Relationship Analysis between Children Interests and Their Positive Emotions for Mobile Libraries' Community Development in a Tsunami Area

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Abstract: During our refuge life caused by the Tsunami in Japan on 11th March 2011, the children have visited the mobile libraries. Our experiences recommend a community development with a focus on children positive emotions for their future dreams by using the mobile libraries against the negative context. However, children have various interests such as art, media and people even during their refuge life. In addition, few studies have focused on relationships between the children interests and the children positive emotions. Therefore, this study proposes a relationship analysis to classify the children, which strengthens the children positive emotions during their refuge life. Data are collected by a questionnaire from all elementary and junior high school students in Ishinomaki City, 11029 children of five to fifteen years old, within two years after the Tsunami in 2011, Japan. A combination of factor loading and text mining classifies the children according to four processing: 1. Grasp the structure of data, 2. Extraction of latent factors, 3. Classification of children interests into several types and 4. Connect free writing data into the classification by text mining. Thus, both quantitative and qualitative outputs are combined by the relationship analysis. The 11029 children are classified into 32 groups. The community development by the

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mobile libraries ought to consider the 32 groups, counting on not only the libraries' property but also people such as children families and friends. In addition, comparing the relationships of the children in non-Tsunami area, Tokyo, results in that 16 groups are with specific in the Tsunami area.

Keywords: mobile library, relationship analysis, combining quantitative and qualitative outputs, children future dreams, children interests, art, media, people, children positive emotions, refuge life, Tsunami

1. Introduction

During our refuge life caused by the big Tsunami in Japan, the Great East Japan Earthquake, a mobile library has become the place of gathering people like a community. A voice of the Tsunami victim leads to a project of mobile library; "When you eat, the meal will disappear. But when you read, it will remain in your memory.", "Now in a very time of distress, the books children read will become the solid foundation to build their lives on." and "libraries should be open." (Kamakura, 2013). We believe that the books children read will become the solid foundation to build their lives on, and we should provide "emotional support" at the same time as material support. We should not leave it until material needs are met (Kamakura, 2013).

Figure 1. A mobile library instead of the public libraries

During two years, from July 2011 to the end of March 2013, 18,000 people used the mobile libraries, shown in Figure 1 (Nissan

and Shanti Volunteer Association, 2012), and more than 38,000 books were checked out within two years (Kamakura, 2013). The mobile libraries have offered during 6 years, finished at the end of March 2017. Emotional aspect is important at the catastrophe area (Kamakura, 2013). Like the illustrated handwritten wall papers (Fight Shimbunsya, 2011), the children positive emotions can reassure and encourage the people. Therefore, our experiences recommend a community development with a focus on children positive emotions by using a mobile library shown as Figure 2.

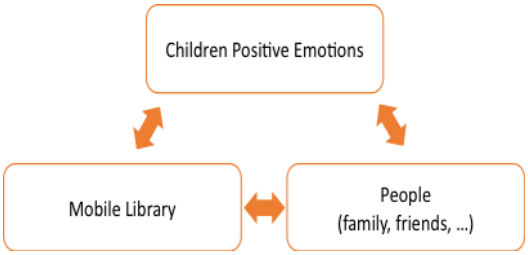


Figure 2. Mobile libraries' community development

The community development takes it into account that each child has each interesting. For example, a child borrows a book of academic and career counseling for his future consideration, and other child borrows a cooking book for enjoying with family. (Tsubaki and Shina, 2008) and (Haraga, Tsubaki and Suzuki, 2014) explain the importance of considering the heterogeneity between the people and the library services. However, it is difficult to find out the heterogeneity with specific in the Tsunami area of the children concern. Table 1 compares the children concern between Tsunami area and non-Tsunami area classified by (Miyata, 2012). The children concern is almost same between the two areas.

Therefore, this study examines the heterogeneity with specific in the Tsunami area by expanding the relationship analysis of (Haraga, Tsubaki and Suzuki, 2014). Shown in Figure 3, the input of the relationship analysis is a multi-point liker-type scale question and the output is the people group classified by the services such as library services' usage. The relationship analysis classifies the people and the services such as usage based on factor

loading of multiple-choice variables, quantitative analysis. This study classifies the children positive emotions, the people and the library services by combining text mining with the factor loading, combining qualitative and quantitative analyses.

	Tsunami area Ishinomaki		Non-Tsunami area Tokyo	
Realistic work	1743	16%	285	14%
Investigative work	748	7%	156	7%
Artistic work	1315	12%	324	15%
Social work	2098	19%	289	14%
Enterprising work	767	7%	79	4%
Conventional work	339	3%	91	4%
Professional athletes	1615	15%	388	18%
No dream or desired work	1559	14%	302	14%
Other (unclassifiable)	845	8%	194	9%
Total	11029	100%	2108	100%

