

Educational Comics in Conveying Earthquake Topics

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Abstract

It can be said that natural disasters, which are expressed as the greatest threat to the history of civilization and cause the most damage to human beings among other natural disasters, are earthquakes. It is a fact that as a result of earthquakes, large masses of people were adversely affected materially and morally by this situation. Therefore, effective earthquake education should be given to individuals of all age groups from the first step of education. In this research, it was investigated what kind of perspective the secondary school 7th grade secondary school students have on earthquake education, which will be given through educational comics. The research was carried out on 21 7th grade secondary school students studying in a public secondary school in the city center of Samsun in the fall semester of the 2022-2023 academic year. The research was carried out by considering the case study technique, which is one of the qualitative methods. The 7th grade middle school students who participated in the research were asked to answer the questions posed through the interview forum, and the answers to the questions were analyzed by subjecting them to content analysis. Using the data obtained in the research, the following conclusions were reached: The most positive aspect of educational comics is their visuality, and the negative aspect is that the font size is small. In addition, it has been concluded that educational comics increase the motivation in the transfer of the subjects, the humor element makes learning fun and allows the concepts to be learned more clearly.

Keywords: Earthquake education, middle school students, educational comics.

INTRODUCTION

In today's world, we see that storms, floods, volcanic eruptions, earthquakes and many other natural disasters, together with different elements, threaten human beings in particular (Demirci and Karakuyu, 2004; Ergünay, 1996). Among the natural disasters mentioned, earthquakes constitute the greatest threat for humankind (Aksoy, 2013). Turkey is a country located on the Alpine-Himalayan Earthquake Belt, which is shown as one of the most dangerous fault zones (Şahin and Sipahioğlu, 2002).

Turkey is a country located on the Anatolian plate and exposed to high seismic activity as a result of the interaction of this plate with the surrounding Arabian, African and Eurasian plates (Atalay, 1989; Şahin and Sipahioğlu, 2002). According to historical records in this geography, BC. Since the earthquake in 411, there have been many major earthquakes. From 1900 to the present, 20 significant earthquakes with a magnitude greater than 7 have been recorded. This situation has caused Turkey to be among the most dangerous countries in the world in terms of earthquake risk

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(Şengör and İmren, 2017). Between 1900 and 2023, 269 earthquakes that occurred in Turkey seriously threatened both human life and structural security. These earthquakes caused loss of life and property damage due to dense population and infrastructure problems, especially in urban areas. In this context, the earthquake with a magnitude of 7.8 that took place in Kahramanmaraş in 2023, the earthquake that occurred in Erzincan with a magnitude of 7.9 in 1939, the Marmara Earthquakes, which occurred in the center of Gölçük and with a magnitude of 7.6 in 1999, were recorded as the largest and most destructive earthquakes in the history of Turkey (Strategy and Budget Presidency, 2023).

This situation reveals the necessity of earthquake education as a country living with earthquakes. Because earthquake education will enable the society to raise awareness about earthquakes and to display appropriate behaviors before, during and after the earthquake (Aksoy and Sözen, 2014). Ultimately, being prepared for earthquakes will contribute to reducing losses and accelerating post-disaster recovery (Aydın and Coşkun, 2020).

It is seen that scientific studies on earthquakes vary in scope and method. Some of these studies focused on examining the psychological and sociological effects of the earthquake on people. In this regard, researchers such as Bozkurt (1999), Karancı et al. (1996), Kasapoğlu and Ecevit (2001), have made important studies on psychological and sociological factors such as trauma, stress, anxiety, fear, depression, mourning, social support, and social solidarity caused by the earthquake. have made contributions.

On the other hand, the earthquake-education relationship has been another remarkable subject in the literature. In the studies conducted in this context, answers were sought to questions such as how the education system plays a role in earthquake preparedness, response and recovery processes, the effects of the earthquake on the educational environments and academic performance of the students, and how the earthquake issue is handled in the education programs. In this context, Yıldız (2000) aimed to convey information about the pre- and post-earthquake to students in his research; In the study carried out by Sert (2002) on the other hand, to what extent the earthquake-induced situations affect the academic achievement levels of primary school students; Koca (2001) teaching earthquake subjects in primary education; Taş (2003) teaching the subjects related to natural disasters in Turkey; Aydın (2010), Aydın and Coşkun (2010), Demirkaya (2007a), Demirkaya (2007b), Kaya (2010) conducted studies examining students' perceptions and attitudes towards the concept of earthquake.

