

Natural disaster literacy in education: A thematic literature analysis

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ABSTRACT

The purpose of this study is to comprehensively examine research conducted between 2018 and 2024 on natural disaster literacy and disaster preparedness levels in the field of education. The study was carried out using a qualitative research approach, employing the document analysis technique. A total of 45 studies were identified through searches targeting articles and postgraduate theses published in the field of education between 2018 and 2024; however, after applying inclusion and exclusion criteria, 11 studies were included in the review. The selected studies were analyzed using descriptive analysis in terms of publication year, study type, research method, design, sample characteristics, data collection instruments, and data analysis techniques. The findings indicate that research on natural disaster literacy has increased notably in recent years; however, the studies are predominantly based on quantitative methods, survey research designs, and samples consisting mainly of pre-service teachers. It was also found that data collection instruments relied largely on scale-based tools, and that basic statistical techniques were most frequently used in data analysis. Qualitative and experimental studies were limited in number, and sample diversity remained relatively narrow. In conclusion, despite growing academic interest in natural disaster literacy, significant gaps remain in methodological diversity and depth. This study presents an overview of existing research and provides a methodological framework to guide future studies on disaster literacy in education.

KEYWORDS: Natural disaster literacy; Disaster preparedness; Document analysis; Education

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1. Introduction

In recent years, the rapid increase in environmental degradation, the growing impacts of climate change, and the disruption of natural ecosystem balance have significantly increased both the frequency and the severity of natural disasters. Changes occurring in meteorological, geological, and hydrological processes have led to more frequent and destructive events such as floods, earthquakes, landslides, droughts, and extreme weather conditions. Consequently, disasters can no longer be regarded merely as unexpected natural events; rather, they have become a multidimensional field of study encompassing social, economic, environmental, and psychological dimensions.

In contemporary literature, disasters are addressed not only as events causing physical destruction but also as complex processes that directly affect individuals' lives, social structures, and sustainable development. Disasters are therefore conceptualized not merely as nature-based

phenomena but as social phenomena that influence all dimensions of societal life (Rahim & Wu, 2015). The Disaster and Emergency Management Authority of Türkiye (AFAD, 2014) classifies disasters by their rate of development into slow-onset and rapid-onset disasters, emphasizing that both types have serious consequences for individuals and societies.

Considering that natural disasters are often triggered or intensified by increasing human pressure on nature, it can be argued that disasters are not solely the result of natural processes but events whose severity is amplified by human activities. In this context, individual and societal awareness plays a critical role in reducing the potential damage caused by disasters. At this point, the concept of natural disaster literacy emerges as a key factor in fostering informed and responsible behavior toward disasters.

Natural disaster literacy is a multidimensional competency that enables individuals to recognize potential disasters, become aware of disaster risks, understand what actions should be taken before, during, and after disasters, and make informed decisions throughout these processes (Zhang & Wang, 2022). Sözcü (2019) defines natural disaster literacy as the process of analyzing disaster-related problems, evaluating risks, and making sound, informed decisions. Natural disaster literacy has a wide range of definitions (Dere & Ateş, 2022). Although increasing disaster literacy cannot prevent disasters, it is considered an effective tool for mitigating their adverse impacts (Başbuğ Erkan et al., 2011). Indeed, studies indicate that societies with higher levels of disaster literacy demonstrate more effective preparedness behaviors and experience relatively lower post-disaster losses (Saeed & Gargano, 2022).

Efforts to reduce disaster risks are addressed not only at the individual level but also at national and international levels. International initiatives led by the United Nations, such as the Sendai Framework for Disaster Risk Reduction, aim to build disaster-resilient societies and place particular emphasis on the role of educational institutions and teachers in this process (Selby & Kagawa, 2012). In Türkiye, AFAD's educational, awareness-raising, and preparedness activities constitute important practices for enhancing natural disaster literacy.

