JOLTIDA Journal of Learning and Teaching in Digital Age, 2025, **10**(2), 287-301
https://dergipark.org.tr/en/pub/joltida
ISSN: 2458-8350 (online)

Research Paper

Natural Disaster Literacy Training for Preschool Teachers

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ARTICLE INFO

Received: 13 April 2025
Revised: 24 May 2025
Accepted: 06 June 2025

Keywords:
natural disaster, disaster literacy, preschool teachers, disaster education, disaster awareness.

doi: 10.53850/joltida.1674816

ABSTRACT

Turkey is in a region where natural disasters (e.g., earthquakes, floods, and landslides) occur frequently due to its geographical location. These disasters cause significant loss of life and property and deeply affect the socioeconomic structure of society. To cope with the destructive effects of disasters and enhance society's resilience against them, disaster education and disaster literacy should be emphasized. The aim of this study is to examine the effect of natural disaster literacy training on preschool teachers' natural disaster literacy levels. The study was conducted with fifty preschool teachers using a quasi-experimental design. Five different tests were used as data collection tools. 50 teachers were selected using the criterion samples method. Teachers participated in a 42-hour natural disaster literacy training program, lasting six hours a day for seven days. A pre-test and a post-test were administered before and after the training. The data were analyzed using the SPSS-25 program. Based on the findings, natural disaster literacy training significantly increased teachers' natural disaster literacy levels, preparedness beliefs, disaster awareness perceptions, and disaster literacy knowledge levels. These results show that natural disaster literacy training is effective in making preschool teachers more prepared and conscious against disasters.

INTRODUCTION

Turkey has been exposed to many natural disasters throughout history due to its geographical location in an active earthquake zone and its diverse climatic characteristics. The most common natural disasters that occur in Turkey are earthquakes, floods, landslides, avalanches, and forest fires (Dikmenli & Yakar, 2019; Ertuğrul and Ünal, 2020). These disasters cause a loss of life and property and negatively affect the lives of both individuals and societies (Yiğit et.al., 2020). In particular, the Marmara Earthquake in 1999 and the earthquake centered in Kahramanmaraş on 6 February 2023, have been a turning point in disaster awareness and management in Turkey. In the aftermath of such disasters, children emerge as one of the most vulnerable groups, both psychologically and developmentally. Studies have shown that exposure to natural disasters can lead to long-term emotional, behavioral, and cognitive impacts on children (Çınaroğlu, Yılmazer, & Sayar, 2025). For example, research conducted after the 2023 Kahramanmaraş Earthquake revealed significant signs of trauma and the need for structured psychosocial support among children (Akgül, 2023; see also: Children After Earthquake: Maraş Earthquake in Türkiye). These findings underline the importance of integrating child-focused strategies into disaster preparedness and response policies. In this context, raising awareness about disaster risks and coping mechanisms among children is essential for fostering a culture of resilience. Furthermore, a study by Aydos et al. (2025) highlighted significant violations of children's rights in the aftermath of the 2023 earthquake, including issues related to shelter, education, health, and protection. The research emphasized the necessity of incorporating child rights-sensitive approaches in disaster response and recovery efforts. In addition, a study by Temeltürk et al. (2024) focused on preschool-aged children who experienced the 2023 Turkey earthquakes and found higher rates of acute stress disorder (ASD) and post-traumatic stress disorder (PTSD) compared to children who experienced other life-threatening events. The study also identified sleep problems as a significant predictor of PTSD in the earthquake-experienced group. Moreover, research by Gül, Özmen and Demirci (2024) analyzed data from children and adolescents at a Child and Adolescent Psychiatry Clinic, identifying common issues such as anxiety, adjustment disorders, ADHD, acute stress disorder, depressive disorder, and tic disorder. These findings underscore the diverse psychological impacts of earthquakes on children and the importance of comprehensive mental health support. After these earthquakes, more comprehensive studies were initiated to prevent disasters and reduce their damage (Sözcü and Aydınözü, 2019). As a part of these efforts, disaster education has gained importance, and the aim is to reach every segment of society.

Disasters are events that affect the social and economic structures of societies and cause a loss of life and property (Ertuğrul & Ünal, 2020). An increasing number of people all over the world are affected by the effects of disasters (Acar, 2023). In Turkey, most disasters are meteorologically induced, and approximately 36% of the disasters that occurred in 2017 and 2018 were caused by storms and tornadoes, 31% by heavy rains and floods, 16% by hail, 7% by snow and 4% by lightning (Ertuğrul & Ünal, 2020). In addition to meteorological disasters, Turkey is a country with a high earthquake risk as it is located on active fault lines.

Between 1923 and 2016, a total of 313 disasters occurred in Turkey, of which 51.1% were natural disasters and 48.9% were technological disasters (Yiğit et al., 2020). As a result of these disasters, a total of 91,797 lives were lost. After 2016, major natural events occurred in Turkey. On 24 January 2020, a 6.8 magnitude earthquake occurred in Elazığ and forty-four people lost their lives. On 30 October 2020, a 6.8 magnitude earthquake occurred in Seferhisar, Izmir, and one hundred and seventeen people lost their lives. In the summer of 2021, there were forest fires affecting fifty-three provinces, in Muğla and Antalya in particular, and eight people lost their lives. On 11 August 2021, there was a flood in the Western Black Sea region, causing major destruction in the provinces of Bartın, Kastamonu and Sinop. On 6 February 2023, Turkey experienced the worst disaster in its history. Consecutive earthquakes of magnitudes 7.8 and 7.7 devastated ten provinces and killed more than 53,537 people (Ministry of Interior, 2024). Considering Turkey's high disaster risk, it is of great importance for society to be prepared for disasters. For this reason, the importance of disaster education and awareness activities is increasing.

Disaster education is the information and awareness-raising activities carried out to ensure that individuals and societies are more resilient against disasters (Dikmenli and Yakar, 2019). The aim of disaster education is to ensure that individuals have the right information about disasters, to develop the right attitudes and behavior against disasters, and to be prepared for disasters (Bulu, 2023). In this way, the aim is to minimize the loss of life and property caused by disasters. Disaster education should cover all segments of society and should start from early ages. At this point, providing disaster awareness to children starting from the preschool period will contribute to society being more resilient against disasters (Sapsağlam, 2019).