Table 1. Children concern about their future dream

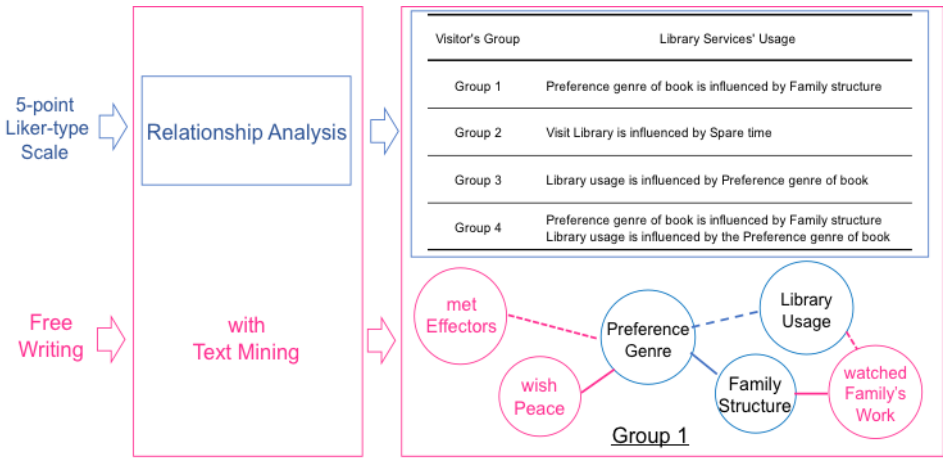


Figure 3. An image of relationship analysis with text mining

Our research proceeds an oral inquiring, data collection by questionnaire, the relationships analysis and examining the community development by the mobile libraries. In chapter 2, the oral inquiring finds out some key elements of the relationships among the children positive emotions, the people around the children and the mobile library properties. Chapter 3 explains the data collection of multiple-choice survey and free text writing. We focus on the children positive emotions like their future dreams. Two analyzes, the relationship analysis by factor loading without and with text mining, are shown with their results in chapter 4. And chapter 5 theorizes the community development by the mobile libraries and validates the results of the analysis. Chapter 6 explains some limitations of the study and recommendations for future study about emotional communication on art (Hamada and Grizzle, 2020) and the media and information literacy expansion (Grizzle and Hamada, 2019). We conclude this study in chapter 7.

2. Oral Inquiring

An oral inquiring survey, at one elementary school and one junior high school in an area damaged by the Tsunami (Kesennuma City), finds some principal relationships of the children positive emotions among the children interests and the people in whom the children are interested (positive influencers) as Figure 4. This study focuses on the children positive emotions like their future dreams of Figure 4 against the negative context of the Tsunami catastrophe.

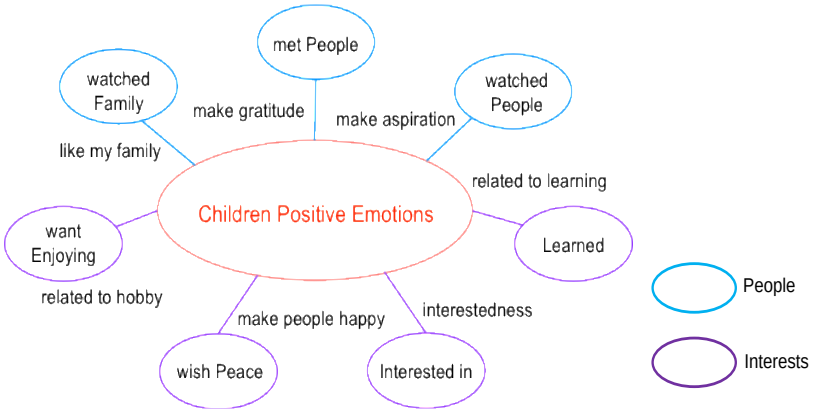


Figure 4. Principal relationships of the children positive emotions

Who was surveyed	All 11,029 pupils in Ishinomaki's elementary and junior high schools in a Tsunami area 7,121 pupils in 42 elementary schools, 3,908 pupils in 21 junior high schools 1,124 pupils in an elementary and a junior high school in Chofu City, Tokyo as non-Tsunami area 624 pupils in 1 elementary school, 500 pupils in 1 junior high school 984 pupils in an elementary and a junior high school in Tachikawa City, Tokyo as non-Tsunami area 522 pupils in 1 elementary school, 462 pupils in 1 junior high school
When the survey was conducted	Ishinomaki City: February–March 2013 Chofu City: August–September 2013 Tachikawa City: September–October 2013
How the survey was conducted	Surveys were distributed in class, filled out and collected
How the survey was answered	Free writing and a 5-point Likert-type scale
Survey categories	① Future dreams (7 questions) ② Why are they your dreams? (8 questions) ③ How long have you had those dreams? (7 questions) ④ When do you feel good? (5 questions) ⑤ How do you normally spend your time? (13 questions) ⑥ What do you do while watching TV? (7 questions) ⑦ Why do you watch TV? (9 questions) ⑧ What media do you use the most? (8 questions)

Table 2. Data collection

3. Data Collection

The data collection is summarized in Table 2. The data are collected by a questionnaire which reflects the oral inquiring. All the elementary and junior high schools in Isinomaki City, the most

damaged area by the Tsunami on 11th March 2011, are selected. The total children number is N=11029 (42 elementary school children N=7121, 21 junior high school children N=3908) from five to fifteen years old. To find out the heterogeneity with specific in the Tsunami area, the children in non-Tsunami area, Tokyo, are selected. The number of children in Tokyo (N=2108), Choufu City and Tachikawa City, is reliable in less than 3% error with 95% reliability. Data are collected by the questionnaire within two years after the Tsunami. More in detail of the questionnaire is shown in Appendix.

4. Relationship Analysis

A classification of service science, such as analyzing a library usage and educational services, is examined on this study. (Tsubaki and Iwasaki, 2011) classifies the students' education style by factor loading based on quantitative analysis of a multiple-choice survey data. (Tsubaki, Oya and Tokutomi, 2012) examines how to increase students' school performance and satisfaction by applying based on the factor loading analysis. (Haraga, Tsubaki and Suzuki, 2014) methodizes the factor loading analysis to increase a customer service and (Miyamoto and Tsubaki, 2018) applies it to a relationship analysis between customers and service providers. This study adopts the relationship analysis of (Miyamoto and Tsubaki, 2018) because the relationships between the children interests and children positive emotions ought to be analyzed. However, the analysis is unable to encompass the variables related to the high factor scores. Text mining can find out connections among related words based on qualitative analysis of free writing survey data. Therefore, this study proposes the relationship analysis with text mining in such a way as to output some related words of qualitative analysis around the high score factors of quantitative analysis. Furthermore, this study compares the relationships in Tsunami area with those of non-Tsunami area, Tokyo, to specify the characteristics in the Tsunami area.

