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The Effects of Using Newspapers in Science and Technology Course Activities on Students' Critical Thinking Skills*

Esma Buluş Kırıkkaya**

Esra Bozkurt***

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Abstract

Problem Statement: In recent years, numerous scientists and intellectuals have stated that "critical thinking" is one of the most significant skills that individuals can possess. One of the aims of the Turkish Science and Technology Curriculum is the development and enhancement of critical thinking skills. Using newspapers in courses helps students develop their critical thinking skills by prompting them to read, think about and comment on complex issues.

Purpose of the study: The purpose of this study is to use newspapers to organize activities in science and technology courses and to determine whether these activities affect students' critical thinking skills.

Methods: Participants in this study included 100 pupils who were in the 5th grade at a primary school in Kocaeli from 2009 to 2010. Two control groups and two experimental groups were selected from this school. The research was conducted with a semi-experimental model. During the science and technology lesson "Unit of Identification and Change of Matter", activities based on newspapers and the course book were used with the experimental groups, while activities based on only the course book were enacted with the control groups.

Fourteen activities were organized by selecting the outcomes inside the unit that were suitable for using newspapers. The Cornell Critical Thinking Test Level X was used to measure students' critical thinking skills.

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** Asst. Prof. Dr., University of Kocaeli, Faculty of Education, bulus@kocaeli.edu.tr

*** Phd. Student, Gazi University, Institute of Education Science, bzkrt.esra@gmail.com

Findings and Results: It was found that the difference between critical thinking skill pre-test and post-test scores favoured the post-test for both experimental groups. The difference between the critical thinking skill pre-test and post-test scores of the control groups was not found to favour the post-test. The critical thinking post-test results of students in the experimental groups were significantly different from those of the control groups.
Conclusions and Recommendations: It can be said that the use of activities in course books, along with the use of activities organized around newspapers, effectively improves the critical thinking skills of students, compared with activities that are organized solely around course books.
Key words: Critical thinking skills, elementary schools, newspaper activities, newspapers in education, science and technology courses.

In today's world, higher level-thinking skills are accepted as necessary to universal literacy, and it is generally accepted that educational systems should focus on developing these kind of skills in students (Drucker, 1999). Today, qualified thinking skills are a precondition for success. Critical thinking is a clear and systematic thinking skill that is useful for individuals from all sorts of careers and professions and improves comprehension, allowing for the effective expression of ideas and enhances language skills (Lau, 2003).

Existing research, which supports the view that newspaper activities can improve the critical thinking skills of students, also points out the utility of newspapers in classrooms (Aiex, 2000; Diamond & Riekes, 1981; Gillespie, 1989; Lentnek, 1997; Street, 2002). A sample course with newspapers was performed by Diamond and Riekes (1981), who found that students' critical thinking skills improved by the end of the course. Gillespie (1989) has stated that the news in newspapers or the use of various sections of newspapers during courses can improve such skills as critical reading, reasoning, identifying main themes, distinguishing similarities and differences through comparison, understanding symbols and summarizing what has been read. Street (2002) has emphasized that reading newspapers improves students' reading, critical thinking and problem-solving skills, and Aiex (2000) has stated that teachers can use newspapers to teach critical thinking and enhance students' sensitivity to their societies, nations and the world. Lentnek (1997), who has examined the effects of using newspapers in education on current event awareness, critical thinking skills and the attitudes of primary school 5th grade students, has determined that students who are educated with newspapers exhibit positive changes in these areas, compared to students who are educated without newspapers.

Newspapers give teachers opportunities to associate educational programs with the lives and interests of students (Segall & Schmidd, 2006). In this context, newspapers are attractive resources that can be used by teachers at each stage of education (Street, 2002). The socio-cultural content of newspapers bears similarities to the daily lives, experiences and demands of readers. Therefore, the use of newspapers in education establishes a perfect connection between the classroom and real life (Dee Garrett, 2007; Segall & Schmidd, 2006).

Teachers can usually identify similarities between what they teach and what is found in newspapers. Accordingly, newspapers can be brought into classrooms as "living" course books. Teachers can use newspapers as an effective educational tool (Jackson, Houghton & Capra, 1975).

In the U.S., the "Newspaper in Education" (NIE) program shows teachers how to use newspapers as a teaching tool and presents sample applications. Activity guides are regularly distributed to teachers to support their use of newspapers in classrooms. Several studies have also been performed on the distribution of newspapers to students and whether this encourages teachers to utilize newspapers (De Garret, 2007; 2008).