A review of the literature reveals that studies on natural disaster literacy in Türkiye have increased notably since 2018. Existing research has primarily focused on university students', pre-service teachers', and teachers' levels of disaster knowledge, disaster awareness perceptions, and disaster preparedness (Sözcü & Aydınöz, 2019; Seven Uygun, 2022). In the international literature, disaster literacy is addressed within the framework of sub-dimensions such as disaster prevention, disaster mitigation, and disaster management, highlighting the multidimensional nature of the concept (Rahim & Wu, 2015; Ryan et al., 2020; Juhadi et al., 2021).

However, a significant portion of the existing studies has been conducted with specific sample groups, limited variables, or single research designs. Comprehensive reviews that examine methodological trends, sample characteristics, data collection tools, and data analysis approaches in an integrated and systematic manner remain limited. This situation clearly indicates the need for studies that present the general trends of research on natural disaster literacy through a holistic and systematic perspective.

An examination of the existing literature further demonstrates that research on natural disaster literacy has largely been carried out using specific samples, restricted variables, or isolated research designs (Sözcü & Aydınöz, 2019; Seven Uygun, 2022). Nevertheless, studies that comprehensively address the methodological and structural characteristics of this body of research remain scarce. Accordingly, the present study aims to fill this gap by systematically analyzing research on natural

disaster literacy not only in terms of content but also with respect to methodological and structural dimensions. In this regard, the study goes beyond merely identifying general research trends and offers an original contribution to the literature by providing a methodological roadmap for future studies.

The purpose of this study is to comprehensively examine existing research on natural disaster literacy and individuals' disaster preparedness levels, examining publication type, research methods, research design, sample characteristics, data collection instruments, and data analysis techniques. The findings of the study are expected to inform educational research and contribute to the development of educational curricula—particularly science education and teacher education programs—within the framework of disaster awareness.

2. Method

2.1. Research Design

In this study, since it aimed to systematically examine the literature on natural disaster literacy and levels of disaster preparedness, the document analysis technique, one of the qualitative research methods, was employed. Document analysis is a method that enables the researcher to obtain data by examining written materials for a specific purpose. In this process, the researcher should systematically follow certain stages. These stages include accessing documents, verifying the authenticity of the documents, understanding the documents, analyzing the data, and using the data (Yıldırım & Şimşek, 2013). Document analysis also encompasses the processes of identifying relevant sources, reading, taking notes, and evaluating them for a specific research purpose (Creswell & Poth, 2018). In this context, the present study aims to present the content-related and methodological characteristics of existing studies from a holistic perspective.

2.2. Data Collection

The study materials consist of scientific studies conducted between 2018 and 2024 on natural disaster literacy and levels of disaster preparedness. Within this scope, journal articles, master's theses, and doctoral dissertations were examined. Another inclusion criterion is that the studies were conducted within Türkiye. In order to access the relevant documents, literature searches were conducted in the National Thesis Center, Google Scholar, DergiPark, and ULAKBİM databases. During the literature search process, the keywords “natural disaster literacy,” “disaster preparedness levels,” and “document analysis” were used separately. As a result of the searches, a total of 45 studies were initially identified; however, after applying inclusion and exclusion criteria, 11 studies were included in the scope of the research.

2.3. Data Analysis

Descriptive analysis was used to analyze the data obtained through document analysis. Descriptive analysis consists of four main stages: establishing a framework, processing the data according to the framework, defining the findings, and interpreting the findings. First, an analysis framework appropriate to the purpose of the study was established, and then the data obtained were organized under themes in line with this framework. Subsequently, the data were defined and supported by direct quotations. In the final stage, the findings were explained, associated, and interpreted (Yıldırım & Şimşek, 2013). In this study, the data were systematically organized under predetermined themes, the descriptions were enriched through quotations, and interpretations were made based on these descriptions.

2.4. Identification of Themes

Within the scope of the research, 10 themes were identified in the analysis of the reviewed studies. These themes include the location of the study, year of publication, type of study, research method, research design, sample group, sample size, sampling method, data collection instrument, and data analysis method. In line with these themes, 11 studies were examined in detail, the data were processed, the findings were defined, and interpretations were made.

3. Findings

In this section, the findings obtained from the systematic review of studies on disaster literacy are presented. The data collected within the scope of the research were analyzed in line with the sub-research questions, organized into tables, and interpreted within the framework of the relevant literature. The publication years of studies on disaster literacy in education from 2018 to 2024 were analyzed, and the findings are presented in Table 1 .