4.1 Relationship Analysis by Factor Loading

(Fabrigar and Wegener, 2012) on factor analysis uses the principal method, promax rotation and parallel analysis criteria. The relationship analysis (Haraga, Tsubaki and Suzuki, 2014) is based on the factor analysis to classify for the people with the services. This study conducts a factor analysis and the relationship analysis with comparing the children at two separate areas of Tsunami area, Ishinomaki and non-Tsunami area, Tokyo. The classification is proceeded by five steps shown as Figure 5 (Haraga, Tsubaki and Suzuki, 2014).

1. Grasp the structure of data:
First, we grasp the data structure by basic statistics.

2. Extraction of latent factors:
Next, we carry out the factor analysis for the repeat data at two time points and understand the relationship structure of the children positive emotions among their interests in the library properties and the people around them.

3. Classification of children into several types:
We perform the factor loading based on the factor score, and classify the positive emotions into several types for the repeat data at two time points.

4. Grasp the relationship between the objective variable and the explanatory variable factors:
We grasp the relationships between the objective variable and the explanatory variable factors by modelling structural equation for the repeat data at two time points.

5. Extraction of latent factors:
We analyse the relationships by the type of children positive emotions, comparing the conditional probability distributions of the objective variable on the preconditions of the ordered or categorical explanatory variables by type, and extract the feedback proposal about the children positive emotions by type.

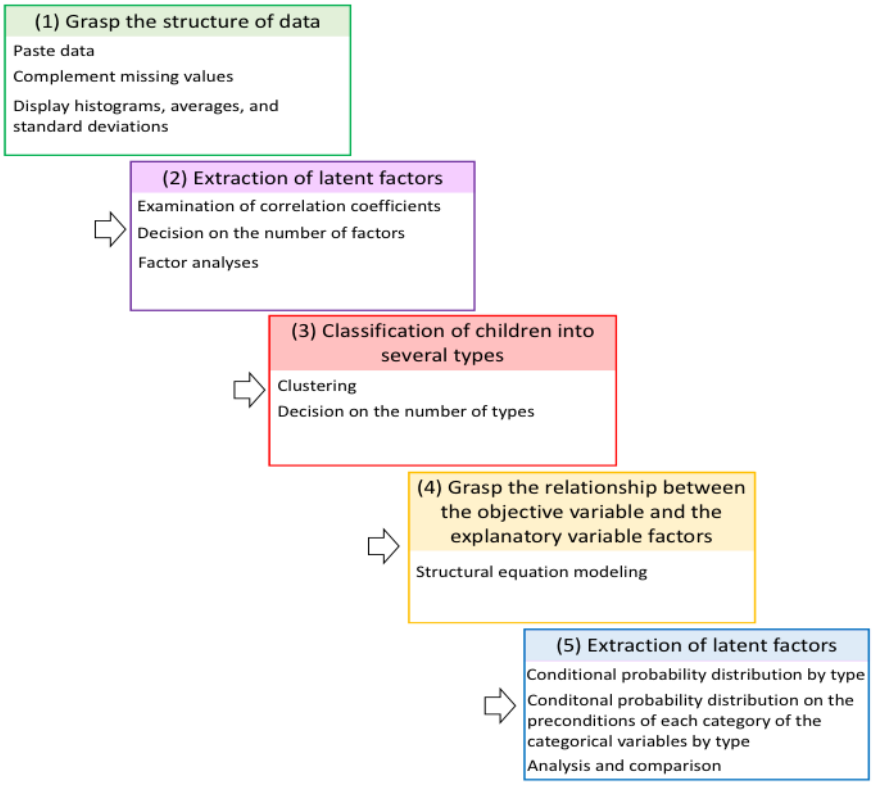


Figure 5. Relationship Analysis by Factor Loading

The questionnaire survey data are analysed by (Haraga, Tsubaki and Suzuki, 2014) as the same conditions of (Miyamoto and Tsubaki, 2018). The analysis reduces variables in which the factor loading is less than 0.4 and more than 0.4 in two factors, and repeats the factor analysis until each variable's factor loading becomes more than 0.4 in one factor.

The number of factors is decided by a point where the eigenvalue and the parallel analysis become almost same with an adequate contribution ratio. In Table 3 as an example, the number is twelve. The names of the twelve factors and the factor loading are shown in Table 4 and Table 5 respectively as the examples.

The classification of children is according to the factor loading. As Table 1, various types of children converge in a number of groups. Therefore, this study shall analyse the types of children

and the similarities and differences among their positive emotions, their interests (the library properties) and the people around them. Based on the factor score, the pupils were clustered using the Ward method and divided into types. The results of the analysis for 'realistic work' of Table 1 are shown as an example. Figure 6 indicates the number of pupils and the average value of the factor score when there are 4, 5 and 6 clusters. In this study, groupings that result from clustering are called 'groups' while 'type' expresses that which is particular to each individual group. Moreover, each group was assessed as being 'high', 'medium', or 'low' based on the size of the type's average of the factor score values, which is referred to when defining the number of clusters. This assessment was conducted as presented below.

f_{im} is the average value of a factor's score, with factor m (m = 1, …, M) for group i (i = 1, …, k), where M is the number of factor and k is the number of the group, then

- For groups assessed as 'high': $f_{im} \geqq 0.5$
- For groups assessed as 'medium': $-0.5 \leqq f_{im} < 0.5$
- For groups assessed as 'low': $f_{im} < -0.5$

According to standard normal distribution, approximately 40% of the assessments fell between 0.5 and -0.5 and approximately 30% fell both above and below these values. Before categorisation of the types, the distribution of factor scores in the sample as a whole was examined using standard normal distribution and the averages were evaluated.

