

Explaining the Model of Public Education in Natural Disasters based on the Meta-Synthesis Method

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Original Article

Abstract

INTRODUCTION: Considering the significant contribution of public education to the reduction of damages incurred by disasters and crises in the country, the identification of all the components and dimensions of public education can be of great help to policymakers in this field in order to adopt a correct policy and decision. The current research aimed to investigate public education in natural disasters with the meta-synthesis method based on the seven-step model of Sandelowski and Barroso (2007).

METHODS: The current qualitative research was conducted based on a meta-synthesis approach. The statistical population of the research included articles related to the research keywords from 2000 until now. A number of 175 articles were retrieved, and after examining the title of the research, 105 articles were removed, and 70 papers were reviewed, out of which 36 papers were removed, and 34 articles entered the final stage for full analysis. Articles were searched in databases, such as Scopus, Emerald, Science Direct, Springer, Google Scholar, and Scientific Information Database (SID). The selected sources were analyzed using Maxqda-2020 software, and the research findings were coded

FINDINGS: According to the findings, in the open coding stage, 100 primary codes were extracted from 34 articles, and after extracting the primary codes, to categorize the concepts, axial coding was used, yielding 5 dimensions, 12 components, and their sub-components.

CONCLUSION: As evidenced by the obtained results, to reduce vulnerability, the responsible institutions can adopt appropriate measures that lead to learning and changes in the audience's behavior by using the presented model and considering the determined components and indicators in the process of public education. This model includes the stages of analysis, educational design, preparation and development, implementation, and evaluation.

Keywords: Educational design; Natural disasters; Public education

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Introduction

Today, the level of knowledge and awareness of the general public in various fields is of great concern to government institutions since the level of their awareness can affect the way they deal with a crisis in many cases. Moreover, one of the potential threats that have always targeted the health and property of people in society is the occurrence of natural disasters. Therefore, it seems that the presence of such variables as public education can, to some extent, prevent the

occurrence of more unpleasant incidents after the disaster. During the past years, the world has witnessed many unforeseen natural hazards, such as floods and earthquakes.

Although crisis management and leadership in countries have recently reduced the damage caused by these disasters, the establishment of headquarters that can educate citizens about these disasters is essential. Natural disasters and accidents cause serious crises, and bouncing back to normal situations depends on the level

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of resilience in society. The inappropriate placement of physical elements and urban uses, worn-out urban fabric, high urban density, the improper establishment of city infrastructure, and the improper distribution of urban open spaces play a fundamental role in increasing the vulnerability of cities (1). In the meantime, it is of utmost importance to develop educational models to educate everyone when different incidents occur.

Today, social science experts fully acknowledge the importance and necessity of real participation of all people from all walks of life in society at different social, economic, political, and cultural aspects in order to achieve dynamic and sustainable development. Participation can be manifested in the form of declaring the need when a crisis occurs that requires management. Public participation reduces the feeling of social isolation and strengthens the feeling of solidarity among people with each other and with the authorities. World conditions in general, the situation of developing countries in particular, at the outset of the 21st century, indicate serious developments in the field of participation of all individuals and society in the development process.

In line with the results of the current research, the authorities and those involved can conduct public education courses for the general citizens to prepare them for natural disasters. They can also face challenges and natural disasters with more preparation and awareness based on the results of the research. Public education refers to all the activities that are carried out in the field of rescue and first aid training for people from all walks of society. In fact, it is general knowledge for people in society, which leads to the reduction of individual and collective vulnerability in the event of disasters and accidents.

Public education signifies an effort to measure and evaluate the existing needs and situation and a continuous effort to foster, maintain, and sustain mutual understanding between the education provider and the society (2). Moreover, public education refers to any pre-designed activity that aims to create learning in learners who are numerous, have no age and gender restrictions, live in a diverse range of society, and do not know each other. The

activities which are performed with the aim of transferring the knowledge or skills of a person or persons to the general public are called public education. Public education should be tailored to people's needs and include factors, such as age, gender, occupation, culture, social and economic characteristics, as well as religious beliefs.

In this way, after designing and compiling the educational content, the most important step in public education is to adopt the appropriate strategy or method that is used to transfer the educational content (3). Farrokhi Nejad et al. (2019) have conducted a study entitled "The components and indicators of improving the quality of public education for the relief and rescue of the Red Crescent Society." The statistical population of the research included full-time faculty members in the field of public education quality. Based on the results of the stated study, the components of improving the quality of general education of the Red Crescent Society include quality of educational resources, physical resources, human resources, program design, information updates, work commitment and motivation, quality instructors, training facilities, attention to learners' needs, relief exercises, physical equipment, and financial resources (4).

