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The Infuence of the Critical Thinking Skills on the Students'Achievement

Çetin Semerci
Department of Education Sciences, Faculty of Education, Firat University, Elazig, Turkey

Abstract: The aim of this study is to examine "The Influence of the Critical Thinking Skills on the Students'Achievement". An experimental method is employed in the study. "Achievement Test" was applied to the experiment and control groups before and after the application of the programs. The study is designed according to the model with "pre-test, post-test control groups". Using the cluster sampling, 50 students are selected; 25 for the experiment group and 25 for the control group. The KR-20 reliability coefficient of the test using in the study was 0.73 and the difficulty of the test was 0.44. In conclusion, the students in the experiment group were more successful than the students in the control traditional group through use of the critical thinking skills which are learnable.

Key words: Critical thinking, Skills, Students, Achievement

Introduction

Critical thinking is accepted as one of the general of thinking ability by the educators. To Ennis (1987) is reasonable reflective thinking that is focused on deciding what to believe or do. McPeck (1981) describes critical thinking as "the propensity and skill to engage in an activity with reflective scepticism". Also, it is a skill that helps students to convince and make decision for their life (Gaforth, 1999). In another word, critical thinking is a well learned-knowledge, that increases application behaviours of the person in a new situation and development of evaluation capacity of him. Critical thinking is not a innate characteristic, it could be taught, explained and easily applicable in the instructional process. Critical thinking is a group of skills that help to attain information and to surpass the confronted difficulty easily. As Hudgins and Edelman (1988) and Halpern (1993) says, one of the desired outcome of education is to give students the critical thinking skills.

The most importantly, Kazanci (1989) and Lee (1989) explain that some characteristic and skills of critical thinking that should be taught to students that they called learn to (Birman, S., 1991). Tendency to be systematic, (Carin and Sund, 1985) be patience, (Chaffe, 1994). cooperative, (Clark and Starr, 1991) how the think, (Cooper and MeIntyre, 1994) autonom and independent, (Ennis, R.H., 1987) motivated, (Ennis, 2000). flexibilite, (Facione, 1998). acting with thinking, (Halpern, 1993) to transfer of information and skill, (Gaforth, 1999). using the language well, (Hudgins and Edelman, 1988) reform and group participant.

As we see, in the development of critical thinking the approaches of teacher and administrator, material and evaluation seem very important. Educators already know the importance of critical thinking ((Ennis, 2000; Facione, 1998) and teachers must provide active participation of students in the development of critical thinking.

For this purpose the following strategy must be taken into consideration to Bermen (1991) and Martin (1991): (Birman, S., 1991) preparing a faithful environment, (Carin and Sund, 1985) making use of the knowledge,(Chaffe, 1994) working with the classroom member, (Clark and Starr, 1991) learning to ask good question, (Cooper and MeIntyre, 1994) learning of affection to classroom-friend, (Ennis, R.H., 1987) learning of multiple point of view, (Ennis, 2000) providing sensitivity, (Facione, 1998) providing a point of view concerning the future and development of standards and (Halpern, 1993) changing of thinking to behavior while they are instructing.

During the teaching of thinking the staffs must be aware of these strategies. Of course, they should the faithful and confident with students'. However, the cultural and psychological difficulties of students create some obstacles for this confident environment for the learning critical thinking. At the same time, according to change and new ideas, the teaching staffs must know how to overcome those obstacles which are monotony, fear of making mistakes and errors, negativeness, out thinking independently, excessive confidence to logic, seeing himself insufficient, perfectiveness, act with not thinking, execessive confidence to the teacher, concentration deficiency, obstinacy, showing dogmatic behavior, excessive faithfullness against himself, not catching the aim and most importantly resistance to thinking (Clark and Starr, 1991 and Carin and Sund, 1985,).

A lot of researches were worked on critical thinking process. Nastasi and Clemen studied (1992) "Computer based higher thinking in education and social-cognitive behavior", they applied a program to 24 person during 26 weeks, in their research and used a video. With the help of one or two counselor teachers, students took lessons in group of 6 persons. In these lessons, the california achievement test (13th level) was used. The test KR-20 was 0.90. At the end, lego and computer based teaching sufficiency was compared and the result was in favour of Computer Based Teaching.