	Eigenvalue	Parallel analysis	Contribution ratio	Cumulative contribution ratio
Factor 1	9.551	1.388	14.9	14.9
Factor 2	4.189	1.356	4.9	21.5
Factor 3	3.138	1.337	3.9	26.4
Factor 4	2.489	1.32	3.0	30.3
Factor 5	1.971	1.302	3.0	33.3
Factor 6	1.922	1.285	2.7	36.3
Factor 7	1.721	1.273	2.4	39.0
Factor 8	1.486	1.257	2.1	41.4
Factor 9	1.403	1.243	2.1	43.5
Factor 10	1.332	1.229	2.0	45.6
Factor 11	1.275	1.216	1.9	47.6
Factor 12	1.219	1.202	1.8	49.5
Factor 13	1.146	1.191	1.8	51.3
Factor 14	1.121	1.178	1.6	53.1
Factor 15	1.033	1.169	1.5	54.7

Table 3. An example of factors

Factor	Factor Name
Factor 1	Interested in relations with people and enjoying themselves
Factor 2	Interested in relations with family, study and homework
Factor 3	Duration dream has been held
Factor 4	Listening to music and using their mobile phones
Factor 5	Interest in TV
Factor 6	Interest in computer games
Factor 7	Computer use
Factor 8	Activities while watching TV
Factor 9	Learning or club activities
Factor 10	Interest in reading
Factor 11	Interest in the news
Factor 12	Relationships with friends and activities outside the house

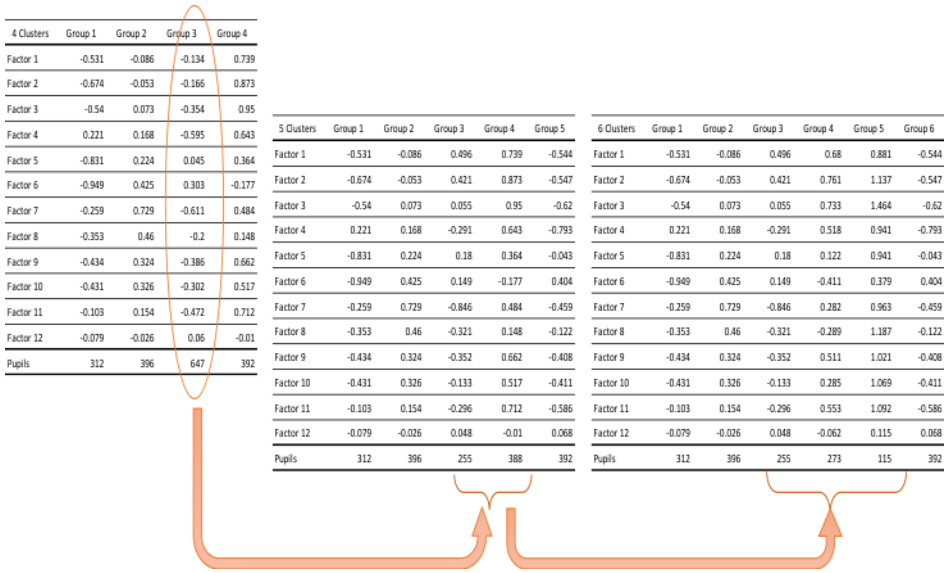
Table 4. The names of the twelve factors of Table 3

	factor 1	factor 2	factor 3	factor 4	factor 5	factor 6	factor 7	factor 8	factor 9	factor 10	factor 11	factor 12
I'd like to work at home	0.171	0.497	0.009	0.093	0.22	0.047	0.009	0.006	0.016	0.029	0.043	0.114
I'd like a job where I meet people	0.206	0.345	0.053	0.024	0.081	0.046	0.025	0.068	0	0.034	0.015	0.177
I'd like an aspirational job	0.457	0.127	0.003	0.112	0.112	0.003	0.004	0.079	0.011	0.025	0.056	0.007
I'd like a peaceful job	0.424	0.062	0.12	0.103	0.026	0.107	0.025	0.047	0.016	0.02	0.025	0.114
I'd like a job related to learning something	0.226	0.26	0.055	0.049	0.057	0.009	0.02	0.046	0.247	0.151	0.02	0.246
I'd like a job where I am interested in something	0.529	0.148	0.045	0.11	0.045	0.024	0.007	0.009	0.081	0.122	0.011	0.221
I'd like a job related to something I enjoy	0.349	0.132	0.055	0.185	0.121	0.078	0.029	0.063	0.005	0.037	0.081	0.049
I like meeting people	0.535	0.164	0.013	0.061	0.004	0.071	0.027	0.12	0.008	0.093	0.051	0.183
I like talking to people	0.604	0.063	0.02	0.113	0.001	0.084	0.003	0.143	0.01	0.021	0.014	0.252
I like enjoying myself	0.611	0.088	0.086	0.006	0.066	0.035	0.017	0.031	0.001	0.03	0.044	0.17
I like to be useful	0.511	0.12	0.101	0.033	0.032	0.039	0.048	0.008	0.025	0.009	0.126	0.056
I like being proud of what I do	0.54	0.003	0.076	0.053	0.03	0.038	0.041	0.003	0.107	0.065	0.081	0.075
I'd like to be in the news headlines	0.239	0.095	0.014	0.001	0.064	0.078	0.017	0.01	0.098	0.014	0.598	0.007
I'd like to give something back	0.508	0.088	0.022	0.008	0.001	0.055	0.013	0.011	0.05	0.045	0.103	0.012
I'd like to brighten people's lives	0.585	0.126	0.003	0.064	0.006	0.082	0.012	0.013	0.051	0.041	0.035	0.098
With my family	0.002	0.505	0.069	0.057	0.099	0.076	0.022	0.063	0.001	0.034	0.002	0.114
With my friends	0.055	0.125	0.03	0.027	0.001	0.087	0.055	0.05	0.296	0.028	0.072	0.296
Doing something with the neighbours	0.103	0.261	0.163	0.044	0.056	0.017	0.028	0.05	0.302	0.075	0.071	0.097
Shopping	0.006	0.36	0.063	0.107	0.015	0.083	0.042	0.025	0.208	0.115	0.115	0.2
Playing computer games	0.066	0.058	0.057	0.023	0.053	0.803	0.01	0.042	0.033	0.045	0.069	0.083
Using the computer	0.011	0.027	0.024	0.006	0.049	0.03	0.848	0.028	0.055	0.021	0.004	0.06
Doing my homework or studying	0.041	0.553	0.174	0.091	0.06	0.098	0.002	0.116	0.081	0.106	0.029	0.006
Listening to music or playing an instrument	0.023	0.108	0.106	0.609	0.09	0.018	0.047	0.028	0.147	0.127	0.014	0.006
Learning something	0.046	0.228	0.035	0.024	0.052	0.07	0.067	0.06	0.467	0.016	0.078	0.046
Club activities	0.098	0.017	0.061	0.121	0.046	0.031	0.038	0.025	0.588	0.038	0.07	0.041
Playing sports	0.093	0.022	0.015	0.021	0.088	0.002	0.065	0.012	0.69	0.029	0.007	0.002
Reading manga (cartoon)	0.033	0.135	0.009	0.053	0.114	0.101	0.022	0.064	0.146	0.465	0.068	0.027
Reading novels or newspapers	0.019	0.146	0.018	0.017	0.122	0.085	0.051	0.033	0.058	0.735	0.097	0.011

