

## Paper:

# Typology of Learning Contents in “Supplementary Textbook for Disaster Prevention Education” – What Are Teachers in the Areas Affected by the Great Hanshin-Awaji Earthquake in 1995, and the Great East Japan Earthquake in 2011, Striving to Teach Students in Junior High School? –

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A supplementary textbook for disaster prevention education was analyzed for understanding the content educators wish to include in disaster prevention curriculums. The text was a condensed textbook – edited by schoolteachers and boards of education in the local governments – from wide areas with a population of one million who were severely affected by the damage and deaths caused by the Great Hanshin-Awaji and the Great East Japan Earthquakes. The targets for analysis were supplementary textbooks for students in junior high schools, published by the five boards of education in Miyagi, Sendai, Iwate, Hyogo, and Kobe. 147 subjects of five supplementary textbooks for disaster prevention education were evaluated as to their applicability to 46 evaluation items. The average of the evaluation items was 11.59 (SD = 2.92). Numerous “Records” (111 subjects, 75.5%) and “Images” (109 subjects, 74.1%), resulted from each evaluation. A remarkable majority of disaster types included “Earthquake disasters” (108 subjects, 73.5%) and “Tsunami disasters” (85 subjects, 57.8%). “Related Fields,” “Social studies” (30 subjects, 20.4%), and “Science” (29 subjects, 19.7%) were the most common subjects. In “Related Fields,” “Special activities” included the highest subjects (59 subjects, 40.1%), after “Ethics,” which included 56 subjects (38.1%). “Writer and persons involved” and “Student who writes compositions and is involved as a learner” included 72 subjects (49.0%). Subsequently, there were “Local residents,” (52 subjects, 35.4%), “Researchers and experts” (36 subjects, 24.5%), and “Unaffected persons” (35 subjects, 23.8%), which included volunteers. Regarding “Type of disaster prevention education,” learning activities for “Prepare for disasters” included the most subjects at 92 (62.6%). Subsequently, learning activities to “Enrich the mind (love for family and community, compassion, the importance of life,)” by raising students’ included 60 sub-

jects (40.8%). Regarding “Qualities and abilities expected to be acquired,” “Knowledge” showed the highest 91 subjects (61.9%). Next was “Self-awareness” (64 subjects, 43.5%), “Social participation/community contribution” (48 subjects, 32.7%), and “Kindness to disaster-affected people” (47 subjects, 32.0%). Moreover, cluster analysis (ward method) was performed using a data set of the subject evaluation of the supplementary textbooks. The analysis with subjects presented six types: “Life-saving measures,” “Fortifying town,” “Measures required for disaster survival,” “Awareness of joining local community,” “Disaster comradery,” and “Living with family and community.” All the five supplementary textbooks featured those six types. More than half of the subjects were featured content regarding student emotions. The first three types were combined and understood as “Countermeasures” with “Knowledge.” In addition, the latter three types were combined and understood as subjects to teach the “Will to live together,” with a relation such as that of ethics and emotional learning. When the same data set was subjected to cluster analysis (ward method) using the evaluation items, four types were obtained: “Knowledge to prepare for earthquake and tsunami disasters,” “Solidarity with family and residents,” “Emergency Response Judgement,” and “Knowledge and skills useful at disaster time.” The types correspond to the classification of the conceptual model of disaster prevention education conducted by Sato et al. [1]. Additionally, all types have corresponding qualities and abilities. The results led teachers to believe that disaster prevention education should be implemented, not simply as life-saving education, but also as instructions that promote the emotional growth of children while cultivating humanity.

**Keywords:** supplementary textbook for disaster preven-



tion education, typology of disaster prevention education, teaching intention in disaster prevention education, three cores of qualities and abilities

## 1. Research Background/Introduction

Ten years have passed since the Great East Japan Earthquake. The tsunami of 2011 caused by the Tohoku Earthquake, off the pacific coast, struck the three prefectures of Iwate, Miyagi, and Fukushima, with tsunamis far exceeding 10 meters in some areas. Loss of human life reached 19,729 deaths including related casualties, as of March 1, the 2nd year of Reiwa (2020) [2].

As a result of the Great Earthquake, national interest in disaster prevention education has increased in schools to save the lives of children. The Ministry of Education, Culture, Sports, Science and Technology (MEXT) has also revised reference materials published in 1998 and developed “Reference materials for disaster prevention of school, Development of disaster prevention education to nurture ‘Zest for Life’” [3]. In the reference materials, the ministry lists goals of disaster prevention education at each level of school education, as illustrated in **Table 1**.

Many goals are shared with elementary school children about how they should preserve their individual safety. However, as students progress to junior high school and high school, goals in addition to the children’s own safety are taught, including their relationships with and responsibilities for others. As children mature, disaster prevention education becomes more than simply about the safety of the students themselves.

This tendency matches with revised one in the study guidance [4, 5] that is currently used in schools. In addition to reaching individual knowledge (“what to learn”), the guidelines emphasize “what can be done” in relation to people other than yourself, such as local people. In August 2015, the Curriculum Planning Special Subcommittee organized these children’s qualities and abilities as “three cores of qualities and abilities.” The three cores are “knowledge and skills,” “the students’ abilities to think, to make judgments and express themselves,” and “Humanity, and the motivation to learn.” Of the three cores, emphasis was placed on cultivating “Humanity, and the motivation to learn” which is intended to be applied to life and society, and how to acquire consciousness in disaster prevention education. Learning how to take part in the manufacture of a safe community is critical, and in addition to acquiring knowledge and skills, the emotional aspects of understanding oneself and others, enable students to encounter regional issues compassionately and proactively, and cooperate to solve issues.

Regarding disaster prevention education in schools, Nagata and Kimura [6] developed a program that provides support during various hazards and verified its effectiveness. Furthermore, Nagata and Kimura [7] developed an earthquake disaster prevention education program for children with intellectual disabilities and is currently verifying its effectiveness. Conducting a study fo-

**Table 1.** Goals of disaster prevention education at each level of school (created from MEXT, “Reference Materials for Disaster Management at School – Development of Disaster Management Education to Foster ‘Zest for Life’” [3].

| Level of school    | Goal of disaster prevention education   |
|--------------------|---|
| Elementary school  | Children who can understand the crisis of disasters that occur in various situations of their daily life, take safe actions (A). Children pay attention to the safety of other people (B).  |
| Junior high school | Students can actively do things by preparing for daily life and making correct judgments (A). They understand the importance of local disaster prevention activities, help each other in occurrence of a disaster, and take part in activities (B). |
| High school        | Students who can be aware of joining the building-up of a safe and secure society, and judge and act proper roles by themselves in local activities of disaster prevention and in support activities at disaster time (B only).                     |

\*In the table, (A) is related to the safety of children and students themselves; and (B) is related on people other than themselves.

cusing on the emotional aspect, Motoyoshi [8] analyzed disaster prevention education and posited that such education aimed at fostering self-efficacy will become important in the future. Further, Kanai et al. [9] conceptualized “Disaster prevention education” not only as “Education that teaches disaster prevention,” but also as an educational method that evolves into “Human education through disaster prevention (education of ethics and education of life).” Katada and Kanai [10] argued that disaster prevention education prior to the Great East Japan Earthquake mostly consisted of “threatening disaster prevention education” or “knowledge-oriented disaster prevention education,” and proposed the idea of “attitude-oriented disaster prevention education.” All researchers have emphasized the value in disaster prevention education that focuses on the emotional aspects of children in addition to disaster prevention and protecting children. Moreover, Sato et al. [11] showed that students’ “Zest for Life” was fostered by conducting activities in a junior high school in Minamisanriku Town, an area affected by the Great East Japan Earthquake, in which students took initiative to run an evacuation center without a set scenario and without receiving instructions from adults. It was shown that students’ “Zest for Life” was nurtured by conducting activities to operate evacuation centers. In addition, Sato et al. [1] categorized practical cases of disaster prevention education for elementary school students, conducted at children’s centers outside the school, which emphasized the emotional aspect of disaster prevention education. Such a model was created to conceptualize the subject group and revealed that it is composed of four fields.

However, in school disaster prevention education, the development of lessons intended to nurture the emotional aspect is not generally promoted yet. Many schools offer disaster prevention education by repeating evacuation drills several times a year, as stipulated by the Fire Service Act. Additionally, there remain a few practical studies, which have clarified the emotional effects children can

experience from disaster prevention education. Further, from the perspective of schoolteachers, sufficient research has not been conducted to clarify what emotional aspects educators are trying to nurture through disaster prevention education.

Therefore, this study clarified what kind of content is available within disaster prevention education, other than saving lives, ensuring safety, and acquiring knowledge and methods for that purpose. To clarify them, this study focused on the supplementary textbooks of disaster prevention education used in school lessons.

Kuromitsu et al. [12] developed a supplementary textbook focusing on the regional hazards of Sakurajima, and Nouchi et al. [13] promoted disaster prevention education with a quiz format and developed a booklet, titled “the disaster prevention pocket notebook,” and his research verified its effectiveness. In addition, local governments, ministries such as the Japan Meteorological Agency, and universities have developed many supplementary textbooks that can be used for disaster prevention education in schools. There are also forms of supplementary textbooks, such as digital teaching materials and lessons that can be downloaded, printed, and distributed. However, most of these are made in the form of disaster types, are devoted only to the introduction of knowledge about the hazards of natural disasters and are written with a biased emphasis on hometown and career education. While all curriculums suggest a wide variety of disaster prevention education, this study focused on the supplementary textbooks of disaster prevention education prepared by the local governments affected by the great disaster.