Science and technology courses show the appropriateness of using newspapers in the classroom, as the content of such courses is highly related to daily life and as newspapers contain data related to lesson outputs. Wellington (1991) has noted that newspapers may be important to formal science education, if used carefully and in moderation. Newspaper articles on science subjects can be effective in attracting people's attention (Halkia & Mantzouridis, 2005). Using newspapers in science classes encourages young people to read the scientific content of newspapers, which may provide a critical overview of scientific topics.

Course activities in science and technology courses that are prepared with the assistance of newspapers will enable newspapers, which have content relevant to the daily lives of readers and, at the same time, are an informal education tool, to be a part of the classroom, attracting students' attention and increasing course attendance. Whatever their individual differences, science and technology education programs all train students in science and technology literacy. Improving the research-questioning, critical thinking, problem solving and decision-making skills of students has been emphasized in definitions of literacy in science and technology (MEB, 2005). In this context, it can be stated that course activities intended to improve critical thinking skills are significant to science and technology courses. In this sense, considering the field literature, the use of newspapers as educational tools is thought to be appropriate in the improvement of students' critical thinking skills. Besides, studies in Turkey on the use of newspapers in classrooms are rather limited. In the national and international literature, research related to the use of newspapers in science lessons exists (Elliott, 2006; Guenther & Lashier, 1985; Halkia & Mantzouridis, 2005; Jarman & McClune, 2002; Jarman & McClune, 2003; Buluş Kırıkkaya & İşeri, 2009; McClune & Jarman, 2004; Özay Köse, 2008; Shibley, 2003; Vaughan, Sumrall & Rose, 1998), but few studies have investigated the effects on critical thinking skills of using newspapers in science lessons. McClune and Jarman (2010) have stated that science programmes that prepare students to read critically and respond thoughtfully to science-based reports in the media could play an important role in promoting informed participation in public debate about issues relating to science, technology and society. In this respect, this study is an important contribution to the literature.

During the 2008-2009 educational year, the Turkish Ministry of Education (MEB) implemented a program named "Using Newspaper Clippings in the Teaching-Learning Stages of the Educational Programs of 4-8th Grade Classes in Primary Education". This attempt is a remarkable indicator of the importance given to this

issue. The supplementary program consists of acquisitions that make available newspaper activities in mathematics, science and technology to Turkish and social science courses (MEB, 2008). However, since the field literature does not include examples of activities or a study guide related to the use of newspapers in science and technology courses, it is difficult to use newspapers as course material. The Ministry of National Education has not provided teachers with any kind of training, in regards to how to make use of newspapers during science and technology lessons. Interviews with teachers have suggested that they do not benefit from including newspapers in lessons. Therefore, it was important that this study present teachers with science and technology activities that made use of newspapers and informed teachers and authorities about the advantages of such activities for students.

This study used newspapers to organize course activities in science and technology courses. Its goal was: to determine whether these activities affected the critical thinking skills of students, to establish an activity source that could act as a teacher guide and could be used in classrooms by science and technology teachers, to shed light on areas for further research and to attract attention to areas for improvement.

With this aim, answers were sought for the following sub-problems:

1. Is there a significant difference between the critical thinking skill pre- and post-test scores of the experimental groups?
2. Is there a significant difference between the critical thinking skill pre- and post-test scores of the control groups?
3. Is there a significant difference between the critical thinking skill post-test scores of the experimental and control groups?

Methods

Research Design

The research was conducted with a quasi-experimental model. In this study, a pre-test-post-test quasi-experimental design was used to determine differences between the experimental and control groups (Christensen, 2004). The independent variables were, for the experimental groups, course activities that were organized around the use of newspapers and, for the control groups, course activities that were included in the science and technology course book. Critical thinking skills were the dependent variable, which was examined in both the experimental and control groups. The critical thinking skill pre-test scores of the experimental and control groups were equivalent. Comparison of the dependent variable was made between the experimental and control groups and among the groups. The experimental models selected were preferred because they enabled comparison of the experimental and control groups (Cohen, Manion & Morrison, 2000). A quasi-experimental design was chosen, because the pre-measurements being used as criteria for the selection of the experimental and control groups – i.e., the pre-test scores – were equivalent, in terms of critical thinking. The difference between a quasi-experimental model and an experimental model lies in the amount of control that can be exercised over the level of similarity of the chosen groups before their

selection. The non-randomized control group pre-test-post-test design is one of the most-widely used quasi-experimental designs in educational research (Ary, Jacobs, Sorensen & Razavieh, 2010; Cohen, Manion & Morrison, 2000; Gray, 2009).