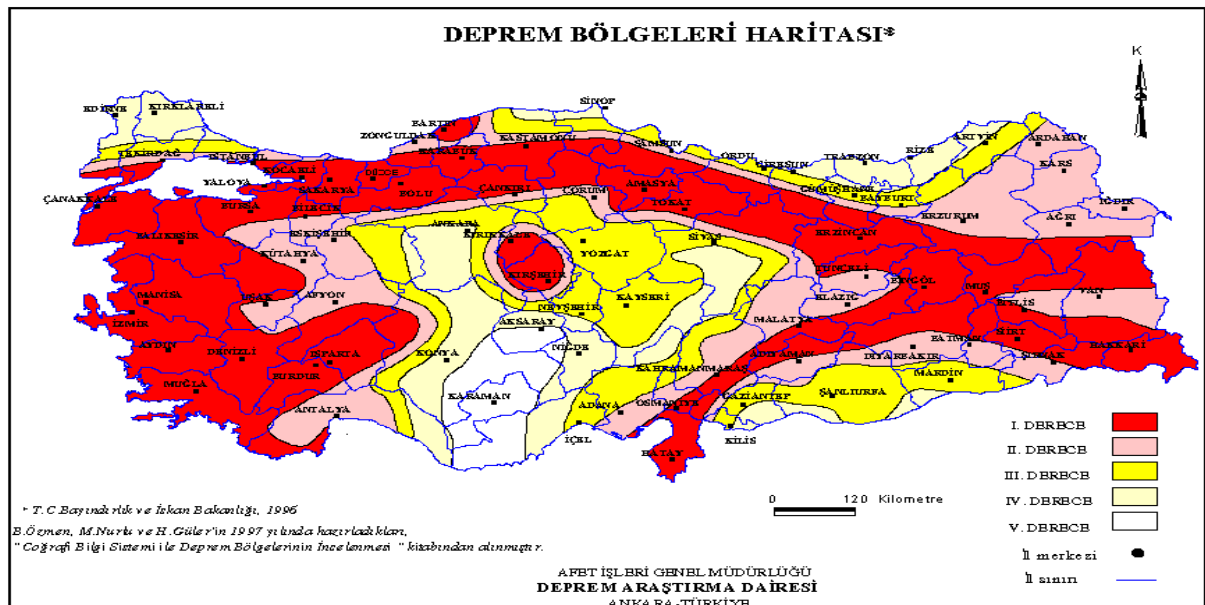


Table 1: Türkiye Earthquake Zones Map

An effective earthquake education requires the active participation of all segments of the society. In this respect, it is important that both government bodies and relevant public institutions and non-governmental organizations support earthquake education in cooperation (Özdemir et al., 2002; Öcal, 2005). The inclusion of earthquake education in school curricula, as well as activities such as campaigns, seminars, awareness meetings, which are non-formal education methods, is of vital importance for the transformation of society on earthquake awareness. In particular, the development of children's knowledge, skills, attitudes and behaviors about earthquakes will support the spread of earthquake awareness in the society.

Earthquake education is an important research topic in Turkey. Academic studies on this subject examine individual and social factors related to earthquakes and propose various strategies to increase earthquake awareness. The scope of these studies includes various dimensions related to earthquake such as perception, knowledge, attitude, metaphor teaching, teaching methods, curricula of different courses and emergency management. The mentioned dimensions are important indicators for evaluating the effectiveness and efficiency of earthquake education. Therefore, these studies reveal the current situation in the field of earthquake education and contribute to future education practices (Değirmençay and Cin, 2016).

Different methods and techniques are used in the education process in order to raise the awareness of students about earthquakes (Buluş-Kırıkkaya, Oğuz-Ünver and Çakın, 2011). In this context, information about the earthquake can be conveyed in a more impressive way through comics that benefit from the power of visual expression and it can be made more permanent in the memories of the participants (Topkaya and Şimşek, 2016). Since comics offer the opportunity to explain complex concepts by simplifying them, they can make subjects such as how the earthquake occurred and how the movements in the earth's crust occur more understandable with visuals. In this context, the characters and events used in comics can help students better understand earthquake-related risks and dangers (Sharpe and Izadkhah, 2014). For example, seeing how a comic book character finds a safe place or what steps he takes during an earthquake can help students gain practical knowledge about how to behave during an earthquake.