Cooper and McIntyre (1994, 633-646), in onother research, worked about "Effecting of teacher and students each other in a subject teaching the classroom management and practise for learning opportunity" they made observation and interview about 13 teachers and 325 student at 11-12 years old. They showed ways thinking between teacher and students it was seen that lessons would be more learnable both with the participation of

students and teacher in learning activity.
Wade (1994) in his research "the point of views of students about classroom discussion in teacher education, critic reflect afflication" when an inquiry was applied to 227 students. 62 % of them stated that they frequently and every time like to share their mind (idea) and 94 % of them pointed that during discussion they listened others frequently and very well everytime.
The proponents of the critical thinking movement mentioned that critical thinking is not effectively taught in traditional school setting because of heavy rote memorizations and didactic teaching methods. Therefore, researchers of the movement have developed numerous programs to teach critical thinking (Reece, 2002; Paul, 1993; Kennedy, 1991; Schrag, 1988 and Nickerson, 1987). In the result of those studies illustrate that critical thinking skills can be developed in the children. In this context, a study on "the influence of critical thinking skills on the achievements of students in the multiple-choice tests unit" was planned to see if the critical skills plays an important role on the student achievement in instruction.
For this purpose, hypothses of research assumed as follows:
There is a significant difference between means of pre-test of experimental group and pre-test of control group.
There is a significant difference between means of post-test of control group and pretest of control group.
There is a significant difference between means of post-test of experimental group and pre-test of experimental group.
There is a significant difference between means of post-test of experimental group and means of post-test of control group.

Meterials and Methods

The method of the study covers the model of the study, the population and the sampling, selection of the sampling group and means for data collection.
This study deals with the influence of a course program, which is planned according to the critical thinking skills, role on the achievement of students. Independent variable is the course program and the dependent variable is the influence of programs on students on the groups achievement. An experimental and a control group were established. A course program organized in accordance with the critical thinking skills is applied to the experimental group and a traditional program is applied to the control group.
The study was patterned according to the model with "pre-test – post-test control group". An Achievement Test was employed both to the experiment group and to the control group before and after the programs were ended.

Population and Sample: The population of the study is the knowledge and skills of 106 first-year primary and secondary education program students studying at the Fýrat University Faculty of Education in the spring term of the 2002 - 2003 education year. There are two reasons why first-year students were included in the study; the first-year students are the highest number of students at the same level and the researcher gives lectures to first-year students.
The sampling of the study is 50 students, 25 of which are in the control group and 25 are in the experiment group. The following procedures were observed in order to select the sampling.

Selection of the Sampling Group: The following points were taken into consideration in establishing the experiment and control groups:
ÖSS (University Entrance Examination) Equal Rated marks of the students,
Academic achievement average marks of the students in the first-year spring term of the 2002 - 2003 education year, High school marks of the students,
Pre-test marks of the students,
Critical thinking skills pre-scale marks of the students.
The above stated criteria were used in order to provide impartiality in creating experiment and control groups. The data provided from the criteria were evaluated with the cluster sampling analysis.
Students with similar characteristics were taken into the same groups and three groups were set up. There were 50 students in the first cluster, 12 in the second cluster and 44 in the third cluster. 50 students in the first cluster were taken as sampling of the study. The distribution of the sampling according to the departments is as follows: As seen in the table, 22 students studying elementary school teaching in the Primary Education program and 28 students studying elementary school teaching in the Secondary Education program are included in the sampling group. 3 students studying in the Secondary Education program were asked to participate in the other group without presenting any reason and they were transferred to the group of the students studying in the Primary Education program. The number of the students in each group amounted to 25 and the sampling group acquired the balance regarding the number of students. The researcher organized the hours of the "School Experience I" course in the spring midterm of the 2002 - 2003 education year as 14:30 - 15:20 on Tuesdays for the Primary Education program and as 15:30 - 16:20 for the Secondary Education program. In doing so, it was expected that the transfer of students to different groups could be easy, morale and aspiration of the researcher could be

preserved at the same level and that the traditional program could be implemented in an active way with the new program. Furthermore, students included in the sampling group and not included in the sampling group participated in the class activities. However, the data belonging to those students not included in the sampling group were not taken into consideration in the study. The data evaluation for these students was extended to them as information. The study was not revealed to students until the end of the term. Students were given information on the study after the final activities of the study were carried out.

Data Collection and Analysis: "Achievement test" as a means of measurement were used in collecting data for investigation.