Disaster Literacy

Disasters are natural events that societies have encountered since the earliest periods of human history, causing loss of life and property, and causing social and cultural damage (Güngör, 2023). It is known that factors such as climate crisis, global warming, unplanned urbanization and unconscious consumption of natural resources increase the frequency and severity of disasters (Işık & Özcan, 2023). To cope with the destructive effects of disasters and to increase the resilience of society against disasters, disaster education and disaster literacy should be emphasized. Disaster literacy refers to the ability of individuals to understand, interpret, analyze, and make the right decisions in the face of disasters beyond having knowledge about disasters (Sözcü, 2019). This definition is similarly addressed on an international scale. For example, disaster literacy is defined as not only knowledge but also action skills (Finn & O'Fallon, 2017). Disaster literacy is an important component of society's efforts to reduce disaster risks and to be prepared for disasters (Güngör, 2023). Therefore, it is important that disaster literacy education should start from an early age and spread to all segments of society (Günşen &Gök Çolak, 2024).

Schools play an important role in developing disaster literacy (Şulek and Aktın, 2023). UNESCO and UNICEF emphasise the strategic role of schools in disaster risk education as part of the Comprehensive School Safety Framework (UNESCO, 2017). Disaster education, especially at the primary and secondary school level, can play an important role in reducing the negative effects of disasters by providing children with accurate information regarding disasters and developing correct behavior against disasters (Demirdelen & Çakıcı, 2021). Therefore, teachers should have high levels of disaster literacy and be able to guide students in this regard (Güngör, 2023).

Disaster literacy is an important skill that enables individuals to be more resilient in the face of disasters (Yıldırım, 2024). This skill plays a critical role in reducing the loss of life and property caused by disasters, disaster preparedness and post-disaster recovery processes. Therefore, dissemination of disaster literacy education and raising awareness of all segments of society on this issue are of great importance in terms of reducing disaster risks and creating a more resilient society against disasters. Considering that disabled individuals, children, the elderly, and individuals with low socioeconomic status, who are considered as disadvantaged groups in society, are more vulnerable to disasters, it is of great importance to develop and implement special training programs for these groups (Işık & Özcan, 2023). Cutter, Boruff, & Shirley. (2003) state that socioeconomic vulnerabilities reduce resilience to disasters.

Disaster literacy education should not only be limited to the transfer of theoretical knowledge but should also include practical and experiential learning methods (Dufty, 2018). Hands-on disaster education, including drills and simulations, has been shown to significantly increase children's preparedness and response capacity (Johnson et al., 2014). In this context, activities such as disaster scenarios, simulations, drills, and field studies can help individuals learn correct behavior and improve their skills in the face of disasters. In addition, the continuity and timeliness of disaster literacy education is also of great importance. By following the developments in the field of disasters and disaster management, training contents and methods should be continuously updated and improved.

In conclusion, disaster literacy is a critically important concept for reducing disaster risks and creating a more resilient society against disasters. Studies to be conducted in this field will contribute to making the society more prepared against disasters and minimizing the negative impact caused by disasters. A comprehensive and continuous disaster literacy education, especially tailored to the needs of different segments of society, will form the basis for a safer and more resilient future against disasters. The Sendai Framework for Disaster Risk Reduction (2015-2030) also emphasises education and knowledge as a central pillar in building disaster resilience globally (UNDRR, 2015).

The preschool period is a period when children's cognitive, physical, social, and emotional development takes place rapidly. Disaster education to be given to children in this period will help them gain basic knowledge and skills regarding disasters and help them to be more conscious and prepared for disasters (Akman &Yıldırım, 2022). In the literature, it is stated that raising disaster awareness at an early age increases children's resilience against risks and contributes to the development of safety awareness (Özmen, 2020; Rengasamy, 2012). Studies conducted in countries such as Japan and New Zealand have shown that early disaster education can create long-term risk awareness and behavioural preparedness (Shiwaku et al., 2007). In this process, preschool teachers are the most important actors who can provide disaster education in accordance with children's developmental levels. Research shows that teachers' knowledge and skills in disaster education directly affect children's level of preparedness for disasters (Petal, 2008). However, research on preschool teachers' competencies in disaster awareness and disaster education is limited in Turkey. What distinguishes the present study from previous research is its specific focus on preschool education, a critical yet underexplored stage in disaster literacy development. This study is grounded in the principle that awareness and preparedness should begin from the earliest years of life, as early childhood is a crucial period for shaping lifelong attitudes and behaviors. Given that teachers are the primary facilitators of learning during this formative stage, their level of disaster awareness and competency directly affects children's ability to understand and cope with disaster-related risks. In this context, the study adopts the perspective that conscious teachers raise conscious students, emphasizing the foundational role of well-equipped educators in cultivating disaster-resilient individuals from a young age. By focusing on the perceptions and competencies of preschool teachers, this study aims to contribute to the development of disaster education policies that are not only age-appropriate but also sustainable and impactful in the long term.

Purpose of the Study

The main purpose of this study is to examine the effect of natural disaster literacy training on preschool teachers' natural disaster literacy levels. Within the scope of this main purpose, answers to the following questions were sought;
Preschool teachers,
1- Is there a statistically significant difference between the pretest and posttest scores of natural disaster behavior?
2- Is there a statistically significant difference between natural disaster affective disposition pretest and posttest scores?
3- Is there a statistically significant difference between the pretest and posttest scores of general disaster preparedness beliefs?
4- Is there a statistically significant difference between the pretest and posttest scores of disaster awareness perception?
5- Is there a statistically significant difference between pretest and posttest scores of natural disaster literacy knowledge?

METHOD

Research Model

In the study, the aim is to examine the effect of natural disaster literacy training on teachers' natural disaster knowledge levels, disaster awareness perceptions, natural disaster literacy levels, natural disaster preparedness beliefs and natural disaster behavior. For this purpose, the study was designed according to a quasi-experimental design. The experimental process is given in Table 1.

Table 1. One Group Pretest-Posttest Quasi-Experimental Design

Group	Pre-test	Procedure	Post-test
Fifty Preschool Teachers	Natural Disaster Behavior Scale Natural Disaster Literacy Affective Dispositions Scale Natural Disaster Preparedness Belief Scale Disaster Awareness Perception Scale	Forty-two hours of natural disaster literacy training lasting six hours a day for seven days	Natural Disaster Behavior Scale Natural Disaster Literacy Affective Dispositions Scale Natural Disaster Preparedness Belief Scale Disaster Awareness Perception Scale

As can be seen in Table 2, within the scope of the study, fifty teachers were given natural disaster literacy training in two different groups in the cities of Van and Muş for seven days for a total of forty-two hours. The training programmes implemented in Van and Muş were the same and the process was carried out as in the table.