Table 1 *Frequencies and percentages of studies on disaster literacy published between 2018 and 2024 by year*

Years	<i>f</i>	%
2018	0	0.00
2019	1	9.09
2020	0	0.00
2021	2	18.18
2022	1	9.09
2023	2	18.18
2024	5	45.45
Total	11	100.00

An examination of Table 1 indicates that studies on disaster literacy conducted between 2018 and 2024 exhibit an uneven distribution across years. The largest number of studies was conducted in 2024, accounting for 45.45% of the total. In contrast, only one study was published in each of 2019 and 2022, whereas two studies were published in 2021 and 2023. These findings suggest that academic interest in disaster literacy has increased markedly in recent years. To present the geographical distribution of the studies, the frequencies and percentages of locations where research on disaster literacy was conducted are shown in Table 2

Table 2 *Frequencies and percentages of the locations where studies on disaster literacy were conducted between 2018 and 2024*

Locations Where the Studies Were Conducted	<i>f</i>	%
Kahramanmaraş	2	18.18
Bitlis	1	9.09
Osmaniye	1	9.09
Nevşehir	1	9.09
Erzurum	1	9.09
Ankara	1	9.09
Artvin	1	9.09
Amasya	1	9.09
Kastamonu	1	9.09
Unspecified	1	9.09
Total	11	100.00

Table 2 presents the provinces in which the studies included in the research were conducted, along with their corresponding frequencies and percentages. It was determined that the vast majority of studies were carried out across different geographical regions of Türkiye; however, in one study, no information was provided regarding the location of the university where the research was conducted. In order to present the distribution of the studies by type, the frequencies and percentages of research on disaster literacy in education conducted between 2018 and 2024 are presented in Table 3.

Table 3 *Frequencies and percentages of study types related to disaster literacy in education conducted between 2018 and 2024*

Type of Study	<i>f</i>	%
Article	6	54.55
Master Thesis	5	45.45
PhD Thesis	0	0.00
Total	11	100.00

An examination of Table 3 shows the distribution of studies on disaster literacy according to study type. Of the 11 studies reviewed, six were journal articles, and five were master's theses. No doctoral-level studies were identified during the period under review. In order to present the distribution of the studies according to research methods, the frequencies and percentages of studies on disaster literacy in education conducted between 2018 and 2024 are presented in Table 4.

Table 4 *Frequencies and percentages of research methods used in studies on disaster literacy in education conducted between 2018 and 2024*

Study Methodology	<i>f</i>	%
Qualitative Research Method	1	9.09
Quantitative Research Method	10	90.91
Total	11	100.00

An examination of Table 4 indicates that the research methods employed in the studies were predominantly quantitative in nature. The vast majority of the reviewed studies (90.91%) were conducted using quantitative methods, while only one study adopted a qualitative approach. Following the analysis of research methods, the present review aimed to identify the research designs within which studies on disaster literacy in education were conducted. Accordingly, the frequencies and percentages of the research designs employed in the relevant studies are presented in Table 5.

Table 5 *Frequencies and percentages of research designs used in studies on disaster literacy in education conducted between 2018 and 2024*

Research Design	<i>f</i>	%
Survey Research model	3	27.27
Descriptive Survey Model	3	27.27
Phenomenology	1	9.09
Quasi-Experimental Research Model	1	9.09
Cross-sectional Survey Model	3	27.27
Total	11	100.00

An examination of Table 5 presents the distribution of the research designs preferred in the reviewed studies. The findings reveal that survey, descriptive survey, and cross-sectional survey designs were the most frequently employed research models. Following the analysis of research design distributions, the present review examined the distribution of sample sizes used in studies on disaster literacy in education. Accordingly, the frequencies and percentages of sample sizes are presented in Table 6.