Specifically, this study researched supplementary textbooks that can be used for comprehensive disaster prevention education that are edited and written by teachers who have worked at schools. Two conditions were established as means for extracting such a supplementary textbook. One was the population scale of the municipality that created the target supplementary textbook. The target municipalities were wide-area municipalities with a population of one million or more, as the national operational standard, needed for designation of ordinance-designated cities. The second was any municipality that was severely damaged by either the Great Hanshin-Awaji Earthquake, or the Great East Japan Earthquake, where the number of dead and missing people exceeded 1,000. The reason for setting these conditions is that the larger the population of a local government, the larger the number of people assigned to the board of education, and greater the budget, more numbers of individuals assigned to the supplementary textbook preparation committee. It was considered that the possibility of producing a supplementary textbook in which the opinion of a specific individual was reflected was reduced. In addition, by choosing a municipality affected by the two major disasters in Japan, it was more likely that teachers involved in editing and creating the supplementary textbooks would have been affected by the disasters and would empathize with the work of the students. Under the above conditions, the five local gov-

ernments that created the supplementary textbook were Miyagi prefecture, Iwate prefecture, Hyogo prefecture, Sendai city, and Kobe city.

## 2. Research Purpose

This study focused on the five local governments affected by the Great Hanshin-Awaji, and Great East Japan Earthquakes: Miyagi; Iwate; Hyogo; Sendai; and Kobe, which develop the comprehensive supplementary textbooks for disaster prevention education. By statistically analyzing the subjects of the supplementary textbook of the local governments, the subjects considered proper and appropriate in disaster prevention education for disaster-affected children, by the teachers of the disaster-stricken local governments and, were recognized. Specifically, the subject of the supplementary textbook of disaster prevention education was categorized with cluster analysis used for typology. By typifying, the future state of disaster prevention education for children at school was envisioned. Naming the qualities and abilities children should acquire to save their own lives, the form of disaster prevention education conducted by school education were the primary considerations of the study. Additionally, it was considered how these issues above relate to the personality formation, which is the goal of school education. Consequently, this study is aimed to make recommendations for future school curriculums on disaster prevention education.

## 3. Research Method

### 3.1. Supplementary Textbooks

In the earlier section, the term “Secondary supplementary textbook” was used to represent a so-called “textbook,” but strictly speaking, such a term does not exist according to the School Education Law. Supplementary textbooks [14] used at schools in Japan are certified by MEXT, and are used for the subjects stipulated in Article 72 [15] of the School Education Law Enforcement Regulations. Therefore, there was originally no “textbook” for disaster prevention education, and it is believed that using such expressions will cause confusion. This paper presents a discussion using the term “supplementary textbook” established by Miyagi prefecture.

In many cases, staff members who oversee the work under the chief of the board of education are appointed by those who were originally schoolteachers for a limited time. Therefore, many faculty members are included as people in charge of developing and editing the supplementary textbooks. For example, 13 (68.4%) members that have been a teacher are included in 19 members of “Miyagi Disaster Prevention Education Supplementary Textbook Preparation Review Committee Working Group” [16] of “Bonds (*Kizuna*) to the Future, Supplementary textbook of Miyagi Disaster Prevention Ed-

ucation” [17] created in Miyagi prefecture in 2013, following the Great East Japan Earthquake. With the facts, the above-mentioned supplementary textbook of the five boards of education can strongly reflect the ideas of the teachers who edit the supplementary textbooks. Based on the premise, by analyzing the supplementary textbook for the disaster prevention education has been edited and published by the boards of education, it is understandable what curriculum content the teachers want to educate children and students on as disaster prevention education.

The list of supplementary textbooks for disaster prevention education of five municipalities is shown in Appendix A. The title of the supplementary textbooks supplies a glimpse into teachers’ thoughts. In preparation for disasters, the subjects of protecting lives, interacting with others, cherishing bonds, and experiencing a happy future express the wishes and thoughts of teachers about children. It is as if the content of the supplementary textbooks for Ethics subject, and it is intended to cultivate the emotional character of children. Various supplementary textbooks were published in a form according to each education level, including kindergarten, elementary school, junior high school, and high school. Of the five supplementary textbooks, only Iwate offers education throughout the prefecture, not as disaster prevention education but as reconstruction education. The supplementary textbooks issued by the five boards of education each pertain to various grades and stages of school. However, among them, only the supplementary textbook for junior high school students is commonly targeted at the three grades of junior high school. Based on this, it was decided to convert the supplementary textbook [16, 18–21] for junior high school students of the five boards of education into data to be analyzed.

The aim of disaster prevention education at the elementary school level is to preserve children’s safety, and as students progress toward junior and senior high schools, various kinds of added curricula is incorporated into the supplementary textbooks. To clarify the overall nature of the school’s disaster prevention education as seen from the supplementary textbooks, the study analyzed junior high school supplementary textbooks as they include various learning goals.

Regarding the subjects of the supplementary textbook for disaster prevention education for junior high school students of the five boards of education, the content is listed in Appendix A based on each table of contents. **Table 2** shows the number of subjects for each supplementary textbook.

Each of the subjects corresponds to the table of contents of the supplementary textbook. Depending on the subject matter, the supplementary textbook has only one to five pages. In principle, the unit time for junior high school is typically 50 minutes, but depending on the subject, some need added time and others have insufficient time. Rather than being used regularly in school lessons like general textbooks, the supplementary textbooks are partially incorporated and used in lessons in related fields. Depending on how the entire class time is used and how

**Table 2.** List of the number of subjects in supplementary textbook of each board of education.

| No.   | Local Government  | The number of subjects used for analysis |
|-------|-------------------|--|
| 1     | Miyagi prefecture | 23                                       |
| 2     | Sendai city       | 30                                       |
| 3     | Iwate prefecture  | 35                                       |
| 4     | Hyogo prefecture  | 19                                       |
| 5     | Kobe city         | 40                                       |
| Total |                   | 147                                      |

the subject is managed, the supplementary textbooks may span several hours.

This study focused on the content of the subtexts, rather than the time allotted for teaching. Analysis and discussion were advanced by setting and subject, based on the table of contents established by people who composed and edited the supplementary textbook.

### 3.2. Evaluation Items

The 147 subjects in **Table 2** are evaluated based on the items presented in **Table 3**. Each subject is evaluated on whether or not it relates to the specific items.

Each major category of evaluation items is described below. In any major category, several evaluation items may correspond.

#### a. Forms of Materials

As for the form of the materials, it was evaluated whether each material was included in the subjects. The category “Literary materials” includes composition, poetry, and essays, and the category “Records” includes descriptive texts, such as disaster records and descriptions of various events. “Statistical data” includes graphs. “Images” include photographic materials. “Presence or absence of notes and descriptive columns” includes horizontal ruled lines of a notebook and a descriptive column such as check sheets.

#### b. Types of Related Disasters

The types of disasters discussed in the subject material was evaluated in five categories: “Earthquake disasters,” “Tsunami disasters,” “Disasters of heavy rain and landslides,” “Volcanic disasters,” and “Others and general disasters.” “Others and general disasters” was selected in cases where other suitable disaster types were not available in the disaster inventory.

#### c. Related Fields

Whether the content was related to one of nine subjects was considered. Special subjects included ethics and the two fields of “Special activities” and “Period for integrated study” that are conducted as classes in junior high schools in Japan. If the content of a supplementary textbook is related to a corresponding subject or field, it is marked with a check mark. In the

**Table 3.** List of evaluation items.

| No. | Major item  | Evaluation item   |
|-----|---|---|
| 1   | Forms of materials  | Literary materials (composition, poetry, essay)   |
| 2   |   | Records   |
| 3   |   | Statistical data  |
| 4   |   | Images  |
| 5   |   | Presence or absence of notes and descriptive columns  |
| 6   | Types of related disasters  | Earthquake disasters  |
| 7   |   | Tsunami disasters   |
| 8   |   | Disasters of heavy rain and landslides  |
| 9   |   | Volcanic disasters  |
| 10  |   | Others and general disasters  |
| 11  | Related fields  | Japanese  |
| 12  |   | Social studies  |
| 13  |   | Mathematics   |
| 14  |   | Science   |
| 15  |   | English   |
| 16  |   | Music   |
| 17  |   | Art   |
| 18  |   | Health and physical education   |
| 19  |   | Industrial art and homemaking   |
| 20  |   | Ethics  |
| 21  |   | Special activities  |
| 22  |   | Period for integrated study   |
| 23  | Writer and persons involved                                       | Student (learner)   |
| 24  |   | Teacher   |
| 25  |   | Family  |
| 26  |   | Local residents   |
| 27  |   | Unaffected persons (volunteers, medical workers, etc.)  |
| 28  |   | Firefighting, police, self-defense forces   |
| 29  |   | Japan Meteorological Agency   |
| 30  |   | Government  |
| 31  |   | Researchers and experts (workers of engineering and construction, media, lifeline)                              |
| 32  | Type based on "Conceptual Model of Disaster Prevention Education" | Offer emergency response in occurrence of disasters   |
| 33  |   | Useful for evacuation life  |
| 34  |   | Preparation for disasters   |
| 35  |   | Enrich the mind (by raising the self-awareness of disaster prevention)  |
| 36  | Qualities and abilities expected to be acquired                   | Knowledge   |
| 37  |   | Skills  |
| 38  |   | Thinking ability  |
| 39  |   | Judgement   |
| 40  |   | Expressive ability  |
| 41  |   | Self-awareness  |
| 42  |   | Kindness to disaster-affected people  |
| 43  |   | Thoughts for the hometown and family  |
| 44  |   | Social participation/community contribution (including bonds, cooperation, solidarity, normative consciousness) |
| 45  |   | Life, nature conservation, and awe to nature  |
| 46  | Aspiration, efforts, and joy of living better                     |   |

case of content related to overall training for disaster prevention by a governor, such as at the city or town level, or calls for participation in training, it is marked as "Special activities" in consideration of its relationship with "Health and physical education" of "Special

activities," though a class with content is not conducted in school.