Table 5. Factor Loading of Table 4

Let's examine the grouping of children in Figure 6. Group 3 in the 4-cluster analysis is divided among Group 3 and 5 in the 5-cluster analysis, and because there is a considerable difference between the averages of the two factor scores for factor 1, etc., then we should be able to examine the 5 clusters in greater detail. For example, Factors 1–4 are assessed as 'medium' in Group 3 and 'low' in Group 5, with the difference in assessments clarifying that there are differences between the characteristics of Group 3 and 5. If we divide the data into 6 clusters, Group 4 in the 5-cluster analysis is divided among Group 4 and 5 in the 6-cluster analysis. However, there was no large difference demonstrated between the average scores for factors 1 to 4 for Group 4 and 5 in the analysis using 6 clusters, and the scores for both groups were assessed as

'high', therefore, the similarities in the group characteristics indicate that it is appropriate to use the 5-cluster model. The 5-cluster average factor scores from the above analysis are plotted in Figure 7, and the characteristics abstracted for each group are shown as types in Table 6.



4 Clusters	Group 1	Group 2	Group 3	Group 4
Factor 1	-0.531	-0.086	-0.134	0.739
Factor 2	-0.674	-0.053	-0.166	0.873
Factor 3	-0.54	0.073	-0.354	0.95
Factor 4	0.221	0.168	-0.595	0.643
Factor 5	-0.831	0.224	0.045	0.364
Factor 6	-0.949	0.425	0.303	-0.177
Factor 7	-0.259	0.729	-0.611	0.484
Factor 8	-0.353	0.46	-0.2	0.148
Factor 9	-0.434	0.324	-0.386	0.662
Factor 10	-0.431	0.326	-0.302	0.517
Factor 11	-0.103	0.154	-0.472	0.712
Factor 12	-0.079	-0.026	0.06	-0.01
Pupils	312	396	647	392

5 Clusters	Group 1	Group 2	Group 3	Group 4	Group 5
Factor 1	-0.531	-0.086	0.496	0.739	-0.544
Factor 2	-0.674	-0.053	0.421	0.873	-0.547
Factor 3	-0.54	0.073	0.055	0.95	-0.62
Factor 4	0.221	0.168	-0.291	0.643	-0.793
Factor 5	-0.831	0.224	0.18	0.364	-0.043
Factor 6	-0.949	0.425	0.149	-0.177	0.404
Factor 7	-0.259	0.729	-0.846	0.484	-0.459
Factor 8	-0.353	0.46	-0.321	0.148	-0.122
Factor 9	-0.434	0.324	-0.352	0.662	-0.408
Factor 10	-0.431	0.326	-0.133	0.517	-0.411
Factor 11	-0.103	0.154	-0.296	0.712	-0.586
Factor 12	-0.079	-0.026	0.048	-0.01	0.068
Pupils	312	396	255	388	392

6 Clusters	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Factor 1	-0.531	-0.086	0.496	0.68	0.881	-0.544
Factor 2	-0.674	-0.053	0.421	0.761	1.137	-0.547
Factor 3	-0.54	0.073	0.055	0.733	1.464	-0.62
Factor 4	0.221	0.168	-0.291	0.518	0.941	-0.793
Factor 5	-0.831	0.224	0.18	0.122	0.941	-0.043
Factor 6	-0.949	0.425	0.149	-0.411	0.379	0.404
Factor 7	-0.259	0.729	-0.846	0.282	0.963	-0.459
Factor 8	-0.353	0.46	-0.321	-0.289	1.187	-0.122
Factor 9	-0.434	0.324	-0.352	0.511	1.021	-0.408
Factor 10	-0.431	0.326	-0.133	0.285	1.069	-0.411
Factor 11	-0.103	0.154	-0.296	0.553	1.092	-0.586
Factor 12	-0.079	-0.026	0.048	-0.062	0.115	0.068
Pupils	312	396	255	273	115	392