Sample

Participants in the study: Students were included in the sample whose critical thinking skill pre-test scores were equivalent. Tests were given in eight 5th grade courses in two schools, and pre-test scores were evaluated. Two experimental and two control groups were then selected from the students who took the test. These constituted the research sample. A total of 50 students were included in the experimental groups – 26 in the first experimental group, 24 in the second. A total of 50 students were included in the control groups – 24 in the first control group, 26 in the second. Thus, participants included 100 5th grade students from 4 classes. The use of two control and two experimental groups in this study had two objectives. First, two experimental groups were used, rather than one, to increase sample size. The same applied to the control groups. In addition, the same independent variables were applied in both experimental groups, and changes in the dependent variable, which was the same in each, were examined for similarities. Similar studies have also selected two experimental and two control groups (Cohen, 1991; Buluş Kırıkkaya & İşeri, 2009; Orcutt, 1997).

Research Instruments

Cornell critical thinking test level X (CCTTX). The CCTTX is used to measure students' critical thinking skills. This test was chosen for its objectivity and for the convenience of its use with the 5th grade students being studied. CCTTX is a measurement tool developed by Ennis and Millman (1985). It is one of the most-used tests by academicians in this field (Ennis, Millman & Thomko, 2005). "Since this test is a multiple choice test, prepared as a story and calculated easily, it can be verified that it is the most widely used test in the world to measure critical thinking skills [at the] primary school level" (Kurfiss, 1988, p.8-9). The test is prepared as a space adventure, and students try to find correct answers to questions asked in four sections (Ennis, at all, 2005) that require students to:

1. Apply inductive reasoning
2. Apply deductive reasoning
3. Judge the credibility of sources and observations
4. Identify assumptions in arguments (determine)

The test includes 76 items. However, since the 1st, 2nd, 26th, 51st, and 66th questions are examples with solutions, the number of questions that students actually answer is 71. Each item is a multiple-choice question with three choices. The CCTTX can be used between grades 4 and 14. It is proposed that students at the primary level be given 64 minutes to complete it (Ennis, at all, 2005). The assessment was originally prepared in English.

Several studies have suggested that the range of reliability for scores on the CCTTX (KR 20, KR 21 and Sperman-Brown) is between 0.67 and 0.90 (Ennis, et al.,

2005). Six studies performed between the fourth and eighth-grade levels have found the item discrimination value to be between 0.36 and 0.64 (Ennis, et al., 2005). The CCTTX was adapted to Turkish by Akar (2007) and Kurnaz (2007). In this study, Akar's (2007) adaptation was used with the permission of the researcher.

Akar's adaptation of the CCTTX has been used with 6th grade students. However, since the sample group in this study consisted of 5th grade students, and since the mean item difficulty and discrimination values for scores were not calculated in the aforementioned study, consistency analysis of test scores was renewed with the permission and at the suggestion of the researcher who adapted the measurement tool.

Validity and Reliability

The validity and reliability of research instruments: Besides the sample group, the measurement tool was applied to 295 5th grade students, and confidence analysis was performed on the resulting data. Bademci (2005) has cited the views of different researchers on sample size, stating that a minimum sample size of 200 individuals is recommended by Kline (1986) and Guilford (1954), while a minimum of 400 is suggested by Bademci (2005). Reliability is defined as the consistency of measured results (Crocker & Algina, 1986) and refers to the reliability of scores obtained with a measuring tool (Bademci, 2005; Crocker & Algina, 1986; Thompson & Vacha-Haase, 2000). The KR-20 consistency coefficient was determined to be .75 for all test scores. It was also determined that item difficulty was .42. When item difficulty is "zero or close to zero this shows that it is a difficult question, when the item difficulty is close to one this shows that it is an easy question" (Crocker & Algina, 1986, p.312). The item scores indicate that the test items were close to medium difficulty. The mean item discrimination was found to be .27 for all test scores. It has been stated that discrimination value increases when items are removed from a test. However, since the content of the test used in this study would have been damaged by doing so, it was decided not to remove any items. The obtained data suggest that the measurement tool selected was appropriate.

After administering Akar's version of the CCTTX, the KR 20 reliability coefficient of students' scores was determined to be .70. The reliability of scores was close to the reliability of scores obtained prior to administering the adapated test.

To determine test score, 1 point was given for each correct answer and 0 points for each wrong answer. The total number of correct answers was reflected by the total score. The total number of possible points was 71 (for 71 questions).