Comics can also make it easier for students to establish emotional bonds with the events experienced during the earthquake. In this sense, the experiences of the characters in the comics will allow students to feel the effects of earthquakes more closely (Yang, 2003). This can contribute to a deeper understanding of earthquakes and enable students to take earthquake-related precautions more seriously. On the other hand, effective use of visual elements is seen as one of the advantages of comics (Topkaya, 2017). In this context, pictures showing what needs to be done before, during and after the earthquake can enable readers to better understand what needs to be done. For example, by means of comics, it can be visually explained how safe places, emergency exit routes or assembly areas are at the time of earthquake. In this way, students can be provided with a clearer idea of how to behave in an earthquake situation.

As a result, comics can be used as an effective tool for earthquake education and can raise students' awareness of earthquakes. For this reason, the use of comics in earthquake education can contribute to the increase of earthquake awareness of the society and their preparation for a safer life.

Purpose of the Research

The aim is to reveal what kind of perspective 7th grade secondary school students have on earthquake education, which will be given through educational comics. The sub-problems to be answered in the research to be conducted for this purpose are listed as follows:

- 1) What do you see most positively in educational comics?
- 2) What is the most negative aspect of educational comics?
- 3) What is the most important contribution of educational comics to the lesson?
- 4) How did educational comics contribute to the course process?

5) What effect do educational comics have on concept teaching?

METHOD

Research Model

This study is a qualitative research conducted in order to reveal the perspectives of 7th grade secondary school students on earthquake education, which will be given through educational comics. The case study technique, one of the qualitative research designs, was used to obtain the data. In qualitative research, the factors affecting the researched element are primarily handled with a holistic perspective, and it reveals how this existing perspective affects the examined situation and at the same time to what extent it is affected by the current situation (Yıldırım and Şimşek, 2016). The most obvious feature in qualitative research is the in-depth examination of events. While doing this, it is primarily the desire of human beings to understand their own limits and the desire to have information about the drifting systemic depths of the world they have constructed (Özdemir, 2010). Based on these reasons, the data to be obtained in this research were obtained by considering the case study technique, which is one of the qualitative research techniques. case study; It can be expressed as the storage of information and documents belonging to any situation (Yin, 1989). In addition, case study is a technique that focuses on making the highest level of conclusions from the obtained situations rather than generalizing and processes these results from a longitudinal perspective (Best and Kahn, 2017; Denzin and Lincoln, 1985).

Working Group

This research was carried out on 21 7th grade secondary school students who continue their education in a public secondary school in the city center of Samsun. The study was carried out in the fall semester of the 2022-2023 academic year. Of the students in the study group, 11 (52%) were male and 10 (48%) were female. All of the secondary school 7th grade secondary school students whose opinions were consulted in the research participated in the study of their own free will, without being subjected to any coercion.

Data Collection Tools

In this qualitative research, the researchers who designed and conducted the research obtain data from the people who participated in the research by making observations, using interview forms, and interviewing in order to obtain data for the study they conducted (Wiersma, 1995). In this study, in which the perspectives of 7th grade secondary school students on earthquake education given through educational comics are revealed, primarily data related to the subject were obtained from the people who participated in the research by means of the interview forms prepared by the researchers who carried out the study. There are 5 open-ended questions in the interview form put forward by the researchers. 3 academicians were asked for their opinions regarding both the content and content validity of the open-ended questions in the semi-structured interview form. As a result of the findings, the concepts in some questions were revised and the semi-structured interview form was given its final form. Worksheets (comics) prepared in the www.pixton.com application were given to the study group participating in the research in order to get opinions from the 7th grade secondary school students on educational comics, and they were encouraged to examine these worksheets. Afterwards, the prepared semi-structured interview form was distributed to the 7th grade secondary school students and they were asked to express their views on the questions. A section of the worksheets (comics) distributed to the study group is as follows.



Picture 1. Use Educational Novel in the Scope of the Study

Analysis of Data

The data obtained as a result of the opinions of 7th grade secondary school students on earthquake education carried out through educational comics were examined by subjecting them to content analysis. Content analysis is expressed as a kind of research technique in which the existing interpretations in the data obtained within the scope of the study are revealed as a result of a series of processes (Weber, 1989). The most basic principle in content analysis is to scan different types of printed or visual materials within a system and to determine thematic relationships in terms of some categories as a result of this scanning (Yıldırım & Şimşek, 2016). The most important issue in this process is the creation of certain themes by the data reached and the analysis of these data (Patton, 1990). The expressions that come to the fore in the creation of the themes put forward are listed from most to least, and the views of the participants in accordance with the themes are included.

RESULTS

The data obtained within the scope of this study, in which the views of 7th grade secondary school students on earthquake education given through educational comics are investigated, are included in this part of the research.