Table 6 *Frequencies and percentages of sample sizes used in studies on disaster literacy in education conducted between 2018 and 2024*

Sample Number	<i>f</i>	%
0–100	1	9.09
100–200	2	18.18
200–300	3	27.27

Sample Number	<i>f</i>	%
300–400	2	18.18
400–700	2	18.18
700–1300	1	9.09
Total	11	100.00

An examination of Table 6 suggests that the sample sizes used in the reviewed studies tended to be concentrated within certain ranges. The findings indicate that sample sizes were generally between 100 and 700 participants. However, one study appears to have employed a larger sample due to the inclusion of all students enrolled in the faculty of education. The most commonly reported sample size range was 200–300 participants, representing 27.27% of the studies. Following the examination of sample size distributions, the present review further considered the distribution of sample groups employed in studies on disaster literacy in education. Accordingly, the frequencies and percentages of the sample groups included in the reviewed studies are presented in Table 7.

Table 7 *Frequencies and percentages of the sample group of the studies on natural disaster literacy in education between 2018–2024*

Sample Group of the Studies	<i>f</i>	%
Pre-Service Science Teachers	3	23.08
Pre-Service Special Education Teachers	2	15.38
Pre-Service Elementary Classroom Teachers	2	15.38
Pre-Service Social Studies Teachers	3	23.08
Pre-Service Teachers	1	7.69
Special Education Teachers	1	7.69
Teachers	1	7.69
Total	13	100.00

An examination of Table 7 suggests that the sample groups preferred in the reviewed studies predominantly consisted of pre-service teachers. In particular, pre-service teachers enrolled in science education, social studies education, and primary education programs appear to have been the most frequently examined groups. In addition, some studies included special education teachers and in-service teachers as part of the sample. Following the examination of the distribution of sample groups, the present review further considered the sampling methods employed in studies on disaster literacy in education. Accordingly, the frequencies and percentages related to sampling methods are presented in Table 8.

Table 8 *Frequencies and percentages of the studies on natural disaster literacy in education between 2018–2024 regarding the sample determination method*

Sample Selection Method	<i>f</i>	%
Purposeful Sampling	5	45.45
Simple Random Sampling	6	54.55
Total	11	100.00

An examination of Table 8 suggests the distribution of sampling methods employed in the reviewed studies. Simple random sampling appears to have been used in 54.55% of the studies, while purposive sampling was preferred in 45.45%. These findings may indicate that researchers adopted different sampling strategies, potentially aiming to balance generalizability with access to sample groups possessing specific characteristics. Following the analysis of sampling methods, the frequencies and percentages related to the data collection instruments used in studies on disaster literacy in education are presented in Table 9.

Table 9 *Frequencies and percentages of data collection tools of studies on natural disaster literacy in education between 2018–2024*

Data Collection Tools	<i>f</i>	%
Natural Disaster Literacy Scale	7	53.85
Disaster Readiness Scale	1	7.69
Disaster Literacy Scale	2	15.38
Psychological Resilience Tests	1	7.69
Semi-structured Interview Forms	2	15.38
Total	13	100.00

An examination of Table 9 suggests that the data collection instruments used in the reviewed studies varied considerably. The findings indicate that the most frequently employed instrument was the disaster literacy scale, accounting for 53.85% of the studies. In addition, disaster literacy and disaster preparedness scales appear to have been utilized in several studies. In qualitative research, semi-structured interview forms were reported to have been used. This diversity may suggest that the studies adopted a multidimensional approach to data collection. Following the analysis of data collection instruments, the frequencies and percentages related to the data analysis methods employed in studies on disaster literacy in education are presented in Table 10.

Table 10 *Frequencies and percentages of the studies on natural disaster literacy in education between 2018–2024 regarding the data analysis method*

Data Analysis Method	<i>f</i>	%
Independent Samples T-test	7	33.33
ANOVA	7	33.33
Dependent Samples T-test	2	9.52
Mann-Whitney-U Test	2	9.52
Kruskall-Wallis	1	4.76
ANCOVA	1	4.76
Descriptive Analysis	1	4.76

An examination of Table 10 suggests that the data analysis methods employed in the reviewed studies were predominantly based on quantitative statistical techniques. The findings indicate that independent-samples t-tests and ANOVA were the most frequently used analytical methods, each accounting for 33.33% of the studies. In addition, more advanced statistical techniques, such as the Mann–Whitney U test, Kruskal–Wallis test, and ANCOVA, appear to have been employed in some studies. In qualitative research, descriptive analysis was reported to have been preferred. Overall, this distribution may suggest that the studies were largely conducted within a statistical analysis framework focused on group comparisons.

