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Approach and Conventional Teaching Approach on the topic of the design of the pneumatic control in a programmable logic controller

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This article was aimed to conduct a comparative study of academic achievement between 2 kinds of instruction (conceptualization teaching approach and conventional teaching approach) on the topic of the design of the pneumatic control in a programmable logic controller. The hypothesis was that students with conceptualization teaching approach will have higher academic achievement in terms of application than students with conventional approach. The research tools included teaching plan for both teaching approaches, academic achievement test with 40 questions, each of which had 4 multiple choices and learning behavior observation form. The teaching plan and the academic achievement test were assessed by experts in contents and experts in assessment. The sampling group contained 40 second-year vocational diploma students at the Department of Electrical Power, Sawangdindaeng Vocational College. There were two groups: experimental and control. Each contained 20 students through purposive sampling method. Before the treatment, students were given a test about their previous knowledge as prerequisite until they pass the 80% requirement. The experimental group was given conceptualization teaching approach whereas the control group conventional approach. The academic achievement was measured and analyzed using T-test statistical method. The research results were that conceptualization teaching approach could help the experimental group achieve higher academic achievement in the aspect of memory than the control group with the statistical significance at 0.05 level. The experimental group also showed higher learning behavior in the aspect of understanding than the control group with the statistical significance at 0.01 level. As for the application and other aspects, there was no difference.

Keywords:Concept / Conceptualization teaching approach

1. INTRODUCTION

At the present time, instruction in educational institutes under the supervision of the Office of the Vocational Education Commission is usually based on one textbook or many textbooks with the same title. The instructors usually give lecture to students or solve problems in front of the classroom so that students can learn how to imitate and do exercises at the end of each chapter. This kind of teaching aims at giving more knowledge to students so that they have to learn a lot and they are forced to remember. However, to gain higher understanding and idea and to solve problems require the application of various teaching methods so that learners can use brains to tackle with the contents and develop understanding inside the learners. Therefore, the researchers would like to conduct a comparative study of academic achievement between conceptualization teaching approach and conventional teaching approach on the topic of the design of the pneumatic control in a programmable logic controller in order to develop the knowledge and understanding of students. The research follows these steps.

1.Selction of subject topic
2.Planning and checking the teaching plan
3.Development of learning achievement test and checking the quality of the test
4.Development of behavior observation form
5.Treatment
6.Data analysis

In this study on the comparative study of academic achievement between conceptualization and conventional teaching approaches on the topic of the design of the pneumatic control in a programmable logic controller, students were divided into 2 groups: Group 1 was the experimental group while Group 2 the control group. Their academic achievement would be compared.

This article will present the results from the comparative study of academic achievement between conceptualization and conventional teaching approaches on the topic of the design of the pneumatic control in a programmable logic controller. The students were divided into 2 groups: Group 1 was the experimental group while Group 2 the control group. Their academic achievement would be compared.

2. EXPERIMENT

2.1 A test about previous knowledge in the design of the pneumatic control in a programmable logic controller was given to students from both experimental and control groups until students from both groups passed 80% requirement.

2.2 The pretest of 40 questions with 4 multiple choices was given to both experimental and control group.

2.3 The experimental group was taught in accordance with conceptualization teaching approach whereas the control was given conventional teaching approach.
2.4 The posttest was given as a learning achievement and this was the same pretest but the items and choices were rearranged for both experimental and control groups.
2.5 The data were analyzed and the score from both groups was compared with previous knowledge, learning achievement, and behavior through t-test statistical technique. Both groups were independent. Previous knowledge and learning achievement were compared using one-way t-test technique.

3. RESEARCH RESULTS

According to the research results from the comparative study of academic achievement between conceptualization and conventional teaching approaches through the academic achievement test of 40 questions with 4 multiple choices, the score was measured by t-test statistical method for 2 independent groups. It was found that students from experimental and control groups showed different academic achievement at the statistical significance of 0.01 level. This means that students from the experimental group showed higher academic achievement than those from the control group. Conceptualization teaching approach could help students from the experimental group gain higher academic achievement than conventional teaching approach.