Tablo 2. Çarem Project Training Content

Van	Muş	Content
21 August 2023	28 August 2023	09:00-10:30 Opening Speeches, Introduction of the Project Team, Information About the Project

		10:45-11:45 Integration of different methods and techniques into PEP 11:45-13:00 Natural disasters, their characteristics, before-during-after and risk mitigation methods 14:00-16:30 Puppet presentation and playback 16:45-19:30 The use of traditional puppet technique in preschool period, features and examples-1
22 August 2023	29 August 2023	09:00-13:00 Field trip 14:00-16:30 The use of traditional puppet technique in preschool period, features and examples-2 16:45-19:30 The use of traditional puppet technique in preschool period, features and examples-3
23 August 2023	30 August 2023	09:00-10:30 Digital gamification in education and its use in pre-school 10:45-13:00 Infocratic & brochure preparation and its use in preschool education 14:00-16:30 The use of traditional puppet technique in preschool period, features and examples-4 16:45-19:30 The use of traditional puppet technique in preschool period, features and examples-5
24 August 2023	31 August 2023	09:00-10:30 Interactive story and book reading techniques and their use in preschool period-1 10:45-13:00 Interactive story and book reading techniques and their use in preschool period-2 14:00-16:30 The use of traditional puppet technique in preschool period, features and examples-6 16:45-19:30 The use of drama activity in preschool education and basic elements and examples
25 August 2023	1 September 2023	09:00-10:30 Augmented reality elements and integration into preschool education-1 10:45-13:00 Augmented reality elements and integration into preschool education-2 14:00-16:30 Designing a drama activity for natural disasters. 16:45-19:30 Designing a drama activity for natural disasters
26 August 2023	2 September 2023	09:00-10:30 Augmented reality elements and integration into preschool education-3 10:45-13:00 Sand Box education and its use in preschool period 14:00-16:30 STEM, STEM+A and STEM+D applications and examples in preschool education-1 16:45-19:30 STEM, STEM+A and STEM+D applications and

	examples in pre-school education-2

As can be seen in the table, the programme was delivered effectively. The educational environment was equipped by the project team with materials that would not disrupt the process. While the training in Van was held in İpekyolu Youth Centre of the Ministry of Youth and Sports, the training in Muş was held in the classrooms of the Faculty of Education of Muş Alparslan University. A pre-test and a post-test were administered before and after the training. Since there was only one group, pretest, and posttest in the study, it is an example of quasi-experimental design. Since there is no random assignment or group matching in this design, it has several limitations in terms of internal validity (Büyüköztürk et al., 2014). However, the voluntary participation of the participants, the application of the pretest and posttest in the same environment and conditions, and the voluntary participation of all participants, except for two participants, contributed to the internal validity of the study.

Population and Sample

Within the scope of the study, data were collected from four provinces where earthquakes, floods, avalanches, and landslides are frequently observed. For this purpose, fifty-two preschool teachers working in the cities of Muş, Bitlis, Van and Hakkâri in the Eastern Anatolia Region were included in the study. In the selection of the teachers, a total of forty-eight teachers (4x6x2=48) from four different provinces (4) and two schools at each socio-economic level in each province (Ministry of National Education, 2023) (2x3=6) as well as two teachers from each school were selected by the criterion sampling method. Criterion sampling involves selecting cases that meet some predetermined criterion of importance (Patton, 2001). In addition, four volunteer teachers were included in the study. During the research process, two teachers left the study for various reasons and the study continued with a total of fifty teachers. All the preschool teachers in the study were female. Of these teachers, twelve (24%) were married and thirty-eight (76%) were single. While thirty-four (68%) of these teachers had between one and five years of seniority, twelve (24%) had between six and ten years of seniority, and four (8%) had beween eleven and fifteen years of seniority.

Data Collection Tools

Within the scope of the research, a total of five data collection tools were used.

The Natural Disaster Literacy Behavior Scale

The scale was developed by Sözcü (2019). In the final version of the scale, there are twenty-three items and three factors (Geographical Inquiry, Personal Protection Measure, Physical and Intellectual Approach). The final version of the scale with three factors explained 49.91% of the total variance. The item-total correlation values of the scale ranged between 0.35 and 0.85. While the reliability value for the overall scale is 0.87, the reliability values of the sub-dimensions vary between 0.72 and 0.91.

The Natural Disaster Literacy Affective Dispositions Scale

The Natural Disaster Affective Dispositions Scale was developed by Sözcü (2019). The scale consists of twenty-five items and three factors (Sensitivity, Awareness, Individual and Community Preparedness). The scale explains 42% of the total variance. The Cronbach Alpha (α) reliability value was obtained as 0.81. The item-total correlation values of the scale vary between 0.30 and 0.68.

The General Disaster Preparedness Belief Scale

The General Disaster Preparedness Belief Scale was developed by İnal, Altıntaş, and Doğan (2018) and consists of thirty-one items and six factors (Perceived Sensitivity, Perceived Seriousness, Perceived Benefit, Perceived Barriers, Mobilizers, and Self-efficacy). The final version of the scale explains 59.2% of the total variance. Cronbach Alpha (α) values for the sub-dimensions of the scale ranged between 0.74 and 0.90. The item-total correlation values of the scale items ranged between 0.38 and 0.87.

The Disaster Awareness Perception Scale

The Disaster Awareness Perception Scale was developed by Dikmenli, Yakar, and Konca (2018) and consists of thirty-six items and four factors (Disaster Education Awareness, Pre-Disaster Awareness, False Disaster Awareness, Post-Disaster Awareness). The Cronbach Alpha (α) reliability coefficient value of the scale was 0.72. Achieving high scores from the scale means that pre-service teachers have high disaster awareness.

The Natural Disaster Literacy Achievement Test

The test was developed by Sözcü (2019) to determine the level of knowledge of pre-service teachers on natural disaster literacy. There are twenty-four items in the final version of the achievement test. The KR-20 coefficient for the reliability of the

measurements obtained from this test was 0.81, while the average item difficulty index values were 0.64 and the average item discrimination values were 0.46.

Process Data Analysis

Within the scope of the research, face-to-face training was conducted with preschool teachers working in Van and Hakkâri between 21-27 August 2023, at the Van İpekyolu Youth Center, and with preschool teachers working in Muş and Bitlis between 28 August and 3 September 2023, at the Muş Alparslan University.

