Uluslararası Eğitimde Yenilikçi Yaklaşımlar Dergisi
International Journal of Innovative Approaches in Education 2024, Vol. 8 (3), 101-129
https://doi.org/10.29329/ijiape.2024.1079.1

Original article

A Qualitative Study on University Students Seismic Awareness Maps: The Case of ÇOMÜ [1]

Davut Atmaca [a, *] & Hayri Çamurcu [b]

[a] Department of Geography, Graduate Education Institute, Canakkale Onsekiz Mart University, Canakkale, Türkiye
[b] Department of Turkish and Social Sciences Education, Faculty of Education, Canakkale Onsekiz Mart University, Canakkale, Türkiye

Abstract

This research aims to assess the earthquake awareness of university students in Çanakkale. The study was carried out within the scope of qualitative research design and was conducted with a study group consisting of 35 university students selected by purposeful sampling method. Data were collected through a semi-structured interview form and analyzed using the descriptive analysis method. The findings show that the most important issue against earthquake risk in Türkiye is "building inspection and reinforcement." In the case of Çanakkale, critical expectations such as "accelerating the urban transformation process" and "re-evaluation of settlement plans" have emerged. In addition, "post-earthquake behavior" and "safety in student accommodation and dormitories" came to the fore among university students' primary opinions regarding the earthquake. 82.86% of the participants think that the general level of awareness against natural disasters in Türkiye is insufficient. At the same time, 37.14% stated that the society's earthquake preparation was inadequate after the February 6 Kahramanmaraş earthquakes. It has been emphasized that in countries with high earthquake awareness, such as Japan, the most important strategic element is "learning from the past by confronting disasters." In line with these results, it was suggested that practical training regarding earthquakes should be increased and earthquake drills should be carried out in a more realistic manner. In addition, reconsideration of environmental plans according to the current risk situation is among the recommendations.

Keywords: Earthquake, Çanakkale, ÇOMÜ, Seismic Awareness, University Students.

Received: 15 September 2024 * **Accepted:** 26 September 2024 * **DOI:** https://doi.org/10.29329/ijiape.2024.1079.1

[1] This research is based on the findings obtained from a part of Davut ATMACA's doctoral thesis titled "Determination of University Students' Earthquake Knowledge Levels and Sustainable Earthquake Awareness", which was carried out under the supervision of Hayri ÇAMURCU at Çanakkale Onsekiz Mart University, Graduate Education Institute, Department of Geography.

* **Corresponding author:**

Davut Atmaca is a PhD student at Çanakkale Onsekiz Mart University, Department of Geography. He has studies on geography education, netnography, educational technologies and earthquake awareness. He works as a Social Studies Teacher at Biga Balıklıçeşme Secondary School. He lives in Çanakkale. He is married and has a child.
Email: adaatmaca17@gmail.com

INTRODUCTION

Natural events, which can be short or long-lasting, occur in nature every moment. Not all of these events are harmful to humans. Natural events only turn into disasters when they begin to cause significant damage to humans and their environment, negatively affecting life (Tekin & Dikmenli, 2021, p. 259). According to the United Nations (UN), natural disasters are defined as "natural events that cause disruptions in the socio-economic and socio-cultural life of society, cause loss of life and property, and are difficult to cope with." (General Directorate of Meteorology, 2016). Similarly the IPCC (2012) defines disasters as "physical events that result in widespread negative impacts on life, property, economy, or the environment." Both definitions emphasize that natural disasters significantly disrupt social life. Özey (2011) states that for an event to result in a disaster, it must cause losses on human communities and settlements, making it challenging to cope with local resources and means. Therefore, it is crucial to develop comprehensive disaster management strategies to reduce the impacts of natural disasters and enhance community resilience.

According to the average of the last decade, approximately 40,000 to 50,000 people worldwide have lost their lives due to disasters such as storms, floods, and droughts. Additionally, millions of people are displaced and left homeless every year following disasters. Furthermore, disaster events also lead to economically difficult conditions (Bavel et al., 2020). Among the disasters occurring globally, earthquakes stand out for their destructive nature and adverse effects (Uyar & Özkan, 2023). An earthquake, also known as a seismic event, refers to the shaking or movement of the earth. It is defined as the perceptible vibrations or strong tremors originating at a certain depth within the earth's crust (Doğanay & Doğanay, 2014). These tremors are short-lived but can create significant changes on the earth's surface (Ceylan, 2014, p. 130).

Earthquakes globally are concentrated in two main belts. The first is the Pacific Ring of Fire, which includes the edges of the Pacific Ocean. The second belt is the Mediterranean-Himalayan Belt. Another belt consists of the Azores and Iceland located on the mid-Atlantic ridge (Atalay, 2012). Countries such as Spain, Morocco, northern Algeria, Italy, Bosnia-Herzegovina, and Greece, including Türkiye, are among the areas most prone to earthquakes (Hoşgören, 2018).

Türkiye is home to two of the World's four major active fault lines, the North Anatolian Fault Line and the East Anatolian Fault Line, which has placed the country in a critical position in terms of earthquake risk (Ceylan, 2014). 96% of Türkiye lies within an earthquake zone (Yeşiltaş, 2009). Türkiye's high seismicity is due to its location within the Alpine Orogenic Belt and the delayed Alpine movements during the Quaternary period (Ardos, 1996). The areas in Türkiye most frequently affected by earthquakes include the Marmara Region, the Aegean Region, Northern Anatolia, Eastern Anatolia, and the collapse basins bordered by young faults around the Hatay-Karlıova line (Ertek, 2016). Major cities like Istanbul, Izmir, Bursa, and Malatya are situated on earthquake belts. Additionally significant

projects such as dams, highways, and tunnels, especially industrial facilities, are also largely located on earthquake belts (Doğanay & Doğanay, 2014).

Due to Türkiye's high seismicity, the durability of structures, disaster management, and public awareness have become critical issues. The fact that major cities and critical infrastructure projects in Türkiye are located on earthquake belts necessitates comprehensive measures to minimize the impacts of potential earthquakes. In this context increasing earthquake awareness, developing risk management strategies, and establishing rapid response capacity after disasters emerge as vital requirements.

Earthquakes cause significant loss of life, psychological issues, and severe material damage in the affected countries (Nakajima, 2012). With current technological capabilities, it is impossible to predict when earthquakes will occur (Akkaş, 2023). Therefore earthquakes have the potential to initiate a chain of events that significantly impact public health through death and injuries (Chaudhary & Piracha, 2021). Especially in countries with high earthquake risk, medium and large magnitude earthquakes generally lead to short and long-term chaos, depending on the duration, magnitude, geological structure of the settlement, and structural reinforcements (Yolcu & Bekler, 2021). In contrast, earthquakes of the same magnitude that cause the death of thousands of people in Türkiye are often survived without loss of life in developed countries like the USA and Japan (Özey, 2013). For example, the Japanese word "Bosai" is a combination of two words. "Bo" carries meanings such as protection, prevention, and mitigation, while "Sai" means disaster. Since ancient times, the survival struggle of the Japanese people has been passed down from generation to generation through cultural skills, such as being prepared for disasters and learning from painful experiences. Even when literacy was not widespread, those who survived natural disasters informed their grandchildren about what could be done to avoid the nature and effects of these traumatic events. All of these have given rise to a unique "prevention culture" encompassing strong civic consciousness against earthquakes (Yazıcı, 2023). On the other hand, in the USA, a professional ethical code, building inspection, and conscience-based approach is adopted (Akın, Peker & Semercioğlu, 2024).

In light of these evaluations, it is necessary to question individuals earthquake awareness, especially in Türkiye, regarding disaster and earthquake preparedness. For example, success has been achieved in Chile by adopting a lifestyle in harmony with nature. Considering that Türkiye is also an earthquake-prone country, establishing an earthquake culture is inevitable (Yolcu & Bekler, 2021). Because the variety of knowledge and preparedness for earthquakes shapes a society's resilience to disasters (Eroğlu, 2023).