Vakili and Sharifi (2016) conducted a study entitled "Investigating the level of readiness of the Red Crescent Society in Isfahan province for the establishment of comprehensive quality management." Six system variables were used, such as group participation and team orientation, training, responsibility and service, managerial support, as well as physical, structural, and legal factors. After analyzing the data, it was demonstrated that the preparedness of the Red Crescent Society in Isfahan province was lower than the average level in each variable. (5)

Gallagher et al. (2019) also performed a study entitled "The effect of group involvement on post-disaster mental health: A longitudinal multilevel analysis." The aforementioned researchers indicated that non-participation in education causes great damage before and during natural disasters (6). Kwesi-Buor et al. (2019), in their research entitled "Scenario analysis and disaster preparedness for port and maritime logistics risk management," concluded that there is a bi-directional relationship between regulation and industry actors' behavior towards

disaster preparedness in maritime logistics networks. This model also illustrated that the level of behavior regulation strongly depends on forecasting accuracy, technology change, risk prevention attitude, port activities, and port environment. (7)

Lauriola et al., in their study entitled "Natural Disaster entitled "Environmental Health Preparedness," which was conducted using a mixed research method, concluded that preparedness is vital in addition to response; the main goal should be to prevent natural disasters. There is a wide range of innovative tools that can be used by general practitioners and researchers in this field. Prevention, preparedness, and effective response efforts require interdisciplinary collaborations, such as public health, health, science, engineering, law, architecture, economics, journalism, sociology, psychology and art. (8)

Hoffman and Muttarak (2017) conducted a study entitled "Learn from the past, prepare for the future: Impacts of education and experience on disaster preparedness in the Philippines and Thailand." The results of the stated research denoted that formal education increases the willingness to prepare for disasters. In Thailand, the impact of education on disaster preparedness is mainly exerted through social capital and understanding of disaster risks, while there is no evidence of education through formal channels in the Philippines (9). In light of the aforementioned issues, the current research aimed to assess the dimensions and components and explain the model of public education with a meta-synthesis approach. The revision of past documents and studies yielded a comprehensive model with 5 dimensions and 11 components.

Methods

According to the purpose of the present research, to explain the public education model and provide an integrated framework using past studies, the meta-synthesis method was used.

Meta-synthesis is a type of qualitative study that examines the information and findings extracted from other qualitative studies with a related and similar topic and provides a systematic approach. In this research, the seven-step method of Sandelowski and Barroso (2007) was used, and the steps of this method are listed below:

Development of the research question

Various parameters are used to develop the research question, such as the studied community, what, when, and how. In this research, this question was explored: What is the model of public education in the conducted studies? Who: who does the studied society include? In this research, who refers to databases and domestic and foreign journals and publications? When: What is the time frame of the articles? In this research, the time frame was considered from 2000 until now. How: it refers to data collection methods. In this research, secondary data, which are past documents, were used.

Systematic literature search

To collect research data, past documents, including all studies on public education, were used.

In the first step, the introduced databases were searched using the keywords and terms in the table 1, and all the articles were collected in a spreadsheet file. Table 2 presents the searched sources.

Searching and selecting suitable texts

The texts were selected in four stages. In the first stage, all the sources were identified; in the second stage, the articles were reviewed based on the title; in the third stage, an overview review was performed; and in the fourth stage, the sources were reviewed in detail. Finally, 34 articles were selected from among 175 studies. Table 3 demonstrates the article acceptance and rejection criteria.

Table 1. Searched keywords

English
public education -Inclusive education

Table 2. Searched sources

Description	n	Acceptable articles at this point
Scientific Information Database	9	4
Scopus, Emerald, Science Direct, Springer, and Google Scholar	166	30
Total	175	34

Table 3. Article acceptance and rejection criteria

Indicator	Acceptance criteria	Rejection criteria
language of research	Persian and English	Other than Persian and English
Time of research	From 2000 until now	Before 2000
Research Methodology	Qualitative and mixed (qualitative-quantitative)	Other than qualitative
Research population	public education- Inclusive education	Other than public education- inclusive education
Study conditions	public education- Inclusive education	Other than these two cases
type of study	Articles published in journals	Conference articles and invalid articles

As mentioned, at this stage, 175 articles were found, which were carefully reviewed in several stages to determine which ones fit the research questions. The stages of the review process were as follows: the title, abstract, and content of the articles were checked, and the articles unrelated to the research questions were discarded. There were 175 articles related to the research keywords, and 105 articles were removed after examining the research title. Thereafter, 70 articles were reviewed, of which 36 articles were removed, and 34 articles entered the next stage for full review.

Findings

Extraction of research information

In the following, based on the meta-synthesis method, the selected and finalized articles were continuously reviewed several times in order to obtain findings in which primary and main studies were conducted. Finally, the information was extracted in the form of a table, where for each article, the author's name and surname, year, important variables regarding public education, and its dimensions were included.