Data Analysis

With the assistance of the program SPSS 15.0, a t-test was conducted for the dependent samples, to solve the first and second sub-problems. A t-test for the independent samples, in addition to ANOVA and Tukey tests, were performed to solve the third sub-problem.

Newspaper Activities

The "Identification and Change of Matter" unit of the 5th grade science and technology course consisted of 46 acquisitions, under 7 titles. Thirteen course activities, which included 35 of the unit acquisitions and gathered students' opinions on all activities in which newspapers were used, were prepared.

Newspaper activities were prepared using the NIE Weekly Teacher's Guide for 2007 and 2008, by Dee Garret; Sanderson's (1999) *Using Newspapers in the Classroom* and course activities prepared by Buluş Kırıkkaya and İşeri (2009) for "The Effects of Using Newspapers in Science and Technology Courses on Students' Attitudes Towards Science".

Examples of these activities include:

Activity 1: "Guess it": Students learn to associate the transition of water on the surface of the Earth with their daily life experiences. Pictures from newspapers are used to make students question the states of water in nature.

Activity 2: "How Does it Warm Up?": Students learn to perceive how solar energy reaches the Earth and how it warms the matter that it reaches. A couple of news items are discussed, and students are asked to design solar energy equipment by referring to these topics.

Activity 3: "How We Heat? Fuel Hunting!": Students come to understand that when fuels are burned, they give off heat by associating this fact with their daily lives. Students are asked to find the fuels mentioned in a news story and answer questions on the story.

Activity 4:"Is There a Difference? Read, Think, Find the Mistake!": Students distinguish between thermal and heat concepts by making associations with their own use of energy in daily life. News stories that cover heat and thermal energy in incorrect ways are identified, and newspapers are used to find and correct mistakes.

Activity 5: "How Much Joule? How Much Calorie?": Students learn about the sizes of joules and calories by associating them with their daily lives. A newspaper story is used to spark discussion and spur questions.

Activity 6:"Observe, Interpret, Discuss!": Students come to understand vaporization and condensation. Weather forecasts from newspapers are used to compare vaporizations speeds in provinces with different temperature values.

Activity 7: *"I Learned by Doing the Experiment, Now, It is Time to Criticize!"*: Students comment on the differences between boiling and vaporizing, using their own knowledge. Newspaper articles are used. Some symbols are distributed, to help students criticize a newspaper article where boiling and vaporing concepts are discussed.

Activity 8: "Death Game on Ice": Students explain the importance of density differences between the solid and liquid states of water for aquatic organisms by making associations with the real world. Newspaper stories related to the subject are read in the classroom. Thinking-aloud techniques are used, and students are asked to answer questions regarding the news story and discuss their answers.

Findings and Results

In this section, findings on the effects of course activities that utilized newspapers on the critical thinking skills of students in science and technology courses are presented in relation to the problem statements.

Comparison of the Critical Thinking Skill Pre- and Post-Test Scores of the Experimental Groups

The findings of the t-tests for the dependent samples, which were performed separately for the two experimental groups, to determine whether there was any difference between the critical thinking skill pre-and post-test scores of each group, are presented in Table 1.

Table 1

Results of the T-Test for the Dependent Sample – The Critical Thinking Skill Pre- and Post-Test Score Means of the Experimental Groups

Groups		N	$\overline{X}$	SS	sd	t	p	η^2
Experimental Group 1	Pre Test	26	26.23	6.21	25	-4.04	.00**	.39
	Post Test	26	33.23	4.45				
Experimental Group 2	Pre Test	24	25.37	6.68	23	-5.69	.00**	.58
	Post Test	24	33.67	5.58				
Total of Experimental Groups	Pre Test	50	25.82	6.38	49	-6.73	.00**	.48
	Post Test	50	33.44	4.98				

** p<.01

In Table 1, it can be seen that there is a significant difference in favour of the mean post-test critical thinking skill score of experimental group 1, experimental group 2 and the experimental groups combined (experimental group 1: t_{25}=-4.04, p<.01; experimental group 2: t_{23}=-5.69, p<.01; combined experimental groups $t_{(49)}$=-6.73, p<.01). The effect of course activities that utilized newspapers on the critical thinking skill scores of experimental group 1 (η^2=.39), experimental group 2 (η^2=.58) and the experimental groups combined (η^2=.48) was large.