The data obtained from the measurement tools applied as pretest and posttest in the study were analyzed with an SPSS-25 programme. To report the descriptive findings, arithmetic mean ($\overline{X}$) and standard deviation (SD) values were reported. In line with the main purpose of the study, the distribution of the data obtained from the measurement tools was examined to decide on the analysis to be performed in order to compare the pretest and posttest scores within a single group. For this purpose, skewness and kurtosis values were taken into consideration. The results obtained are given in Table 3.

Table 3. Skewness and Kurtosis Values for Normality of Distribution

Scales	Subscales	N	Pre-test		Post-test	
			Skewness	Kurtosis	Skewness	Kurtosis
Natural Disasters Behavior Scale	Geographical Inquiry	50	0.02	-1.06	-2.13	2.26
	Personal Protection Measure	50	0.72	0.59	-1.49	1.42
	Physical and Intellectual Approach	50	0.31	-1.25	-2.20	1.06
Natural Disaster Literacy Affective Dispositions Scale	Sensitivity	50	-1.20	2.38	-0.42	-1.09
	Consciousness	50	-1.19	2.50	-2.18	2.76
	Individual and Social Readiness	50	-1.78	1.94	-1.88	2.12
General Disaster Preparedness Belief Scale	Overall	50	1.25	1.17	-0.75	0.90
	Perceived Responsiveness	50	-1.04	1.14	-0.83	0.77
	Perceived Seriousness	50	0.22	-1.56	-0.76	-0.64
	Perceived Benefit	50	-0.29	0.14	-1.16	0.97
	Perceived Barriers	50	0.33	-1.31	-1.32	1.70
	Mobilizers	50	0.35	-0.32	-0.08	-0.09
	Self-efficacy	50	-0.88	0.63	-0.94	0.86
Disaster Awareness Perception Scale	Overall	50	0.03	0.88	-0.61	1.25
	Disaster Education Awareness	50	0.70	-0.71	0.12	-0.12
	Pre-Disaster Awareness	50	-0.40	0.32	-1.51	2.06
	False Disaster Awareness	50	-0.99	0.60	-1.73	1.90
	Post-Disaster Awareness	50	-0.69	-0.27	-1.67	2.16
Natural Disaster Literacy Achievement Test		50	-0.35	-0.49	-0.05	-0.90

As can be seen in Table 2, the skewness and kurtosis values of all the scales are generally between -1 and +1. This value shows that the distributions do not deviate much from normal (Hair et al., 2010). Since the distributions are normal, a Dependent Samples T-test, one of the parametric methods, was used as the data analysis method. A significance level of 0.05 was taken into consideration.

FINDINGS

Natural disaster literacy training was given to fifty teachers within the scope of the study. Before and after the training, The Natural Disasters Behavior Scale, The Natural Disaster Literacy Affective Tendencies Scale, The General Disaster Preparedness Belief Scale, The Disaster Awareness Perception Scale and The Natural Disaster Literacy Achievement Test were applied. In this way, the effectiveness of the training given to the teachers within the scope of the Project was determined.
In the context of the first sub-objective of the study, descriptive findings related to the scores obtained from the measurement tools applied were reported. The findings obtained are given in Table 4.

Table 4. Descriptive Statistics of the teachers' scores on the scales

Scales	Subscales	*N*	Pre-test		Post-test	
			$\overline{X}$	*SS*	$\overline{X}$	*SS*
Natural Disasters Behavior Scale	Geographical Inquiry	50	32.72	7.09	45.92	4.46
	Personal Protection Measure	50	15.14	4.84	27.10	3.23
	Physical and Intellectual Approach	50	28.48	3.71	31.56	3.61
	Sensitivity	50	67.12	5.61	71.26	3.49

Natural Disaster Literacy Affective Dispositions Scale	Consciousness	50	32.16	2.56	33.58	2.49
	Individual and Social Readiness	50	10.00	1.70	11.24	2.15
General Disaster Preparedness Belief Scale	Overall	50	183.28	11.38	204.12	7.37
	Perceived Responsiveness	50	26.62	2.31	28.44	1.45
	Perceived Seriousness	50	17.22	1.99	18.30	1.88
	Perceived Benefit	50	25.86	2.87	27.82	2.14
	Perceived Barriers	50	57.94	5.17	65.80	3.51
	Mobilizers	50	16.60	3.42	19.52	3.32
	Self-efficacy	50	39.04	5.19	44.24	3.57
Disaster Awareness Perception Scale	Overall	50	156.38	7.21	168.16	5.84
	Disaster Education Awareness	50	57.74	3.31	59.18	3.25
	Pre-Disaster Awareness	50	36.22	2.19	38.68	1.41
	False Disaster Awareness	50	37.18	2.17	38.58	1.81
	Post-Disaster Awareness	50	25.24	4.77	31.72	2.81
Natural Disaster Literacy Achievement Test			19.48	1.75	20.72	1.89

As can be seen in Table 3, the mean pretest scores of the teachers in the geographical inquiry sub-dimension of the natural disasters behavior scale increased from $\overline{X}$ =32.72 to $\overline{X}$ =45.92, in the personal protection measure sub-dimension from $\overline{X}$ =15.14 to $\overline{X}$ =27.10, and in the physical and intellectual approach sub-dimension from $\overline{X}$ =28.48 to $\overline{X}$ =31.56.

Considering the scores obtained from the sensitivity sub-dimension of the natural disaster literacy affective dispositions scale, the pretest mean scores $\overline{X}$ =67.12, the posttest mean scores $\overline{X}$ =71.26, the consciousness sub-dimension pretest mean scores $\overline{X}$ =32.16, the posttest mean scores $\overline{X}$ =33.58, and the individual and social preparedness sub-dimension pretest mean scores $\overline{X}$ =10.00, posttest mean scores $\overline{X}$ =11.24.

Considering the scores obtained from the overall natural disaster preparedness belief scale; the mean pretest score was $\overline{X}$ =183.28 while the mean posttest score was $\overline{X}$ =204.12; the mean pretest score was $\overline{X}$ 26.62 while the mean posttest score was $\overline{X}$ =28.44; the mean pretest score was $\overline{X}$ =17.22 while the mean posttest score was $\overline{X}$ =17.22; the mean posttest score was = 18.30, the mean pretest score was $\overline{X}$ =25.86, while the posttest mean score was $\overline{X}$ = 27.82; the perceived barriers (this sub-dimension is reverse scored) sub-dimension pre-test mean score was $\overline{X}$ =57.94, while the posttest mean score was $\overline{X}$ =65.80; the enablers sub-dimension pre-test mean score was $\overline{X}$ =16.60, while the posttest mean score was $\overline{X}$ =19.52; the self-efficacy sub-dimension pre-test mean score was $\overline{X}$ =39.04, while the post-test mean score was $\overline{X}$ =44.24.