d. Writer and persons involved

A writer of materials, for example, a person who describes the composition, was studied. Further, in the case where a writer is unclear such as "Records," an evaluation item of a person, occupation, and type of occupation related to the content was marked. There are nine evaluation items: "Student (learner)," "Teacher," "Family," "Local residents," "Unaffected persons (volunteers, medical workers, etc.)," "Firefighting, police, self-defense forces," "Japan Meteorological Agency," "Government," and "Researchers and experts (workers of engineering and construction, media, life-line)." "Student (learner)" is marked in the case where the pupil is not a writer of materials but a learner. For example, in the case of a subject that specifically presents a way of exercise for mental care to be practiced by students, there can be a student who is a learner – as opposed to clinical psychologists and healthcare professionals – and in this case, "Student (learner)" is marked. Further, an evaluation item "Unaffected persons" is established in addition to "Local residents" of the disaster area, including volunteers, clinical psychologists, and healthcare professionals. "Unaffected persons" is set up with a relation because many people enter the disaster location following the event. Further, the research supplied analysis based on the natural disaster, itself. Therefore, an evaluation item for judging "Japan Meteorological Agency," was established, independently of another "Researchers and experts."

e. Type Based on "Conceptual Model of Disaster Prevention Education"

The evaluation items are types referring to the research of Sato et al. [1] described in the preface. Learning activities of the disaster prevention education were classified into the following four categories: "Offer emergency response in occurrence of disasters," "Useful for evacuation life," "Prepare for disasters," and "Enrich the mind." Content was marked if it matched the subjects "Offer emergency response in occurrence of disasters," and "Useful for evacuation life." The subjects "Prepare for disasters" and "Enrich the mind" included those aiming at guidance for communication with local people. If examples of emergency measures to save lives and useful methods in disaster-affected life were not causally related to learning content, and the subject raised self-awareness, the item "Prepare for disasters" was marked. In addition, even if the content was a different from disaster prevention and can supply sympathy to others, "Enrich the mind" was marked.

f. Qualities and Abilities Expected to Be Acquired

Items of the qualities and abilities were created based on the "Three cores of qualities and abilities" to be nurtured, appearing in the "Arrangement of Issues, Curriculum Planning Special Subcommittee" [22] when the new course of study is organized. In the dis-

discussion points mentioned in above, the qualities and abilities that should be nurtured include three cores of “knowledge and skills,” “the students’ abilities to think, make judgments and express themselves,” and “Humanity, and the motivation to learn.” Of the items, the former two cores are the five items: “Knowledge,” “Skills,” “Thinking ability,” “Judgment,” and “Expressive ability.” The motivation to learn is another core, which was replaced by independence and changed to “Self-awareness.” Regarding humanity, the author created five items: “Kindness to disaster-affected people,” “Thoughts for the hometown and family,” “Social participation/community contribution,” “Life, nature conservation, and awe to nature,” and “Aspiration, efforts, and joy of living better” in consideration of an evaluation of disaster prevention education, by carefully examining multiple supplementary textbooks so that an appropriate evaluation was accomplished, with reference to the content item of “Ethics.” The evaluation of this major category was based on the qualities and abilities that the author evaluated and expects to acquire. Some of the materials on the subjects were chosen by multiple common boards of education. However, depending on the handling of the material, content can be read with different intentions, and even if the same material is used, the marked point can be different.

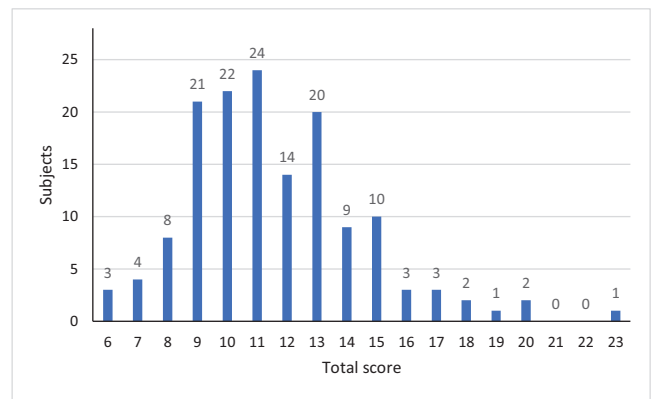
Using the 46 evaluation items listed above, a total of 147 subjects in the five supplementary textbooks were marked for applicability and non-applicability. The data set is in the form of a two-dimensional table in which “subject” and “evaluation item” are arranged in rows and columns. If applicable, substitute “1,” and if not applicable, substitute “0.” Initially, the evaluation remained unclear. During the evaluation, there were cases where it was inconvenient to set the evaluation items. The evaluation item was recreated and evaluated again. After the evaluation of the five supplementary textbooks was completed, a comparative study was conducted on similar subjects of different supplementary textbooks. The common and uncommon parts were examined in view of the subjects and then re-evaluated. By repeating such a thing, the data set was completed.

Using the completed data set, cluster analysis was performed according to the ward method and Euclidean square distance.

## 4. Research Results

### 4.1. Summary of Evaluation of Supplementary Textbooks

From the five supplementary textbooks, the total number of subjects used for analysis is 147. Each of the subjects is evaluated with 46 evaluation items. To know the overall tendency, if the score of each subject is 46, the average of all subjects is 11.59 (SD = 2.92). The minimum value is 6 and the maximum value is 23. **Fig. 1** shows the distribution of the total scores of the subjects.



**Fig. 1.** Distribution of total score of subjects.

**Figure 2** shows the situations of each evaluation item. Of all the evaluation items, there are no subjects corresponding to “Mathematics,” “English,” and “Art” in “Related Fields.” To provide an overview for each major category, “Forms of materials,” is “Records” (111 material, 75.5%) using photographs (“Images” (109 subjects, 74.1%)) of the Great Earthquake.

Additionally, since the “Types of related disasters” is the areas affected by the Great Earthquake, “Earthquake disasters” (108 subjects, 73.5%) and “Tsunami disasters” (85 subjects, 57.8%) are exceedingly large. In “Related Fields,” “Social studies” (30 subjects, 20.4%) and “Science” (29 subjects, 19.7%) contribute significantly to the disaster prevention education. In addition, “Special activities,” which is primarily related to evacuation drills that are the main activities of disaster prevention, is the most common with 59 subjects (40.1%), but “Ethics” is 56 subjects (38.1%) that is close to “Special activities.” As for “Writer and persons involved,” “Student (learner),” who writes materials, participates in student composition, or is involved as a learner, has the highest 72 subjects (49.0%). Subsequently, there are “Local residents” (52 subjects, 35.4%), “Researchers and experts” (36 subjects, 4.5%), volunteers, and other “Unaffected persons” (35 subjects, 23.8%). In the “Type based on ‘Conceptual Model of Disaster Prevention Education,’” learning activities “Prepare for disasters” are the highest 92 subjects (62.6%). Then, learning activities to “Enrich the mind” (by raising the self-awareness) have 60 subjects (40.8%). There are 51 subjects (34.7%) and 21 subjects (14.3%), respectively, for learning activities that “Offer emergency response in occurrence of disasters” and “Useful for evacuation life.” Finally, “Knowledge” is especially high, with the highest 91 subjects (61.9%) in “Qualities and abilities expected to be acquired.” Obviously, understanding of the knowledge to save lives is the central learning of the disaster prevention. Afterwards, “Self-awareness” has 64 subjects (43.5%), “Social participation/community contribution” including person-to-person bonds and cooperation and sense of solidarity has 48 subjects (32.7%), and “Kindness to disaster-affected people” has 47 subjects (32.0%), respectively.

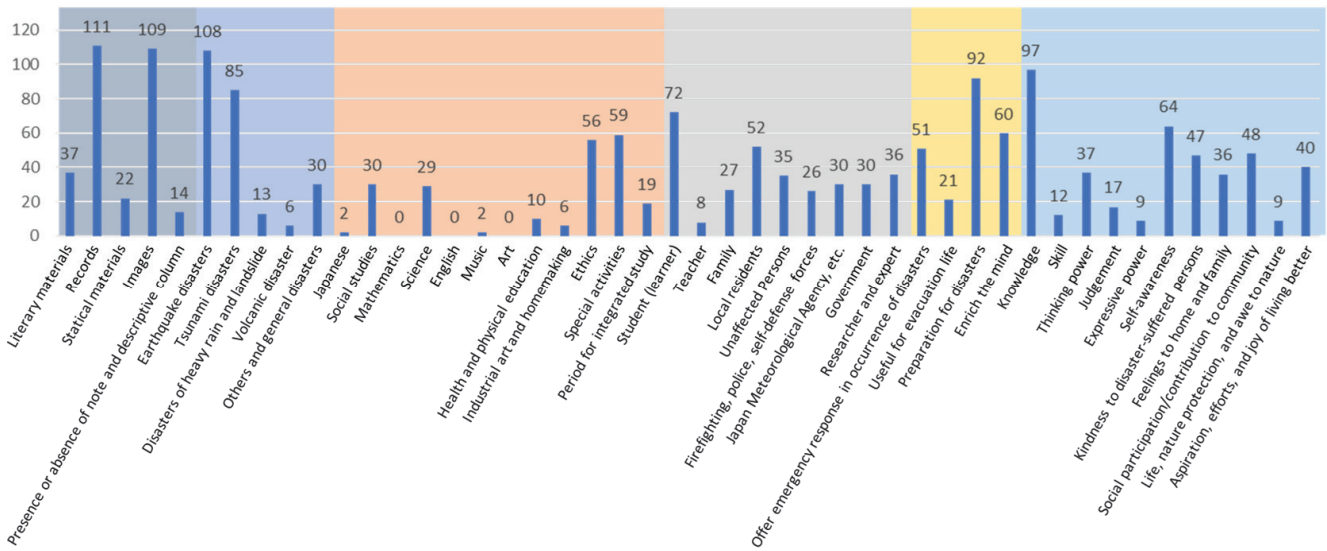


Fig. 2. Situation of score of each evaluation item.

#### 4.2. Cluster Analysis of Evaluation of Supplementary Textbook (Subjects Are Typed by Evaluation Items)

A total of 147 subjects were typed in the data set obtained by the evaluation of the supplementary textbook. The dendrogram obtained through the cluster analysis (ward method) is shown in Fig. 3. The dendrogram was summarized, and six types appeared as follows. The reasons for naming each type are described below.