Table 1. Findings Regarding the Positive Aspects of Educational Comics

Expressions	Participants	f	%
to have visual	S2, S3, S5, S6, S9, S17, S18, S20	8	38.09
Using humorous language	S1, S8, S12, S15, S19, S21	6	28.57
Giving the topics short and clear	S4, S7, S10, S16	4	19.04
Providing an environment for discussion	S11, S13, S14	3	14.28

"What is the most positive aspect of educational comics?" Their responses to the question are given in Table 1. Looking at Table 1, 8 of the 7th grade secondary school students expressed the opinion of "having visuality". While 6 people focused on the answer of "Using a humorous

language", 4 people gave the answer "To give the subjects a short and clear" answer, and 3 people gave the answer as "Providing a discussion environment". Excerpts from the participant's views are given below:

"These comics that our teacher gave us in class are great. The pictures intrigued me. Especially the existence of the picture with the text made it easier for me to understand. The illustrations of the earthquake are great and we are taught well what to do with those images." S18.

"The language used in comics is hilarious. It's the same words I use when talking to my friends. I literally felt myself next to the heroes in the comics. Some of the issues related to the earthquake are complex, but he tells us some of the actions that we should not do during the earthquake in a funny way." S1.

"The texts in our textbooks are very long and I get tired while reading them. In the comic book given to us, the information about the earthquake is explained in a short and clear way. I think it is very useful." S16.

"The fact that the characters in the comics were discussing the earthquake with each other gave us an atmosphere of discussion. For example, while I was defending the view of one character, another friend of mine discussed the view of another character in the classroom." S14.

Table 2. Findings Regarding the Negative Aspects of Educational Comics

Expressions	Participants	f	%
Small font size	S4, S8, S9, S13, S15, S19, S21	7	33.33
Too intense colors	S1, S3, S7, S10, S12	5	23.80
There are some logic errors	S6, S11, S14, S17, S18	5	23.80
Too many texts	S2, S5, S20	3	14.28
Character's faces are not clear	S16	1	4.76

7th grade middle school students' "What is the most negative aspect of educational comics?" Their answers to the question are given in Table 2. Looking at Table 2, 7 of the 7th grade secondary school students expressed the view that "it should gain speed reading skills". While 5 people focused on the answer "The color is too intense", the other 5 people answered "There are some logic errors" and 1 person answered "The faces of the characters are not clear". Excerpts from the participant's views are given below:

"It was nice with the comic book given to us, but I had a hard time reading the texts. Even though I read the subject with a well-explained picture and with difficulty, it was still good." S8.

"The colors were so intense. I couldn't understand the part of what to do during the earthquake because everything seemed to be intertwined." S12.

"I think there were some logical errors. I mean, when I was going from one frame to another, it felt like time passed very quickly and I was saying what's the matter." S11.

"The comic book was good in general. So I understood the earthquake issue well, but the speech bubbles were taking up a lot of space in some places. In other words, those conversations make learning by seeing difficult." S20.

"I think gestures and facial expressions are very important in comics. In the comics, I would like to see the expressions on the faces of the children and the parents, for example, when the earthquake started. It was not clear." S16.

Table 3. Findings Regarding the Most Important Contribution of Educational Comics to the Course

Expressions	Participants	f	%
Boosting motivation	S1, S2, S5, S9, S12, S13, S15, S16, S17, S19, S20	11	52.38
Positive effect on the perspective of the lesson	S4, S6, S7, S8, S10, S14, S18, S21	8	38.09
Preventing boredom from the lesson	S3, S11	2	9.52

“What is the most important contribution of educational comics to the lesson?” of 7th grade middle school students. Their answers to the question are given in Table 3. Looking at Table 3, 11 of the 7th grade secondary school students expressed the view that it “increases motivation”. While 8 people emphasized the answer “It affects the perspective towards the lesson positively”, 2 people answered “It does not prevent boredom from the lesson”. Excerpts from the participant’s views are given below:

“Normally, I didn’t like this social class. But when the subject mattered, it caught my attention. I think the subject of the earthquake in the comic is explained perfectly. Our teacher said that we will be teaching our lesson with comics next week, and I’m really looking forward to next week.” S1.

“At least it made me love this weekly class.” S7.

“Normally our lessons are boring. The teacher talks, we listen, sometimes we talk, our teacher listens. These comics were pretty good, they put the lesson in a different mood.” S11.