Analysis and synthesis of qualitative findings

In this research, firstly, from the extraction of studies, all the relevant dimensions and components were identified, and in the final step, based on the frequency of each component in a table, their priority was determined.

Quality Control

In order to maintain the quality of the study, Persian sources were extensively reviewed and an effort was made to prioritize and accurately identify the components of public education. Since the remaining articles should be reviewed for content quality, Critical Appraisal Skills

Program was used. To this end, a checklist consisting of 10 questions was used, which helped the researcher in checking the accuracy, validity, and importance of qualitative studies. The questions include research objectives, method logic, research design, sampling method, data collection, reflectivity or the relationship between researcher and participants, ethical considerations, accuracy of data analysis, clear expression of findings, and research value. When using this tool, the articles were studied, and a score between one and five was assigned to each article.

In this research, 10 articles were removed due to poor and very poor scores, and 34 articles were accepted in the evaluation process. The validity of the meta-synthesis method, like many qualitative research methods, depends on such criteria as transparency, the structure of the research implementation, the investigated field, and the generalizability of its findings. To determine the **inter-coder** reliability in qualitative research, the Kappa coefficient was used. In this research, five articles (15% of the documents) were given to one of the experts for evaluation, and the results of coding showed that the Kappa coefficient calculated by SPSS software was 0.642. Considering that this value is higher than 0.6 and the significant number obtained for the Kappa index is smaller than 0.05, the assumption of the dependence of the extracted codes is confirmed.

Presentation of research findings

In this stage of the meta-synthesis method, the research findings were categorized by coding, and in the open coding stage, 100 primary codes were extracted from 34 articles and after extracting the primary codes, axial coding was used to categorize the concepts,

yielding 5 dimensions, as well as 12 components and subcomponents (Table 4)

In the end, the results obtained from the meta-synthesis were presented in the form of an

extractive model of public education with the meta-synthesis approach using Maxqda-2020 software.

Table 4. Coding of primary codes of public education

Dimension	Component	Indicator
Analysis	Goal analysis	The scientific nature of needs assessment / initial measurement and evaluation of needs / the necessity of training to reduce stress / the up-to-dateness of training / the effectiveness of training according to needs assessment / the need for public education in the prevention of social harms / determining the goal of preparation for the prevention of natural disasters / carrying out a needs assessment in the organization office and methods/identification of training needs/assessment of training needs/determination of training goals / public training to reduce injuries / mutual understanding and empowerment of the community / improving the skills of people in the field of first aid / public training for first aid / public training for prevention and dealing with Crisis/ institutionalizing the attitude of respect for citizenship rights through public education
	Needs assessment of the target group	Awareness of the educational needs and demands of the target group/paying attention to the needs of the diversity of the audience/the compatibility of the audience's needs with the educational courses/paying attention to the age requirements of the audience in holding the courses/paying attention to the growth opportunities as a factor of needs assessment/identifying the audiences at risk/the need to acquire skills For audiences in addition to public education / public education of resilience skills
	Analysis of conditions	Determining the capacity of people to learn from experiences/allocating sufficient budget to the crisis management headquarters/lack of continuous changes in educational strategies/informing the officials of the headquarters about the conditions governing the educational environment/adapting the guidelines to the actual conditions of the provinces/inapplicability of some items from the executive instruction of education/proper structure of crisis management headquarters/sustainable investment in crisis management discussion/requirement of support from relevant authorities
	Material and equipment design	Specific educational space/collaboration of experienced trainers/high tuition fee/choice of educational tools according to community and native methods/quality of educational resources/educational facilities/updating information/quality of education with maximum ability and talent/adopting a suitable strategy to transfer public education
Instructional Design	Teaching method design	Training the teachers on the teaching methods /diversity of trainers/up-to-date knowledge of professors and trainers/carrying out rescue maneuvers/training specialist manpower/using appropriate teaching techniques/using the co-teaching method of two trainers (one is a general education trainer and the other is a special trainer education or other specialists)/creating outdoor learning spaces
	Educational content design	Content of localized training courses/ Suitability of training courses to incidents and needs of regions/ Preparation of comprehensive training software/ Preparation of virtual training content/ Strengthening of rescue training standards/ Scientific documentation of rescuers' experimental skills/ Detailed planning based on the latest content/ Development of modern learning methods /qualitative development of public education/applicability of the topics taught in the courses/designing teaching approaches/designing educational content according to people's opinions and interests/considering people's knowledge, attitude and performance in educational content/ Designing educational content to master the tasks/preparation of a comprehensive training manual/public training to deal with incident based on the appropriate design of the content of educational programs
Preparation and development	Educational tools and media	Radio/TV/Poster/ Educational class/publications and special pamphlets/videos/internet/production of learning tools/providing specialized and required services
Implementation	Rescue and relief training	Considering all experiences as a learning process/conducting natural disaster maneuvers through education/creating necessary skills in the field of self-help/teaching self-regulation skills to learners/public information and information management/participation in training to prevent huge damage before and during natural disasters/ training for disaster preparedness and rescue
	First aid	Getting ready to implement correct measures/control of vital signs/opening respiratory airways/control of organ bleeding/number of normal breaths/sensitize officials and personnel to pay more attention to promoting first aid training
Assessment	Educational design evaluation	Systematic monitoring and evaluation of training courses/ evaluation of results and guarantee the correctness of the training path/revision of training programs/officials' assessment of the educational problems of the provinces
	Evaluation of Learners' Performance	Adequate supervision of public education/proportion of evaluation from the audience/consistency of the type of evaluation with the education level of the audience