Figure 6. An example of the classification

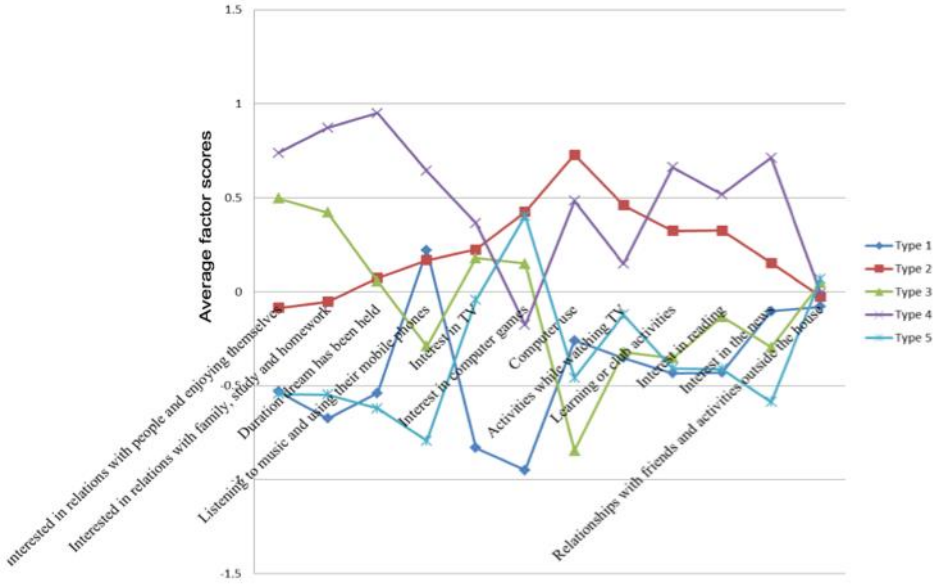


Figure 7. An example of 5-cluster (5 types) average factor scores

	Books & Manga	Computer games	Computers	Music & Mobile phones	TV	News	Relationships with people
Type 1	×			○	×		×
Type 2		○	○		○		
Type 3			×				○
Type 4				○		○	○
Type 5	×	○	×	×			

○ : High relation × : Low relation

Table 6. An example by the relationship analysis with factor loading

Like Table 6, the relationship analysis with factor loading can classify the children, but has a difficulty to find out the relationship between the child positive emotions and the library properties such as books and manga (cartoon). And it seems that the relationship analysis cannot find out the all children relationships with the people.

4.2 Relationship Analysis by Factor Loading and Text Mining

The books are low relation with the children positive emotions at Type 1 of Table 6 when they are classified by only factor loading. However, the text mining can find out the relationship as Figure 8, where

Black nodes - High Frequency words,
Red nodes - Low Frequency words strongly linked with Black Nodes,
Green-circled nodes - Nodes co-occurring with other nodes, keywords,
Black links - Links joining nodes with significant co-occurrence,
Red-dashed links - Columns linking nodes, etc.

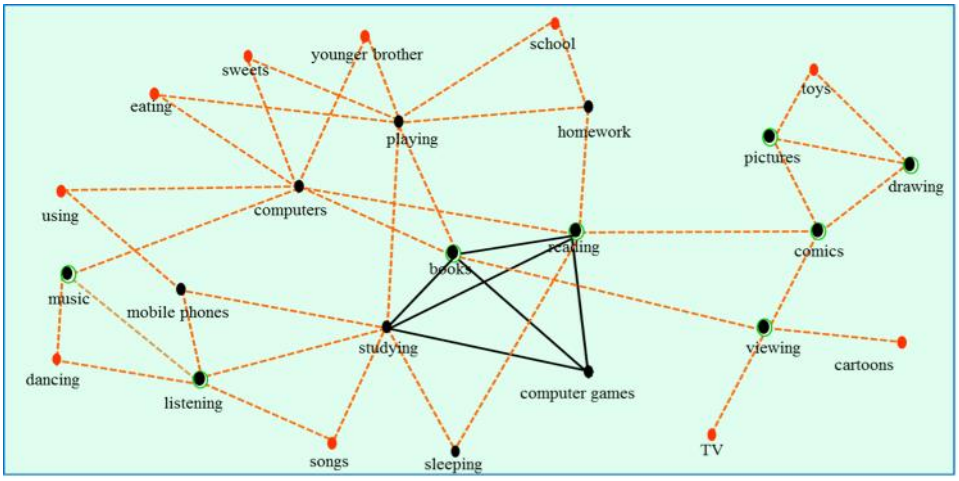


Figure 8. An example of the relationships classified by Text Mining

Red nodes are low frequency words, but are strongly linked to black nodes, which indicate a potential factor or chance, while green-circled nodes are keywords.

A combination of factor loading and text mining have an opportunity to find out the relationships among the children positive emotions, their interest as the library's properties and the people around the children. The classification is according to four processing as Figure 9:

1. Grasp the structure of data:
First, we grasp the data structure by basic statistics.

2. Extraction of latent factors:
Next, we carry out the factor analysis for the repeat data at two time points and understand the relationship structure of the children positive emotions among their interests in the library properties and the people around them.

3. Classification of children into several types:
We perform the factor loading based on the factor score, and classify the positive emotions into several types for the repeat data at two time points.

4. Connect free writing data to the children interests by text mining:
Text mining tool such as KeyGraph analyses the free writing entries after classifying students into types as a means of examining the characteristics and differences for each category. Thus, both quantitative and qualitative outputs are combined by the relationship analysis.

