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The Effect of Educational Comics on the Academic Achievement and Attitude towards Earthquake

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ABSTRACT

This study was conducted to find out how much the educational comics are effective on teaching earthquake subject which takes place in 5th grade, Social Studies lesson, the unit of "Let's Learn Our Region." Within the context of quantitative methodology, pretest-posttest control group quasi-experimental design was used in the study. 114 5th grade students studying in two different state schools from Hatay city center in 2014-2015 academic year spring term, participated. "Earthquake Attitude Scale" and "Academic Standing Scale for Earthquake" were used as instrument to collect data. Teaching for the experimental group was carried out with educational comics prepared by the researcher, and it was carried out for the control group with no intervention. The implementation lasted for two weeks. At the end of the implementation, the study finished by doing the post-tests for experimental and control groups. At the end of the study, the data was analyzed by using many-variance analyze (MANOVA) via SPSS 17.00 program. With the result of the findings, it was found that the use of educational comic strips created a significant difference in favors of the experimental group students' attitude to earthquake and academic success.

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Keywords: [1]
Social studies, earthquake, attitude toward earthquake, academic success, educational comics

Introduction

Storm, flood, volcanic eruption, and earthquake are the natural disasters that change considerably human life in human life (Demirci & Karakuyu, 2004; Ergünay, 1996). Among the mentioned natural disasters, it can be said that earthquake is the one of the most threatening disaster for humans (Aksoy, 2013).

Turkey is located on the most dangerous seismic belt, Alp-Himalaya Seismic Belt. Thus, active fault lines with faulted structures have been formed in most of its land (Şahin & Sipahioğlu, 2002). When we look at the fault lines in Turkey, Norhtern Anatolia Fault Line in the country's north and Western Anatolia Fault Line in its west (Özey, 2000) constitute the first-degree seismic zone (Atalay, 1987).

Due to the active fault lines, it can be argued that 92 percent of the lands and 98 percent of the population in Turkey are often affected by the earthquakes (Başıbüyük, 2004). Therefore, it is known that earthquakes that happened in Turkey in the past caused a great deal of loss of life and property (Buluş Kırıkkaya, Oğuz Ünver & Çakın, 2011). For example, The Marmara earthquake caused 6,2 billion dollars economic burden in 1999 (Öcal, 2005), and after this earthquake, 90620 dwellings and 14513 workplaces were collapsed (Özey, 2000). However, after 8 magnitude earthquake in Japan, the death of relatively very few people showed that an awareness of the reality of earthquake took shape in Japan (Demirkaya, 2007).

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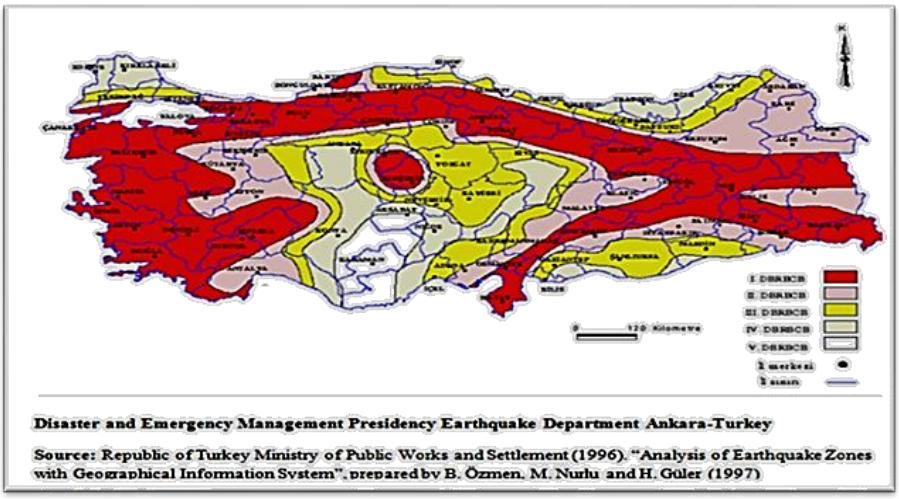


Figure 1. Turkey earthquake map

Training people about earthquake has an important role as it minimizes financial and emotional damage after an earthquake (Ekinci, 2004). The aim of training students at school about earthquake is to expose them to this reality by teaching everything about earthquake, teach necessary so as to raise their awareness on this issue and behave correctly with the nature. This suggests encouraging people to participate actively in finding solutions before, during and after an earthquake. Schools are places where issues such as earthquake is discussed. We try to learn what an earthquake is, how it happens, how it effects the environment, and more importantly what the possible results are, what kind of measures should be taken, and what must be done to protect (Aydın, 2010). It can be taught correctly and effectively at schools (Buluş Kırıkkaya & Çakın, 2011).