Discussion and Conclusion

As mentioned earlier, this research was conducted based on the meta-synthesis method, and the public education indicators were extracted according to the review of the research literature. Finally, the model of public education based on the meta-synthesis method was obtained. The research results pointed out that the analysis stage in the model includes goal analysis, target group needs assessment, and condition analysis. The goal analysis includes indicators such as the scientific nature of the needs assessment or the necessity of public education in preventing social harm. At this stage, the goal of public education will be investigated, and it is mentioned for the preparedness for natural disasters.

The importance of goals lies in the fact that by conducting public education, people's attitudes towards the need to respect each other's citizenship rights can be changed. In the needs assessment of the target group, information should be obtained from the educational needs and demands of the target group, and the diversity of the audience should be examined since the form of education is different based on this diversity. At this stage, the needs of the audience should be aligned with the educational courses related to general education. The condition analysis component refers to the situations in which public education should be formed. Among its indicators, the allocation of a sufficient budget to the crisis management headquarters can provide a more realistic implementation of goals and sustainable investment in crisis management.

In the stage of educational design, the design of materials and equipment includes indicators such as the adoption of a suitable strategy for the transfer of public education or the quality of educational resources and facilities. At this stage, the educational tool is selected according to the selected community and local methods for public education. Regarding the component of designing the teaching method, education experts are needed, and appropriate teaching techniques are used. Up-to-date knowledge of professors and trainers or performing rescue maneuvers can be regarded as indicators of public education teaching methods.

In the design of educational content, the comprehensive training software and the content of the training courses are prepared in a localized form, and at this stage, the appropriateness of the

training courses with the events and needs of the regions assumes critical importance. At this stage, people's knowledge, attitude, and performance are examined in order to design educational content. Scientific documentation of the experimental skills of rescuers can create quality educational content for the public education audience. In the development and preparation stage, the media and educational tools are selected. Media, such as radio and television, as well as educational tools, such as posters, videos, or the Internet, are examined in this stage. In this component, the production of different learning tools based on environmental conditions and audiences is considered.

In the implementation phase, public education is realized in the form of first aid training. In this component, the implementation of rescue and relief maneuvers in natural disasters through education or developing the necessary skills in the field of self-help is very effective. The issue of preparedness for implementing appropriate measures is among the first aid indicators in the implementation phase, which leads to a better and more effective implementation of public education. The evaluation stage includes the evaluation of the educational design and the performance of the learners. One of the indicators of this stage is the supervision of the officials in the provinces in order to solve the problems and better implement public education.

Moreover, the establishment of systematic monitoring and evaluation of training courses, as well as the evaluation of the learning process of the audience, is performed by responsible institutions in order to check and improve the effectiveness of education. The results of the present research are in agreement with those reported by Farrokhi Nejad (2019), who pointed to the quality indicators of public education, including educational quality, program design, and educational facilities based on the needs of learners, which are also presented in the indicators of this research.(4)

Furthermore, the results of the research are in line with the findings of the study by Pourkarimi (2016), who examined the components and dimensions of the public education process in his research entitled "Presenting the public education model for Iranian Red Crescent Society: a comprehensive and systemic approach. Journal of Rescue and Relief" (10). The results of this

research regarding the dimensions of the public education model and its two main indicators, resilience skills and preparedness, are in accordance with those obtained by Lariola et al., who pointed out that preparedness is vital in addition to response and the main goal should be the prevention of natural disasters.

Finally, it is suggested that relative policy-making institutions strengthened culture of public education in the society in order to promote public education based on the results of the research and the model presented,

Furthermore, institutions that organize public education can plan a major role by taking into account different cultural conditions. They can also help reduce the damage caused by the crisis by encouraging people to participate in first aid courses and by using various educational techniques, tools, and media since, without considering the level of knowledge and attitude of people, it is not possible to create learning that will lead to a change in their behavior by providing public education.

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Conflict of Interests

Authors have no conflict of interests.

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