Table 4. Findings Regarding the Contribution of Educational Comics to the Course Process

Expressions	Participants	f	%
Allowing the lesson to be fun	S2, S4, S5, S10, S11, S14, S15, S19	8	38.09
Provide an environment for discussion	S3, S6, S9, S13, S17, S20, S21	7	33.33
Allows comparisons between ideas	S1, S7, S12, S16	4	19.04
Allowing the subjects to be given clearly	S8, S18	2	9.52

7th grade middle school students' ***“What kind of contribution did educational comics make to the course process?”*** Their responses to the question are given in Table 4. Looking at Table 4, 8 of the 7th grade secondary school students expressed the view that “It allows the lesson to be taught fun”. While 7 people focused on the answer “It allows for a discussion environment”, 4 people answered “It allows to make comparisons between ideas” and 2 people answered “It allows the subjects to be given clearly”. Excerpts from the participant’s views are given below:

“Recently, our teacher told the same subject, but although the subject was important, it was boring. I would like to say that these comics distributed to us in the lesson made the lesson very enjoyable.” S5.

“There was an issue of what should be done first in the earthquake. The characters were asking each other what to do in an earthquake there. Then our teacher asked us a question and said which hero’s idea did you adopt, let’s discuss it. I think it was very useful” S21.

“Like our teacher, the characters were discussing what to do about earthquakes, we also discussed among ourselves and compared ours with other opinions.” S16.

"It's a fact, these comics taught us very clearly what to do before, during and after the earthquake." S8.

Table 5. Findings on the Effect of Educational Comics on Concept Teaching

Expressions	Participants	f	%
Fixing the misconception	S1, S2, S5, S6, S7, S9, S10, S12, S13	9	42.85
Clarifying concepts	S4, S11, S15, S17, S19, S20	6	28.57
Simplifying concept teaching	S14, S16, S18, S21	4	19.04
Allows comparisons between concepts	S3, S8	2	9.52

7th grade middle school students' **"What kind of effect do educational comics have on concept teaching?"** Their answers to the question are given in Table 5. Looking at Table 5, 9 of the 7th grade secondary school students expressed the view that "it should clear the misconception". While 6 people focused on the answer "It clarifies the concepts", 4 people gave the answer "It simplifies the concept teaching" and 2 people answered "It allows to make comparisons between the concepts". Excerpts from the participant's views are given below:

"I used to mix some concepts about earthquakes before, but now after these comics, I see that I don't mix those concepts anymore." S7.

"In the comics our teacher brought, some concepts about earthquakes were clearly explained by the characters there." S17.

"There are concepts that are constantly confused, for example, the triangle of life. They were talking about it before, but I couldn't understand what the triangle of life was. But after reading this comic, I now know how to do the triangle of life." S18.

"I used to confuse some concepts related to earthquakes. Thanks to these comics, I no longer confuse these concepts." S3.

RESULTS and DISCUSSION

Turkey is located in the Alpine-Himalayan Earthquake Belt, which is considered one of the most active earthquake zones (Şahin, Doğanay and Özcan, 2004). There are three main belt fault lines surrounding Turkey on this active belt. These main belts are: West Anatolian Fault Line, North Anatolian Fault Line and Southeastern Anatolian Fault Line (Erinç, 1996). Due to this young geological structure, 96% of the country's lands, 99% of the current population, 65% of the urban population, approximately 98% of the organized and industrial zones, 75% of the places where the existing power plants are considered as risky. located in areas (Erdik 2002). In our country, which is considered a risky region in terms of human life, earthquakes cannot be prevented, but actions can be taken to reduce the destruction of the earthquake. It should not be forgotten that the most important element for this is to raise educated individuals. Because while education increases people's knowledge level, it also shapes their beliefs along with their perceptions (Forrester et al., 2016). This is a very important situation for the construction of a livable and safe society (Kitamura, 2014). As a matter of fact, while educational institutions support individuals mentally, they also increase their reasoning skills with their predictions (Hoffmann and Muttarak, 2017). Educational institutions, which undertake a mission in terms of developing the individual, also train them in preparing for disasters and what to do before, during and after disasters. Because, educational institutions undertake a vital mission in the correct elimination of beliefs belonging to known false schemas (Izadkhah and Hosseini, 2005). As stated above, it should not be forgotten that earthquakes cannot be prevented, but an effective earthquake education that

will be given to individuals in schools will bring desired results in reducing the loss of life and property (Mangione et al., 2013). Attention should be paid to the fact that earthquake education to be given in schools is given by adhering to disaster action plans and updating it periodically (Öcal and Topkaya, 2011). In order for earthquake education to be carried out in a healthier way, the training activities to be provided should be frequently supported with up-to-date materials. It is thought that giving earthquake education by making use of educational comics, which we see more and more in educational activities today, can create awareness in individuals in cognitive and affective sense. In this context, in this study, it was investigated what kind of perspective 7th grade secondary school students had on earthquake education supported by educational comics.