When examining the relevant literature, it was found that Budak and Kandil (2023) researched the earthquake awareness levels of students in the Faculty of Sports Sciences, focusing on their earthquake knowledge levels and sustainable earthquake awareness. The study concluded that the participants knowledge of earthquake regions and effects was sufficient and that awareness of

precautions and measures against earthquakes was high. In order to evaluate the earthquake awareness of prospective teachers, Bilen and Polat (2022) used a qualitative research method. The findings revealed that prospective teachers remembered the devastating earthquakes in Türkiye and were knowledgeable about earthquake-related non-governmental organizations. Türksever (2021) evaluated the earthquake awareness of teacher candidates in terms of factors such as gender, place of residence, and the number of floors in the building/dormitory where they live. According to the findings no significant difference was found between the gender of the prospective teachers and their knowledge levels regarding earthquake zones. Nevertheless it was determined that there was a significant statistical relationship between the earthquake awareness of teacher candidates and the number of floors of the buildings or dormitories in which they reside. The study concluded that teacher candidates had earthquake awareness, but this knowledge had not turned into action. Şen and Yetim's (2023) study aimed to determine how university students conceptually perceived the housing group most affected by the destruction following the 2023 Kahramanmaraş earthquakes. According to this, students were given a prompt containing concepts such as "post-earthquake housing/home." Based on this prompt, it was found that students listed concepts such as fear/panic, durable/sturdy, insecurity, debris/wreckage, anxiety, family, destruction, life/living space, grave, and safety. Dikmenli and Yakar (2019) examined the disaster awareness perceptions of teacher candidates according to sub-dimensions. In this research, 748 teacher candidates who received education in the fields of Social Studies, Science and Primary Mathematics Teaching at Kırşehir Ahi Evran University in the 2016-2017 academic year were selected as samples. The results showed that the prospective teachers generally had a moderate level of disaster awareness perception, but those with disaster experience had higher awareness levels. It was also found that the disaster awareness perceptions of senior students were higher than those of first-year students. Additionally the studies conducted by Yıldız and Öztürk (2023), Arslan and Kuyulu (2023), Kardaş and Tanhan (2018), Sarıgül (2023), Aras, Mumcu, and Karabey (2021) were also examined. It was observed that these studies were related to university students general disaster awareness, metaphors for disasters, the sociological structure of individuals after an earthquake, and post-earthquake social support practices.

It has been determined that in existing studies on earthquake awareness, the knowledge levels, perceptions and disaster awareness levels of university students and teacher candidates have been examined and addressed. However today's university students are individuals who have the potential to be parents, teachers and leaders in the future. Therefore, increasing the earthquake awareness of these students is important to ensure that future generations are more prepared and conscious against earthquakes. As a young and dynamic part of the academic community, these individuals have the potential to take on critical roles in the future. In this context, it is thought that determining the earthquake awareness levels of university students will play a key role in the process of creating earthquake awareness at the social level.

Although previous studies have examined the earthquake and disaster awareness levels of university students, it is noteworthy that there are no studies investigating the earthquake awareness of the society after the February 6 Kahramanmaraş earthquakes and making evaluations specifically for Çanakkale. Therefore, the main purpose of the study was determined to evaluate the earthquake awareness of university students in Çanakkale in a qualitative context.

MATERIALS and METHODS

Model

The research was conducted within the framework of qualitative research methods. Qualitative research is an approach to understanding phenomena in depth and aims to describe the data in philosophical depth (Merriam, 2013; Yıldırım & Şimşek, 2013). Denzin and Lincoln (2005) defined qualitative research as a method that examines the unique features of entities and phenomena and the social construction of reality. Due to the nature of the study, the convergent parallel design was preferred, which aims to provide an in-depth understanding of the research problem and to increase the quality and validity of the research by organizing the data collection process (Creswell and Clark, 2011). Çanakkale Onsekiz Mart University Graduate Education Institute Ethics Committee provided the necessary ethical approval for the collection of data to be used in the research with its decision dated 23.03.2024 and numbered E-84026528-050.99-2400085800.

Sample and Population

Descriptive research designs aim to explore and predict causal relationships, as well as to comprehend how individuals interpret their experiences, construct their perceptions of the world, and ascribe meaning to those experiences (Merriam, 2013). In line with the objectives of this study, the earthquake awareness of university students was examined. The research sample is composed of 35 students enrolled in four distinct departments across three faculties at Çanakkale Onsekiz Mart University during the 2023-2024 academic year. Demographic information pertaining to the study participants is detailed in Table 1.

Table 1. Demographic Distribution of Participants

Section	n	%
Emergency Aid and Disaster Management (EADM)	7	20
Geography (GEOG)	10	28.57
Geography Teaching (GeogEdu)	8	22.86
Social Studies Teaching (SoStT)	10	28.57
TOTAL	35	100

According to Table 1 data, the highest rate of 35 students in the research group was obtained from the Geography and Social Studies Teaching departments with 28.57%. These rates are followed by

Geography Teaching departments with 22.86% and Emergency and Disaster Management (EADM) departments with 20%, respectively. Figure 1 visually shows the distribution of students by department.

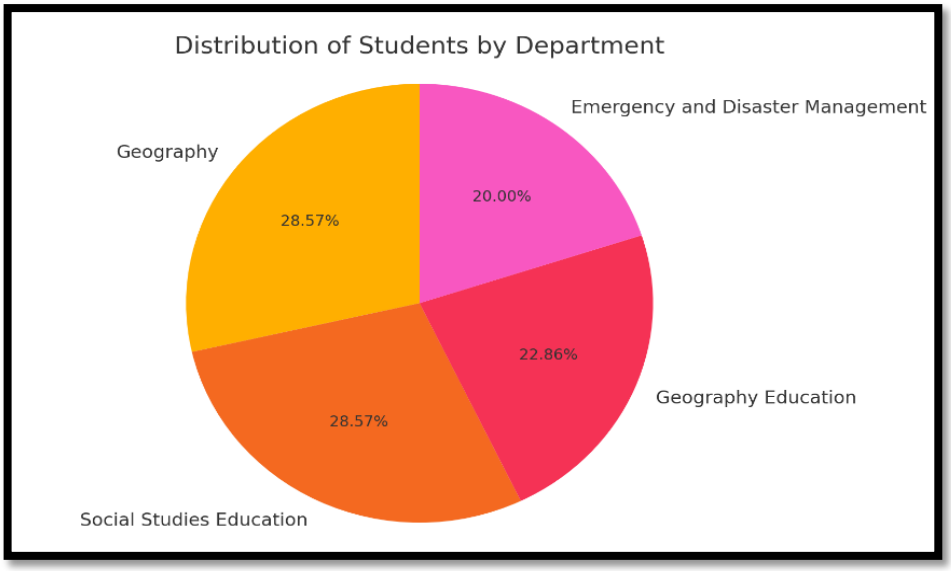

Figure 1. Demographic distribution of participants

In determining the university students, a sequential and concurrent mixed method sampling technique, one of the purposive sampling methods, was preferred. This technique stands out as the most commonly used method in the literature (Creswell, PlanoClark, Gutmann & Hanson, 2003; Johnson & Onwuegbuzie, 2004; Kemper, Stringfield & Teddlie, 2003). In many studies conducted using this technique, the final sample used in the quantitative phase is decisive for sample selection in the subsequent qualitative phase (Baki & Gökçek, 2012, p. 7).

In the study to protect the identities of the university students, each participant was assigned a pseudonym (Berg & Lune, 2015). Accordingly, students from the Social Studies Education department were coded as SoStT1…., SoStT07; students from the Emergency and Disaster Management department as EADM3….., EADM9; students from the Geography department as GEOG12……., GEOG30; and students from the Geography Education department as GeogEdu20….., GeogEdu32.

The location map of the study area, Çanakkale province, is shown in Figure 2.

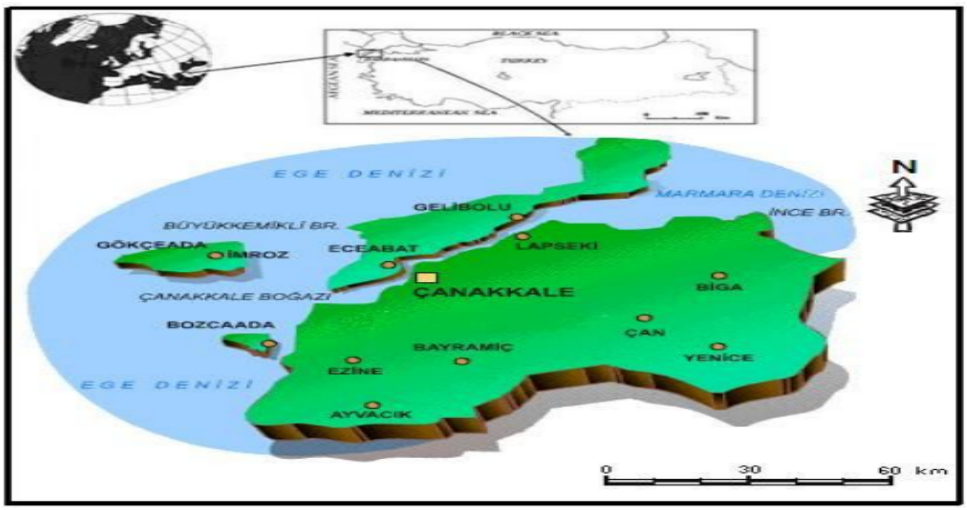

Figure 2. Çanakkale location map (Ilgar, 2010)

Data Collection Tools

There are different data collection methods in qualitative research, such as case study, archive-document scanning, observation and interview (Kozak, 2014). In this study, interview technique was used in accordance with the qualitative research approach.

The interview technique is a very flexible research process and enables in-depth information to be obtained about a certain research topic or a question (Büyüköztürk, Çakmak, Akgün, Karadeniz & Demirel, 2013). Merriam (2013) states that the interview method is necessary to learn how observable behavior, emotion or the world is expressed. The purpose of choosing the interview method in this research is to obtain comprehensive and qualified data on a complex subject such as determining individual awareness about earthquakes.