In the Social Studies Curriculum (4th and 5th grades) on 2th, 6th and 17th general items aims to educate individuals who knows local and global problems, characteristic features of the place where he lives, fulfils his responsibilities, produces solutions against those problems (MEB, 2005). 3 Learning acquisitions about the earthquake are included in "Unit of the Place Where We Live", "Unit of Let's Know our Region" from the Social Studies Curriculum. It can be said that instructional activities of the Social Studies can make considerable contribution to general education and specifically earthquake and disaster education. Therefore, it is necessary to support the issues about earthquake with appropriate activities and different instructional materials in order to increase permanency of knowledge, skills, attitudes and values about earthquake. Besides it is known that teacher employ cartoons, animations, simulations, photographs and especially concept cartoons to conduct instruction about earthquake and disaster training. Comics are another visual instructional material (Topkaya, 2014).

Educational comics are one of the instructional materials that exhibit the image-script relation in the most perfect way (Alsaç, 1994). Using many types of comics make the readers considerably excited. It started to be used for educational aims in America in the mid-20th century and spread to whole world in the following years (Symeon, 2008). There has been a huge demand for comics from the people since they first appeared in United States of America. Especially, unlike the idea that comic is a means of entertainment for kids, a study done by Gallup Institute in 1929 found out that comics were read by especially bankers, rectors, professors, and doctors; 58,3 percent of men and 56,6 percent of women followed the comics in newspapers with interest (Metken, 1970). It can be said that comic which has an impact on majority of people has a significant influence to develop some desired behaviors of individuals, to raise academic success, to increase the motivation towards lesson to the maximum level, to create curiosity, to get the children who have difficulty in reading adopt the habit of reading(Haugaard, 1973; Koenke, 1981).

In related literature, it is found out that there a limited number of researches that analyze the efficiency of educational comic in lesson process (Akkaya, 2013; Cihan, 2014; Freeman & Freeman, 2000; Haugaard, 1973; Megawati & Anugerahwati, 2012; Özdemir, 2010; Purnell & Solman, 1991; Topkaya, 2014; Topkaya & Yılar, 2015; Topkaya, 2016). When they are reviewed, any study that analyzes the effect of

educational comics on the attitude towards earthquake and academic success. Therefore, it is estimated that this study will contribute to the literature by filling the gap in this field.

Purpose and Research Questions

Aim of the present study is to investigate impact of instructional comics on 5 grade students' attitudes and academic achievement in 5th grade Social Studies Curriculum. Therefore, following research problem and sub-problems were developed

i) Is there a significant difference between pre-test and post-test scores of 5 experimental and control group students' Earthquake Academic Achievement Test?

ii) Is there a significant difference between pre-test and post-test scores of 5 experimental and control group students' Earthquake Attitude Academic Achievement Test?

Method

Research Design

In this study which analyzes the effect of educational comics on the attitude towards earthquake and academic success, quasi-experimental design with pretest late test control group, one of quantitative research, was used. In quasi experimental design with pre-test post-test there are two groups as the experiment group; independent variable has impact on, and the control group on which independent variable has no effect. If there is no significant difference between the groups, the groups was accepted as equal each other. Both of the groups are compared to find whether there is significant difference (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz & Demirel, 2012; Christensen, 2004; Bulduk, 2003). In this design, two groups are formed with respect of the technique of impartial assignment by the researcher. One of the groups is experimental, and the other one is control group. The lessons were carried out in the experimental group with the materials that were aimed to measure its impact, and they were conducted in the control group as in the way that the teacher designated. Thus, at the end of the experimental practice, it is a study was conducted to see whether there was a difference or not (Çepni, 2003). For this reason and considering the methods used in similar studies in the literature, a quasi-experimental approach was used in this study (Linn & Gronlund, 2000). While the independent variable of the research included educational comics prepared for teaching the subject of earthquake, academic achievement and attitude toward earthquakes were the dependent variables.