- **Type I. Life-Saving Measures**

The subjects classified into Type I include “Learn about earthquake (tsunami) disasters” (Miyagi). In addition, heavy rain, volcanic, and nuclear disasters were also included with the aim of understanding the mechanisms and dangers from the viewpoint of natural science. Additionally, knowledge and methods to save lives during disasters, such as “Prepare for earthquake (tsunami) disasters” (Miyagi) in preparation for various disasters centered on earthquakes and tsunami and “My thought about disaster prevention,” were included. Considering this type nurtures “Awareness,” Type I is called a “Life-saving measures.”

- **Type II. Fortifying Town**

Type II includes “the Great East Japan Earthquake on March 11, 2011” (Iwate), “Recovery/reconstruction society from the Great Hanshin-Awaji Earthquake” (Hyogo), “Hopes for reconstruction” (Kobe), and consists of subjects such as “Join local disaster prevention drills” (Iwate) and “Natural disaster chronology/reconstruction, chronology of Sendai” (Sendai). This type is strongly related to social studies, and many of the subjects deal with the history of past natural disasters and the state of restoration and reconstruction of the affected towns. Included in the lessons were subjects intended for development of a

disaster-resistant community such as active participation in disaster prevention drills, in relation to student’s buildup of future community, particularly, each student’s “Self-awareness of the disaster prevention.” Therefore, Type II is called “Fortifying town” because it focuses on knowledge about fortifying town.

- **Type III. Measures Required for Disaster Survival**

Type III contains “Use media” (Kobe), “Disaster prevention simulation” (Kobe), “Protect mental health” (Sendai), “Protect mental health” (Kobe), and “Basics of first aid” (Iwate). The characteristic of this subject matter is that the disaster types are composed only of “Others and general disasters.” Further, Type III curriculum consists of subjects using media information at the time of disaster occurrence, and “Thinking ability” and “Judgment” for a countermeasure and a subject for learning “Knowledge” required for evacuation life. Such subjects are related to motivation of “Self-awareness.” Furthermore, such subjects also include learning at a usual time such as mental health in the evacuation life after the disaster, first aid for the injured and sick, and preparation for the next disaster. This type also has a strong relationship with “Self-awareness.” Based on the above considerations, Type III is a type of “Knowledge” related to the possible response in life after disaster and is called “Measures required for disaster survival”

- **Type IV. Awareness of Joining Local Community**

Type IV, called “Awareness of joining local community,” includes “Mutual help is wonderful” (Sendai), “As an evacuee” (Miyagi), “What you can do as a member of the local community” (Hyogo) (Miyagi), “Vest indicating roles” (Iwate), “Friends of Japan” (Kobe), and “Toward the dream step by step, Collaboration school” (Iwate).

This type is closely related to “Unaffected persons,”

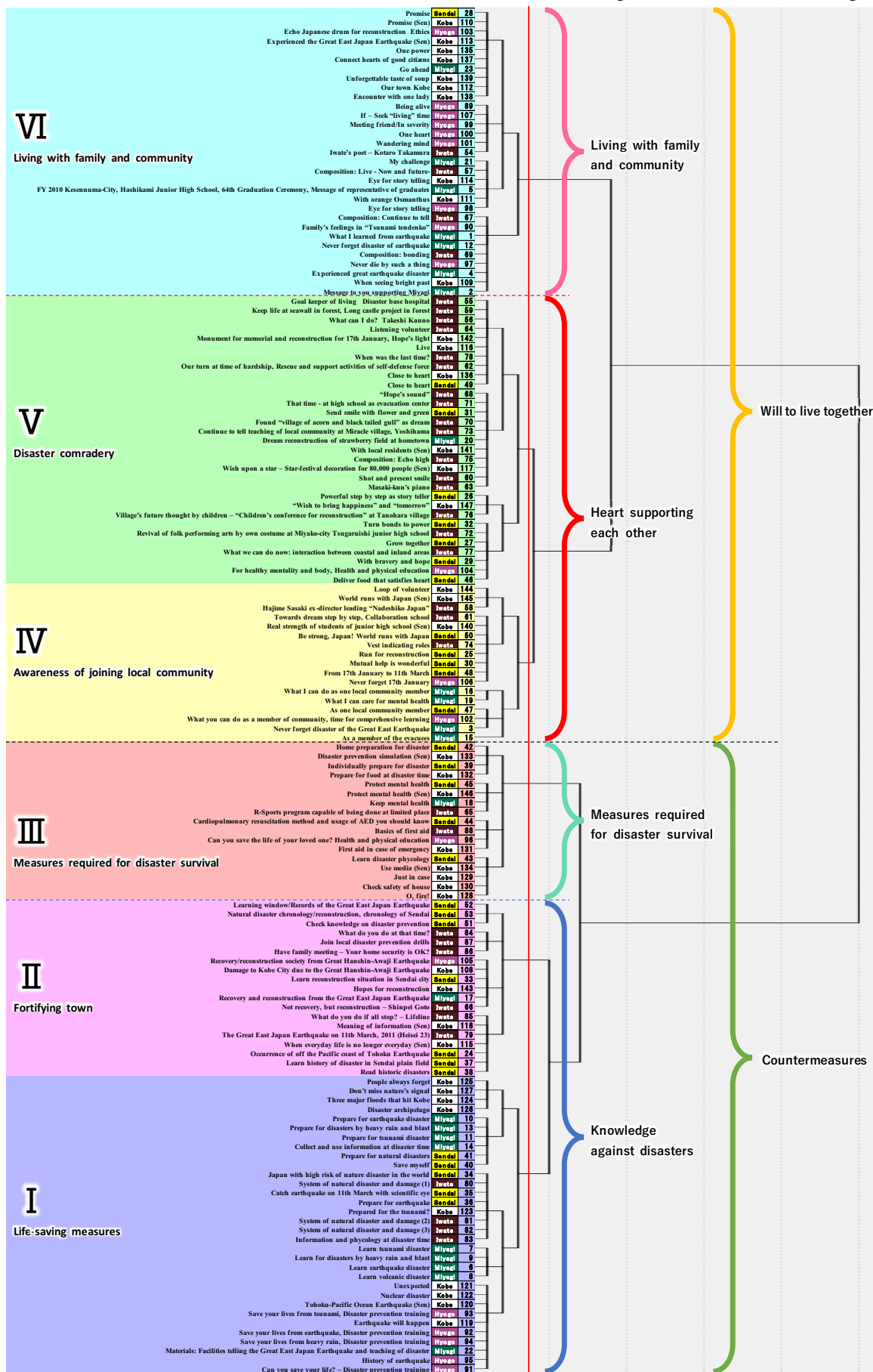


Fig. 3. Results of cluster analysis with subjects.

such as volunteers and “Local residents.” In addition, Type IV includes many subjects that are expected to teach emotional aspects such as “Kindness to disaster-affected people” and “Social participation/community contribution.” There is a subject that encourages students as learners to think about what they can do at once after a disaster in their hometown. There is also a subject that deals with the awareness of joining local festivals and disaster prevention drills as a member of the community during normal times. Furthermore, there is a subject called “Knowledge” that raises awareness of the fact that tangible and intangible services and volunteer support are received not only from Japan but from all over the world. The wonders of service and mutual help, and the value of kindness are realized, and it is believed that this type nurtures the awareness among students to join in the building of a local community.

#### - **Type V. Disaster Comradery**

Type V includes subjects of: “With local residents” (Kobe), “Turn bonds to power” (Sendai), “What can we do now – interaction between coastal and inland areas” (Iwate), “Wish to bring happiness and tomorrow” (Kobe), “Close to heart” (Kobe) (Sendai), “Continue teaching of local community at miracle village, Yoshinohama” (Iwate), and “Listening volunteer” (Iwate). This type is closely related to “Earthquake disasters” and “Tsunami disasters,” and most of them are “Records” from the Great Hanshin-Awaji Earthquake and the Great East Japan Earthquake. In addition, the characteristic of this type is that it is closely related to the subjects of “Ethics” and “Enrich the mind” (by raising the self-awareness). The core feeling is “Kindness to disaster-affected people,” and it is closely related to volunteers such as “Local residents” and “Unaffected persons.” For this reason, Type V, called “Disaster comradery,” is designated to learn kindness from the local people and volunteers who are joined by the circumstances of the earthquake.

#### - **Type VI. Living with Family and Community**

Type VI includes subjects such as “Eye for story telling” (Kobe) (Hyogo), “What I learned from the earthquake” (Miyagi), “One heart” (Hyogo), “FY 2010 Kesenuma-city, Hashikami junior high school, 64th graduation ceremony, message of representative of graduates” (Miyagi), “Meeting a friend/In severity” (Hyogo), and “Experiencing the Great East Japan Earthquake” (Kobe).

Unlike other types, Type VI, called “Living with family and community,” is characterized only by emotional materials such as student compositions. Therefore, it is strongly related to “Ethics” and “Enrich the mind” (by raising the self-awareness). The core feelings correspond to many evaluation items such as “Thoughts for the hometown and family” and “Aspirations, efforts, joy of living better.” For this reason, Type VI allows students to consider a better life in the community by sharing their thoughts with their hometown residents,

family, and residents, by considering the feelings of those who have experienced the disaster.

Cluster analysis of the subjects of the supplementary textbooks for disaster prevention education, created by the teachers, yielded six types. In addition, each of the six types always includes the subject of the five boards of education extracted this time. It is proper to consider six fields as an outline of the disaster prevention education developed by the teachers.

Moreover, with reference to the dendrogram in **Fig. 3**, the six regions are divided into two groups: Type I to Type III, and Type IV to Type VI. The difference between the two groups is whether they focus on learning the emotional aspect.