In the study, 7th grade secondary school students were asked within the scope of the first sub-problem, "What is the most positive aspect of educational comics?" It was determined that the majority of the students expressed the expression "having visuality" intensely. It can be said that the reason why students express this view towards educational comics is that they are more affected by visual learning than writing. Studies supporting the conclusion reached within the scope of the study (Sones, 1944; Purnell and Solman, 1991; Rota and Izquierdo, 2003; Cary, 2004; Meriç, 2013; Topkaya and Şimşek, 2016) are found in the relevant literature. In the study, 7th grade secondary school students were asked within the scope of the second sub-problem, "What is the most negative aspect of educational comics?" The majority of the students stated that "The font size should be small". It is thought that the reason for the students to express this view towards educational comics is that the message that is intended to be given to the individuals is wanted to be given in more detail. The study supporting the conclusion reached within the scope of the study (Yıldırım, 2016) is found in the relevant literature. In the study, 7th grade secondary school students were asked within the scope of the third sub-problem, "What is the most important contribution of educational comics to the lesson?" The majority of the students expressed the expression "increasing motivation" intensely. It is thought that the inclusion of a material that they have not encountered frequently before in the course process is the reason why students express this view towards educational comics. Studies supporting the conclusion reached within the scope of the study (Wright and Sherman, 1994; Hutchinson, 1949; Haugaard, 1973; Koenke, 1981; Olson, 2008; Topkaya and Yılar, 2015) are found in the relevant literature. In the study, 7th grade secondary school students were asked within the scope of the fourth sub-problem, "What kind of contributions did educational comics make to the course process?" The majority of the students expressed the expression "It allows the lesson to be taught fun" intensely. It is thought that the reason for the students to express this view towards educational comics is the funny comparison of the humorous language used in educational comics and the ideas between the characters. Studies supporting the conclusion reached within the scope of the study (Yıldırım, 2016; Özdemir, 2017a; Topkaya and Doğan, 2020) are found in the relevant literature. In the study, 7th grade middle school students were asked within the scope of the fifth sub-problem, "What effect do educational comics have on concept teaching?" The majority of the students expressed the opinion of "eliminating the misconception" intensely. It is thought that the reason why the students express this view towards educational comics is that the simple and understandable language used in educational comics allows the concepts to be presented by simplifying them. Studies supporting the conclusion reached within the scope of the study (Özdemir, 2017b; Topkaya and Doğan, 2020) are found in the relevant literature.

REFERENCES

- Aksoy, B. (2013). Depremi yaşamış olan 9. sınıf öğrencilerinin "deprem" kavramına yönelik algılarının nitel açıdan incelenmesi. *Zeitschrift für die Welt der Türken Journal of World of Turks*, 5(1), 247-265.
- Aksoy, B. ve Sözen, E. (2014). Lise öğrencilerinin coğrafya dersindeki deprem eğitimine ilişkin görüşlerinin çeşitli değişkenler açısından incelenmesi (Düzce ili örneği). *Uşak Üniversitesi Sosyal Bilimler Dergisi*, 7(1), 279-297.
- Atalay, İ. (1989). *Türkiye coğrafyası*. Ankara: Yeniçay Basın, Yayın Sanayi.
- Aydın, F. ve Coşkun, M. (2010). Observation of the students' "earthquake" perceptions by means of phenomenographic analysis (primary education 7th grade-Turkey). *International Journal of the Physical Sciences*, 5(8), 1324-1330.