Participants

Convenience sampling method, a type of non-probability sampling technique was used. When application of random or systematic sampling methods is quite difficult to use for researchers, convenience sampling method is preferred since those selected by convenience sampling are usually individuals that researchers can reach easily (Fraenkel & Wallen, 2006). Sample of the present study included 114 5th grade students, studying public school in Hatay. In the identification of the students' academic success level, the academic standing scale for earthquake is applied as pretest. As a result of the pretests, one control and one experimental groups were formed for each school. Accordingly, in school A 58 (30 experimental, 28 control) and in school B 56 (28 experimental, 28 control) 5th grade students form the sample of the study.

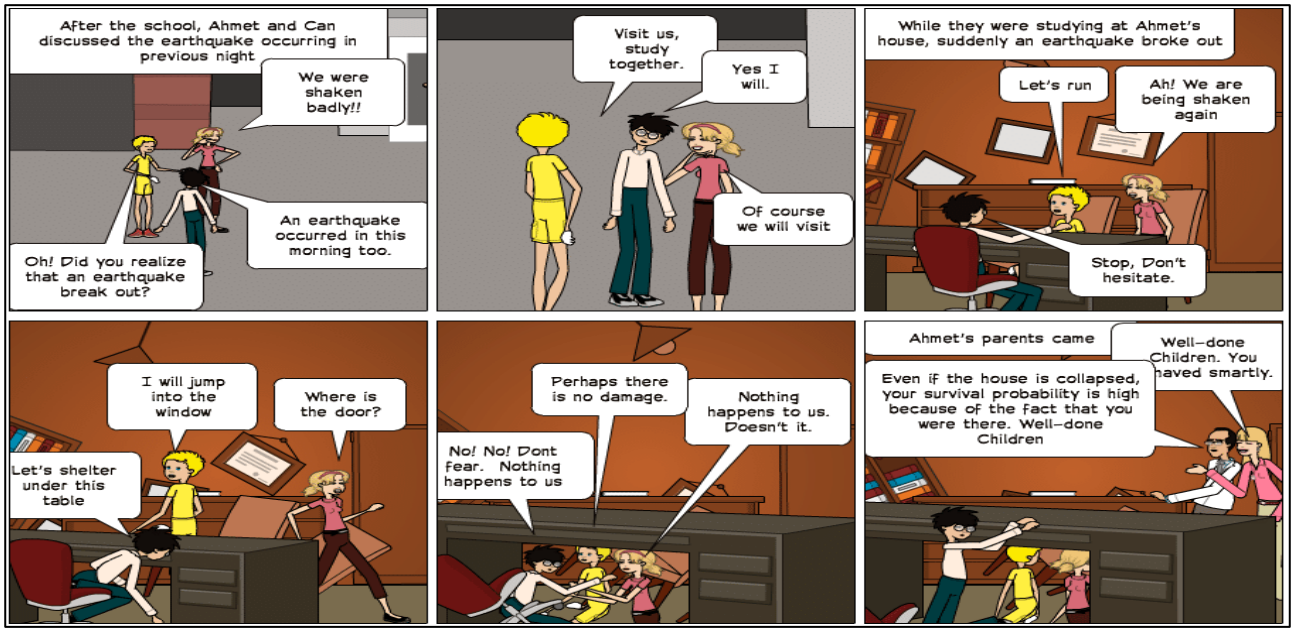
Table 1. The sample according to gender

	Experimental Group		Control Group	
	Male	**Female**	**Male**	**Female**
School A	18	12	15	13
School B	15	13	12	16

The Process of Preparing the Teaching Material

In the process of preparing the teaching material, firstly a draft scenario for the educational comic is made up by examining the attainments and the values in the unit called "Let's Learn Our Region" within the 5th grade Social Sciences Lesson Curriculum. In this scenario, some values and attainments are clearly presented while some are secretly presented. In order to test the clarity of the scenario in the pilot study, it

was practiced on 17 secondary school 5th grades students who are out of the sample, and they were asked to tell their opinions on the scenario. According to their ideas, some unclear dialogues in scenario were rearranged. Later, the scenario was finalized by being analyzed in terms of language and meaning by three Turkish teaching experts, and the required adjustments were done. After finalizing the scenario, an educational comic themed earthquake was prepared by the researcher by utilizing the interface called Pixton (http://www.pixton.com) which enables to draw comic. The characters in the comic were created by regarding the ages and interests of the students. Next, the dialogues in the scenario were put in the speech balloons. The time expressions were written on the frames in the comic to clarify the time transitions, so the teaching material was finally finished. Before practicing, students' opinions on the educational comic were asked again, and it is made clear if the drawings are good enough to understand. Only a small part of the practiced teaching material in the research is taking place below.