Research data were obtained through a semi-structured interview form consisting of eight open-ended questions prepared by the researcher. In the preparation of open-ended questions, a literature review was conducted and opinions were obtained from four Geography field experts and one Turkish Language and Literature faculty member. In order to confirm the functionality of the interview questions, the opinions of five university students were used to finalize the open-ended questions. After the data collection tool was finalized, university students in the sample were asked to write their thoughts on open-ended questions. The pilot application was conducted on a voluntary basis. The answers in the interview form are arranged as yes because, no because, for example, ……..,. This study was conducted to clarify unclear points about whether university students approved or disapproved of the stated situation after they expressed the situation in depth (Crabtree & Miller, 1999).

Collection of Data and Analysis

Descriptive analysis was used in the analysis of the data in the research. Descriptive analysis involves systematically organizing the data collected after observation and interview and presenting it to the reader (Baltacı, 2019). In addition, the data obtained after descriptive analysis are summarized and interpreted according to previously determined codes (Gültekin, Atalay & Ay, 2014). Therefore after the participants answers to the questions in the study were classified under certain codes, the participants participation rates in the codes were marked separately by two researchers. The percentage values obtained were interpreted by turning them into tables. Additionally direct quotes from university students answers to open-ended questions are included.

Apart from the above, the codings made by two separate researchers were examined in terms of reliability and integration. In this regard, the reliability calculation method of Miles and Huberman (1994) was used. According to this formula, reliability increases as the consensus increases, but reliability decreases as the difference in suitability in the system or measurement increases. That is, if the consensus within the group is high and the variance in agreement is low, reliability is higher. Accordingly the agreement between the coders was determined as 87%. Situations where the agreement percentage is 70% and above are considered as sufficient reference range. Therefore it was accepted that reliability was ensured in terms of data analysis. On the other hand, the codes in which differences were detected were reviewed again and the new code was discussed, and accordingly the compliance percentage was increased to 100% (Silverman, 2005).

Finally the data in the study is limited to a period of 2.5 months. Another limitation in the research consists of the questions in the "Earthquake Awareness Semi-Structured Interview Form" applied to the participants.

FINDINGS

The supporting or differing aspects of the findings obtained through open-ended questions from university students are presented below.

Question 1: Which topics do you think should be emphasized more in relation to earthquake risk in Türkiye?

As a result of analyzing the responses of the university students to Question 1, seven different descriptive codes emerged. Accordingly, Table 2 shows which topics should be prioritized in addressing earthquake risk in Türkiye.

Tablo 2. Codes and Percentage Values for the Category of Topics That Should be Emphasized More Regarding Earthquake Risk in Türkiye

Identification codes	**n**	**%**
1-Building inspection and reinforcement	16	45.71
2- Increasing social awareness	8	22.86
3- Environmental plans and city layout planning	3	8.57
4- Infrastructure preparation and improvements	3	8.57
5- Local structural features	2	5.71
6- Preventing migration to crowded areas	2	5.71
7- Investments in risky areas	1	2.87
TOTAL	35	100

When Table 2 is examined, the highest priority was given to "building inspection and reinforcement" (45.71%). The definition code for "increasing social awareness" (22.86%) was determined as an important priority. In addition, codes related to "environmental plans and city layout planning" and "infrastructure preparation and improvements" have a rate of 8.57%. Codes such as "local structural features" and "preventing migration to crowded areas" account for 5.71%. Apart from this, "investments in risky areas" was the lowest priority issue with 2.87%.

Question 2: a) How do you evaluate the seismicity of Çanakkale Province?

Table 3 shows how the participants evaluated the seismicity of Çanakkale province.

Table 3. University Students Rating of the Seismicity of Çanakkale Province and Its Percentage Value

Participation status	**N**	**%**
Very high	15	42.86
High	12	34.29
Middle	2	5.71
Low	0	0
Very low	0	0
No idea	6	17.14
TOTAL	35	100

Considering Table 3; It was determined that the participants largely evaluated the seismicity level of Çanakkale as "very high" (42.86%) and "high" (34.29%). While the rate of those who stated the degree of seismicity as "middle" was 5.71%; The rate given to the "no idea" option was determined as 17.14%.

Question 2:b) What can be done regarding the seismicity of Çanakkale Province?

As a result of the analysis of the responses given by the university students participating in the research, 6 different identification codes emerged. The resulting codes and percentage values are given in Table 4.

Tablo 4. Category of Things to be Done for Seismicity in Çanakkale Province

Identification Codes	**n**	**%**
1- Increasing awareness of local people	10	28.57
2- Acceleration of the urban transformation process	8	22.86
3- Reviewing settlement plans	8	22.86
4- Determination of filling areas	5	14.29
5- Strengthening disaster control centers	3	8.57
6- The need to increase investments	1	2.85
TOTAL	35	100

When Table 4 is evaluated; the code related to "increasing awareness of local people" stands out with a rate of 28.57%. In addition, it was determined that issues such as "acceleration of the urban transformation process" and "reviewing settlement plans" were given priority at a similar rate (22.86%). Other than this, codes such as "determination of filling areas" (14.29%) and "strengthening disaster control centers" (8.57%) were identified. Finally, it was determined that the code related to "the need to increase investments" received the lowest rate (2.85%).

Some participant opinions on this issue are as follows:

-EADM3: "… Precautions should be taken against the flood risk that may occur as a result of an earthquake on the Sarıçay Bridge…"

-GeogEdu19: "…Stopping construction in swamp areas…"

-SoStT31: "…Settlements should be transferred to safer areas like Esenler."

-GeogEdu32: "... I believe that not building housing near wetland areas would be effective..."

Question 3:a) How do you think university education has raised your awareness about natural disasters?

Table 5 reflects the situation of university education in raising students' awareness against natural disasters.

Table 5. University Education's Status of Raising Awareness of Students Against Natural Disasters

Participation Status	**n**	**%**
Yes	26	74.3
No	9	25.7
TOTAL	35	100

According to Table 5, the majority of participants (74.3%) think that university education provides the necessary awareness against natural disasters. However, 25.7% of participants do not agree with this opinion.

Question 3:b) Do you think university education has raised your awareness about natural disasters?

Four different identification codes emerged in line with the participants answers to this question. Moreover, 9 out of 35 participants answered no to this question. Table 6 shows the codes that emerged after the responses of the participants who said yes to the fact that university education raises students awareness against natural disasters.

Table 6. Codes and Percentage Values Emerging After the Responses of Participants Who Said Yes to the Question "Does University Education Raise Students Awareness Against Natural Disasters?"

Identification codes	**n**	**%**
1- Field studies and theoretical courses	18	69.22
2- Land application	6	23.08
3- Drills and simulations	1	3.85
4- Emergency aid and rescue efforts	1	3.85
TOTAL	26	100

According to Table 6; the code "field studies and theoretical courses" has a rate of 69.22%. "Land application" comes in second place with a rate of 23.08%. On the other hand, codes such as "drills and simulations" and "emergency aid and rescue efforts" have a low representation rate of 3.85%.

Question 4:a) How often do you discuss earthquake issues with your friends at university?

Table 7 shows the frequency with which university students talk about earthquakes with their friends.

Table 7. Frequency of University Students Talking About Earthquakes with Their Circle of Friends

Participation status	**n**	**%**
Very frequently	6	17.14
Often	9	25.71
Occasionally	14	40
Rarely	5	14.29
Never	1	2.86
TOTAL	35	100

When Table 7 is examined, 40% of the participants talk about earthquakes "occasionally". Again, 25.71% of the participants stated that they talked about the earthquake issue "often". The rate of those who "rarely" talk about the earthquake is 14.29%; the rate of those who speak "very frequently" is 17.14%. Those who "never talk about the earthquake issue" constitute a very small group with a rate of 2.86%.

Question 4:b) What topics related to earthquakes do you discuss with your friends at university?

The prominent sharing codes regarding the earthquake are shown in Table 8. Since participant SoStT31 did not provide a response to this question, the answers in this section are evaluated based on thirty-four respondents.

Table 8. Codes Retrieved from University Students Earthquake Conversations with Their Friends

Identification Code	**n**	**%**
1-Post-earthquake behaviors	10	29.42
2- Security in student accommodation and dormitories	10	29.42
3- On the university campus safe areas	4	11.76
4- Participation in social awareness activities	4	11.76
5- Local risks	4	11.76
6- Communication with family and relatives	2	5.88
TOTAL	34	100

According to Table 8; the prominent codes were "post-earthquake behavior" and "security in student accommodation and dormitories", which had a rate of 29.42%. Apart from this, it was determined that codes such as "on the university campus safe areas", "local risks" and "participation in social awareness activities" had the same rate with 11.76%. Additionally, the code "communication with family and relatives" constitutes a rate of 5.88%.

Some participant comments are as follows:

- ***SoStT1:*** "Are the buildings we live in solid or not?"