- Bozkurt, V. (1999). *Deprem ve toplum*. İstanbul: Alfa Basım Yayın Dağıtım.
- Buluş-Kırıkkaya, E., Oğuz-Ünver, A. ve Çakın, O. (2011). Teachers views on the topic of disaster education at the field on elementary science and technology curriculum. *Necatibey Faculty of Education Electronic Journal of Science and Mathematics Education*, 5(1), 24-42.
- Cary, S. (2004). *Going graphic: Comics at work in the multilingual classroom*. Portsmouth, NH: Heinemann.
- Demirci, A. ve Karakuyu, M. (2004). Afet yönetiminde coğrafi bilgi teknolojilerinin rolü. *Doğu Coğrafya Dergisi*, 9(12), 67-100.
- Demirkaya, H. (2007a). İlköğretim 5. 6. ve 7. sınıf öğrencilerinin depreme yönelik tutumlarının çeşitli değişkenlere göre incelenmesi. *Türkiye Sosyal Araştırmalar Dergisi*, 3, 38-49.
- Demirkaya, H. (2007b). İlköğretim öğrencilerinin deprem kavramı algılamaları ve depreme ilişkin görüşleri. *Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi*, 8, 68-76.
- Değirmençay, Ş.A. ve Cin, M. (2016). Türkiye'deki deprem eğitimi araştırmaları: Betimsel içerik analizi. *Van Yüzüncü Yıl Üniversitesi Eğitim Fakültesi Dergisi*, 13(1), 301-314.
- Erdik, M. (2002). *Earthquake performance and vulnerability of buildings in Turkey*. İstanbul: Deprem Mühendisliği Bölümü, Kandilli Rasathanesi ve Deprem Araştırma Enstitüsü, Boğaziçi Üniversitesi.
- Ergünay, O. (1996). *Afet yönetimi nedir? Nasıl olmalıdır*. Erzincan ve Dinar Depremleri Işığında Türkiye'nin Deprem Sorunlarına Çözüm Yolları Arayışları Sempozyumu'nda sunulan sözlü bildiri, Ankara.
- Erinç, S. (1996). *Jeomorfoloji-I*. Öz Eğitim Yayınları, İstanbul.
- Forrester, I. T., Mayaka, P., Brown-Fraser, S., Dawkins, N., Rowel, R. ve Sither, V. (2016). Earthquake disaster resilience: A framework for sustainable gardening in Haiti's vulnerable population. *Journal of Hunger & Environmental Nutrition*, 12(1), 136-149.
- Haugaard, K. (1973). Comic books: Conduits to culture? *Reading Teacher*, 27, 54-55.
- Hoffmann, R. ve Muttarak, R. (2017). Learn from the past, prepare for the future: Impacts of education and experience on disaster preparedness in the Philippines and Thailand. *World Development*, 96, 32-51.
- Hutchinson, K. (1949). An experiment in the use of comics as instructional material. *Journal of Educational Sociology*, 23, 236-245.
- Izadkhah, Y. O. ve Hosseini, M. (2005). Towards resilient communities in developing countries through education of children for disaster preparedness. *International Journal of Emergency Management*, 2(3), 138-148.
- Karancı, A. N., Akşit, B. ve Sucuoğlu, H. (1996). *Dinar'da afet yönetiminin psikososyal boyutları*. Erzincan ve Dinar Depremleri Işığında Türkiye'nin Deprem Sorunlarına Çözüm Yolları Arayışları Sempozyum Bildirileri içinde (273-283). Ankara: TÜBİTAK.
- Kasapoğlu, A. ve Ecevit M. (2001). *Depremin sosyolojik araştırması*. Ankara: Sosyoloji Derneği Yayınları.
- Kitamura, Y. (2014). The possibility of holistic safety education in Japan: From the perspective of education for sustainable development (ESD). *International Association of Traffic and Safety Sciences*, 38(1), 40-47.
- Koca, M. K. (2001) *İlköğretimde deprem ve depremin zararlarından korunma yollarının öğretimi*. Yayınlanmamış Yüksek Lisans Tezi, Atatürk Üniversitesi
- Koenke, K. (1981). The careful use of comic books. *Reading Teacher*, 34, 592-595.
- Mangione, G. R., Capuano, N., Orcioli, F. ve Ritrovato, P. (2013). Disaster Education: A narrativebased approach to support learning, motivation and students' engagement. *Journal of eLearning and Knowledge Society*, 9(2), 129-152.
- Meriç, A. (2013). The effect of comic strips on EFL reading comprehension. *International Journal on New Trends in Education and Their Implications*, 4(1), 54-64.
- Olson, J. C. (2008). *The comic strip as a medium for promoting science literacy*. Northridge: California State University Press.
- Öcal, A. (2005). İlköğretim sosyal bilgiler dersinde deprem eğitiminin değerlendirilmesi. *Gazi Üniversitesi Gazi Eğitim Fakültesi Dergisi*, 25(1), 169- 184.
- Öcal, A. ve Topkaya, Y. (2011). [Earthquake preparedness in schools in seismic hazard regions in the South-East of Turkey](#). *Disaster Prevention and Management: An International Journal* 20(3), 334-348.
- Özdemir, M. (2010). Nitel veri analizi: sosyal bilimlerde yöntem bilim sorunsalı üzerine bir çalışma. *Eskişehir Osmangazi Üniversitesi Sosyal Bilimler Dergisi*, 11(1), 323-343 .
- Özdemir, E. (2017a). Humor in elementary science: Development and evaluation of comic strips about sound. *International Electronic Journal of Elementary Education*, 9(4), 837-850.
- Özdemir, E. (2017b). Comics in modern physics: Learning blackbody radiation through quasi-history of physics. *Studies in Educational Research and Development*, 1(1), 41-59.
- Özdemir, Ü., Ertürk, M., Güner, İ. ve Koca, M. K. (2002). İlköğretimde deprem ve depremin zararlarından korunma yollarının önemi. *Doğu Coğrafya Dergisi*, 7(7), 111-131.