The former group is a subject that aimed to foster “Self-awareness,” which is the “Motivation to learn” of the three cores of qualities and abilities. Additionally, “Knowledge” was the focus, and is related to “Skills,” “Thinking ability,” and “Judgment ability.” The latter group focuses on learning the emotional aspect of “Humanity,” in terms of the three cores of qualities and abilities, in addition to learning “Knowledge.” Type VI is occupied by subjects that can be described as “Ethics.”

These groups are further divided into three types, respectively. However, the former group Type I and Type II are close to each other. In addition, the dendrogram in **Fig. 4** shows that the latter group Type IV and Type V are also close to each other.

A combination of Type I “Life-saving measures,” and Type II “Fortifying town,” results in the subjects for learning. “Knowledge against disasters,” showing that lives are saved from disasters and a town resistant against disasters is fortified. Further, Type III “Measures required for disaster survival” are collectively called “Countermeasures.” This is mentioned above. This is a group called the former that collects Type I to III.

The group that is called the latter earlier is set, first as a combination of the close Type IV “Awareness of joining local community,” and Type V “Disaster comradery,” as learning on helping each other of people in a local community and volunteers outside the disaster location. Consequently, the combination of Types IV and V is called “Heart supporting each other.” Furthermore, in addition to the desire to help each other and live together by adding Type VI to the combination of Types IV and V, with feelings to help each other and live together, the will to join a local community and a new disaster location is added. Therefore, it is called “Will to live together.”

With the above-mentioned analysis and the analysis of the supplementary textbooks for disaster prevention education at junior high schools in the disaster-affected areas with the Great Earthquake, obviously, the teachers desire to nurture “Countermeasures” for learning the knowledge on disasters and how to deal with them, and “Will to live together” by bringing the local community together and helping the local families.

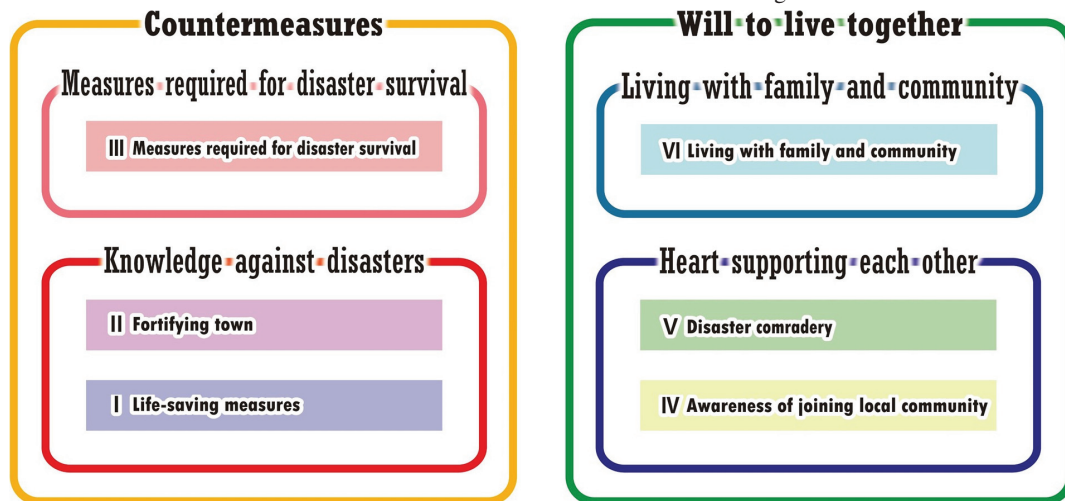


Fig. 4. Arrangement of categorizations of subjects.

#### 4.3. Cluster Analysis of Evaluation of Supplementary Textbook (Evaluation Items are Typed by Subject)

Next, 46 evaluation items of the evaluation of the supplementary textbooks were typed. As in Section 4.2, the dendrogram obtained from cluster analysis (ward method) is shown in Fig. 5. The dendrogram was summarized, and it was considered that there were four types as shown below. The reasons for naming each type are described below.

##### - Type A. Knowledge to Prepare for Earthquake and Tsunami Disasters

The purpose of Type A is to learn “Prepare for disaster” and “Knowledge” of “Earthquake disasters” and “Tsunami disasters” based on “Records” with “Images.” Therefore, Type A is called “Knowledge to prepare for earthquake and tsunami disasters.”

##### - Type B. Solidarity With Family and Residents

Type B is related to evaluation items of emotions such as “Thoughts for the hometown and family,” “Social participation/community contribution,” and “Kindness to disaster-affected people,” based on “Literary materials” such as composition written by “Student (learner).” Further, Type B has content of learning “Family,” “Local residents,” and volunteers as “Unaffected persons” in relation to “Ethics.” From this kind of learning, Type B intends to raise the self-awareness by encouraging students to “Enrich the Mind,” and is called “Solidarity with family and residents.”

##### - Type C. Emergency Response Judgement

This type is related to “Science” and “Social studies” that are findings of “Researchers and experts” of “Japan Meteorological Agency.” Based on the learning content of various disasters, “Self-awareness” is nurtured. Furthermore, in evacuation drills, held as health, safety, and physical education events of “Special activities,” “Thinking ability” and “Judgment” are

nurtured as “Emergency response in occurrence of disaster.” Considering this type, Type C is called “Emergency Response Judgement.”

##### - Type D. Knowledge and Skills Useful at Disaster Time

This type includes evaluation items of “Disasters of heavy rain and landslides,” “Volcanic disasters,” and “Others and general disasters.” Type D is a type of learning “Skill” of an emergency lifesaving method, in “Health and physical education” and “Period for integrated study” with a relation to emotional learning such as “Life, nature protection, and awe to nature” without limiting the type of disaster. In addition, in a guidance on emergency lifesaving method, firefighters can be invited as instructors and a class is offered with a relation to evaluation items such as “Firefighting, police, and self-defense forces.” With a connection with such a type, Type D is called “Knowledge and skills useful at disaster time.”

This result matches the number of types proposed by the conceptual model of disaster prevention education conducted by Sato et al. [1] which is the evaluation item in this study. In addition, 11 “Qualities and abilities expected to be acquired” are classified into each type as evaluation items. This is summarized in Table 4.

Type A “Knowledge to prepare for earthquake and tsunami disasters” corresponds to “Activities to prepare for disasters.” This type is the opposite of the three Types B to D and is considered to occupy a large area of disaster prevention education. In this analysis, it is focused on the areas affected by the Great Hanshin-Awaji Earthquake and the Great East Japan Earthquake, so the disaster is a close-up of the earthquake and tsunami, but considering the disaster prevention education, the earthquake is a type of learning “Knowledge” that prepares for disasters in general, not limited to tsunami. This type is prepared and does not focus on offering of an emergency response. According to the research by Sato et al. [1],

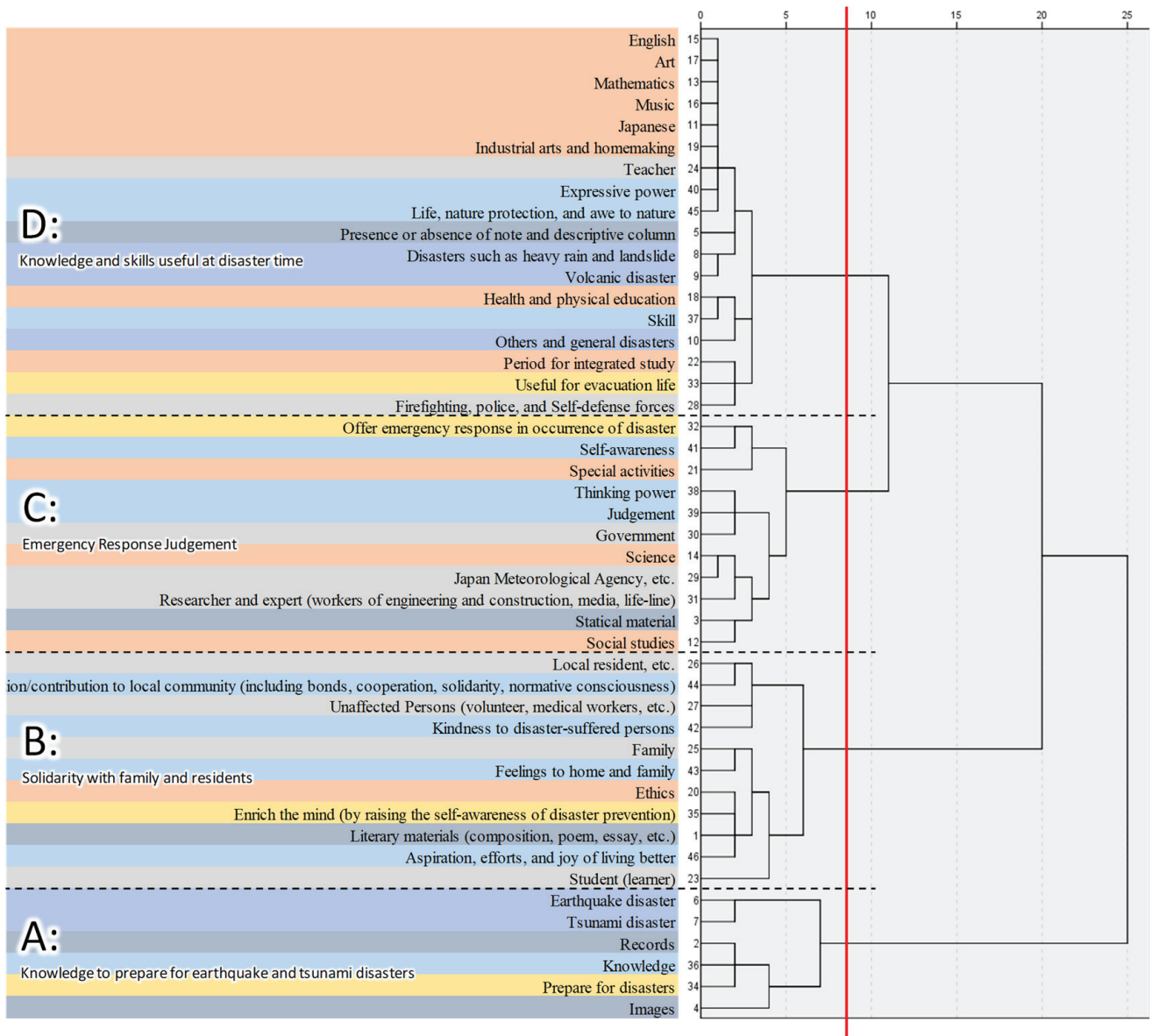


Fig. 5. Results of cluster analysis with evaluation items.