Comparison of the Critical Thinking Skill Pre- and Post-Test Scores of the Control Groups

The findings of the t-test for the dependent samples, performed to determine whether there was any difference between the critical thinking skill pre-and post-test score means of the two (separate) control groups and the critical thinking skill pre- and post-test score means of both control groups (combined) are presented in Table 2. From Table 2, it is evident that there was not any significant difference in favour of the mean post-test critical thinking skill scores of control group 1, control group 2 and the control groups combined (control group 1: $t_{(23)}$=-.62, p>.05; control group 2: $t_{(25)}$=-1.06, p>.05; control groups combined: $t_{(49)}$=-.69, p>.05).

Table 2
Results of the T-Test for the Dependent Sample – The Critical Thinking Skill Pre- and Post Test Score Means of the Control Groups

Groups		N	$\overline{X}$	SS	Sd	t	p	η^2
Control Group 1	Pre Test	24	28.75	8.15	23	-.62	.95	.02
	Post Test	24	28.87	6.93				
Control Group 2	Pre Test	26	27.69	6.04	25	-1.06	.30	.04
	Post Test	26	29.19	4.53				
Total of Control Groups	Pre Test	50	28.20	7.08	49	-.69	.49	.01
	Post Test	50	29.04	5.75				

Comparison of the Critical Thinking Skill Post-Test Scores of the Experimental and Control Groups

The data on this sub-problem were analyzed in two ways. First, whether there was a difference between the critical thinking skill post-test score means of the two experimental and the two control groups was analyzed with One-Way ANOVA and Tukey tests for unrelated samples. The findings are shown in Tables 3 and 4. Second, when the critical thinking skill post-test score means of the experimental group and both control groups were compared, it was determined from the t-test for the independent samples that there was no significant difference among the post-test score means. The findings of the ANOVA test are included in Table 5.

Table 3
Examination of the Critical Thinking Skill Post-Test Score Means with ANOVA

Groups	N	$\overline{X}$	SS
Experiment Group 1	26	33.23	4.45
Experiment Group 2	24	33.67	5.58
Control Group 1	24	28.87	6.93
Control Group 2	27	29.19	4.92

From Table 3, it can be observed that the critical thinking skill post-test score means of experiment group 1 and experiment group 2 are close to each other. Furthermore, it can be said that the critical thinking skill post-test score means of

control group 1 and control group 2 are similarly close to each other, but the critical thinking skill post-test score means of each of the experimental and control groups are different from one another. The results of the ANOVA analysis, performed to determine the statistical significance of the difference between the critical thinking skill post-test score means of the groups, is presented in Table 4.

Table 4
The Results of ANOVA Analysis and the Tukey Test for Unrelated Samples of the Critical Thinking Skill Post-Test Score Means of Groups

Source of Variance	Sum Squares	df	Mean Squares	F	p	η^2	Significance
Between Groups	487.63	3	162.54	5.51	.00**	.15	Experimental group 1 - Control group 1; Experimental group 1 - Control group 2; Experimental group 2- Control group 1; Experimental group 2 - Control group 2.
Within Groups	2828.61	96	29.46				
Total	3316.24	99					

**p<.01

From Table 4, it can be seen that the critical thinking skill post-test score means of the experimental and control groups show significant differences ($F_{(3-96)}$=5.51, p<.01). The Tukey test analysis, performed to determine among which groups this difference was realized, shows that the critical thinking skill post-test mean of experimental group 1 was positively different from that of control group 1 and control group 2, while the mean for experiment group 2 was positively different from that of control group 1 and control group 2. Accordingly, it is evident that the critical thinking skill post-test score means of each experimental group differ from those of the control groups. The magnitude of the impact of course activities that utilized newspapers on critical thinking skill post-test scores was large (η^2=.15). This shows that there was no difference in the critical thinking skill post-test score means of experimental group 1 and experimental group 2. In other words, there was no differentiation among the experimental groups. Similarly, since there was also no difference in the critical thinking skill post-test score means of control group 1 and control group 2, there was no differentiation among the control groups.