- *GEOG2:* "We discuss that the country cannot handle a second earthquake."

- *GEOG21:* "How do we alert others if we get trapped under rubble?"

Question 5: Sustainable earthquake awareness involves long-term preparation and continuous public consciousness on the topic. What measures can be taken from a sustainability perspective for earthquake precautions? How should a sustainable earthquake strategy be structured?

Table 9 shows the recommendations for sustainable earthquake measures and strategies.

Table 9. What to Do for Sustainable Earthquake Precautions and Strategy?

Identification codes	**n**	**%**
1- Promotion of earthquake-resistant buildings	12	34.28
2-Social activities aimed at collective consciousness	8	22.86
3-Sustainable building and materials	7	20
4-Green infrastructure and open areas	5	14.29
5- Circular economy and waste management	2	5.71
6- International cooperation and sharing of experiences	1	2.86
TOTAL	35	100

When Table 9 is examined, the code related to "promotion of earthquake-resistant buildings" stands out with 34.28%. "Social activities aimed at collective consciousness" comes in second place with a rate of 22.86%. This is followed by "sustainable building and materials" with a rate of 20%. The code related to "green infrastructure and open spaces" is 14.29%. The code related to "circular economy and waste management" is 5.71%. On the other hand, the rate for the code "international cooperation and sharing of experience" was determined as 2.86%.

Some participants responses to this question include:

- *GeogEdu6:* "... Establishing gathering areas close to home."

- *GEOG14:* "Creating rail systems for buildings."

- *GEOG18:* "... The government and the public must act in unity against natural disasters."

- *GeogEdu19:* "... Drills should be conducted in universities and KYK (Eng. CREDIT AND DORMITORIES INSTITUTION [CDI]) dormitories."

Question 6:a) Do you think there is a general level of awareness about natural disasters in Türkiye?

The codes expressing the general level of awareness towards natural disasters in Türkiye are given in Table 10.

Table 10. What is the General Awareness Level in Türkiye Regarding Natural Disasters? Participation Status for the Category

Participation status	**n**	**%**
I absolutely agree	0	0
I agree	3	8.57
I'm undecided	3	8.57
I disagree	18	51.43
I strongly disagree	11	31.43
TOTAL	35	100

When Table 10 is examined, 51.43% of the participants selected the "disagree" option, which represents the highest level of agreement. In addition, the "strongly disagree" option constitutes the second highest rate with a rate of 31.43%. Apart from this, 8.57% of the participants chose the options "I agree" and 8.57% "I am undecided." There are no participants who selected the "I absolutely agree" option.

Question 6:b) What should be done in response to the insufficiency of earthquake awareness in Türkiye?

The codes related to what should be done in the face of insufficient natural disaster awareness are presented in Table 11.

Table 11. Codes Emerging Based on Participants Responses to the Question "What Should We Do Against Insufficient Natural Disaster Awareness?"

Identification codes	n	%
1- Public service announcements should be increased	10	28.57
2- Disaster preparedness curriculums	9	25.71
3- Disaster-oriented GSM and mobile applications	6	17.14
4- Realistic drills	6	17.14
5- Building inspection and construction standards	4	11.44
TOTAL	35	100

When Table 11 is examined; the code "public service announcements should be increased" comes first with a rate of 28.57%. In second place is "disaster preparedness education programs" with a rate of 25.71%. Codes such as "disaster-focused GSM and mobile applications" and "realistic exercises" account for 17.14%. Other than that the lowest rate belongs to the "Building Inspection and Construction Standards" identification code with 11.44 percent.

Two participants commented on this question:

-GEOG3: "... past disasters should not be forgotten."

-GeogEdu20: "Drills should not be conducted just for photo opportunities."

Question 7: Have you observed an increase in earthquake preparedness in society after the February 6th Kahramanmaraş-centered earthquakes?

Table 12 shows the participation status of the society in earthquake preparation after the February 6 earthquakes centered in Kahramanmaraş.

Table 12. Was There an Increase in Earthquake Preparedness in Society After the February 6th Kahramanmaraş-Centered Earthquakes?

Participation status	**n**	**%**
Yes	6	17.15
No	13	37.14
Partially	16	45.71
TOTAL	35	100

According to Table 12; 45.71% of the participants found the earthquake preparations of the society partially adequate after the February 6 earthquakes. 37.14% of the participants stated that society was unprepared for possible earthquakes. On the other hand, 17.15% of the group declared that the society was prepared for possible earthquakes.

The sixteen participants who partially answered this question generally used the following expressions:

Twelve participants (n=12) responded that "*a general awareness has emerged in society. However, this remained only a short-term reaction."*

Three participants (n=3) stated that "*while there was an increase in some segments, no change was observed in other segments.*"

One participant (n=1) responded that "*the tendency to take more precautions has increased in certain groups or regions.*"

Question 8: What strategic elements do countries with high earthquake awareness focus on to ensure public awareness?

Table 13 reveals the strategic elements focused on by countries with high earthquake awareness.

Table 13. Which Strategic Elements Do Countries With High Earthquake Awareness Focus on?

Identification Code	**N**	**%**
1- Learning from the past by facing disaster	15	42.86
2- Disaster resistant construction	6	17.14
3-Earthquake exercises and emergency scenarios active involvement	4	11.43
4- Up-to-date strategies against possible earthquakes	4	11.43
5- Advanced communication infrastructure	3	8.57
6- Safe behavior training	3	8.57
TOTAL	35	100

When Table 13 is examined, "learning from the past by facing disaster" was determined as the most important strategy with 42.86%. While "disaster resistant construction" ranked second with a rate of 17.14%; the codes "earthquake exercises and emergency scenarios active involvement" and "up-to-date strategies against possible earthquakes" were each considered important by 11.43%. Codes such as "advanced communication infrastructure" and "safe behavior training" were found to be less important than other codes with 8.57%.

Some participants responses on this topic are directly quoted:

-GeogEdu4: "… One of our country's biggest problems is not learning from disasters and adapting to them after a brief shock…"

-SoStT 4: "Countries like Japan, where earthquakes are severe but there is no significant loss, should be taken as examples."

-GeogEdu19: "Buildings should be constructed with a focus on human life, regardless of material costs."

RESULTS and DISCUSSION

This research was conducted to determine earthquake awareness of university students. After the questions in the interview form were asked to the students, comments were made based on the scoring of the answers given to the questions. It is thought that the results will help determine various earthquake-related priorities and provide important clues about which areas need further work. The results that emerged after analyzing the data in the research are as follows:

It was determined that seven definition codes emerged in the first research question, which indicated what should be emphasized regarding earthquake risk in Türkiye. The first of these codes is related to "building inspection and reinforcement" and has a rate of 45.71%. This reflects a strong belief that existing buildings should be made earthquake resistant and new buildings should be constructed with strict inspections. Additionally ensuring structural safety is a critical step in preventing destruction that may occur during an earthquake. In the study titled "zero loss of life project for earthquake preparation of Istanbul" conducted by Kaptan (2013), the importance of concepts such as building

inspection, reinforcement and earthquake insurance was emphasized. This situation shows how critical it is to ensure structural safety in order to prevent destruction that may occur during an earthquake. Inspection and reinforcement of structures not only ensures the life safety of individuals, but also contributes to preventing economic losses and social trauma. Therefore, Kaptan's (2013) study draws attention to these issues and reveals that a holistic and comprehensive approach should be adopted for earthquake preparations.

In addition to this the effective implementation of post-earthquake emergency plans and social awareness programs is also of great importance. Another prominent code in the research, "increasing social awareness", has a rate of 22.86%. This finding indicates the necessity of earthquake awareness studies. Because awareness-raising activities aim to minimize loss of life and injuries by informing individuals and communities about how to act. Other studies (Varol and Kırıkkaya, 2017; Ay, Bahadır, Kılıç, Ay and Başıbüyük 2023; Budak and Kandil 2023; Şekerci, Ayvazoğlu and Çekiç, 2023) also mentioned the importance of earthquake awareness playing a vital role in disaster preparation. On the other hand the code related to "infrastructure preparation and improvements" was found to be 8.57%. Therefore it is understood that the participants find this issue important in terms of earthquake preparedness, for example, in terms of strengthening water, electricity and communication systems. Genç (2008) stated that in Türkiye, existing infrastructure and investments should be used efficiently in order to control the development of cities within the framework of long-term plans. Akay (2007) emphasized the importance of determining the settlement and land use patterns to be arranged in accordance with regional plans at the country level in order to make a more sound settlement planning of cities, and underlined the implementation of plans where land requirements are concentrated, such as transportation axes and industrial areas. For this reason "infrastructure preparation and improvements" are of great importance both in terms of ensuring the uninterrupted continuation of individuals daily lives and in accelerating the post-disaster recovery process. Another code that stood out in the research was "environmental plans and city layout planning." The proportional distribution of this code was determined as 8.57%. This finding points to the importance of environmental regulations and settlement plans in urban planning. Özcan and Özkan (2012) in their research on Denizli province, reconsidered the effects of urban projects that have significant effects on the city as a whole in terms of urban land use decisions and transportation system, on the holistic planning system of the city of Denizli, which was achieved in a long and problematic process, and their relationship with the environmental plan produced. emphasized its importance. Türkoğlu and Yönder (2011) emphasized the importance of shaping any future decisions in the planning process according to the measures to be taken based on risk analysis at every stage of the planning process in order to reduce disaster risk. Because of it is clear that environmental plans and settlement planning must be carefully designed and implemented in order to minimize future disaster risks. Additionally the topic of "investments in risky areas" has a participant rate of 2.87%. This finding points to the importance of understanding the investments made in risky

areas and the importance of the safety of the people living there. However the priority given to this item among the participants was lower than other issues. This shows that this issue is not seen as a priority as other urgent measures. In this regard, Coşkun (2022) touched upon the importance of disseminating the disaster risk reduction culture at the local level for our country and emphasized the necessity of determining the priority areas for investment to ensure sustainable development at the local level. Particularly ensuring sustainable development at the local level and developing investment strategies to reduce disaster risks are of great importance in terms of minimizing the effects of possible disasters in priority areas.