“Activities to prepare for disasters” includes “Activities to prepare for disasters but not for offering of an emergency response and evacuation life.” As an example, “Artistic activities such as theater, music, and painting related to disasters” are given as a general example. The main subjects of the supplementary textbooks adopted in this study are those aimed at acquiring the knowledge necessary for disaster preparedness, such as the mechanism of earthquake and tsunami, using descriptive materials for earthquake and tsunami. There are some subjects such as taking up the tradition of disasters and plays on local disasters in the supplementary textbooks of some local governments, and introducing songs that sing the feelings on disasters, but in the form of a lecture lesson with a supplementary textbook due to its nature, it is possible to experience a value by performing activities such as theater and singing. It seems that it is just an introduction to the fact that theater and songs have such a value, and it is regarded as a type centered on knowledge.

Type B “Solidarity with family and residents” corresponds to “Activities to enrich the mind (by raising the self-awareness).” This type of education aims to nurture the emotional aspect of students and raise self-awareness. Looking at the composition of this type, it is possible that the center of the “Feelings” that Sato et al. [1] says is a sense of solidarity with various people surrounding the student, such as family members, residents, and volunteers. However, caution is needed in understanding this point. In the analysis of this study, it is understood that the teachers at the school want to make the students feel the sense of solidarity with the above-mentioned people only in the lessons conducted using the supplementary textbooks of disaster prevention education. That is to say, the awareness with solidarity is not all of “Feelings” at the time of disaster.

Type C “Emergency Response Judgement” corresponds to “Activities for emergency response in occurrence of disaster.” Emphasis of Type C is “Thinking abil-

**Table 4.** Summary of types by evaluation items and comparison with types of disaster prevention education and qualities and abilities expected to be acquired.

| Type | Summary of type   | Type based on “Conceptual model of disaster prevention education”** | Qualities and abilities expected to be acquired  |
|------|---|---|--|
| A    | Knowledge to prepare for earthquake and tsunami disasters | Activities to prepare for disasters                                 | Knowledge  |
| B    | Solidarity with family and residents                      | Activities to enrich the mind (by raising the self-awareness)       | <ul style="list-style-type: none"> <li>● Aspiration, efforts, and joy of living better</li> <li>● Thoughts for the hometown and family</li> <li>● Kindness to disaster-affected people</li> <li>● Social participation/community contribution</li> </ul> |
| C    | Emergency Response Judgement                              | Activities as offering emergency response in occurrence of disaster | <ul style="list-style-type: none"> <li>● Judgement</li> <li>● Thinking ability</li> <li>● Self-awareness</li> </ul>  |
| D    | Knowledge and skills useful at disaster time              | Activities useful for evacuation life                               | <ul style="list-style-type: none"> <li>● Skills</li> <li>● Life, nature protection, and awe to nature</li> <li>● Expressive ability</li> </ul>   |

\*Since the research by Sato et al. [1] is obtained by categorizing the activities for elementary school students conducted as disaster prevention education, the ending is “-activity.” Noted that the evaluation item of this study is not about whether the activity is conducted, but whether the aim of each subject of the supplementary textbook is related to which category of activity.

ity” and “Judgment” according to disaster and the situation at the time. And it is “Self-awareness” that can be considered as one’s own thing. The teachers who created the supplementary textbooks focused on protecting each student’s life and hoped that the students would be able to protect their own lives by responding flexibly in the event of disasters.

Type D “Activities useful for evacuation life” corresponds to “Knowledge and skills useful in occurrence of disaster.” Type D is related to “Skills” as the center. Sato et al. [1] limit the phase to evacuation life after the disaster as “Activities useful in evacuation life,” but in the analysis of this study, skills that require training such as emergency lifesaving methods are collected as one type. It is necessary to acquire the skills of emergency lifesaving and first aid methods for injuries and illnesses in combination with knowledge. Skills such as firefighting and cooking are also needed to prepare for meals for evacuation life. Since it is necessary to express such things as the result of actual learning, it is considered that “Expressive ability” also falls into this category. Also, emotional such as “Life, nature prevention, and awe to nature,” and “Qualities and abilities” are included in Type D, probably because the lifesaving method is related to life. In addition, Type D deals with “Skills” in the disaster prevention education in schools using a supplementary textbook. It clearly shows that disaster education needs to be provided with learning that requires experiential training. To learn the procedure and knowledge of various handling methods by using a supplementary textbook and learning only the knowledge in a classroom manner, is quite impossible. The teachers who edited the supplementary textbook think direct learning to acquire “Skills” like this is important. Disaster prevention education in schools needs a place where students learn with experience by doing things.

## 5. Discussion

First, the relationship between the two types of analysis results obtained from the cluster analysis in the earlier section, Types I to VI and Types A to D must be considered. **Table 5** shows the relationship between the two types.

Considering the A to D types in **Table 5** that classify the evaluation items, many checks are gathered for Type A. The knowledge to prepare for earthquake and tsunami disasters of Type A is the center of the disaster prevention education using the supplementary textbooks. Congruent with the “Ability to respond to disasters” of Types I to III, which focuses on learning to acquire “Knowledge,” the “Will to live together” of Types IV to VI, which focuses on learning related to emotions also, received many checks. Initially, it is a contradictory result that many checks were seen in both two groups, but this seems to be intended to raise students’ awareness of disaster prevention and effectively intended to acquire “Knowledge,” by paying attention to feelings related to disasters. It is thought that the intention was to raise the level of knowledge and effectively establish “Knowledge.” In addition, there are many configurations in which students’ actions are triggered, such as actively preparing for disasters, triggered by emotions. Disaster prevention education is an area where learning motivation and learning content coexist in an extremely natural way.

As for Type B, many checks were gathered in Types IV to VI, and most of them are moral and other emotional subjects. Type C contrasts with this, and many checks were found in the subjects of Types I to III. It is occupied by the subject related to emergency response in a disaster, judgment of the situation, and flexible thinking and judgment according to the situation. There was some association between Types B and C, and Types III and IV,

**Table 5.** Relationship between two types (numbers in the table represent the percentage of applicable items).

|  | I                           | II              | III                                     | IV                                   | V                  | VI                               |
|--|-----------------------------|-----------------|---|--------------------------------------|--------------------|----------------------------------|
|  | Countermeasures             |                 |   | Will to live together                |                    |                                  |
|  | Knowledge against disasters |                 | Measures required for disaster survival | Heart supporting each other          |                    | Living with family and community |
|  | Life-saving measures        | Fortifying town |   | Awareness of joining local community | Disaster comradery |                                  |
| A: Knowledge to prepare for earthquake and tsunami disasters | 83.9%                       | 85.1%           | 55.9%                                   | 74.5%                                | 74.7%              | 38.7%                            |
| B: Solidarity with family and residents                      | 2.8%                        | 6.7%            | 14.4%                                   | 39.0%                                | 50.7%              | 62.5%                            |
| C: Emergency Response Judgement                              | 63.1%                       | 34.0%           | 23.5%                                   | 21.4%                                | 3.5%               | 4.7%                             |
| D: Knowledge and skills useful at disaster time              | 5.2%                        | 6.1%            | 18.3%                                   | 10.5%                                | 5.4%               | 3.2%                             |

which are proximity types, respectively.

Although Type D was the least marked, there were comparatively many checks in the subjects related to Types III and IV. Type D was less marked because it is a type in which “Skills” can be learned more effectively by experience learning, and it seems that the affinity was not good with the learning conducted in the study using the supplementary textbook. Conversely, it is considered that the learning which acquires “Skills” is necessary for the disaster prevention education of the junior high school student, and it is necessary to learn in the experience for that.

Next, each of the Types I to VI, which classify the subject, must be considered vertically. Then, the first and second types are B type and D type, and the check ratio is low, showing that the subject is not remarkably familiar with the B and D types. In addition, Types V and VI were not familiar with Types C and D. Compared to these, Types III and IV seem to correspond to a wide range of evaluation items, penetrating Types A to D. In other words, it is considered that the subjects belonging to the Types III and IV can be used when implementing disaster prevention education in any of the Types A to D.

The two types of proximity, Type III “Measures required for disaster survival” and Type IV “Awareness of joining local community” are reminiscent of the cooperation with local people at evacuation centers in the disaster area. It is a work activity. The management of evacuation shelters in collaboration with local people, including those related to food, clothing, and shelter such as cooking rice, cleaning, and washing, is learning content related to engaging with local people and surviving the disaster together.

Since this study analyzed supplementary textbooks conducted in classroom lectures, the values of Types III and IV were not as high as those of the checks gathered in type A. However, in the subjects belonging to Types III and IV, if the lessons are conducted in consideration of the type of lessons that children’s experience, the educational effects of “Emotional aspects” (Type B), “Thoughts and judgments” (Type C) and “Skills and expressive ability” (Type D) is expected to be even higher. At the beginning

of the discussion, I mentioned that Type A is the center of disaster prevention education using supplementary textbooks, but the learning content belonging to Type III or IV is a greater disaster prevention education that includes experiential activities. In such a form of disaster prevention education, the learning content belonging to Type III or IV is one of the cores of students’ learning and activities. As an example of such experiential activities, the study of Sato et al. [11] mentioned above can be mentioned.