4. Discussion and Conclusion

In this study, research conducted between 2018 and 2024 on natural disaster literacy in the field of education was systematically examined in terms of publication year, study type, research method and design, sample characteristics, data collection instruments, and data analysis methods. The findings indicate that academic interest in natural disaster literacy has increased markedly in recent years; however, this interest has remained limited in terms of methodological diversity and sample scope.

The results reveal that a significant proportion of the reviewed studies were concentrated in 2024. This situation is considered to be associated with the increase in social and academic awareness regarding disaster awareness, disaster preparedness, and natural disaster literacy following the large-scale disasters experienced in Türkiye in recent years. It has been emphasized in the literature that disaster experiences influence research trends and that academic output on disaster-related topics increases in post-disaster periods (Shaw, 2022). In this context, the surge in studies on natural disaster literacy during certain periods suggests that the field is closely aligned with current societal needs. However, this indicates that the disaster literacy literature exhibits a 'reactive' character—developing in the aftermath of major disasters—rather than a 'proactive' (preventive) progression. Since the fundamental aim of disaster education is to ensure preparedness before risks materialize, the concentration of academic interest exclusively in post-disaster periods may pose a risk to the sustainability of disaster education policies (UNDP, 2015).

An examination of the locations where the studies were conducted shows that the research was distributed across different geographical regions of Türkiye. This finding indicates that natural

disaster literacy is regarded as an educational issue that should be addressed not only at the regional level but also at the national level. However, the absence of information regarding the research location in some studies points to the fact that methodological reporting transparency has not always been ensured at a sufficient level. In terms of study type, it was determined that the research was concentrated at the journal article and master's thesis levels, while no doctoral-level studies were identified. This finding suggests that natural disaster literacy has not yet been sufficiently addressed through advanced academic research and that the field is still developing.

An examination of the research methods shows that the vast majority of the studies were based on quantitative approaches. The widespread use of survey and descriptive survey designs indicates that studies aiming to determine levels and make comparisons are dominant in the field of disaster literacy. The prevalence of scale-based quantitative research suggests a focus on measuring disaster knowledge, awareness, and preparedness levels (Zhang & Wang, 2022). However, the predominant use of Likert-type scales as data collection tools introduces the limitation of reliance on 'self-reported' data. Although disaster literacy is a construct that encompasses the competence to take action, scale-based studies measure participants' perceptions of disaster situations rather than their behavioral reflexes during an actual event. Given the discrepancy between individuals' perceived preparedness and their actual preparedness, it can be argued that the existing literature falls short in revealing the 'behavioral dimension' of disaster literacy. In contrast, the limited number of qualitative and quasi-experimental studies restricts in-depth exploration of disaster literacy in relation to individuals' experiences, perceptions, and emotional responses. However, disaster literacy is a multidimensional construct encompassing cognitive, affective, and behavioral dimensions (Lindell & Perry, 2012; Cutter, 2018).

The findings related to research designs reveal that survey models are predominant, while phenomenological and quasi-experimental designs are used at a very limited level. This situation indicates that intervention programs and applied educational practices aimed at improving disaster literacy have not been sufficiently represented in the literature. However, previous studies emphasize that disaster education is more effective when supported by experiential learning, problem-solving, and simulation-based activities (Chernikova et al., 2020; Ronan & Johnston, 2005). From this perspective, the limited number of experimental and quasi-experimental studies points to a significant gap in the field.

The results regarding sample groups show that the studies were predominantly conducted with pre-service teachers. The frequent inclusion of pre-service teachers in science education, primary education, and social studies education programs may be attributed to the more direct relationship between disaster education and the curricula of these fields. Also, this concentration within the sample structure suggests a tendency toward 'convenience sampling' during data collection. While preservice teachers may be receptive to theoretical knowledge, the underrepresentation of in-service teachers and school administrators—who actively experience the school ecosystem and crisis management—undermines the findings' ability to reflect the practical realities of the field (Etikan et al., 2016). Nevertheless, the limited number of studies conducted with in-service teachers and special education teachers is noteworthy. Considering the critical role of in-service teachers in transferring disaster literacy into school settings, the insufficient representation of this group in the literature can be regarded as an important shortcoming.