Among the precautions to be taken against earthquakes, "local structural features" was also found to be important (5.71%). This finding points to the importance of evaluating local architecture and construction techniques in terms of earthquake safety. In particular a scenario was created for the Gebze district in the study conducted by Fahjan, Pakdamar, Eryılmaz and Kara (2015). After the risk analysis in the research where the relationship between earthquake magnitude and ground was examined, it was emphasized that a planning should be made in settlements that takes earthquake disaster into consideration due to the high loss of life and property as a result of a possible earthquake. Therefore especially in areas where industry is clustered and settlement is dense, consideration of factors such as the quality of construction materials, the age and maintenance status of buildings, soil structure and engineering standards used in building design has been determined as an important issue to reduce the impact of possible disasters. In this context it is of critical importance to develop and implement building standards appropriate to local conditions in order to minimize earthquake risk.

In addition to the issues mentioned above, the code related to "preventing migration to crowded areas" has a proportional distribution of 5.71%. This finding gives rise to the predominant belief that preventing concentration in crowded areas can help reduce casualties in a possible earthquake. This situation is also seen as a proposal that aims to encourage a more balanced settlement of cities. Regarding "preventing migration to crowded areas", Çelik (2019) stated that after a possible natural disaster in Istanbul, there may be major problems because there is no area to gather large masses of people and no place to meet basic needs. The findings of the study once again reveal the critical importance of preventing population growth in crowded cities in disaster management and emergency planning.

In the research question regarding the seismicity of Çanakkale province, most of the participants (77.14%) stated the seismicity level of Çanakkale province as "very high" and "high." In the disaster awareness study conducted by Bekler, Cifci, Bekler and Demirci (2022) for Çanakkale province, the rate of those who stated that Çanakkale was in a high-risk earthquake zone was determined as 70%. Based on the common findings of the two studies, the conclusion that emerges is that the participants have a high awareness of the seismicity of Çanakkale province. On the other hand, in the study conducted by Yalçın and Sabah (2016) in which the seismicity of the provinces and districts of

Çanakkale was revealed, Gökçeada, Ayvacık, Yenice, Biga and Gelibolu districts were stated as "high risk districts". Again in the same study, Lapseki, Çan, Eceabat, Ezine, Bayramiç, Bozcaada and Çanakkale Central District were emphasized as "medium risk districts". In addition, in the 1/100,000 Scale Environmental Plan of the Ministry of Environment and Urbanization (2014), the planning region covering Balıkesir-Çanakkale Provinces is expressed as a first-degree earthquake zone due to the active faults passing through its borders. The findings show that although Çanakkale province is at high earthquake risk, participant awareness of earthquakes is quite high.

The codes revealed in the evaluations regarding the seismicity of Çanakkale province are similar to the codes identified in the first research question. For example codes such as "increasing awareness of local people", "increasing investments", "reviewing settlement plans" and "accelerating the urban transformation process" determined in the second research question are parallel to codes such as "increasing social awareness", "environmental plans and settlement planning of cities" and "investments in risky areas" obtained within the scope of the first research question. These similarities reveal the consistency of the basic needs and priorities emphasized by the participants in both research questions. Particularly a significant awareness is observed among the participants regarding earthquake awareness, planning and infrastructure investments. This shows that there is a general sensitivity to earthquake risk in the region.

The most striking issues regarding the seismicity of Çanakkale province were determined as "determination of filling areas" (14.9%) and "strengthening of disaster control centers" (8.57%). Especially "determination of filling areas" is seen as an issue that needs attention when considering the alluvial filled ground of Çanakkale. Defining filling areas as risky areas is necessary to minimize loss of life and property in possible disasters. Regarding the filling areas in Çanakkale province, A. Erginal and G. Erginal (2003) stated that since the Çanakkale region geomorphologically shows a simple topography consisting of alluvial bottom plains, the monotony in morphology creates a limitation in the choice of location, and that the liquefaction situation in the ground covers the entire city. Özden (2023) stated that considering the ground structure, topography and construction speed on which Çanakkale is built, not only earthquakes but also other disasters may occur. Regarding the selection of the ideal settlement area in Türkiye, Özdemir (2021) stated that the most suitable morphological unit for urban or city-type settlements is the central part of the plains and the belt in front of the steep slopes that provide the transition to the mountainous area. Sağlık, Kelkit and Sağlık (2012) stated that settlement should not be allowed in the alluvial areas in Çanakkale, especially at the foothills of Sarıçay, and stated that the areas suitable for settlement in the city are the ridges and plateau areas between the Esenler field and Karacaören, Işıklar and Kurşunlu Villages. When the findings of the research and the results of the studies examined are evaluated together, it becomes clear that Çanakkale needs to take critical measures in the process of creating a city that is more resilient against both earthquakes and other disasters.

Another code to be considered in the research question regarding the seismicity of Çanakkale (8.57%) was "strengthening disaster control centers." Emergency centers or monitoring centers play a vital role, especially in increasing the effectiveness of emergency management and response processes. Equipping disaster control centers with the necessary infrastructure and resources to provide fast and effective service during earthquakes should be among the priority targets of local governments. In their study on Çanakkale province, A. Erginal and G. Erginal (2003) strengthened the bridges over Sarıçay, which divides the city into two, and built hospitals, fire departments, etc. in the city. In the same study, the importance of strengthening institutions in combating disasters was highlighted. Therefore, the construction of alternative bridges within the city center of Çanakkale and the reinforcement of public buildings for disaster control are of great importance in order to ensure uninterrupted urban transportation and emergency services in disaster situations.

In the third research question of the study, 74.3% of the participants stated that university education provides the necessary knowledge, skills and equipment against natural disasters. These findings show that the vast majority of participants agree that university education provides the necessary knowledge, skills and equipment against natural disasters. However, the fact that 25.7% of the participants answered no to this question indicates that more comprehensive and practical training should be provided, especially in the field of disaster management and preparedness, and that more resources and support should be provided to students to increase their knowledge and skills in this regard. As a result, the capacity of university education to provide knowledge and skills against natural disasters was generally evaluated positively. In the quantitative research conducted by Budak and Kandil (2023) on the earthquake awareness of students at the faculty of sports sciences, it was determined that the students who received training on disaster management had a higher average than the students who did not receive training. These results highlight that disaster management training provided at universities plays an important role in increasing the knowledge and skill levels of students and the need for further investment in this area. In addition, following the answers of the participants who answered yes to the question above, codes such as "field studies and theoretical courses", "drills and simulations" and "emergency aid and rescue efforts" were identified. Meydan (2023) stated that a participatory approach based on field exercises will be the first step in developing a holistic perspective on disaster. On account of it is thought that it would be appropriate to increase applied training on disasters in universities.

When the findings regarding the frequency of university students talking about earthquakes with their friends were examined, it was seen that 40% of the students answered this question "we talk from time to time." It was determined that the rate of those who answered "I talk about earthquakes very often" and "I talk about them often" was 43%. It was determined that approximately 17% of the people stated that they rarely or never talked about the earthquake. This distribution reveals that university

students awareness and interest in earthquakes vary. In especial the fact that the number of students in the "we talk very often" and “we talk often” categories is higher compared to other categories indicates that this topic has an important place among the students. However the presence of answers such as “we rarely talk” and “we never talk” also shows that some students do not discuss or dwell on this issue enough. This indicates that more education and information activities are necessary to increase earthquake awareness. The results of the studies by Şahin (2019), Yolcu and Bekler (2020), Bostan and Yüce (2020), and Aytıs (2023) also support the findings of the study.