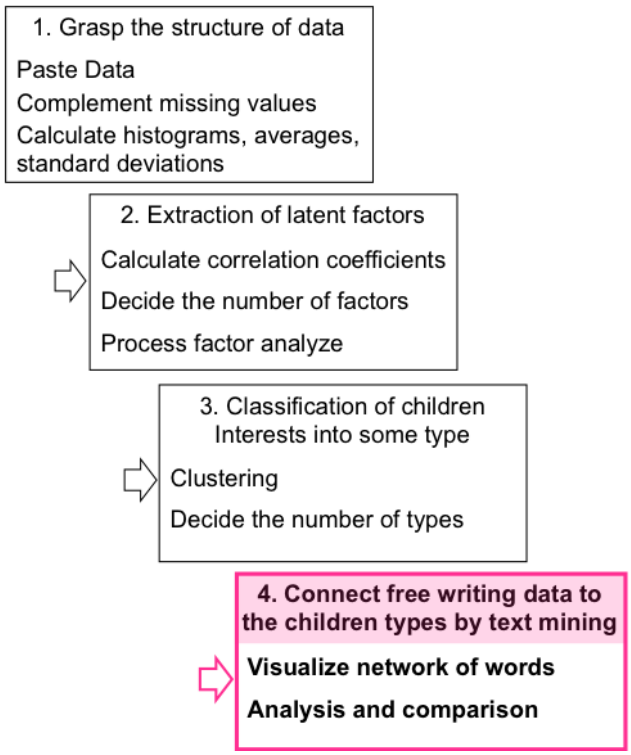


Figure 9. Relationship analysis by factor loading and text mining

The differences from the factor loading in Figure 5 are the steps shortened from 5 steps to 4 steps, and 4. Connect free writing data to the children interests by text mining. The others from Step 1. to Step 3. are exact same procedures. The books and manga have a high frequency word by the text mining and have some relationships with the people in Figure 8. The people around the child generate the relationships between the children interest such as books and their positive emotions shown in Figure 10, the all relationships of the 11,029 children.

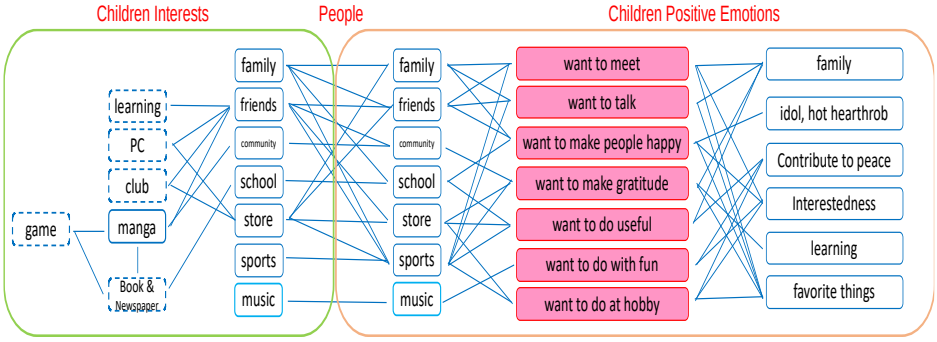


Figure 10. The relationships analyzed by factor loading and text mining

4.3 Result of Classification

The results shown in Table 7 explain that the children are classified into 32 groups and the children groups strongly relate to music, manga and books & newspaper at the point marked "+". The combination of factor loading and text mining can find out the relationships between the children positive emotions and the library properties, the effect of the people around the children and the relationships with specific in Tsunami area. But only factor loading can find out these characteristics partly. Compared the relationships of the children in non-Tsunami area, Tokyo, the 16 groups, colored green in Table 7, are with specific in the Tsunami area.

The results of classification are summarized in Table 8. The children concern about their future dream in Table 1. The all relationships are analyzed by factor loading and text mining in Figure 10. And the classification of the 11,029 children is shown in Table 7.

5. Theorizing Community Development by Mobile Libraries

We assume that there are two directions of the relationships in Figure 10, the forward direction and the backward direction. The forward direction means the capability of the relationships from the children interests as the library properties to the children positive emotions. The forward relationships are indirect because

of the people around the children between the children interests and their positive emotions. The backward direction means the usability of the relationships from the children positive emotions to their interests. The backward relationships are also indirect.

	Relationship Analysis by Factor Analysis			Relationship Analysis by Factor Analysis and Text Mining			
	Music	Manga	Book & Newspaper	Music	Manga	Book & Newspaper	Number
Group 1				+		+	312
Group 2					+		396
Group 3				+		+	255
Group 4	+			+	+		388
Group 5					+		392
Group 6					+		380
Group 7			+	+	+	+	221
Group 8				+		+	147
Group 9				+	+		231
Group 10					+		532
Group 11				+	+		552
Group 12				+		+	474
Group 13						+	389
Group 14			+	+		+	505
Group 15	+			+		+	364
Group 16				+	+		366
Group 17					+		171
Group 18	+				+		243
Group 19			+		+	+	147
Group 20					+		206
Group 21				+	+		223
Group 22						+	78
Group 23					+		38
Group 24				+	+		206
Group 25				+	+		489
Group 26				+	+		208
Group 27				+	+		537
Group 28				+		+	175
Group 29			+	+	+	+	307
Group 30					+		529
Group 31				+	+		548
Group 32					+		175

Table 7. Classification of the 11,029 children

	Categorization by Future Dream	Relationship Analysis by Factor Loading	Relationship Analysis by Factor Loading and Text Mining
Classificartion	9 Groups	32 Groups	32 Groups
Relationships between Children positive eimotions and library properties	×	△	○
Effect of the people around the chidren	×	△	○
The relationships with specific in Tsunami Area	×	△	○