When the scores obtained from the overall disaster awareness scale are taken into consideration: the pretest mean scores $\overline{X}$ =156.38; the posttest mean scores $\overline{X}$ =168.16; the disaster education awareness sub-dimension pretest mean scores $\overline{X}$ =57.74; the posttest mean scores $\overline{X}$ =59.18; the pre-disaster awareness sub-dimension pretest mean scores $\overline{X}$ =36.22, while the posttest mean score was $\overline{X}$ =38.68; the pre-test mean score for the sub-dimension of false disaster awareness (this sub-dimension was reverse scored) was $\overline{X}$ =37.18, while the post-test mean score was $\overline{X}$ =38.58; and the post-disaster awareness sub-dimension pre-test mean score was $\overline{X}$ =25.24, while the post-test mean score was $\overline{X}$ =31.72.

Considering the scores of the teachers from the natural disaster literacy achievement test, the mean pretest score was $\overline{X}$ =19.48, while the mean posttest score was $\overline{X}$ =20.72.

The findings obtained show that there is an increase in the scores of the teachers in all the scales and sub-dimensions after the training. To test the effectiveness of the natural disaster literacy training, the teachers' pretest and posttest scores were compared and the findings are given in Table 5.

Table 5. The dependent sample T-test results for the comparison of the teachers' pretest and posttest scores

	Test	**Test**	**N**	**X̄**	**t**	**sd**	**p**
Natural Disasters Behavior Scale	Geographic Inquiry	Pre-test	50	32.72	-13.62	49	0.000*
		Post-test	50	45.92			
	Personal Protection Measure	Pre-test	50	15.14	-17.48	49	0.000*
		Post-test	50	27.10			
	Physical and Intellectual Approach	Pre-test	50	28.48	-5.31	49	0.000*
		Post-test	50	31.56			
Natural Disaster Literacy Affective Dispositions Scale	Sensitivity	Pre-test	50	67.12	-6.77	49	0.000*
		Post-test	50	71.26			
	Consciousness	Pre-test	50	32.16	-3.04	49	0.004*

			Post-test	50	33.58		
	Individual and Social Preparedness		Pre-test	50	10.00	-3.08	49	0.003*
			Post-test	50	11.24		
General Disaster Preparedness OvBelief Scale	Overall Scale		Pre-test	50	183.28	-12.39	49	0.000*
			Post-test	50	204.12		
	Perceived Responsiveness		Pre-test	50	26.62	-5.39	49	0.000*
			Post-test	50	28.44		
	Perceived Seriousness		Pre-test	50	17.22	-2.47	49	0.017*
			Post-test	50	18.30		
	Perceived Benefit		Pre-test	50	25.86	-4.21	49	0.000*
			Post-test	50	27.82		
	Perceived Barriers		Pre-test	50	57.94	-13.23	49	0.000*
			Post-test	50	65.80		
	Mobilizers		Pre-test	50	16.60	-6.66	49	0.000*
			Post-test	50	19.52		
	Self-efficacy		Pre-test	50	39.04	-8.75	49	0.000*
			Post-test	50	44.24		
Disaster Awareness Perception Scale	Overall Scale		Pre-test	50	156.38	-11.29	49	0.000*
			Post-test	50	168.16		
	Disaster Education Awareness		Pre-test	50	57.74	-3.53	49	0.001*
			Post-test	50	59.18		
	Pre-Disaster Awareness		Pre-test	50	36.22	-7.78	49	0.000*
			Post-test	50	38.68		
	False Disaster Awareness		Pre-test	50	37.18	-4.58	49	0.000*
			Post-test	50	38.58		
	Post Disaster Awareness		Pre-test	50	25.24	-10.73	49	0.000*
			Post-test	50	31.72		
Natural Disaster Literacy Achievement Test			Pre-test	50	19.48	-3.51	49	0.001*
			Post-test	50	20.72		

*p<0,05

As can be seen in Table 4, the scores of the teachers on geographical inquiry (t=-13.62; p<0.05), personal protection measures (t=-17.48; p<0.05), and physical and intellectual approach (t=-5.31; p<0.05) sub-dimensions of the Natural Disasters Behavior Scale show a statistically significant difference in favor of the posttest. The findings show that the natural disaster literacy training given to teachers is effective in increasing their natural disaster behavior.

When the scores of the teachers from the affective dispositions of the Natural Disaster Literacy Scale are taken into consideration, the scores obtained from the sensitivity (t=-6,77; p<0,05), consciousness (t=-3,04 p<0,05), and individual and social preparedness (t=-3,08; p<0,05) sub-dimensions of the scale show a statistically significant difference in favor of the posttest. The findings show that the natural disaster literacy training given to the teachers was effective in increasing their affective dispositions towards disaster.

When the scores obtained from the General Natural Disaster Preparedness Belief Scale were taken into consideration, the scores of the teachers showed a statistically significant difference in favor of the posttest (t=-12.39; p<0.05). The perceived sensitivity (t=-5,39; p<0,05), perceived seriousness (t=-2,47; p<0,05), perceived usefulness (t=-4,21; p<0,05), perceived barriers (t=-13,23; p<0,05), mobilizers (t=-6,66; p<0.05) and self-efficacy (t=-8.75; p<0.05) sub-dimensions also showed a statistically significant difference in favor of the posttest. The findings show that the natural disaster literacy training given to the teachers was effective in increasing their disaster preparedness beliefs.

When the scores of the teachers from the Disaster Awareness Perception Scale were taken into consideration, a statistically significant difference was obtained in favor of the posttest (t=-11.29; p<0.05). Similarly, the scores obtained from the disaster education awareness (t=-3,53; p<0,05), pre-disaster awareness (t=-7,78; p<0,05), false disaster awareness (t=-4,58; p<0,05) and post-disaster awareness (t=-10,73; p<0,05) sub-dimensions of the scale also showed a statistically significant difference in favor of the posttest. The findings show that the natural disaster literacy training given to teachers was effective in increasing their perceptions of disaster awareness.