The first two codes that emerged in the earthquake conversations that the participants had with their friends at the university were “post-earthquake behaviors” and “security in student accommodation and dormitories.” These codes have the highest percentage, each at 29.42%. This situation emphasizes the students interest in how they should behave after the earthquake and the safety measures in the places they stay. In addition the topics “safe areas on the university campus”, “local risks” and “participation in social awareness activities” are evenly distributed with a rate of 11.76%, and there is a remarkable interest in these issues. These findings suggest that students understand the importance of knowing safe spaces on campus and being aware of local risks. At the same time the importance of participation in social awareness activities was also emphasized by the students. The code with the lowest rate, which emerged after sharing conversations with friends, was “communication with family and relatives” with 5.88%. This indicates that students are less focused on the importance of communicating with their families and relatives during or after the earthquake. However this low rate also shows that before the earthquake, students focused more on how to act on their own in emergency situations. In general the findings show that students have different priorities regarding earthquake safety and awareness, and some topics receive more attention.

In the research question about sustainability, the priorities in this regard were determined by classifying the actions to be taken for sustainable earthquake measures and strategies. When the findings were evaluated, the most emphasized issue was “encouraging earthquake resistant buildings.” The proportional distribution of this code was 34.29%. This high rate emphasizes the necessity of increasing the resistance of buildings against earthquakes. Besides the topic “social activities aimed at increasing social awareness” was found remarkable with a rate of 22.86%. Besides the topic “social activities aimed at collective consciousness” was found remarkable with a rate of 22.86%. The topic of “sustainable construction and materials” ranks third with 20%. In this context participants also pay attention to the issue of sustainability and environmentally friendly building materials. This situation shows that in addition to the perception of earthquake resistance, environmental protection awareness also comes to the fore in the research. The code “green infrastructure and open areas” ranks fourth with 14.29%, indicating the importance that participants attach to elements such as gathering areas and natural solutions in disaster situations. Moreover although “circular economy and waste management” seems

to be a less priority issue with a rate of 5.71%, it still draws attention to the importance of issues such as post-earthquake waste management and efficient use of resources. After examining the findings, the lowest participation was on "international cooperation and sharing of experiences" with a rate of 2.86%. This indicates that students care more about local measures in the face of disasters, but that international experiences and collaborations should also be taken into account. In his study evaluating the city of Çanakkale in the context of sustainability disaster awareness, Özden (2023) stated that today's cities and urban systems have extremely complex structures and this complexity turns cities into a "risk pool". Varol and Buluş Kırıkkaya (2017) stated that in complex systems, social and systemic resilience can be increased by following an effective disaster risk management and mitigation strategy. The codes highlighted in this study overlap with the complex structures of cities and the danger of turning into a risk pool, which Özden (2023) emphasized in his study evaluating Çanakkale in the context of sustainability and disaster awareness. Similarly Varol and Buluş Kırıkkaya (2017) emphasized that social and systemic resilience can be increased with an effective disaster risk management and mitigation strategy in complex systems and emphasized what a sustainable earthquake strategy should be. Overall the findings indicate that various issues are considered important in sustainable earthquake precautions and strategies. The fact that issues such as the promotion of earthquake-resistant buildings, social awareness activities and sustainable building materials are at the forefront reveals the importance of combining both safety and environmental sustainability.

In order to determine the general level of awareness about natural disasters in Türkiye, the participants think that the awareness about natural disasters in Türkiye is not at a sufficient level. This indicates that more comprehensive education and awareness programs are required to increase disaster awareness. The findings regarding the research question of what needs to be done in the face of insufficient awareness of natural disasters in Türkiye reveal the priorities and needs of the society regarding earthquake awareness and disaster preparedness. For example; "public service announcements should be increased" stand out as an effective tool to reach a wide segment of the society. According to 28.57% of the participants, awareness campaigns and media awareness need to be increased. In the studies of Özer (2017) and Özdemir and Şahinöz (2022), it was stated that including programs about disasters on television would contribute to social awareness. "Disaster preparedness curriculums" stand out as another precaution regarding what needs to be done in response to the insufficient level of perception against natural disasters. This finding which received support from 25.71% of the participants, emphasizes the role of education systems in raising individuals who are prepared for disasters. The research results of Çalımlı (2022) also support the findings of the research. On the other hand the topic of "disaster-focused GSM and mobile applications" received 17.14% support from the participants. This finding supports the idea that by using technology, information flow can be accelerated and coordination can be increased during disasters. "Disaster-oriented GSM and mobile applications"

are considered as an effective tool in disaster management. Similarly the results of the studies Macit (2018), Şen and Akgül (2023) are consistent with the findings of the research.

Another code in the research is "building inspection and construction standards" and has an importance of 11.44%. Finally the code related to "realistic drills" has a rate of 17.14%. In the research conducted by Kurtoğlu, Balıkçı, Tıkır and Güzel (2021), it was stated that evacuation, assembly place, the existence of assembly areas and training and drills for assembly areas were insufficient in disasters. On the other hand Ekizoğlu (2009) stated in her master's thesis that realistic drills in disasters involve many ethical and practical difficulties. These findings draw attention to the lack of realistic exercises regarding precautions that can be taken against disasters.

Participant opinions on the state of earthquake preparation of the society after the February 6th Kahramanmaraş-centered earthquakes are as follows: 17.14% of the participants selected the "yes" option and stated that they thought the society was adequate in earthquake preparation. 37.14% of the participants answered "no" and stated that the society was not sufficiently prepared for possible earthquakes. The highest rate was given to the answer "partially" with 45.71%, and sixteen participants answered that the society was partially sufficient in earthquake preparation. Accordingly when the answers "we are partially prepared" and "we are not prepared" for the earthquake are evaluated together, a significant part of the society (82.85%) thinks that there are deficiencies against possible earthquakes. Aytıs (2023) stated that the February 6 earthquakes made many necessary situations visible for all areas, and that creating social awareness against disasters should be addressed in a holistic structure. By implication increasing social awareness against disasters and addressing this awareness in a systematic and comprehensive manner is of critical importance in improving earthquake preparedness.

When the research findings regarding the strategic elements that countries with high earthquake awareness focus on are examined, it has been determined that various focus areas have emerged. Following participant responses, the most important strategy was "learning from the past by facing disaster" (42.86%). By analyzing past earthquakes, it is concluded that it is important to be prepared for similar disasters in the future. In second place is "disaster resistant construction" (17.14%), where the necessity of measures such as the construction of resilient buildings and the reinforcement of existing structures is emphasized. Codes such as "up-to-date strategies against possible earthquakes" (11.43%) and "earthquake exercises and emergency scenarios active involvement" (11.43%) were found to be important in ensuring that the public and institutions act effectively during and after the earthquake. "Advanced communication infrastructure" (8.57%) and "safe behavior training" (8.57%) show the importance of the necessary infrastructure and training for the rapid flow of information and the correct reactions of the public in the event of a disaster. Consequently the participants found the above-mentioned strategic elements important for countries to become more resilient to earthquake risk and more effective in disaster management. Following these evaluations, other studies have also provided

suggestions for changing our earthquake strategies as a country. For instance; Yolcu and Bekler (2020) stated that as a country, our disaster management policies should be changed and a lifestyle compatible with nature should be adopted. Göver (2023) compared Türkiye and Japan in the context of earthquake reality and attributed the reason why Japan suffered fewer losses in earthquakes than Türkiye to social and cultural differences. Gündüz (2022) emphasized the importance of the concept of "ethical and inclusive society" in creating disaster-resistant societies in her research on the Haiti and Japan earthquakes. In this context, revising disaster management policies to include life styles compatible with nature and creating ethical, inclusive societies is seen as a critical step for achieving strategic success of countries with high earthquake awareness.

Recommendations

- This research shows that earthquake awareness among university students in Çanakkale is high. However it is seen that more work is needed on issues such as building inspection and reinforcement, infrastructure preparations, and environmental plans, specifically for Çanakkale.
- Although university education is seen as effective in providing knowledge and skills regarding natural disasters, more applied training and information activities are needed.
- Due to achieve strategic success in countries with high earthquake awareness, disaster management policies need to be revised to include life styles compatible with nature.
- On account ofensure social unity and solidarity in natural disasters, it is necessary to establish an inclusive understanding in society that is compatible with ethical principles.
- In particular building inspection and construction standards should be tightened and realistic earthquake drills should be conducted.
- Community resistance to disasters should be increased through comprehensive information activities about evacuation and assembly areas and disaster prevention studies.
- Disaster control centers should be strengthened in terms of infrastructure and resources, taking into account the local characteristics of each province. It must be ensured that these places provide transparent, effective and fast service during earthquakes.
- In accordance with Çanakkale's earthquake risk, construction should be limited, especially in the city center and high-risk areas. It is also suggested that settlement should be encouraged by spreading to rural areas around the city center.

REFERENCES

Akay, A. (2007). Çevre düzeni planları ve yetki sorunları. *Amme İdaresi Dergisi*, 40(3), 113-148.

