousness of understanding syntax, processing subsisting data on the server to be processed on the client side, 4) it is arduous to distinguish which is on the client side and which is on the server side, 5) it is arduous to elaborate OOP concepts, 6) learning outcomes incline to be low on material for making web applications. These constraints cause students to be passive in the cognition process and the cognition outcomes are not following educators' prospects. Predicated on the results of the study, it was verbally expressed that the Self-Directed Learning model was efficacious in amending student learning outcomes [13].

Self-Directed Learning (SDL) is an integral part of the psychological and gregarious development of adulthood [6]. Plenarily self-directed adults' plenarily control their cognition efforts, but not all adults are plenarily self-directed [7, 16]. Psychological and gregarious maturity are inseparable factors in determining adult independent learning [12, 16]. SDL is a central concept for adult learners learning, despite much reprehension and perplexity circumventing it [6]. Divergent viewpoints on SDL have been offered by the various inculcation skills; some see SDL as a process [14], a personal attribute [12], and others as both. SDL is an approach to incentivizing students to postulate personal responsibility and collaborative control of cognitive and contextual processes in building consequential and valuable learning outcomes [6]. SDL readiness is visually perceived as a cognition compartment that brings students to perpetuate learning predicated on their initiative [3]. SDL is optically discerned as the goals, processes, and characteristics of students who change with the nature of learning [4]. The prosperity of students in independent learning requires control in orchestrating learning speed [17], monitoring learning understanding [18], and making assessments on sundry aspects of the cognition process [19]. In the context of independent learning, students need to be aware of and actively investigate a variety of learning materials [20].

Additionally, students must learn how to overcome obstacles related to independent study and create techniques for effectively utilizing resources [8]. Students need to be incentivized to surmount challenges associated with independent learning [5] and utilize communication technology capabilities to engender consequential interactions [9]. The SDL model is intended for adult students who have the initiative to diagnose learning needs, formulate and implement opportune learning strategies, and evaluate results with or without the avail of other people and most adult students can practice cognizance and skills from independent cognition activities. To get optimal learning outcomes and amend learning outcomes, students are given the task of making a project. The cognition model that includes project engendered is a significant step in accumulating and coordinating predicated on genuine practice experiences that students must explore and learn [21, 22].

The advantages of including projects engendered in the cognition model are 1) can increment learning motivation, 2) can amend skills in managing sundry sources, 3)

students are more active, 4) trains students to manage projects, and 5) learning is more fun. The inclusion of projects in the cognition model accentuates that students can learn independently by solving difficulties and can engender authentic projects or work.

2 Methods

This research utilizes a quasi-experimental research type. Quasi-experimental studies are habituated to compare one or more control groups receiving other treatments. Researchers conducted research at STMIK Methodist Binjai in the 4th semester of the Information Systems study program. The fourth semester of SI-A class and the fourth semester of SI-B class were used as the experimental class and the control class, respectively, by the researchers. SI-A is the experimental class, and SI-B is the control class. The cognitive model, which is the independent variable, and student learning outcomes, which is the accepted variable, are the two variables that will be evaluated based on the research objectives. The population and sample of this research are all students of the Information Systems study program semester 4 of the 2021/2022 academic year with a total population of 60 students.

This study utilizes a saturated sampling technique, this is because there are only two classes. One class is utilized as an experimental class utilizing the Project-Oriented Self-Directed Learning model, while the second class is a control class utilizing a conventional learning model. The tenaciousness of the experimental and control classes did not utilize simple arbitrary sampling. Data accumulation techniques used tests and documentation. The Prerequisite Analysis Test is one of three data analysis methods used in this study. Here, the homogeneity test with the Bartlett technique and the normality test with the Lilliefors method is used as the necessary tests. The normality test and homogeneity test are used to test data. Then the balance test utilizes a two-party independent sample t-test. Conclusively, the Hypothesis Test utilizes a one-sided t-test. Afore the t-test is carried out, a prerequisite test is carried out as in the balance t-test.

3 Results

The study used two classes as a sample of the population, namely 4th-semester students of the STMIK Methodist Binjai Information Systems Study Program. The total population is 60 students, and the sample data is taken, namely class SI-A as an experimental class with a total of 30 students and SI-B with a total of 30 students as a control class. Each class was given a different treatment, the experimental class was given treatment by applying the Project-Oriented Self-Directed Learning model while the control class was given treatment utilizing conventional learning models. After being given the treatment of each class and given a post-test to ascertain the cognition outcomes of students. The cognition outcomes of students in the experimental class were 82.2 while in the control class, the average learning outcomes were 72.5. The cognition outcomes obtained by each class can be optically discerned in Table 1.

According to Table 1, can be explicated that the experimental class or SI-A class has a minimum value of 80 and a maximum of 90 while the control class or SI-B has a minimum value of 60 and a maximum of 80. The standard deviation in the SI-A class is

Table 1. Post-Test Results Data

Class	Calculation Results					
	N	$\sum X$	\bar{X}	S	X_{\max}	X_{\min}
SI-A class (Experiment Class)	30	2466	82.2	5.18	90	80
SI-B class (Control Class)	30	2175	72.5	6.48	80	60

5.18 and the SI-B class is 6.48. The average value of the experimental class was 82.2 and that of the control class was 72.5. When viewed from the data described above, there is a difference in the maximum value and minimum value between the experimental class and the control class. These results are a positive influence on the utilization of the Project-Oriented Self-Directed Learning model, this is because students are given the liberty to study material and engender web application projects. Web Programming materials can be explored by students through internet technology and other sources predicated on the way students prefer.

4 Discussion

The results of the researcher's observations of the use of the Project-Oriented Self-Direct Learning model in the experimental class showed that students were enthusiastic about participating in the learning process, this is because the Project-Oriented Self-Direct Learning model provides freedom to study Web Programming material and create web-based applications. Independent learning is related to the level of understanding of students, providing opportunities to analyze learning needs, formulate learning objectives, determine learning resources, choose learning strategies, and evaluate student learning outcomes independently. So, the resulting impact is to grow and develop student learning independence optimally to increase significant learning outcomes. Increasing student learning independence can be assisted by using a qualified learning model, so that students become accustomed to learning independently [23] The intended model is Project-Oriented Self-Directed Learning by including project creation of web-based applications so that students can understand the material and be able to create web-based application projects independently, this will have an impact on improving student learning outcomes. According to this study's findings, project-based learning can increase students' skill levels when combined with self-directed learning [24].

5 Conclusion

The adoption of the project-oriented self-directed learning model can enhance learning outcomes for students in the information systems study program in the STMIK Methodist Binjai web programming course, according to the findings of the research analysis previously described. The experimental class's average value is higher than the control class's average value. Students look more enthusiastic, more active, and eager to participate in learning. A project-oriented self-directed learning model is created by

combining project-based learning and self-directed learning to enhance learning outcomes in web programming courses. The study's main drawback is that there weren't enough participants in the experimental and control groups to assess the efficiency and applicability of the project-oriented self-directed learning model.

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