Experimental Process

Table 2. Experiment design

School	Group	Pre-Test	Application	Post-Test
(School A)	TG	T_1 T_2	ECFE	T_1 T_2
	CG	T_1 T_2	TB	T_1 T_2
(School B)	TC	T_1 T_2	ECFE	T_1 T_2
	CG	T_1 T_2	TB	T_1 T_2

In Table 2, while EG implies the experimental group implemented educational comics for earthquake (ECFE); CG is the control group in which the textbook (TB) distributed by the Ministry of Education (MoNE) was used. While T1 shows Attitude Scale of Earthquake, T2 indicates Academic Achievement Test toward Earthquake. The study was imitated by applying the Attitude Scale of Earthquake and Academic Achievement Test toward Earthquake, both of which were developed by the researcher, to the experimental and control groups. The application lasted a total of two weeks, two hours per week. "Getting to Know Our Region" unit was taught by social studies teachers through educational comics and instruction stream guidelines prepared by the researcher. The same unit was taught in the control group through the course book printed by the MoNE. After two weeks of the application, the Attitude Scale of Earthquake and Academic Achievement Test toward Earthquake were applied to the both experimental and control groups again.

Data Collection

Earthquake Attitude Scale: Earthquake Attitude Scale prepared by Demirkaya (2007) is a 5 point Likert scale to measure primary school students' knowledge of earthquake and natural disaster. It consists of

40 items, and the item total correlation for each one is calculated as 24 and more. The internal consistency parameter per item in the scale is found out as α=.73.

Academic Standing Scale for Earthquake: Achievement test is an instrument that assesses level of knowledge about something (Yıldırım, 1999). Achievement test must have content validity. Therefore, all behaviors about learning aims must be included proportionally (Büyüköztürk, 2004). For the standing scale, firstly the three attainments of the unit of "Let's Learn Our Region" within the curriculum of 5th grade Social Studies Lesson in Turkey were taken into consideration, and 10 questions in different hardness were prepared. Totally 30 questions were decreased to 16 according to expert opinion. Language experts and experts on environment were asked to investigate the achievement test. After expert investigation, it was concluded that the achievement test contain 20 items. In order to conduct item analysis, the achievement test with 20 items was applied on 122 5th grade students. The items on the achievement test are such multi-optional that 1 was given to each correct answer, 0 was given for each false answers or blank answer. After the statistical x^2

Data Analysis

It is agreed to use many-variance analyze (MANOVA) in order to determine the effect of the experimental process which is determined as an independent variable in the study on the academic standing and the attitude (Çokluk, Şekercioğlu & Büyüköztürk, 2010). MANCOVA is a powerful technique which is applied in determining the impact of the experimental procedure on the final test regardless of pretest measurements in experimental design. In another words, by ignoring the effects of pre-test measurements on post-test measurements, only the impact of the experimental procedure on post-test measurements is evaluated through MANCOVA. When applying MANCOVA analysis, it is necessary to provide a set of prerequisites as well. In this study, it was determined that the groups were independent of each other, the homogeneity of variance was ensured and the regression coefficient was equal within the group. SPSS 17:00 software program was used in the analysis of the data.

Findings

In this section findings about impact of instructional comics on academic achievement and attitude were included.

Findings about the Sub-Problems

Findings about the 1st and 2nd sub-problems were displayed on Table 3, Table 4, Table 5 and Figure 2.

Table 3. MANCOVA results about the variables

Factor	Variance Source	Wilks' Lambda	F	$Sd_{hypothesis}$	Sd_{error}	p	n^2
School A	AC Pre-test	.75	8.84	2	53	.001	.25
	AE Pre-Test	.77	7.73	2	53	.001	.23
	Group	.05	494.99	2	53	.001	.95
School B	AC Pre-test	.71	10.64	2	51	.001	.30
	AE Pre-Test	.77	7.63	2	51	.001	.23
	Group	.05	437.00	2	51	.001	.95

AA: *Academic Achievement,* **ATE**: *Attitudes towards the Earthquake*

For the school A as a result of performed MANCOVA analysis, attitude preliminary test scores attitudes toward earthquake of academic achievement pre-test scores with the average for the earthquake (λ = .77, $F_{(2, 53)}$= 7.73, p <.001, n^2 = .23) and academic achievement latest test scores (λ = .75, $F_{(2, 53)}$= 8.84, p <.001, n^2 = .25) were significant at the level of impact. Therewithal, the academic success of the groups and its effect on post-test scores attitudes towards earthquake were found significantly meaningful (λ = .05, $F_{(2, 36)}$= 494.99, p <.001, n^2 = .95). According to this, it can be said that the changes observed in academic success in school A and attitudes toward earthquake rooted to average scores of preliminary testing. At this point when the impact majors are evaluated, it can be stated that in the development of academic achievement and attitudes toward the earthquake provides the most effective set of variables.