Akın, E., Peker, C. & Semercioğlu, N. (2024). Depreme karşı önlem ve düzenlemelerde örnek ülke uygulamaları. Rekabet ve Regülasyon. Retrieved from https://www.rekabetregulasyon.com/depreme-karsi-onlem-ve-duzenlemelerde-ornek-ulke-uygulamalari/ Access date: 26.06.2024

Akkaş, H. H. (2023). *Deprem bilinci. kahramanmaraş merkezli depremler sonrası için akademik öneriler*. Gaziantep: Özgür Yayıncılık. https://doi.org/10.58830/ozgur.pub99

Ardos, M. (1996). *Türkiye'de kuaterner jeomorfolojisi*. İstanbul: Çantay Kitabevi.

Arslan, H. & Kuyulu, İ. (2023). Üniversite öğrencilerinin deprem bilgisi başarı testi değerlendirmesi: Spor bilimleri örneği. *Akdeniz Spor Bilimleri Dergisi*, 6(1-Cumhuriyet'in 100. Yılı Özel Sayısı), 562-572. https://doi.org/10.38021/asbid.1355566

Atalay, İ. (2012). *Genel fiziki coğrafya*. İzmir: Meta Basım Matbaacılık.

Ay, F. A., Bahadır, Z., Kılıç, B., Ay, F. & Başıbüyük, G. Ö. (2023). 60+ Tazelenme üniversitesi öğrencilerinin afet bilinci algı düzeyleri. *Yaşlı Sorunları Araştırma Dergisi*, 16(2), 69-77. https://doi.org/10.46414/yasad.1384942

Aytıs, S. (2023). Deprem kavramı, etkileri ve 6 şubat 2023 depremleri bağlamında süreçler üzerinden bütünsel değerlendirmeler. *Journal of Architectural Sciences and Applications*, 8(Special Issue), 567-584. https://doi.org/10.30785/mbud.1287755

Baki, A. & Gökçek, T. (2012). Karma yöntem araştırmalarına genel bir bakış. *Elektronik Sosyal Bilimler Dergisi*, 11(42), 1-21. https://dergipark.org.tr/en/pub/esosder/issue/6156/82721

Bekler, T., Cifci, S., Bekler, F. & Demirci, A. (2022). Çanakkale şehir merkezi risk azaltma çalışmaları ve afet farkındalığın değerlendirilmesi. *Türk Deprem Araştırma Dergisi*, 4(1), 73-97. https://dergipark.org.tr/tr/pub/tdad/issue/70213/1041575

Berg L.B. & Lune H. (2015). *Sosyal bilimlerde nitel araştırma yöntemleri*. Ankara: Eğitim Yayınevi.

Bilen, E. & Polat, M. (2022). Öğretmen adaylarının deprem farkındalığına ilişkin görüşleri. *Türk Deprem Araştırma Dergisi*, 4(1), 155-173. https://doi.org/10.46464/tdad.1098199

Bostan, S. & Yüce, M. Y. (2020). Afetlerde lojistik yönetimi: Çanakkale depremi örneği. *Yönetim Bilimleri Dergisi*, 18(37), 499-519. https://doi.org/10.35408/comuybd.568269

Budak, D. & Kandil, N. (2023). Üniversite öğrencilerinin deprem bilgi düzeyleri ve sürdürülebilir deprem farkındalık düzeylerinin araştırılması: spor bilimleri örneği. *Sportive*, 6(2), 29-40. https://doi.org/10.53025/sportive.1322709

Büyüköztürk, Ş., Çakmak, E. K., Akgün, Ö. E., Karadeniz, Ş. & Demirel, F. (2013). *Bilimsel araştırma yöntemleri*. Ankara: Pegem Akademi.

Ceylan, S. (2014). *Türkiye coğrafyası ve jeopolitiği*. İçinde H. Yazıcı & N. Koca. (ed). Türkiye'de doğal afetler (129-167). Ankara: Pegem Akademi.

Chaudhary, M. T. & Piracha, A. (2021). Natural disasters—origins, impacts, management. *Encyclopedia*, 1(4), 1101-1131. https://doi.org/10.3390/encyclopedia1040084

Crabtree B.F. & Miller W.L. (1999). *Doing qualitative research second edition*. London: Sage Publications.

Creswell, J. & Plano-Clark, V. L. (2011). *Designing and Conducting mixed methods research*. London: Sage Publications.

Creswell, J. W., Plano Clark, V. L., Gutmann, M. & Hanson, W. (2003). *Advanced mixed methods research designs*. In A. Tashakkori & C. Teddlie (Eds.), Handbook of mixed methods in social & behavioral research (p. 209-240). Thousand Oaks, CA: Sage.

Çalımlı, A. (2022). İlköğretimdeki öğretim programları, ders ve çalışma kitaplarında afet ile ilgili kavramlara yer verilme düzeyinin incelenmesi. *Journal of Social and Humanities Sciences Research*, 9(81), 331-343. https://doi.org/10.26450/jshsr.3004

Çelik, S. (2019). Hızlı şehirleşmenin doğurduğu sorunlar ve çözüm yolları. *Journal of International Social Research*, 12(62), 312-320. https://doi.org/10.17719/jisr.2019.3054

Denzin, N.K. & Lincoln, Y. S. (2005). *Introduction: The discipline and practice of qualitative research*. In N.K. Denzin & Y.S. Lincoln (Eds.), The SAGE handbook of qualitative research (3rd ed. pp. 1-33). California: Sage Publications.

Dikmenli, Y. & Yakar, H. (2019). Öğretmen adaylarının afet bilinci algı düzeylerinin incelenmesi. *Van Yüzüncü Yıl Üniversitesi Eğitim Fakültesi Dergisi*, 16(1), 386-416. https://dergipark.org.tr/en/pub/yyuefd/issue/50700/660832

Doğanay, H. & Doğanay, S. (2014). *Coğrafya'ya giriş*. Ankara: Pegem Akademi.

Erginal, A. E. & Erginal, G. (2011). Çanakkale şehrinde yer seçiminin jeomorfolojik açıdan değerlendirilmesi. *Doğu Coğrafya Dergisi*, 8(9), 93-116. https://dergipark.org.tr/en/pub/ataunidcd/issue/2432/30897

Ekizoğlu, B. (2009). *Acil durum tahliye simülasyonları ve işletme fakültesinde uygulanması*. (Yüksek Lisans Tezi). İstanbul Üniversitesi, İstanbul.

Eroğlu, E. (2023). Lise Öğrencilerinin deprem bilgi düzeyleri ve afet bilinci algılarına ilişkin görüşlerinin incelenmesi. *International Academic Social Resources Journal*, 8(53), 3757- 3765. https://doi.org/10.29228/ASRJOU RNAL.72296

Ertek, A. (2016). *Türkiye coğrafyası ve jeopolitiği*. İçinde M. H. Kanat (ed). Türkiye'de doğal afetler (169-218). Ankara: Nobel Akademik Yayıncılık.

Fahjan, Y., Pakdamar, F., Eryılmaz, Y. & Kara, F. İ. (2015). Afet planlamasında deprem riski belirsizliklerinin değerlendirilmesi. *Doğal Afetler ve Çevre Dergisi*, 1(1-2), 21-39.

Genç, F. N. (2008). Türkiye'de kentsel dönüşüm: Mevzuat ve uygulamaların genel görünümü. *Yönetim ve Ekonomi Dergisi*, 15(1), 115-130. https://dergipark.org.tr/en/pub/yonveek/issue/13688/165663

General Directorate of Meteorology. (2016). Meteorological natural disasters 2016 evaluation report. Retrieved from: https://www.mgm.gov.tr/FILES/genel/kitaplar/dogalafet-2016.pdf Access date: 16.06.2024

Göver, İ. H. (2023). Türkiye ve Japonya'nın deprem gerçekliği: Karşılaştırmalı bir analiz. *Mevzu–Sosyal Bilimler Dergisi*, (10), 279-323. https://doi: 10.56720/mevzu.1319896

Gültekin M., Atalay N. & Ay Y. (2014). İlköğretimde serbest etkinliklere yönelik sınıf öğretmeni ve öğrenci görüşleri, *Kastamonu Eğitim Dergisi*, 22 (2), 419-437.

Gündüz, F. (2022). Afetlerde kadın ve toplumsal cinsiyet perspektifi ile çıkarılması gereken dersler (Haiti ve Japonya depremi örneği). *IBAD Sosyal Bilimler Dergisi*, (12), 440-460. https://doi: 10.21733/ibad.1039215

Hoşgören, M. Y. (2018). *Jeomorfoloji'nin ana çizgileri I*. İstanbul: Çantay Kitabevi.

Ilgar, R. (2010). Çanakkale'de kuraklık durumu ve eğilimlerinin standartlaştırılmış yağış indisi ile belirlenmesi. *Marmara Coğrafya Dergisi*, (22), 183-204. https://dergipark.org.tr/en/download/article-file/3218

IPCC. (2012). *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC)* (Field et al., (eds.). Cambridge: Cambridge University Press.