Considering the results of the Natural Disaster Literacy Achievement Test applied before and after the training, it was concluded that the posttest scores were higher than the pretest scores and this difference was statistically significant (t=-3.51; p<0.05). The

findings obtained show that the natural disaster literacy training given to teachers is effective in increasing their natural disaster knowledge levels.

When the findings obtained are considered in general, it is concluded that the natural disaster literacy training given to teachers is effective. After the training, a significant increase was observed in the teachers' natural disaster literacy levels, natural disaster preparedness beliefs, disaster awareness perceptions and disaster literacy knowledge levels.

CONCLUSION, DISCUSSION AND RECOMMENDATIONS

The following results were reached in the context of the main and sub-objectives of the study.

The natural disaster literacy training given to teachers show that this training is effective in increasing natural disaster behavior. After the training, the teachers' geographical inquiry, personal protection measures, and physical and ideational approach skills increased significantly. This result is like many studies in the literature. For example, Güngör (2023) found that pre-service teachers did not have problems in the steps of accessing, understanding, and evaluating information regarding disasters, but they could have problems in the implementation step. This reveals that disaster training should be designed in such a way as to go beyond theoretical knowledge and develop practical skills. Similarly, the United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2015) emphasized that disaster literacy training improves teachers' preparedness and response capacities for disasters by increasing practical knowledge and skills. İnal et.al. (2012) and Kocaman (2019) found that individuals who received disaster training had higher levels of disaster preparedness and knowledge than those who did not. Similarly, Ertuğrul and Ünal (2020) found that students who received disaster education had higher general disaster preparedness beliefs than those who did not. In the literature, it is stated that disaster education not only increases the level of knowledge, but also improves individuals' post-disaster survival skills and strengthens their self-efficacy perceptions (Twigg, 2015). These results show that disaster education positively affects individuals' disaster preparedness levels and beliefs. However, different results were also found in other studies. In a study conducted by Demirbilek and Gökkaya (2022) with the students of the Emergency Aid and Disaster Management (EADM) department, it was found that there was a significant positive relationship between the participants' general disaster preparedness beliefs and their psychological resilience, but there was a significant negative relationship between their perceived seriousness and their psychological resilience. According to the results of this study, the participants' high level of disaster preparedness positively affected their psychology, while their psychology was negatively affected as the perceived seriousness of disasters increased. Similarly, Brock et al. (2020) stated that disaster training was effective in increasing the psychological resilience level of their participants, but the participants' ability to cope with the perceived severity of disasters varied depending on the quality of the training. This shows that disaster training should not only be limited to providing information but should also be designed to support psychological resilience. Yıldırım (2024) revealed that the natural disaster literacy levels of special education students were low and their psychological resilience levels remained at an average level. These results suggest that individuals with special needs may be more vulnerable to disasters and therefore, the disaster awareness and psychological resilience of special education teachers should be improved. According to research, disaster training for individuals with special needs plays a critical role in increasing their preparedness and coping capacities (Lindsay, 2011). In several studies in the literature, it was observed that the knowledge levels of individuals receiving disaster training increased (Çelik, 2020; Herdiansyah et al., 2020). This can be interpreted as the increase in the knowledge levels of individuals who receive disaster education contributes to their being more prepared for disasters. For example, Ronoh et.al. (2015) showed that individuals who received disaster education improved not only their knowledge levels but also their ability to exhibit safe behavior during disasters. Günşen and Gök Çolak (2024) found that preservice preschool teachers' processes of developing science, technology, engineering, and mathematics (STEM) projects for disaster awareness positively affected their disaster awareness perceptions and STEM self-efficacy. This shows the importance of disaster awareness education from early childhood and how interdisciplinary approaches such as STEM can be integrated into this education. STEM-based disaster education is seen as an important tool in developing individuals' analytical thinking, problem-solving and collaboration skills (Bequette & Bequette, 2012).

The effectiveness of natural disaster training given to teachers can create positive changes not only in the level of knowledge but also in attitudes and behavior. In this context, increasing teachers' disaster awareness and consciousness can help them and their students to be more prepared for disasters and to act more effectively in disaster situations (Demirdelen & Çakıcı, 2023). In the literature, there are findings that disaster education provides multidimensional effects. For example, Dufty (2018) states that disaster education programs are generally based on providing general information and preparedness plan templates focusing on cognitive learning. However, he emphasizes that disaster education should also cover different learning domains such as social learning, experiential learning, and transformational learning. This will enable disaster education to go beyond mere transfer of knowledge and enable individuals and societies to prepare more effectively for disasters and cope better in disaster situations. On the other hand, certain studies question the effectiveness of official information and communication, especially in preparedness for natural disasters such as earthquakes. Kirschenbaum, Rapaport, and Canetti (2017) argue that public information and communication strategies for disaster situations can sometimes be inadequate and therefore individuals act according to their own risk perceptions. However, Cornia, Dressel, & Pfeil (2016) emphasize that risk culture and approaches towards disasters may differ among societies and communication strategies for societies with different risk cultures should take these differences into account. In addition, the effects of disaster education on psychological resilience have also been emphasized. For example, Finnis and Johnston (2015) state that disaster training can help individuals recover faster after a

disaster by increasing their psychological resilience. These findings show that disaster training contributes to individuals' emotional and psychological empowerment beyond increasing their knowledge levels. In conclusion, disaster education and natural disaster literacy are critical in reducing the negative impact of disasters. Research in this field shows that education affects not only the level of knowledge but also attitudes, behavior, self-efficacy, and psychological resilience. Therefore, disaster training should start from an early age, cover all segments of the society, develop practical skills, and be designed to support psychological resilience (UNESCO, 2017).