An examination of the data collection instruments indicates that scales measuring natural disaster literacy and disaster preparedness levels were used in most studies. The widespread use of scales suggests that certain measurement tools have been standardized in the field. However, the limited

use of qualitative data collection instruments restricts in-depth examination of individuals' subjective perceptions and emotional dimensions related to disaster experiences. Similarly, reliance on basic statistical techniques, such as independent-samples t-tests and ANOVA, limits the comprehensive examination of variables affecting disaster literacy.

In conclusion, this study demonstrates that although there has been an increase in academic interest in natural disaster literacy in recent years, the research has largely remained limited to quantitative, survey-based designs and samples primarily comprising pre-service teachers. The limited use of qualitative, experimental, and mixed-method approaches, the narrow scope of sample diversity, and the dominance of basic statistical techniques in data analysis indicate significant gaps in the existing literature. By presenting the general trends of current research from a holistic perspective, this study provides a methodological and conceptual framework to guide future research on natural disaster literacy. In conclusion, the reviewed studies indicate that the field of natural disaster literacy in Turkey is currently in an 'exploratory' stage. The field exhibits a profile that remains at a descriptive level, focusing primarily on status assessment. It is of critical importance for future research to transcend mere 'status assessment' and focus on experimental interventions aimed at enhancing disaster literacy, as well as mixed-method designs that investigate cause-and-effect relationships, in order for the field to attain theoretical and practical maturity.

4.1. Limitations and Future Directions

Based on the findings obtained in this study, several recommendations can be made for future research in the field of natural disaster literacy. First, given that existing studies are largely based on quantitative methods and survey research designs, it is recommended that qualitative and mixed-method studies be increased. Such studies may provide deeper insights into individuals' experiences, perceptions, and behaviors related to disasters. In terms of sample groups, the findings indicate that research has mostly been limited to pre-service teachers. Therefore, conducting studies that include different stakeholders such as in-service teachers, students, school administrators, and parents may contribute to a more comprehensive understanding of how disaster literacy is reflected in educational settings. With regard to data collection instruments, it is recommended that, in addition to scale-based studies, interviews, observations, and practice-based assessment tools be utilized. In this way, not only the cognitive dimension of disaster literacy but also its affective and behavioral dimensions can be addressed. Finally, it is recommended that data analysis move beyond basic statistical techniques and that analytical methods capable of examining relationships among variables in a more comprehensive manner be preferred. Studies conducted in this direction are expected to contribute to the theoretical and practical development of the field of natural disaster literacy.

5. Declarations

5.1. Conflict of interest

The authors declare that there are no financial, commercial, or personal conflicts of interest related to this study.

5.2. Funding

The authors declare that the study received no external funding.

5.3. Author contributions (CRediT)

Ebru Yılmaz: Conceptualization; Methodology; Formal analysis; Writing—original draft; Writing—review & editing

Erol Taş: Investigation; Formal analysis; Writing—original draft; Writing—review & editing

Hacı Mehmet Yeşiltaş: Conceptualization; Methodology; Investigation; Writing—review & editing

All authors reviewed the results and approved the final version of the manuscript.

5.4. Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

5.5. Ethics approval

This study is based solely on the analysis of publicly available documents, including published journal articles and postgraduate theses. No data were collected from human participants, and no personal or sensitive information was used within the scope of the research. Therefore, ethics committee approval was not required for this study. Throughout the research process, scientific and ethical principles were strictly adhered to.

5.6. Use of artificial intelligence (AI) tools

In this study, artificial intelligence tools were used only for language-related support during the preparation of this manuscript. Specifically, AI-assisted software was utilized to improve the clarity of expression, refine academic tone, and support English–Turkish translation during the editing process. No AI tool was used for generating research data, conducting analyses, interpreting results, or producing the scientific content of the study. All conceptual, methodological, analytical, and interpretive components of the research were carried out solely by the authors.

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