Table.1 Comparison of academic achievement between experimental and control groups

Sampling group	N	$\bar{X}$	S.D.	t-value
Experimental group	20	17.25	1.78	-3.42
Control group	20	19.35	2.43	

According to data analysis from Table 1, it was found that t-value was statistically significant (0.01,df = 38). The t-value from the table was 2.457 whereas the t-value from the calculation was -3.42. This means that the experimental and control groups showed statistically significant difference in their average score of the academic achievement test. The experimental group and the control group showed difference in academic achievement before the treatment.

Table.2shows the mean, standard deviation and t-test value of the academic achievement pretest by the experimental group

Experimental group	N	$\bar{X}$	S.D.	t-value
Pretest	20	17.25	1.78	-12.68
Posttest	20	25.35	1.59	

According to data analysis from Table 2, it was found that the t-value was statistically significant (0.01,df = 38). The t-value from the table was 2.457 whereas the t-value from the calculation was -12.68. This means that the pretest and the posttest by the experimental group were different with statistical significance. It can be said that the students with the conceptualization teaching approach showed higher academic achievement.

Table.3shows the mean, standard deviation and t-test value of the academic achievement pretest by the control group

Control group	N	$\bar{X}$	S.D.	t-value
Pretest	20	19.35	2.43	-2.47
Posttest	20	24.85	2.31	

According to data analysis from Table 3, it was found that the t-value was statistically significant (0.01, df = 38). The t-value from the table was 2.457 whereas the t-value from the calculation was -2.47. This means that the pretest and the posttest of the control group were different with statistical significance. It could be said that students with conventional teaching approach showed difference in academic achievement for their pretest and posttest.

Table.4shows the mean, standard deviation, and t-test value from the academic achievement of posttest for experimental and control groups

Sampling group	N	$\bar{X}$	S.D.	t-value
Experimental group	20	25.35	1.59	3.90 **
Control	20	24.85	2.31	

** Statistically significant at the0.01 level

According to data analysis from Table 4, it was found that the t-value was statistically significant (0.01,df = 38). The t-value from the table was 2.457 whereas the t-value from the calculation was 3.90**. This means that the academic achievement of posttest by the experimental group and the control group showed difference with statistical significance. This means that the students from experimental group with conceptualization teaching approach showed higher academic achievement than the students from control group with conventional teaching approach.

Table.5shows the mean, standard deviation, t-test value of the academic achievement by the experimental and control groups as classified by the learning behaviors.

Learning behaviors	Experimental group			Control group			t-value
	N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	
Memory	20	19.8	1.5	20	15.2	2.6	-3.667 **
Understanding	20	19.2	2.34	20	13.8	4.40	-2.125
Application	20	19.2	2.98	20	15.8	3.58	-2.845 **

** Statistically significant at the0.01 level

According to data analysis from Table 5, it was found that the t-value was statistically significant (0.01, df = 38). The t-value from the table was 2.457 whereas the t-value from the calculation was -3.667, -2.125 and-2.845for the learning behaviors as in memory, understanding and application, respectively. The average of the experimental group was higher than that of the control group. This means that the students from conceptualization teaching approach showed higher academic achievement on the topic of the design of the pneumatic control in a programmable logic controller than the students from conventional teaching approach.

4. CONCLUSION

According to the research on academic achievement between conceptualization and conventional teaching approaches on the topic of the design of the pneumatic control in a programmable logic controller through the academic achievement test containing 40 questions with 4 multiple choices, the score was analyzed by independent samples t-test statistical method. It was found that the students from the experimental and control groups showed difference in their academic achievement of posttest with statistical significance at the 0.01 level. This means that the students from experimental group showed higher academic achievement for posttest than the students from control group. The conceptualization teaching approach could help students gain higher academic achievement than the conventional teaching approach.

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