In the context of the second sub-objective of the study, the effect of natural disasters literacy training given to teachers on their affective skills towards natural disasters was examined and it was concluded that the training was effective in increasing teachers' affective dispositions (sensitivity, awareness, individual and social preparedness) towards natural disasters. This result is consistent with several studies in the literature. For example, in a study conducted by Vu et al. (2023), it was found that natural disaster awareness, knowledge and skills were highly interrelated and natural disaster preparedness education positively affected all these components. Similarly, in another study conducted by Genç et al. (2022), it was stated that the disaster literacy scores of the participants who received disaster training were significantly higher than those who did not receive training. Şulek and Aktın (2023) also stated that social studies textbooks contribute to disaster awareness and consciousness. Similar results were also found in international studies. For example, Tanaka (2005) states that education plays a critical role in raising disaster awareness and that teachers' knowledge and attitudes towards disasters have an impact on students. Paton (2007) states that disaster education increases the risk perception of individuals and leads them to more proactive behavior. In addition, Wisner et al. (2012) emphasize the impact of disaster education on building social resilience and reveals that such programs not only increase individuals' knowledge levels but also strengthen their emotional resilience. Efeoglu et al. (2021) also state in their study that higher education levels and internal locus of control have a negative effect on perceived barriers. However, certain studies point to limitations in achieving behavioral changes. In a study conducted with pre-service teachers, Türker and Sözcü (2021) found that the participants' natural disaster literacy levels were generally high, but that they remained at a medium level in the behavioral dimension. This suggests that natural disaster education can be effective in improving knowledge and affective skills, but it may require more effort to ensure behavioral changes. Similarly, the Federal Emergency Management Agency (FEMA 2018) stated that disaster preparedness programs are generally successful in increasing the level of knowledge and awareness, but more comprehensive and repeated interventions are needed for behavioral changes. Gökçay and Çevirme (2023) state that there is a positive relationship between disaster preparedness beliefs, hopelessness, and fatalism, and that this will increase anxiety and helplessness against disasters. Similarly, Becker et al. (2013) state that while disaster preparedness education creates positive attitudes in individuals, it can sometimes lead to anxiety by increasing the perceived seriousness of the risk. Despite the differences in the literature, the results of this study suggest that natural disaster education plays an important role in improving teachers' affective skills and these skills can help them prepare for and respond to disasters more effectively. However, the need for more comprehensive and long-term training programs for the sustainability of this effect and its transformation into behavioral changes should not be ignored. As Işık and Özcan (2023) state, disaster awareness and consciousness can be increased through visual materials and educational programs. As Güngör (2023) states, pre-service teachers should be more involved and informed in the stages of mitigation and preparation for disasters. As suggested by Wisner et al. (2012), disaster education should focus not only on knowledge transfer, but also on interactive learning approaches that change individuals' attitudes towards risks. Bulut (2023), on the other hand, states that various studies have been conducted to raise awareness in society regarding disaster education and to create a front against disasters, but these studies are insufficient. In this context, it is recommended to implement more comprehensive and long-term training programs to educate all segments of society regarding disasters and to improve disaster literacy.

In the context of the third sub-objective of the study, the effect of natural disasters literacy training given to teachers on their disaster preparedness beliefs was examined and it was concluded that natural disasters literacy training given to teachers was effective in increasing their perceived susceptibility, perceived seriousness, perceived benefit, perceived barriers, enablers, and self-efficacy levels. This finding is also supported by studies in the literature. It is also emphasized in the international literature that there is a positive relationship between disaster education and disaster awareness (Güngör, 2023; Ivanov & Cvetkovic, 2014). Ivanov and Cvetkovic (2014) state that local communities and schools play key roles in disaster awareness and risk reduction processes. Similarly, Goddard et al. (2018) state that disaster awareness training for university students provides positive changes in self-efficacy and risk perception by increasing the level of knowledge. This shows that disaster education increases both knowledge and confidence levels of individuals and enables them to be more prepared for disaster situations. A study by Vu et al. (2023) reveals that natural disaster preparedness training contributes to individuals to act more consciously against disasters by improving their knowledge, skills, and risk perception. Demirdelen and Çakıcı (2023) emphasize that teachers' natural disaster literacy levels can be improved through training and that this training can increase their confidence towards disaster situations. Yıldırım (2024) found that the psychological resilience of prospective special education teachers increased significantly after receiving natural disaster literacy training. Ertuğrul and Ünal (2020) determined that disaster education strengthened students' disaster preparedness beliefs. This reveals that disaster education develops both cognitive and affective dimensions of individuals and creates permanent effects on attitudes and beliefs towards disasters. Furthermore, Genç et al. (2022) emphasize that disaster literacy plays a critical role in increasing the overall disaster resilience of society and draw attention to the importance of disseminating disaster education. In particular, the role of schools and communities in the disaster education process has also been addressed as an important issue in the international literature in developing disaster awareness. For example, Baker and Cormier (2015) state that families and local communities should also be included in the process in

raising disaster awareness. In addition, it is also stated that individuals who receive disaster education make more effort to transform this knowledge into behavior (Mubarak, Amiruddin, & Gaus, 2019). This study once again shows that disaster education is effective in increasing teachers' perceived susceptibility, perceived seriousness, perceived benefits, perceived barriers, enablers, and self-efficacy levels. However, more comprehensive and long-term training programs are needed for the sustainability of this effect and its transformation into behavior.

In the context of the fourth sub-objective of the study, the effect of natural disasters literacy training given to teachers on their disaster awareness perception levels was examined and the results show that the natural disasters literacy training given to teachers was effective in increasing their general perception levels of disaster awareness, disaster education awareness, pre-disaster awareness, accurate disaster awareness, and post-disaster awareness. Gökçay and Çevirme (2023) examined individuals' disaster preparedness beliefs in terms of various variables and found that psychological factors such as hopelessness and fatalism affect disaster preparedness beliefs. This finding shows that disaster training should not only provide information, but also take into account the psychological states of individuals. Similarly, Gowing et al. (2017) emphasize that disaster preparedness programs should not only provide information but also help individuals manage their negative emotions such as fear, panic and stress. Güngör (2023) examined the knowledge levels of pre-service teachers on pre-disaster mitigation and preparedness and found that although pre-service teachers have knowledge on these issues, they have deficiencies in practice. This supports the idea that disaster training should include practical activities as well as theoretical knowledge. Similarly, Shaw and Okazaki (2004) state in a study that disaster training should be supported not only in classroom environment but also with simulations and field activities. It has been revealed that such practices increase behavioral changes in disaster preparedness. İnal et al. (2018) examined the disaster awareness of public employees and the factors affecting this awareness. In the study, it was found that people who received disaster training had higher pre-disaster awareness levels, but that receiving disaster training did not have a significant effect on post-disaster awareness. This shows that disaster training should be comprehensive and should include pre-disaster preparedness as well as post-disaster response and recovery. In this context, Paton (2007) argues that post-disaster intervention and psychological recovery processes should be an integral part of disaster awareness training. Yıldırım (2024) examined the natural disaster literacy levels of special education students in terms of nunerous variables. In the study, it was found that male students and second grade students had higher natural disaster literacy levels. This shows that disaster training should be differentiated according to the target group and that individuals with special needs should be made aware of disasters. Günşen and Gök Çolak (2024) reveal that STEM projects were effective in increasing disaster awareness perception levels and in the STEM self-efficacy of pre-service preschool teachers. This study shows the importance of using different teaching methods in disaster education and that increasing pre-service teachers' self-efficacy in this subject can positively affect their disaster awareness perception levels. Similarly, Chan (2012) emphasizes that problem-based learning and STEM-based activities are effective in increasing disaster awareness. In conclusion, the research emphasizes the importance of disaster education and the need to provide it to different audiences through various methods. Disaster education should not only convey theoretical knowledge, but also include hands-on activities, psychological factors, and awareness activities for individuals with special needs (Gowing et al., 2017; Shaw and Okazaki, 2004). Moreover, Ivanov and Cvetkovic (2014) emphasize the importance of schools, families, and local communities working together in raising disaster awareness.