Table 5

Comparison of The Critical Thinking Skill Post-Test Score Means of the Experimental and Control Groups with the T-Test for Independent Samples

Groups	N	$\overline{X}$	SS	Sd	F	t	p	η^2
Total of experiment groups	50	29.04	5.75	98	1.71	-4.09	.00**	.15
Total of control groups	50	33.44	4.98					

**p<.01

From Table 5, it can be observed that the critical thinking skill post-test score means of the experimental and control groups were significantly different ($t_{(98)}$=-4.09, p<.01). The critical thinking skill post-test score means of the experimental groups combined ($X_{(avg.)}$=29.04) were higher than the critical thinking skill post-test score means of the control groups combined ($X_{(avg.)}$=33.44). The effect of course activities that utilized newspapers on critical thinking skill post-test scores was large (η^2 =.15). This finding supports the findings presented in Tables 3 and 4. Therefore, in relation to the third sub-problem, the findings obtained in favour of the experimental groups combined suggest that the application of course activities that make use of newspapers had a positive impact on students' critical thinking skills.

Conclusions and Recommendations

The generalization of the study results is limited, due to the use of semi-experimental methods. The study sample could be increased and varied, to make the results more generalizable. For this reason, the results that were obtained are listed in order of relevance.

1. It was found that the difference between the critical thinking skill pre- and post-test scores favoured the post-tests for both experimental groups. The finding of similar results for both experimental groups showed that course activities that utilized newspapers, whose effects on the experimental groups were examined, affected critical thinking skills similarly. In other words, the results were not obtained by coincidence. Furthermore, when the two experimental groups were evaluated as one experimental group, by taking the mean of their scores, it was found that there was a significant difference between the critical thinking skill pre- and post-test scores, in favour of the post-tests. Accordingly, it can be said that courses that are taught with course activities that utilize newspapers improve the critical thinking skills of students. This result is similar to the results of the field literature, which claims that activities organized around newspapers have positive impacts on the critical thinking skills of students in experimental groups (Diamond & Riekes, 1981; Lentnek, 1997). It is well known that, in recent years, it has become quite important to teach individuals to apply critical thinking, which can be defined

as the type of thinking necessary to acquire both valid and reliable knowledge about the world, to their lives. The ability to develop students' critical thinking skills through newspaper-based or -supplemented science and technology lessons increases the importance of making use of this material. However, it might be argued that there are other activities that develop students' critical thinking skills, and the importance of using newspapers might be questioned.

In addition to enabling students to establish easy connections between science and technology lessons and daily life, newspapers are quite cheap and multi-functional (Sanderson, 1999; Segal & Schmidd, 2006). Therefore, they are convenient to use.

2. It was found that there were no significant differences between the critical thinking skill pre- and post-test scores of both control groups. Furthermore, when the two control groups were evaluated as one control group, by taking the mean of their scores, it was found that there was no significant difference between the critical thinking skill pre- and post-test scores. The results obtained separately for each control group parallelled the results that were obtained when both control groups were evaluated as a single, combined control group. This shows that the results for the two control groups were not obtained by coincidence and that they support each other. Accordingly, courses that utilize course books do not lead to differences in the critical thinking skill scores of students in control groups. The vision of the Turkish Science and Technology Curriculum (2004) is to teach all students, irrespective of individual differences, to be science and technology literate. Descriptions of science and technology literacy put particular emphasis on the development of examination-investigation, critical thinking, problem-solving and decision-making skills (MEB, 2005). Exposed to this curriculum, the control groups in the study did not experience a significant change in their critical thinking levels, which indicates that they needed different activities to develop these skills.

3. When the critical thinking skill post-test scores of the two experimental and the two control groups were compared, it was found that the critical thinking skill score means of the experimental groups were significantly different from those of the control groups. The significant difference was in favour of the experimental groups. Also, courses that utilized newspapers had a widening impact on the difference between the critical thinking skill post-test scores of the experimental and control groups.

The critical thinking post-test scores of the two experimental groups did not show a statistically significant difference. The same result was obtained for the control groups. The critical thinking post-test scores of the two control groups did not show any statistical difference. Therefore, this result shows that the critical thinking post-test scores of the two control groups did not show difference among each other.

When the two experimental groups were evaluated as one experimental group, by taking the mean of their critical thinking skill post-test scores, and also when the two control groups were evaluated as one control group, by taking the mean of their critical thinking skill post-test scores, it was concluded that the critical thinking post-test means showed a significant difference in favour of the experimental group.

These results show that courses that are taught with course activities organized around newspapers are more effective in improving students' critical thinking skills than are courses that take a more traditional education approach. The results of this study support the results obtained for the first and second sub-problems. It can be said that the use of activities that rely on course books, along with the use of course activities that utilize newspapers, is effective in improving the critical thinking skills of students, compared with activities that are organized solely around course books. The results of this investigation also support the findings of previous studies (Diamond & Riekes, 1981; Gillespie, 1989; Lentnek, 1997).