Kaptan, K. (2013). İstanbul'un deprem hazırlığı için 'sıfır'can kaybı projesi. *Çukurova Üniversitesi Mühendislik-Mimarlık Fakültesi Dergisi*, 28(1), 119-126. https://dergipark.org.tr/en/pub/cukurovaummfd/issue/22759/242930

Kardaş, F. & Tanhan, F. (2018). Van depremini yaşayan üniversite öğrencilerinin travma sonrası stres, travma sonrası büyüme ve umutsuzluk düzeylerinin incelenmesi. *Van Yüzüncü Yıl Üniversitesi Eğitim Fakültesi Dergisi*, 15(1), 1-36. https://dergipark.org.tr/en/pub/yyuefd/issue/40566/490529

Kozak, M. (2014). *Bilimsel araştırma: tasarım, yazım ve yayım teknikleri*. Ankara: Detay Yayıncılık.

Kurtoğlu, H. İ., Balıkçı M., Tıkır A. N. & Güzel A. (2021). Assesment of level of university students' information and awareness regarding for evacuation and muster areas. *Emerg Aid Disaster Science*, 1(2), 39-44. https://dergipark.org.tr/en/pub/eadsjrnl/issue/75969/1256645

Macit, İ. (2018). Bütünleşik afet yönetim sistemlerinde karar destek sistemi geliştirilmesi: mobil uygulama örneği. *Uluslararası Yönetim Bilişim Sistemleri ve Bilgisayar Bilimleri Dergisi*, 2(1), 23-41. https://dergipark.org.tr/en/pub/uybisbbd/issue/37798/424008

Merriam, S. B. (2013). *Nitel araştırma desen ve uygulama için bir rehber*. (3. Basımdan Çeviri). Ankara: Nobel Akademik Yayıncılık.

Meydan, A. (2023). Afet yönetiminde coğrafya eğitiminin önemi. *Uluslararası Sosyal Bilimler Eğitimi Dergisi*, 9(2), 101-129. https://doi: 10.47615/issej.1308208

Miles, M. B. & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. London: Sage.

Ministry of Environment and Urbanization. (2024). Ministry of Environment and Urbanization, General Directorate of Spatial Planning, Balıkesir-Çanakkale Planning Region 1/100.000 Scale Environmental Plan Explanation Report. Retrieved from: https://mpgm.csb.gov.tr/balikesir-canakkale-planlama-bolgesi-1- 100.000- scale-environment-plan-i-82273. Access date: 30.07.2024

Nakajima, Ş. (2012). Deprem ve sonrası psikolojisi. *Okmeydanı Tıp Dergisi*, 28(2), 150-155.

Özcan, K., & Özkan, T. (2012). Denizli kentinin planlama deneyimi. *Doğu Coğrafya Dergisi*, 17(27), 233-250. https://dergipark.org.tr/en/download/article-file/26987

Özdemir, M. A. (2021). Türkiye'de büyük yerleşme alanlarının seçiminde jeomorfolojik esaslar. *SSRN*, 28, 1-15. http://dx.doi.org/10.2139/ssrn.3732707.

Özdemir, A. & Şahinöz, T. (2022). Toplumda afet farkındalığı oluşturmaya yönelik kullanılan araçlar: nitel bir çalışma. *Afet ve Risk Dergisi*, 5(1), 78-93. https://doi: 10.35341/afet.975612

Özden, M. A. (2023). Sürdürülebilir topluluklar için afet bilinci, farkındalığı ve kültürü: Çanakkale kenti incelemesi. *Journal of Awareness (JoA)*, 8(4), 381-396. https://doi.org/10.26809/joa.2137

Özer, Y. E. (2017). Afet konusundaki algı ve yerel aktörlerin sorumlulukları. *Sayıştay Dergisi*, (106), 1-34. https://dergipark.org.tr/en/pub/sayistay/issue/61562/919219

Özey, R. (2013). *Günümüz dünya sorunları*. İstanbul: Aktif Yayınevi.

Sağlık, A., Kelkit, A. & Sağlık, E. (2012). Çanakkale kenti örneğinde çarpık şehirleşme. *Uluslararası Katılımlı Şehirlerin Yapılandırılması Sempozyumu (Kentsel Dönüşüm 2012)*, tam metin bildiri kitabı içinde (ss. 110-121). İstanbul: İstanbul Teknik Üniversitesi ve Beykent Üniversitesi.

Sarıgül, A. (2023). Depremi deneyimlemiş kız üniversite öğrencilerinin deprem sonrası sosyal destek uygulamalarına ilişkin fenomonolojik bir çalışma. *Spor, Eğitim ve Çocuk*, 3(3), 21-37. https://doi: 10.5505/sec.2023.46330

Silverman D. (2005). *Doing qualitative research: A practical handbook*. London: Sage Publications.

Şahin, Ş. (2019). Türkiye'de afet yönetimi ve 2023 hedefleri. *Türk Deprem Araştırma Dergisi*, 1(2), 180-196. https://doi.org/10.46464/tdad.600455

Şekerci, Y. G., Ayvazoğlu, G. & Çekiç, M. (2023). Üniversite öğrencilerinin temel afet bilinci ve farkındalık düzeylerinin saptanması. *Gümüşhane Üniversitesi Sağlık Bilimleri Dergisi*, 12(1), 74-81. https://doi.org/10.37989/gumussagbil.1136227

Şen, R. & Akgül, S. K. (2023). WhatsApp Dayanışma Grupları ve İletişim Uygulamaları: 6 Şubat 2023 Kahramanmaraş Depremleri. *Afet ve Risk Dergisi*, 6(4), 1410-1428. https://doi.org/10.35341/afet.1291956

Şen, D. E. & Yetim, E. (2023). Mimarlık öğrencilerinin deprem ve konut algısı üzerine bir araştırma. *Yüzüncü Yıl Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, (62), 1-16. https://doi.org/10.53568/yyusbed.1339230

Tekin, Ö. & Dikmenli, Y. (2021). Sınıf öğretmeni adaylarının afet bilinci algısı ve deprem bilgi düzeylerinin incelenmesi. *Ahi Evran Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 7(1), 258-271. https://doi: 10.31592/aeusbed.811043

Türkoğlu, H. & Yönder, A. (2011). Türkiye'de son 10 yılda afet yönetiminde gelişmeler. *1. Türkiye Deprem Mühendisliği ve Sismoloji Konferansı (1.TDSMK)* tam metin bildiri kitabı içinde (ss. 1-4). Ankara: Orta Doğu Teknik Üniversitesi.

Türksever, Ö. (2021). Öğretmen adaylarının deprem farkındalıkları ile depreme karşı hazırlık durumu düzeyleri arasındaki ilişki. *Journal of History School*, 14(LIII), 2681-2701. https://doi.org/10.29228/Joh.51799

Uyar, H. E. & Töre, E. (2023). Deprem sonrası ilk durak: İstanbul'da toplanma alanlarına dair bir inceleme. *Afet ve Risk Dergisi*, 6(1), 226-242. https://doi.org/10.35341/afet.1119551

Van Bavel, B., Curtis, D. R., Dijkman, J., Hannaford, M., de Keyzer, M., Van Onacker, E. & Soens, T. (2020). *Past and Present. In Disasters and History: The Vulnerability and Resilience of Past Societies*. Cambridge: Cambridge University Press.

Varol, N. & Buluş Kırıkkaya, E. (2017). Afetler karşısında toplum dirençliliği. *Resilience*, 1(1), 1-9. https://doi.org/10.32569/resilience.344784

Yalçın, C. & Sabah, L. (2016). Deprem verilerine göre Çanakkale sanayisinin tematik haritalarla risk analizinin ortaya konulması. *4th International Geography Symposium – GEOMED* tam metin bildiri kitabı içinde (ss. 681-689), Antalya.

Yazıcı, S. (2023). Japonya depremlere hazırlanırken neyi doğru yapıyor? Yanıt bosai kültüründe saklı... Mashable Türkiye. Retrieved from: https://tr.mashable.com/depremler/9081/japonya-depremlere-hazirlanirken-neyi-dogru-yapiyoryanit-bosai-kulturunde-sakli Access date: 24.06.2024.

Yeşiltaş, N. K. (2009). *Sosyal bilgiler öğretiminde yeni yaklaşımlar-I*. İçinde R. Turan, A. M. Sünbül & H. Akdağ. (ed). Sosyal bilgiler öğretiminde afet ve deprem eğitimi (213-240). Ankara: Pegem Akademi.

Yıldırım, A. & Şimşek, H. (2013). *Sosyal bilimlerde nitel araştırma yöntemleri*. Ankara: Seçkin Yayıncılık.

Yıldız, C. D. & Öztürk, E. D. (2023). Üniversite öğrencilerinin depreme ilişkin metaforik algıları. *Üniversite Araştırmaları Dergisi*, 6(3), 308-316. https://doi.org/10.32329/uad.1313899

Yolcu, M. & Bekler, T. (2020). Deprem kültürü ve farkındalık çalışmaları: şili ve elazığ depremlerinin karşılaştırılması. *Lapseki Meslek Yüksekokulu Uygulamalı Araştırmalar Dergisi*, 1(2), 71-82. https://dergipark.org.tr/en/pub/ljar/issue/59169/819563