According to the findings of the school B, attitude preliminary test scores attitudes toward earthquake of academic achievement pre-test scores with the average for the earthquake (λ= .77, $F_{(2, 51)}$= 7.63, p< .001, n^2= .23) and academic achievement latest test scores (λ= .71, $F_{(2, 51)}$= 10.64, p< .001, n^2= .30) were significant at the level of impact. Therewithal, the academic success of the groups and its effect on post-test scores attitudes towards earthquake were found significantly meaningful (λ= .05, $F_{(2, 51)}$= 437.00, p< .001, n^2= .95). According to this, it can be said that the changes observed in academic success in school A and attitudes toward earthquake rooted to average scores of preliminary testing. At this point when the impact majors are evaluated, it can be stated that in the development of academic achievement and attitudes toward the earthquake provides the most effective set of variables.

Table 4. Interaction between the variables.

Factor	Variance Source	Dependent Variables	KT	Sd	KO	F	p	n^2
A School	Group	AA post-test	227.61	1	227.61	506.34	.001	.90
		ATE post-test	8820.57	1	8820.57	403.53	.001	.88
B School	Group	AA post-test	161.79	1	161.79	277.19	.001	.84
		ATE post-test	6710.23	1	6710.23	518.96	.001	.91

AA: *Academic Achievement*, **ATE:** *Attitudes towards the Earthquake*

When Table 4 examined, it was determined that there was a significant difference between the created two school experimental and control group in attitudes toward academic achievement scores and earthquakes. As a result, students' academic achievement and attitude towards earthquakes who took place in the experimental and control groups were found to be significant differences between post test scores. Therefore, educational comic books were concluded to be effective on the rise of academic success and the development of the experimental procedure applied by attitudes towards earthquake. Attitude and academic achievement for the earthquake of experimental and control groups are given a pre-test and post-test score averages in detail in Table 5 and Figure 2.

Table 5. Pre-test and post-test scores of the groups

School	Measurement	Group	Pre-test		Post-Test	
			Mean	SD	Mean	SD
School A	AA	Treatment	7.33	.80	14.68	.81
		Control	7.78	.69	10.32	.61
	ATE	Treatment	117.53	7.43	175.50	3.25
		Control	120.28	6.72	151.03	6.99
School B	AA	Treatment	7.32	.98	14	.81
		Control	7.60	.88	10.71	1.01
	ATE	Treatment	135.64	5.36	173.96	3.66
		Control	138.71	5.19	151.21	3.79