According to the results of this study, the following can be stated:

- Newspapers can be used in science and technology courses to improve the critical thinking skills of students.
- Course activities that utilize newspapers can be used by science and technology teachers.
- The effect of using newspapers in science and technology education on other high-level thinking skills and on reading and deduction skills should be researched.
- The effect of using newspapers in other courses should be researched.

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Fen ve Teknoloji Ders Etkinliklerinde Gazetelerden Yararlanmanın Öğrencilerin Eleştirel Düşünme Becerilerine Etkisi (Özet)

Problem Durumu: Bugün, çok sayıda bilim insanı eleştirel düşünme becerisini bireylerin sahip olması gereken en önemli becerilerden biri olarak göstermektedir. 2005 yılından itibaren uygulanmakta olan fen ve teknoloji öğretim programının amaçlarından biri de, yeniliklere karsı eleştirel ve sorumlu tutumlar geliştirmek için gerekli bilgi ve becerileri geliştirmektir. Bu bilgiler ışığında fen ve teknoloji derslerinde gazetelerin kullanılmasının öğrencilerin okuma, düşünme ve yorum yapma becerilerini kullanarak, eleştirel düşünme becerisini geliştirmesi amaçlanmaktadır. Fen derslerinde gazetelerin kullanılması konusunda yapılmış sınırlı sayıda araştırma bulunmaktadır. Yapılan araştırmalar da ortak olarak fen derslerinde gazete kullanımının öğrencilerin derse ilgisini çekmeyi kolaylaştırdığını vurgulamaktadır. Fen derslerinde gazetelerin kullanımı öğrencilerin gazetede yer alan fenni okuma ve okudukları üzerinde düşünmesine olanak sağlayacağı için, günümüzdeki bireylerin sahip olması gereken en önemli becerilerden biri olarak gösterilen eleştirel düşünme becerisini de geliştireceği düşünülmüştür. Özellikle sözel ağırlıklı derslerde gazetelerin kullanılmasıyla eleştirel düşünme becerisinin geliştirileceğine yönelik çalışmalar bulunmaktadır. Ancak fen derslerinde gazete kullanımının eleştirel düşünme becerisi üzerindeki etkisine yönelik herhangi bir çalışmaya rastlanmamıştır. Bu bilgiler ışığında fen derslerini daha ilgi çekici hale getirmeye ve günlük yaşam ile ilişki kurmaya uygun hale getirebileceği vurgulanan gazetelerin, eleştirel düşünme becerileri üzerindeki etkisi merak konusu olmuştur.

Araştırmanın Amacı: Bu araştırmada gazetelerden faydalanılarak ders etkinlikleri hazırlanması ve bu etkinliklerin öğrencilerin eleştirel düşünme becerileri üzerindeki etkisinin belirlenmesi amaçlanmaktadır.

Araştırmanın Yöntemi: Araştırmanın katılımcılarını 2009-2010 eğitim öğretim yılında Kocaeli ilindeki bir ilköğretim okulunun 5. sınıfında öğrenim görmekte olan 100 öğrenci oluşturmaktadır. Bu okuldan 2 deney ve 2 kontrol grubu seçilmiştir. Araştırmanın 2 deney 2 kontrol sınıfı ile yürütülmesinin iki amacı vardır. Birinci amaç; her iki deney grubu yapılacak uygulamalar birbirinin aynı olduğu için toplam