In addition, the “Will to live together” that appeared from the results of cluster analysis based on the subject described in Section 4.2 is family love, attachment to the community, compassion, contribution to the community, awareness of participation, and solidarity. Most of the curriculum was about emotional aspects such as consciousness. This part is a goal added as the school level goes up, as seen in **Table 1**. It is a goal that requires students to take initiative and participate in social development such as approaching the community, which is also the learning of the emotional aspect in the analysis of the supplementary textbooks for junior high school students in this study. It became embossed that it is important that disaster prevention education focuses on such emotional aspects in school education.

It is not clear whether teachers are consciously conducting such emotional education in their daily disaster prevention education. However, regardless of whether the teachers were aware, such learning accounted for almost half of the subject of the supplementary textbooks, which appears to be closely related to the fact that school education aims at “fully-developing the individual character” of children throughout the curriculum. On the contrary, disaster prevention education can be regarded as a paraphrase that includes “fully-developing the individual character” of children, which is the goal of school education.

Disaster prevention education is a field where students can comprehensively learn the three cores of “knowledge and skills,” “the students’ abilities to think, make judgments and express themselves,” and “humanity, and the motivation to learn.” Disaster prevention education is an area that can supply comprehensive learning that encompasses a wide range of fields, and is considered that disas-

ter prevention education has the potential as an education aiming at “fully-developing the individual character.” It is necessary for this kind of recognition to spread widely to the public, including teachers in the field, and to develop disaster prevention education that clearly aims for the growth of children in schools.

## 6. Conclusion

A supplementary textbook for disaster prevention education was analyzed. Cluster analysis (ward method) was performed with a data set of subject evaluation of the supplementary textbooks. As a result of the analysis with subjects, six types were obtained: “Life-saving measures,” “Fortifying town,” “Measures required for disaster survival,” “Awareness of joining local community,” “Disaster comradery,” and “Living with family and community.” Next, the same set of data was analyzed with clusters using evaluation items. As a result of the analysis, four types are obtained: “Knowledge to prepare for earthquake and tsunami disasters,” “Solidarity with family and residents,” “Emergency Response Judgement,” and “Knowledge and skills useful at disaster time.” These correspond to the classification of the conceptual model of disaster prevention education conducted by Sato et al. [1] In addition, each type has the corresponding qualities and abilities. For these reasons, more than half of the subjects contained in the supplementary textbooks for disaster prevention education prepared by schoolteachers should be emotional. Consequently, it is found that teachers think that disaster prevention education should be implemented not only as an education that saves life but also as an education that promotes the growth of children while cultivating humanity.

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## Appendix A. Supplementary Textbook Lists

The supplementary textbooks of the five boards of education are listed in **Table 6** and the contents of each textbook are shown in **Table 7**.

**Table 6.** Types of supplementary textbooks for disaster prevention of the five boards of education.

| No. | Issued by                            | Name of the education program | Issued supplementary textbook  |
|-----|--------------------------------------|-------------------------------|--|
| 1   | Miyagi Prefecture Board of Education | Disaster prevention education | <ul style="list-style-type: none"> <li>● Miyagi Disaster Prevention Education Supplementary Textbook, Bonding to Future (for kindergarten children)<br/>Part 1 Story “Smile, everyone”<br/>Part 2 Learning “Let’s think about it! What should I do if I have problem?”</li> <li>● Miyagi Disaster Prevention Education Supplementary Textbook, Bonding to Future, Elementary school 1st and 2nd grades</li> <li>● Miyagi Disaster Prevention Education Supplementary Textbook, Bonding to Future, Elementary school 3rd and 4th grades</li> <li>● Miyagi Disaster Prevention Education Supplementary Textbook, Bonding to Future, Elementary school 5th and 6th grades</li> <li>● Miyagi Disaster Prevention Education Supplementary Textbook, Bonding to Future, Junior high school</li> <li>● Miyagi Disaster Prevention Education Supplementary Textbook, Bonding to Future, High school</li> </ul> |
| 2   | Sendai City Board of Education       | Disaster prevention education | <ul style="list-style-type: none"> <li>● Sendai’s Version of Disaster Prevention Education Supplementary Textbook 3.11 to Future, Elementary school 1st, 2nd, and 3rd grades</li> <li>● Sendai’s Version of Disaster Prevention Education Supplementary Textbook 3.11 to Future, Elementary school 4th, 5th and 6th grades</li> <li>● Sendai’s Version of Disaster Prevention Education Supplementary Textbook 3.11 to Future, Junior high school</li> </ul>   |
| 3   | Iwate Prefecture Board of Education  | Reconstruction Education      | <ul style="list-style-type: none"> <li>● Live, Engage, Prepare for lower grades of elementary school</li> <li>● Live, Engage, Prepare for higher grades of elementary school</li> <li>● Live, Engage, Prepare for junior high school</li> </ul>  |
| 4   | Hyogo Prefecture Board of Education  | Disaster prevention education | <ul style="list-style-type: none"> <li>● “Disaster Prevention Education in Hyogo,” Save Lives, Nurture Bonds, and Live Tomorrow (for lower grades of elementary school)</li> <li>● “Disaster Prevention Education in Hyogo,” Save Lives, Nurture Bonds, and Live Tomorrow (for higher grades of elementary school)</li> <li>● “Disaster Prevention Education in Hyogo,” Save Lives, Nurture Bonds, and Live Tomorrow for junior high school student</li> <li>● “Disaster Prevention Education in Hyogo,” Save Lives, Nurture Bonds, and Live Tomorrow for high school students</li> </ul>  |
| 5   | Kobe City Board of Education         | Disaster prevention education | <ul style="list-style-type: none"> <li>● Carry happiness for 1st, 2nd, and 3rd grades of Kobe elementary school</li> <li>● Carry happiness for 4th, 5th, and 6th grades of Kobe elementary School</li> <li>● Carry happiness for junior high school</li> </ul>   |

**Table 7.** Titles of supplementary textbooks for disaster prevention education for junior high school students of the five boards of education.

| No | Government        | Large category   | Title of subject   |
|----|-------------------|--|--|
| 1  | Miyagi Prefecture | –  | ● Learned from experience of earthquake  |
| 2  |                   | –  | Message to you for supporting Miyagi   |
| 3  |                   | Chapter 1<br>Never forget 3.11                           | Never forget the Great East Japan Earthquake   |
| 4  |                   |  | ● Experienced the Great Earthquake disaster  |
| 5  |                   |  | ● FY 2010 Kesennuma-City, Hashikami Junior High School, 64th Graduation Ceremony, Message of representative of graduates |
| 6  |                   | Chapter 2<br>Know disaster                               | 1. Learn about earthquake disasters  |
| 7  |                   |  | 2. Learn about tsunami disasters   |
| 8  |                   |  | 3. Learn about volcano disasters   |
| 9  |                   |  | 4. Learn about heavy rain and blast disasters  |
| 10 |                   | Chapter 3<br>Saving myself                               | 1. Prepare for earthquake disasters  |
| 11 |                   |  | 2. Prepare for tsunami disasters   |
| 12 |                   |  | ● Never forget earthquake disasters  |
| 13 |                   |  | 3. Prepare for heavy rain and blast disasters  |
| 14 |                   |  | 4. Collect and use information during a disaster   |
| 15 |                   | Chapter 4<br>Help each other, live together              | 1. As an evacuee   |
| 16 |                   |  | 2. What I can do as a local community member   |
| 17 |                   | Chapter 5<br>Public support and preparation              | Recovery and reconstruction from the Great East Japan Earthquake   |
| 18 |                   | Chapter 6<br>Mental care                                 | 1. Preserve mental health  |
| 19 |                   |  | 2. What I can do for mental health   |
| 20 |                   | Chapter 7<br>Ways of living                              | ● Dream reconstruction of strawberry field at hometown   |
| 21 |                   |  | ● My challenge   |
| 22 |                   | –  | Materials: Facilities telling about the Great East Japan Earthquake and teaching of disaster                             |
| 23 |                   | –  | ● Go ahead   |
| 24 | Sendai City       | Chapter 1<br>Memories of the Great East Japan Earthquake | 1. Occurrence of Tohoku Earthquake off the Pacific coast   |
| 25 |                   |  | 2. Run for reconstruction  |
| 26 |                   |  | 3. Powerful steps as a storyteller   |

Table 7. Continued.