AA: *Academic Achievement*, **ATE:** *Attitudes towards the Earthquake*

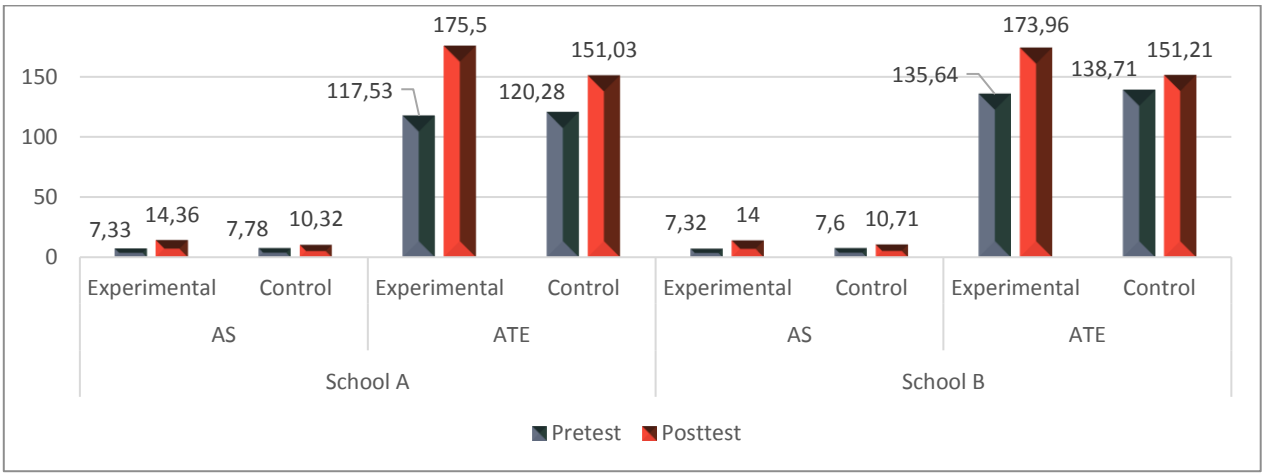


Figure 2. Attitude towards earthquake and academic achievement for the experimental and control groups pre-and post-test score averages.

Discussion, Result and Suggestion

Turkey, located in Alpine-Himalayan seismic zone, is a country with a high risk of earthquakes. In order to minimize the material and spiritual losses that are likely to occur in the future created by the earthquake in Turkey, an effective training should be given to people who live in this country. As a priority, awareness and consciousness of earthquake, which is a great threat to people, should be created in individuals. This awareness and consciousness are to be acquired by individuals especially in the first years of educational activities because education provided to individuals during this period has known to be more effective on raising consciousness, awareness and habits. Indeed, Erten (2004) states that in shaping the behavior, education given at an early age refers to the creation of awareness, individuals would be more effective. Materials create interest in this subject especially educational to ensure the desired level for the education of earthquake and ways of protection from the earthquake in primary schools (Özdemir et al., 2002). So comics should be used frequently in the course process. Educational comics are teaching materials in which both visuals and writings are used together. It can then assert that educational comic books, with the humorous way of dealing with issues and the feeling of curiosity in people, have a very important place in point to correlate with circumstances or events.

In the first sub-problem of the study, an answer to the question of "Is there a significant difference between pre-test and post-test scores of 5 experimental and control group students' Earthquake Attitude Academic Achievement Test?" is looked for. As a result of the findings acquired, teaching materials have been prepared on the basis of educational comics concluded that experimental students made a significant difference in favor. For educational comic books', constitute the main theme in this study, having an impact on the academic achievement, making cognitive schemas more concrete through visual, dialogues between heroes in the novel allowing a comparison between the ideas, allowing of the handling of topics in a simple way for the revision of the wrong learning and information, and short and clearly stating of the topics covered through the scenarios in comics can said to be helpful to clarify the desirable details (Topkaya, 2014). Purnell and Solman (1991) revealed with a study that visual illustrations with text in harmony enable understanding the issues better. Özdemir (2010) revealed with the study that educational comic books have made an impact on academic achievement on teaching of the concepts involved in "Heat and temperature" subject. Topkaya (2014) reached that the use of educational comics have an impact on students' academic achievement of experiment group students in citizenship and democracy education course theme "Every human being is precious".

In the second sub-problem of the study, an answer was searched for "is there any significant difference between the control and experimental groups of secondary school 5th grade students' pretests and post test scores of earthquake attitude scale?" question. With the obtained data, it was concluded that teaching materials with educational comics created significant difference in favor of experimental group students. It is thought that today's children who live in almost a universe of simulation have difficulty to integrate into a single acting acculturation process in which they are inactive in today's world which has technological acceleration thereby there is an accumulation of knowledge. Hence, it can be said that students can think and comment about the events more actively via educational comics based on the background that they are familiar. This is because educational comics can motive them highly by making the lesson more joyful. It is thought that making the students to embrace the desired attainments by telling them in a short story with comic characters in the process of teaching makes the subjects more lively and interesting. Therefore, it can be pointed out that together with triggering the imagination power of children, their attitudes to lesson increases positively at the end of their experience of academic success (Topkaya, 2014). In accordance with this result, here are some suggestions:

5th grade students formed the research group of the study, and their attitudes and academic success on the subjects related to earthquake in "Let's Learn Our Region" unit are analyzed. This study has limitations in terms of grade level and working group. Further studies could be done with different grade levels and samples. In this study, the effectiveness of educational comics was determined by using experimental design. In further studies, the effectiveness of educational comics could also be determined in qualitative researches as well. This study was done for a short time, for two weeks. In order to determine the effect of educational comics on the attitude towards earthquake and academic success exactly, there should be longer practices.

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