tek deney grubu gibi alarak örneklem büyüklüğünün artırılmasıdır. Aynı durum kontrol grubu için de geçerlidir. İkinci amaç ise, aynı bağımsız değişkenin uygulandığı deney gruplarının ikisinde de araştırmanın bağımlı değişkenlerindeki değişimin benzer olup olmadığının kontrol edilmek istenmesidir. Deney ve kontrol grupları araştırmanın bağımlı değişkeni olan eleştirel düşünme becerisi ön test puanları bakımından birbirine denk sınıflardan seçilmiştir. Araştırmada deneme modellerinden ön test son test kontrol gruplu yarı deneysel yöntem kullanılmıştır. Araştırma "Maddenin Değişimi ve Tanınması" ünitesi boyunca gerçekleştirilmiş ve bu ünite için gazete kullanmaya uygun kazanımlar seçilerek, bu kazanımlarla ilgili 13 gazete etkinliği geliştirilmiştir. Deney gruplarında ders kitaplarındaki etkinliklerin yanı sıra gazete etkinlikleri uygulanırken, kontrol gruplarına yalnızca ders kitaplarında yer alan etkinlikler uygulanmıştır. Öğrencilerin eleştirel düşünme becerilerini ölçmek amacıyla Cornell Eleştirel Düşünme Becerileri Testi- Düzey X kullanılmıştır. Test, bu araştırmada kullanılmadan önce farklı bir örneklem grubuna uygulanmış, madde analizleri ve güvenirlik çalışmaları yenilenmiştir. Güvenirlik çalışması için testtin uygulandığı gruptan elde edilen ölçümlerin KR 20 güvenirlik katsayısı .71 olarak tespit edilmiştir. Elde edilen ölçümler doğrultusunda testte yer alan maddelerin tamamı için madde güçlük indeksi ortalama .46, madde ayırt edicilik indeksi ise, .27'dir. Ayırt edicilik indeksinin .30'dan düşük çıkmış olması nedeniyle testi kullanan alan uzmanlarından görüş alınmıştır. Testte bazı maddelerin çıkarılması durumunda ayırt edicilik indeksi artacaktır ancak testin kapsam geçerliği bozulacağı için, uzman görüşleri doğrultusunda bu haliyle kullanılmasına karar verilmiştir. Araştırmanın örneklem grubundan elde edilen ön ve son test ölçümleri için güvenirlik katsayısı hesaplanmış ve KR 20 güvenirlik katsayısının .75 olduğu tespit edilmiştir.

Araştırmanın Bulguları: 1. Deney Grubu, 2. Deney ve Deney gruplarının toplamı için eleştirel düşünme becerisi ön test son test ölçümleri son testler lehine anlamlı farklılık göstermiştir (1. Deney Grubu: $t_{25}=-4.04$, $p<.01$; 2. Deney Grubu: $t_{23}=-5.69$, $p<.01$; Deney gruplarının toplamı $t_{(49)}=-6.73$, $p<.01$).1. Kontrol Grubu, 2. Kontrol ve Kontrol gruplarının toplamı için eleştirel düşünme becerisi ön test son test ölçümleri arasında anlamlı bir farklılık olmamıştır (1. Kontrol Grubu: $t_{(23)}=-.62$, $p>.05$; 2. Kontrol Grubu: $t_{(25)}=-1.06$, $p>.05$; Kontrol Gruplarının Toplamı: $t_{(49)}=-.69$, $p>.05$). Deney ve kontrol gruplarının ön test ölçümleri bakımından birbirine denk olarak seçilmesi nedeniyle, deney ve kontrol gruplarının son testleri karşılaştırılmış ve her bir deney grubunun kontrol gruplarından anlamlı olarak daha yüksek puanlara sahip olduğu tespit edilmiştir ($F_{(3-96)}=5.51$, $p<.01$). Deney gruplarının toplamı ve kontrol gruplarının toplamının son test ölçümlerinden elde edilen puanlar karşılaştırılmış ve deney gruplarının toplamının son test puanları lehine aralarında anlamlı farklılık olduğu tespit edilmiştir ($t_{(98)}=-4.09$, $p<.01$).

Sonuç ve Öneriler: Bu çalışma yarı deneysel bir yöntemle gerçekleştirildiği için sonuçların genellenmesini kısıtlamaktadır. Bu araştırmada, gazetelerden faydalanılarak hazırlanan ders etkinliklerinin çalışma grubundaki öğrencilerin eleştirel düşünme becerilerini geliştirilmede etkili olduğu görülmüştür. Yalnızca ders kitaplarında yer alan etkinliklerin uygulanmasının öğrencilerin eleştirel düşünme becerileri üzerinde anlamlı bir etkisi olmadığı tespit edilmiştir. Çalışmanın örneklemi çeşitlendirilip arttırılarak genel sonuçlara varılabilir. Bu araştırmanın sonuçlarına benzer olarak farklı alanlardaki dersler için de gazete kullanımının eleştirel düşünme

becerisini geliştirmek konusunda etkili olduğuna yönelik çalışmalar bulunmaktadır (Diamond & Riekes, 1981; Lentnek, 1997). Yapılan çeşitli araştırmalarda da vurgulandığı gibi gazeteler dersler ile günlük yaşam arasında ilişki kurmayı sağlayan güncel kaynaklardır (Guenther ve Lashier, 1985; Jarman ve McClune, 2002; Jarman ve McClune, 2003). Gazetelerin bu özelliğinin öğrencilerin eleştirel düşünme becerilerini geliştirici yöndeki etkisini destekler nitelikte olduğu düşünülebilir.