The Achievement Test: First, a multiple-choice test with 29 items was prepared. 4 items were removed from the test according to the expert opinions and an open-ended question was included. Questions were prepared in accordance with the steps of cognitive field and planned an illustration Table of Specifications (Measurement Matrix) which the illustration Table is given below.
The studies on the item analysis proceedings of the achievement test were performed on 234 fourth-year students who had studied "Multiple choise" subject under the course name measuring and evaluation or planning and evaluation in education in the previous years in the Eupharates University the Faculty of Technical Education and the Faculty of Science - Letter. Difficulties of the items and item separation matrixes were calculated from the item analysis proceedings according to the application results. The roots and choices of the items, separation matrixes of which are between 0.20 and 0.30 including 0.20, were reviewed and as the number of the items are not many, all of the 25 items were used. The open-ended question was used as well according to the expert and student opinions. Difficulties of 25 items vary between 0.26 and 0.62 and separation matrixes vary between 0.16 and 0.43. Test difficulty was 0.44 and KR-20 reliability coefficient was 0.73.
Analysis of the data collected was performed with the SPSS for Windows statistical package program. Statistics of the Mann Whitney test, of the two-sample Kolmogorov Smirnov test and of the Wilcoxon signed ranks test were used in the study.

Results and Discussion

This section includes the findings on "The Influence of the Critical Thinking Skills on the Students'Achievement". There are 50 students in total in the control and experiment group in the study.
No considerable statistical difference was found between the pre-tests of the control and experimental groups. In other words, at first there is not any considerable statistical difference for the achievement of students on the "multiple choise tests" of the control and experiment groups (Table 3). However a considerable statistical difference was found between the pre-test and the post-test in the control group where "multiple chooise tests" subject was undertaken with traditional methods (Table 4). As seen in the Table 4, the traditional education system (pretest and posttest of control group) is increased the achievement of the students. New methods and techniques, however, are tried in order to improve the achievement of the students in a further manner. The influence of critical thinking skills on the achievement of students is examined in the experimental group in the Table 5. According to the t-test results, the students in the experiment group to which critical thinking skills were applied, provided a significant achievement. In other words, a statistical significant difference was found between the pre-test and the post-test in the experiment group. The t-test results of the post tests in the experiment and control groups are given in the Table 6.
A considerable statistical difference was found between the post-tests of the experiment and control groups. In other words, students in the experiment group were more successful than the students in the control group.

Table 1: The distribution of the sampling according to the departments.

Faculty of Education Departments(I. Class)	Type of education	Class size	Frequency of student in sampling
Division of Elementary	I. Instruction	52	22
Division of Elementary	II. Instruction	54	28

Table 2: The table of specifications

Selective Tests	Knowledge	Comprehension	Application	TOTAL
Basic Concepts	3	2	1	6
Main Types of Selective Tests	6	2	2	10
Features of Selective Tests	5	4	-	9
TOTAL	14	8	3	25

Table 3: t- test results of pretest of experience and control groups.

Experience and Control Group	N	X	S	t	p
Experience pretest	25	36,5	7,51	-0,260	-,796
Control pretest	25	35,9	7,71		
P>.05	Df=48				

Table 4: t-test results of pretest and posttest of control group.

Control Group	N	X	S	r	t	p
Pretest	25	35,9	7,71	-,098 (p=0,641)	,796,	000
Posttest	25	54,6	9,36			
P<.05	Df=24					

Experience group.

Experience Group	N	X	S	r	t	p
Pretest	25	36,5	7,51	-0,13 (p=0,524)	12,396	0,000
Posttest	25	70,2	10,40			
P<.05	Df=24					

Table 6: t-test results of posttests of experience and control groups.

Experience ve Control Group	N	X	S	t	p
Experience posttest	25	70,2	10,40	-5,567	.000
Control posttest	25	54,6	9,39		
P<.05	Df=48				

Result and Discussions

Critical thinking is a dimension of thinking, which can be taught. Managers and teachers have certain important duties in order to develop critical thinking. Studies carried out illustrate that critical thinking skills of students can be developed. The subject "The Influence of the Critical Thinking Skills on the Students'Achievement" was examined with an experiment method different than in other studies.

First of all, an education program was prepared and applied in the "Multiple choise tests" unit, in which critical thinking skills were employed. It was observed that critical thinking skills developed with this program, influence of such skills on the achievement of students was examined in a detailed way and it was observed that the students in the experimental group were more successful than those students in the control group. In other words, the students in the experimental group to which critical thinking skills were applied were more successful than the students in the control group to in which the traditional method was applied.

It can be suggested that critical thinking skills have to acquire an active role in education programs.

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