In the context of the fifth sub-objective of the study, the effect of natural disasters literacy training given to teachers on their natural disaster literacy knowledge levels was examined and it was concluded that it significantly increased their natural disaster literacy knowledge levels. Sözcü (2020) examined disaster education studies in Turkey and found that disaster education intervention increased participants' disaster awareness and knowledge levels. Similarly, in a study conducted by Genç et al. (2022), it was determined that the disaster literacy levels of participants who received disaster education were higher. These results support our findings that receiving training on natural disasters increases the knowledge levels of individuals. Gökçay and Çevirme (2023) in particular, in their study, found that individuals who received training on disasters and their management had lower hopelessness and fatalistic tendencies than those who did not. This shows that disaster education can positively affect not only the level of knowledge but also the psychological states of individuals. In the international context, Wisner et al. (2004) state that disasters generally cause more damage due to a lack of knowledge and a low-risk perception. In this context, improving disaster literacy plays a key role in increasing the capacity of individuals to protect themselves from disasters. Moreover, Petal and Izadkhah (2008) reveal that disaster education increases not only the knowledge level of individuals but also the resilience level of communities. In their study, it was emphasized that training programs should be designed to increase risk awareness and response capacity. Yıldırım (2024) also states that there is a positive relationship between education level and disaster literacy, and that disaster literacy increases as education level increases. This finding also supports the importance of the training given to teachers. On the other hand, several studies reveal different results. For example, Şulek and Aktın (2023) report that the content related to disaster education was not sufficiently included in the 2018 Social Studies Curriculum and associated textbooks. This situation suggests that teachers may not have sufficient knowledge and equipment regarding disaster education. In addition, Burde et al. (2016) examines the effects of educational intervention on access to learning, learning quality and protection in conflict and disaster situations. It was stated that education does not always have a positive impact in conflict and disaster situations, and in certain cases it may fuel conflict, or the content of education may be biased. This emphasizes the importance of the content and implementation of disaster education intervention. In a study conducted by Güngör (2023), it was stated that the disaster literacy levels of pre-service teachers were generally high, but that there were deficiencies in the implementation dimension. This shows that although pre-service teachers have theoretical knowledge, they may be ill-equipped in putting this knowledge into practice. Bourn and Brown (2011) emphasize that disaster education should include not only a knowledge

transfer-oriented approach but also critical thinking, collaboration, and real-life skills. Therefore, it is important to include practical training and drills as well as theoretical knowledge in disaster education.
In parallel with the results of the study, the following recommendations are made for researchers, policy makers and educators.

Suggestions for Researchers

Different Teaching Methods and Activities: By using different teaching methods and activities in natural disaster education, researchers could ensure more active participation of students and a deepening of their learning. For example, methods such as simulations, role-playing activities, field studies and gamified learning can be used.
Psychological and Social Dimension: Researchers could focus more on the psychological and social dimensions of natural disaster education. Research could also be conducted on the effects of disasters on the psychology of individuals and societies, post-traumatic stress disorder, anxiety, and depression.

Diversification of Training Materials: Researchers could develop various educational materials suitable for different age groups and learning styles. These materials could include interactive games, animations, videos, brochures, and social media content.
Longitudinal Studies: Researchers could design longitudinal studies to examine the long-term effects of natural disaster education. These studies are important in determining the durability of the training and whether it translates into behavioral change.

Recommendations for Policy Makers

Making Disaster Education Compulsory: Legislators could make natural disaster education compulsory at all levels of education. In this way, all segments of society could be made aware of disasters.

Allocating Resources for Disaster Education: Legislators should allocate sufficient resources for natural disaster education. These resources could be used for teacher training, educational materials, disaster drills in schools and disaster response equipment.
Setting Standards for Disaster Education: Legislators could set national standards for natural disaster education. These standards should cover the content, methods, and evaluation criteria of such training.

Community-Based Disaster Education Programs: Legislators could support community-based disaster education programs. These programs could be carried out through local administrations, non-governmental organizations, and volunteers.

Suggestions for Educators

Updating Training Programs: Practitioners should regularly update their natural disaster training programs. These updates should be made in line with the latest scientific information, disaster scenarios and response methods.
Interactive Education Methods: Practitioners should encourage active participation of students by using interactive education methods in natural disaster education.

Practical Drills: Practitioners should organize drills that allow students to apply the knowledge they have learned in practice. These drills could include topics such as evacuation, first aid, firefighting, as well as search and rescue.
Training for Different Target Audiences: Practitioners should develop specific training programs for different age groups, professions and individuals with special needs.

Cooperation and Coordination: Practitioners should work in cooperation and coordination with other institutions on natural disaster education. These institutions may include schools, local administrations, non-governmental organizations, and disaster response teams.

Ethics and Consent: Ethical approval for this study was obtained from the Muş Alparslan University Scientific Research and Publication Ethics Committee on March 14, 2022, with the approval number 43928. The ethics approval was granted within the scope of a TÜBİTAK-funded project, and this article has been produced as part of the same project.

Acknowledgments

This research was supported by the Ministry of National Education of the Republic of Turkey and conducted with the valuable contributions of preschool teachers working in the cities of Van, Muş, Bitlis, and Hakkâri. We sincerely thank all the teachers who participated voluntarily in the training program and contributed to this study with their valuable time and feedback.

We would also like to express our gratitude to the trainers and experts who developed and delivered the natural disaster literacy training program, as well as to the administrative staff at Van İpekyolu Youth Center and Muş Alparslan University for providing logistical support during the training sessions.

Special thanks are extended to the ethics committee that approved this research and to the colleagues who provided feedback during the data collection and analysis process. Without their support, this study would not have been possible.

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