- Purnell, K. N. ve Solman, R. T. (1991). The influence of technical illustrations on students' comprehension in geography. *Reading Research Quarterly*, 26(3), 277-299.
- Rota, G. ve Izquierdo, J. (2003). "Comics" as a tool for teaching biotechnology in primary schools. *Issues in Biotechnology Teaching*, 6(2), 85-89.
- Sert, E. (2002). *Deprem in ilköğretim öğrencilerinin güdülerini ve başarı başarısızlık yüklemelerini etkileme düzeyi*. Yayınlanmamış Yüksek Lisans Tezi, Sakarya Üniversitesi.
- Sharpe, J. ve Izadkhan, Y O. (2014). Use of comic strips in teaching earthquakes to kindergarted children. *Disaster Prevention and Management*, 23(2), 138-156.
- Sones, W. (1944). The comics and instructional method. *Journal of Educational Sociology*, 18, 232-240.
- Şahin, C., Doğanay, H. ve Özcan, N.A. (2004). *Türkiye coğrafyası ve jeopolitiği* (Fiziki Beşeri-Ekonomik-Jeopolitik). (Genişletilmiş ikinci baskı) Gündüz Eğitim ve Yayıncılık. Ankara.
- Şahin, C. ve Sipahioğlu, Ş. (2002). *Doğal afetler ve Türkiye*. Ankara: Gündüz Eğitim ve Yayıncılık.
- Şengör, A.M.C. ve İmren, C. (2017). Büyük istanbul depremi: Bir hatırlatma ve Bir İkaz. *Deprembilim*, 64, 12-15.
- Taş, G. (2003). *Türkiye'de ortaöğretim kurumlarında doğal afetler (Deprem, Kütle Hareketleri, Volkan, Don Olayı) konularının öğretiminin değerlendirilmesi*. Yayınlanmamış Yüksek Lisans Tezi, Gazi Üniversitesi.
- T.C. Strateji ve Bütçe Başkanlığı (2023). *Kahramanmaraş ve Hatay Depremleri Raporu*
- Topkaya, Y. (2017). Demokratik algı üzerine eğitici çizgi romanların etkisi. *Atatürk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 21(2), 747-756
- Topkaya, Y. ve Yılar, B. (2015). Analysis student views related to educative comics. *Route Educational and Social Science Journal*, 2(3), 106-117.
- Topkaya, Y. ve Şimşek, U. (2016). The effect of educational comics on the academic achievement and attitude towards earthquake. *International Online Journal of Educational Sciences*, 8(3), 46-54.
- Weber, R. P. (1989). *Basic content analysis*. Sage: London.
- Wright, G. ve Sherman, R. (1994). What is black and white and read all over? The funnies!. *Reading Improvement*, 31(1), 37-48.
- Yang, G. (2003). "Comics in education" Erişim: www.humblecomics.com/comicsedu
- Yıldırım, E. (2016). Sınıf öğretmenleri adaylarının eğitici çizgi roman hakkındaki görüşlerinin incelenmesi. *Kilis 7 Aralık Üniversitesi Sosyal Bilimler Dergisi*, 6(11), 52-70.
- Yıldırım, A. ve Şimşek, H. (2016). *Sosyal bilimlerde nitel araştırma yöntemleri*. Ankara: Seçkin Yayıncılık.
- Yıldız, M. (2000). *İlköğretim okullarındaki öğretmenlerin deprem öncesinde ve deprem sonrası öğrenme ve öğretme başarıları ile deprem sonrası oluşabilecek değişiklikler*. Yayınlanmamış Yüksek Lisans Tezi, Marmara Üniversitesi.