



## The Effect of Reflective Thinking Strategies Used in Teaching of the Subject of Neural System on Undergraduates' Academic Achievement and Knowledge Permanence

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### Abstract

*This study has been conducted so as to determine the effect of reflective thinking strategies used in teaching of the subject of neural system in Anatomy class on students' academic achievement and knowledge permanence. The freshmen of First and Immediate Aid Department of Vocational Health High School of Mardin Artuklu University form the research sample. The research is a quantitative study and pretest-posttest control group model from quasi-experimental design has been applied. The subject is taught by using reflective thinking strategies in experimental group meanwhile in control group, it is handled by conventional teaching method. Whether there is an equation between the groups has been searched by applying pretest-posttest achievement test to the undergraduates generating work group. The application period of the research is 10 weeks and Academic achievement test has been used as data collection tool. This test has been applied to the same group in order to evaluate the permanence of knowledge as a permanence test after 5 weeks the posttest process of the application. Data analysis have been carried out with independent samples and paired samples tests in SPSS 18.00 package for data analysis. With reference to the result of this research, a significant difference has been observed between the achievement posttest scores of experimental and control group, the pretest-posttest achievement scores of experimental group, the pretest-posttest scores of control group, the posttest-permanence test scores of experimental and control group. In consequence of all these analysis, it is deduced that training applications based on reflective thinking strategies used in teaching the subject of neural system in Anatomy class enhance positively the success of undergraduates with regards to learning about the covered subject, and also their knowledge is more permanent by the way of these strategies.*

### 1. Introduction

Early 19th century John Dewey stated that the principal need of a society is that students should learn how to reflect what they found out at school to real life. It is pointed out that the best way to support students at schools is teaching of reflective thinking [Shermis, 1992]. Dewey defines reflective thinking as an effective, consistent and attentive way of thinking in his work entitled How We Think. Reflection in teaching may simply be explained as thinking about what is happening during teaching process and after it, and as emending in consideration of these thoughts [Mc. Collum, 2002] It has been argued that reflective application is a way of thinking which not only enriches the activities conducted in class but also motivates students' self –confidence and personal development in a positive way [Vitanova and Miller 2002] . To implement this the reflections of teaching and learning in a class is definitely to be observed and evaluated, and the essential alterations should be made as a result of the evaluation. In this regard, reflective thinking is a method that features students' feelings, increases the communication between teacher and student, provides permanent learning, reveals students' skills, enhances the motivation of student and teacher and ensures the individual to explore his/her abilities and interests, and it is one of the principal methods next generation teachers and students should apply. Therefore it is substantial to determine the effect of using reflective thinking strategies on teaching. With this study, the effect of teaching fulfilled by using reflective thinking strategies on student success in the subject of "Neural system" of Human Anatomy class and the permanence of the knowledge they gained has been tried to defined. In accordance with this aim, the following questions have been searched for an answer.

1. Is there a significant difference between pretest scores of the experimental group that reflective thinking strategies have been applied to and the control group that conventional method has been applied to?
2. Is there a significant difference between pretest and posttest scores of the experimental group that reflective thinking strategies have been applied to?
3. Is there a significant difference between posttest scores of the experimental group that reflective

thinking strategies have been applied to and the control group that conventional method has been applied to?

4. Is there a significant difference between posttest and permanence scores of the experimental group that reflective thinking strategies have been applied to?

5. Is there a significant difference between posttest and permanence scores of the experimental group that reflective thinking strategies have been applied to and the control group that conventional method has been applied to?

## 2. Method

The pretest-posttest comparative method with experimental-control group that is one of the quantitative research methods has been used in the research. Pretest has been held in the research in order to ascertain whether the student groups to whom the application is performed are equal or not, and posttest has been held with regards to display the effectiveness of the methods. The subject of "Neural System" has been covered by using reflective learning strategies to the experimental group during two weeks. The researcher has personally attended the lectures and with being 2x2 the lectures have been taught in an orderly manner. The same subject has been taught to the control group by teacher centered method for two weeks. The research has held out during 10 weeks as the application of pretests for 1 week and of posttests for 1 week, the discussion of the subject for 2 weeks and after 5 weeks the application of permanence tests. The assignment of the sample as experimental and control group has been held in an impartial choice way. The classroom size and branch of the classes forming the design and sample of the research has been shown in Table 1 and Table 2.

Table 1. The Design of the Research

Group	Pre-application	Manner of application	Post-application
Experimental	Pretest (Test1)	Reflective thinking strategy	Posttest (Test 1)
Control	Pretest (Test1)	Conventional Method	Posttest (Test 1)

Table 2. The undergraduates forming the sample of the research

Classes	Gender				Total
	Female		Male		
	N	%	N	%	
A(Experimental)	35	58.5	25	41.7	60
B (Control)	46	76.7	14	23.3	60

### 2.1. Data Collection

An achievement test in respect of "Neural System" consisting of 60 close-ended questions has been prepared in order to realize the general purpose of the research. Some experts's opinions have been asked for test validity and in accordance with these opinions the pilot scheme has been applied to the 146 undergraduates in total studying at Mardin province Mardin Artuklu University Vocational Health High School and Cronbach-Alfa reliability coefficient has been found as 0.787. The fact that reliability coefficient is 0.787 indicates that the test is fairly reliable [Kalaycı, 2010]. After pretests in the process of research have been held, a teaching correspondent with reflective thinking strategies has been applied to the experimental group while a teaching correspondent with teacher centered method has been held in the control group. The achievement test has been applied to both groups as posttest and a five week off permanence test after the subject has been put an end.