| No | Government   | Large category                                  | Title of subject  |   |
|----|--|---|---|---|
| 27 | Sendai City  | Chapter 2<br>Steps for reconstruction           | 1. Grow together  |   |
| 28 |  |   | 2. Promise  |   |
| 29 |  |   | 3. With bravery and hope  |   |
| 30 |  |   | 4. Mutual support is wonderful  |   |
| 31 |  |   | 5. Send smiles with flowers and greenery  |   |
| 32 |  |   | 6. Turn bonds to power  |   |
| 33 |  |   | 7. Learn about the reconstruction situation in Sendai city  |   |
| 34 |  | Chapter 3<br>Mechanism of earthquakes           | 1. Japan with elevated risk of nature disaster  |   |
| 35 |  |   | 2. Observe the earthquake on March 11 with a scientific eye   |   |
| 36 |  |   | 3. Prepare for earthquake   |   |
| 37 |  |   | 4. Learn about history of disasters in the Sendai plain field   |   |
| 38 |  |   | 5. Read about historic disasters  |   |
| 39 |  | Chapter 4<br>Judgement and action for self-help | 1. Individually prepare for disaster  |   |
| 40 |  |   | 2. Save oneself   |   |
| 41 |  |   | 3. Prepare for natural disasters  |   |
| 42 |  |   | 4. Home preparation for disaster  |   |
| 43 |  |   | 5. Learn disaster phycology   |   |
| 44 |  |   | 6. Cardiopulmonary resuscitation method and usage of AED that you should know                         |   |
| 45 |  |   | 7. Protect mental health  |   |
| 46 |  | Chapter 5<br>Play a part in mutual assistance   | 1. Deliver food that satisfies the heart  |   |
| 47 |  |   | 2. As a local community member  |   |
| 48 |  |   | 3. From January 17 to March 11  |   |
| 49 |  |   | 4. Close to heart   |   |
| 50 |  |   | 5. Be strong, Japan! Friends of Japan   |   |
| 51 |  | Chapter 6<br>Materials                          | 1. Check knowledge on disaster prevention   |   |
| 52 |  |   | 2. Learning window – Records of the Great East Japan Earthquake                                       |   |
| 53 |  |   | 3. Natural disaster/reconstruction chronology of Sendai   |   |
| 54 |  | Iwate Prefecture                                | –   | Iwate’s poet – Kotaro Takamura                                |
| 55 |  | Iwate Prefecture                                | Live  | Goalkeeper of living – Disaster base hospital                 |
| 56 |  |   |   | What can I do? Takeshi Kanno                                  |
| 57 |  |   |   | Composition: Live – Now and future                            |
| 58 | Hajime Sasaki ex-director leading “Nadeshiko Japan”                                |   |   |   |
| 59 | Keep life at seawall in forest – Long castle project in forest                     |   |   |   |
| 60 | Shot and present smile   |   |   |   |
| 61 | Towards dream step by step, Collaboration school                                   |   |   |   |
| 62 | Our turn at time of hardship – Rescue and support activities of self-defense force |   |   |   |
| 63 | Masaki-kun’s piano   |   |   |   |
| 64 | Listening volunteers   |   |   |   |
| 65 | R-Sports program capable of being performed at a limited place                     |   |   |   |
| 66 | Engage   |   |   | Not recovery, but reconstruction – Shinpei Goto               |
| 67 |  |   |   | Composition: Continue to tell                                 |
| 68 |  |   |   | “Hope’s sound”  |
| 69 |  |   | Composition: Bonding  |   |
| 70 |  |   | Found “village of acorn and black tailed gull” as dream   |   |
| 71 |  |   | That time – At high school as evacuation center   |   |
| 72 |  |   | Revival of folk performing arts by own costume at Miyako-city Tsugaruishi junior high school          |   |
| 73 |  |   | Continue to tell teaching of local community at Miracle village, Yoshihama                            |   |
| 74 |  |   | Vest indicating roles   |   |
| 75 |  |   | Composition: Echo high  |   |
| 76 |  |   | Village’s future thought by children – “Children’s conference for reconstruction” at Tanohara village |   |
| 77 |  |   | What we can do now: Interaction between coastal and inland areas                                      |   |
| 78 |  |   | When was the last time?   |   |
| 79 |  |   | Prepare   | The Great East Japan Earthquake on March 11, 2011 (Heisei 23) |
| 80 | Main disasters in the world (excluded from analysis due to non-disclosure of PDF)  |   |   |   |
| 81 | System of natural disaster and damage (1)  |   |   |   |
| 82 | System of natural disaster and damage (2)  |   |   |   |
| 83 | System of natural disaster and damage (3)  |   |   |   |
| 84 | Information and phycology at disaster time   |   |   |   |
| 85 | What do you do at that time?   |   |   |   |
| 86 | What do you do if all stops? – Lifeline  |   |   |   |
| 87 | Have family meeting – Is your home security OK?                                    |   |   |   |
| 88 | Join local disaster prevention drills  |   |   |   |
|    | Basics of first aid  |   |   |   |

Table 7. Continued.

| No  | Government                                   | Large category  | Title of subject  |
|-----|--|---|---|
| 89  | Hyogo Prefecture                             | –   | Being alive   |
| 90  |  | –   | Family's feelings in "Tsunami tendenko"   |
| 91  |  | Learn about disasters   | Can you save your life? – Disaster prevention training                          |
| 92  |  | Save your life yourself   | Save your life from earthquake – Disaster prevention training                   |
| 93  |  |   | Save your life from tsunami – Disaster prevention training                      |
| 94  |  |   | Save your life from heavy rain – Disaster prevention training                   |
| 95  |  | Learn about disasters   | History of earthquake   |
| 96  |  | Saving myself   | Can you save the life of a loved one? Health and physical education             |
| 97  |  |   | Never die by such a thing   |
| 98  |  |   | Eye for story telling   |
| 99  |  |   | Meeting friend/In severity  |
| 100 |  |   | One heart   |
| 101 |  |   | Wandering mind  |
| 102 |  | Live together   | What you can do as a member of community, time for comprehensive learning       |
| 103 |  | Ways of living  | Echo Japanese drum for reconstruction, Ethics                                   |
| 104 |  | Mental care   | For healthy mentality and body, health and physical education                   |
| 105 |  | Get public support  | Recovery/reconstruction society from Great Hanshin-Awaji Earthquake             |
| 106 | –  | Never forget January 17   |   |
| 107 | –  | If – Seek "living" time   |   |
| 108 | Kobe City                                    | –   | Damage to Kobe City due to the Great Hanshin-Awaji Earthquake                   |
| 109 |  | This thing happened   | 1. When seeing bright past  |
| 110 |  |   | 2. Promise ( <i>Sen</i> )   |
| 111 |  |   | 3. With orange Osmanthus  |
| 112 |  |   | 4. Our town Kobe  |
| 113 |  |   | 5. Experienced the Great East Japan Earthquake ( <i>Sen</i> )                   |
| 114 |  |   | 6. Eye for story telling  |
| 115 |  |   | 7. When everyday life is no longer everyday ( <i>Sen</i> )                      |
| 116 |  |   | 8. Live   |
| 117 |  |   | 9. Wish upon a star – Star-festival decoration for 80,000 people ( <i>Sen</i> ) |
| 118 |  |   | 10. Meaning of information ( <i>Sen</i> )                                       |
| 119 |  | Save lives  | 11. Earthquake will happen  |
| 120 |  |   | 12. Tohoku-Pacific Ocean Earthquake ( <i>Sen</i> )                              |
| 121 |  |   | 13. Unexpected  |
| 122 |  |   | 14. Nuclear Disaster  |
| 123 |  |   | 15. Prepared for the tsunami?   |
| 124 |  |   | 16. Three major floods that hit Kobe  |
| 125 |  |   | 17. People always forget  |
| 126 |  |   | 18. Disaster archipelago  |
| 127 |  |   | 19. Don't miss nature's signal  |
| 128 |  |   | 20. O, fire!  |
| 129 |  |   | 21. Just in case  |
| 130 |  |   | 22. Check safety of house   |
| 131 |  |   | 23. First aid in case of emergency  |
| 132 |  |   | 24. Prepare for food at disaster time   |
| 133 |  |   | 25. Disaster prevention simulation ( <i>Sen</i> )                               |
| 134 |  |   | 26. Use media ( <i>Sen</i> )  |
| 135 |  |   | Live together   |
| 136 |  | 28. Close to heart  |   |
| 137 |  | 29. Connect hearts of good citizens                                       |   |
| 138 |  | 30. Encounter with one lady   |   |
| 139 |  | 31. Unforgettable taste of soup   |   |
| 140 |  | 32. Real strength of students in junior high school ( <i>Sen</i> )        |   |
| 141 |  | 33. With residents ( <i>Sen</i> )   |   |
| 142 |  | 34. Monument for memorial and reconstruction for January 17, Hope's light |   |
| 143 |  | 35. Hopes for reconstruction  |   |
| 144 |  | 36. Loop of volunteers  |   |
| 145 |  | 37. Friends of Japan ( <i>Sen</i> )                                       |   |
| 146 |  | 38. Protect mental health ( <i>Sen</i> )                                  |   |
| 147 | 39. "Wish to bring happiness" and "tomorrow" |   |   |

\*The word "(*Sen*)" after the name of the subject of the Kobe City supplementary textbook indicates that the subject is created in cooperation with Sendai City Board of Education.



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- “Proposal of an Experiential Education Program for Disaster Management to Develop ‘Zest for Life’ by ‘Evacuation Center Management Training’ Which is Made by Students’ Proactive Learning –A Case Study on Shizugawa Junior High School, Minami-sanriku Town–,” J. of the Social Safety Science, No.33, pp. 313-323, 2018 (in Japanese).
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  - “Implementation and Operation of a Cloud-Based Participatory Damage Recognition System to Obtain a Common Operational Picture that Supports a Quick Disaster Response,” Int. J. for Infonomics, Special Issue, Vol.1, Issue 1, pp. 860-866, 2013.
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  - “Issues Facing Voluntary Evacuees from the Fukushima Daiichi Nuclear Power Plant Accident Based on the Collection and Analysis of Cases of Voluntary Evacuation,” J. Disaster Res., Vol.10, No.sp, pp. 755-769, 2015.
  - “Development of a ‘Disaster Management Literacy Hub’ for Collecting, Creating, and Transmitting Disaster Management Content to Increase Disaster Management Literacy,” J. Disaster Res., Vol.12, No.1, pp. 42-56, 2017.
  - “A Study on the 2016 Kumamoto Earthquake: Citizen’s Evaluation of Earthquake Information and Their Evacuation and Sheltering Behaviors,” J. Disaster Res., Vol.12, No.6, pp. 1117-1138, 2017.
  - “Developing a Disaster Management Education and Training Program for Children with Intellectual Disabilities to Improve ‘Zest for Life’ in the Event of a Disaster – A Case Study on Tochigi Prefectural Imaichi Special School for the Intellectually Disabled –,” J. Disaster Res., Vol.15, No.1, pp. 20-40, 2020.
  - “Research for Contributing to the Field of Disaster Science: A Review,” J. Disaster Res., Vol.15, No.2, pp. 152-164, 2020.
  - “The Determinants of Residents’ Evacuation Behavior in the Torrential Rain in Western Japan in 2018: Examination of Survey Data of Victims in Okayama Prefecture,” J. Disaster Res., Vol.15, No.7, pp. 1011-1024, 2020.
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- "Public acceptance model for siting a repository of radioactive contaminated waste," J. of Risk Research, Vol.24, pp. 1-13, 2020.
- "The Influences of Residents' Evacuation Patterns in the 2016 Kumamoto Earthquake on Public Risk Perceptions and Trust Toward Authorities," J. Disaster Res., Vol.12, No.6, pp. 1139-1150, 2017.

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