### 2.2. The Analysis of the Data

The scores that the undergraduates got from the tests have been analyzed in the SPSS-18.0 program. Unrelated samples t-test has been used to measure the scores against each other, which the groups got from the tests so as to test 1,3 and 5 sub problems of the research while related samples t-test has been used to test 2 and 4 problems.



### 3. Findings

*Table 3.1. The results of Independent Samples T test towards Anatomy Achievement Pretest Scores of Pre Application Experimental and Control Groups*

Groups	Achievement Test	N	$\bar{X}$	Ss	Sd	t	p
Experimental	Pretest	60	17,48	4.55	118	-1,314	0.191
Control	Pretest	60	18.50	3.89			

p>0.05

According to this table, there hasn't been found a significant difference between the experimental and control groups in the pretest application in terms of success level ( t= -1.314, p= 0.191; p>0.05).

*Table 3.2. The results of Dependent Samples T test towards Anatomy Achievement Pretest – Posttest Scores of Experimental Group*

Groups	Achievement Test	N	$\bar{X}$	Ss	Sd	t	P
Experimental	Pretest	60	17.48	4.55	59	-21.655	0.00*
Experimental	Posttest	60	31.55	3.59			

\*p<0.05

According to this table, the difference between the achievement pretest and posttest average scores of the experimental group is quite high (approximately two times ) and it has been found significant (t-score -21.655, p= 0.00; p<0.05).

*Table 3.3. The results of Independent Samples T test towards Anatomy Achievement Posttest Scores of Experimental and Control Groups*

Groups	Achievement Test	N	$\bar{X}$	Ss	Sd	t	P
Experimental	Posttest	60	31.55	3.59	118	9.314	0.00*
Control	Posttest	60	24.27	4.87			

\*p<0.05

According to this table, there has been found a significant difference between achievement posttest scores of experimental and control groups in favor of experimental group (t= 9.312, p= 0.00; p<0.05).

*Table 3.4. The results of Dependent Sample T test towards Anatomy Achievement Posttest and Permanence Test Scores of Experimental Group*

Groups	Achievement Test	N	$\bar{X}$	Ss	Sd	t	p
Experimental	Posttest	60	31.55	3.59	59	6.371	* 0.00
Experimental	Permanence	60	29.20	2.46			

\*p<0.05

According to this table, there has been found a significant difference between achievement posttest and permanence test scores of experimental group (t=6.371, p= 0.00; p<0.05)

Table 3.5. The results of Dependent Sample T test towards Permanence Test Scores of Experimental and Control Groups

Groups	Permanence Test	N	$\bar{X}$	Ss	Sd	t	p
Experimental	Permanence	60	29.20	2.46	89.954	21.772	*0.00
Control	Permanence	60	14.47	4.63			

\*p<0.05

According to this table, there has been found a significant difference between score average of permanence test of experimental-control groups ( $t= 21.772$ ,  $p= 0.00$ ;  $p<0.05$ ). Additionally, the comparison of Neural System achievement pretest-posttes, achievement posttest and permanence test scores of control group has been held.

Table 3.6. The results of Dependent Sample T test towards Anatomy Achievement Pretest and Posttest Scores of Control Group

Groups	Achievement Test	N	$\bar{X}$	Ss	Sd	t	p
Control	Pretest	60	18.50	3.89	59	-7.354	*0.00
Control	Posttest	60	24.27	4.87			

\*p<0.05

According to this table, there has been found a significant difference between average scores of achievement pretest and posttest of control group ( $t= -7.354$ ,  $p= 0.00$ ;  $p<0.05$ )

Table 3.7. The results of Dependent Sample T test towards Anatomy Achievement Posttest and Permanence Test Scores of Control Group

Groups	Achievement Test	N	$\bar{X}$	Ss	Sd	t	p
Control	Posttest	60	24.27	4.87	59	13.357	* 0.00
Control	Permanence	60	14.47	4.63			

\*p<0.05

According to this table, there has been found a significant difference between posttest and permanence test ( $t=13.357$ ,  $p= 0.00$ ;  $p<0.05$ ).

#### 4. Result and Discussion

As a result of the comparison of anatomy success pre-test data of test and control group for teacher-centered method teaching and reflective thinking strategies on ``Nervous System`` with the independent sample t-test a significant difference in terms of both groups` success level has not been found between two groups. The absence of a significant difference has shown that control and test groups are two equal groups and the sample has been appointed as independently. As a result of the comparison of test and control groups` academic success posttest data with independent sample t-test a significant difference between two groups` success levels has been found. And it shows that reflective thinking strategies during teaching is much more effective on the student`s success than the conventional method. However at the end of the posttest a certain level of success in both groups has been observed. This result shows that besides teacher-based teaching method using reflective thinking strategies contributes significantly to success in terms of ``Nervous System``. It has been found that anatomy posttest average point of teaching human being by using reflective thinking strategies on ``Nervous System`` is higher than pre-test average score and a significant difference has been found between them. This result shows that students obtain a certain level of success till they come to the posttest application with the teaching by reflective thinking strategies after pre-test application. Generally speaking though in test and control group the difference between pre and post



test points is significant, success rate is higher in test group. And this enables us to reach the result that reflective thinking activities applied on test group is much more effective on the academic success of the students compare to the conventional method. Besides, the fact that the lecturer has applied his lesson plan successfully in both groups has taken the attention of the students and made them active by encouraging them to participate to the class, this has prompted the result that as a lecturer his not staying on the second plan by only observing what they have been doing in test group on the contrary participating into the activity as a guide and sharing the situation with the students becoming active became effective on the permanency of their success and knowledge they gained.

## References

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