×: cannot find out △: can find out partly ○: can find out

Table 8. Results of the classification

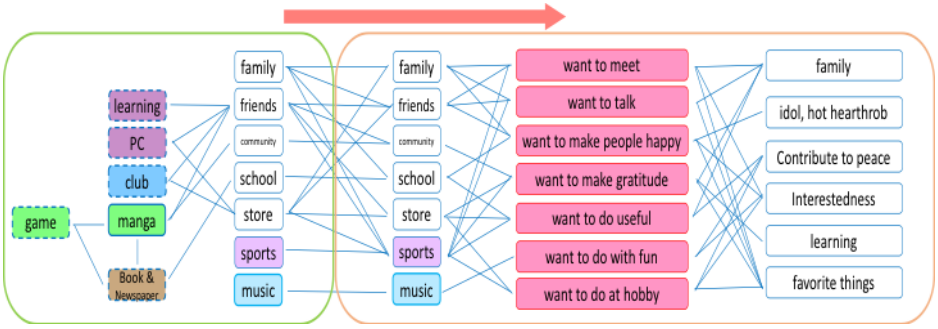


Figure 11. Capability of the relationships

	The Maximum Usability	The Maximum Usabiliy with the Positive Effectors
Music	9.00%	61.20%
Manga (cartoon)	0%	75.50%
Book & Newspaper	10.70%	30.60%
Music and Manga	9.0% (double routes 0%)	95.8% (double routes 49.3%)
Music and Book & Newspaper	19.7% (double routes 0%)	76.7% (double routes 4.7%)
Manga and Book & Newspaper	10.7% (double routes 0%)	100% (double routes 6.1%)
Music, Manga and Book & Newspaper	19.7% (double routs 0%) (triple routs 0%)	100% (double routs 55.3%) (triple routs 4.8%)
Analysis	Relationship Analysis by Factor Loading	Relationship Analysis by Factor Loading and Text Mining

Table 9. Maximum capability of the children interests

5.1 Capability of the relationships

The sum of all forward relationships, the all relationships of Figure 11, means the maximum capability of the relationships. The people around the children, the positive influencers, enhances the maximum capability. Table 9 indicates the maximum capability of the children interests as the library properties without and with the positive influencers. The relationships without positive influencers generate small capability, 9.0% by music, 0% by manga and 10.7% by books & newspaper. On the other hand, the relationships

with positive influencers enhance the capability, 61.2% by music, 75.5% by manga and 30.6% by books & newspaper. The combination of music and manga enhances the capability from 9.0% to 95.8%, music and the media from 19.7% to 76.7%, manga and books & newspaper from 10.7% to 100% and music, manga and books & newspaper from 19.7% to 100%. Therefore, the positive influencers are recommended to the community development by the mobile libraries.

5.2 Usability of the relationships

The children positive emotions are influenced by physical damages of the Tsunami. In the locations little damaged by the Tsunami, the children would love to their family works. On the other hand, in the locations much damaged by the Tsunami, the children would love to contribute to peace. This difference affects the usability of the relationships. In the locations of little damage, the children positive emotions connect directly to the positive influencers (family, friends and community people) shown in Figure 12. In the locations of much damage, the children positive emotions connect indirectly to the positive influencers shown in Figure 13. If there weren't the positive influencers in Figure 13, the children positive emotions would lose the positive influencers at all. Thus, the positive influencers in the locations of much damaged cause high effectiveness to the relationships between the children positive emotions and their interests as the library properties. The effect of usability caused by the positive influencers is very similar to the physical damages by the Tsunami shown in Table 10. The effect of schools is also important because the schools connect the children positive emotions and the books & newspaper directly in both situations of Figure 12 and Figure 13. Therefore, the positive influencers and schools are very important as well as the mobile libraries' properties in the locations much damaged by the Tsunami.

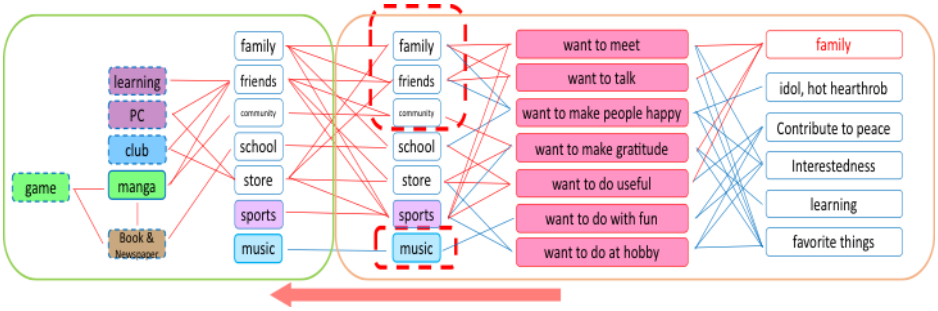


Figure 12. Usability in little damaged locations

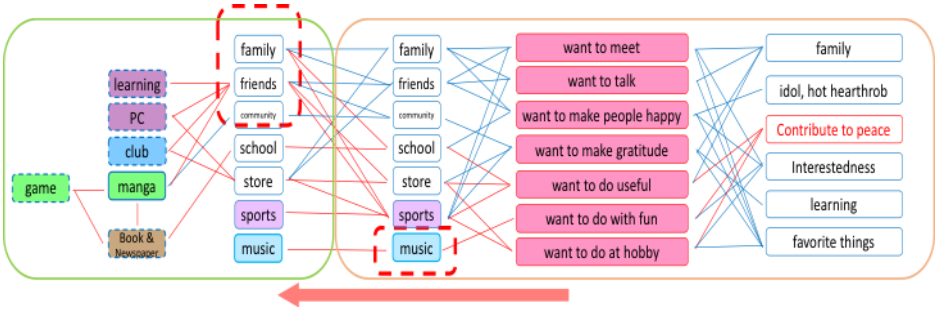


Figure 13. Usability in much damaged locations

Physically damaged by Tsunami	Locations much damaged 40%	Locations little damaged 60%
Effect of positive effectors	High effectivness 44%	Small effectiveness 56%
Connection of positive effectors	Indirect connection	Direct connection
Connection of schools	Direct connection	Direct connection
Similarity between Tsunami area and non-Tusnami area	With specifc in Tsunai area, Ishinomaki	Similar to non-Tunami area, Tokyo

Table 10. Effect of the positive relationships

5.3 Our Recommendation and Validation of the Theory

Maslow's Hierarchy of Needs (Maslow, 1943) indicates a hierarchical human motivation. General understanding in ascending order, shown in Figure 14, is first the basic needs (physiological, safety, love/belonging), and then psychological needs (esteem), and finally self-actualization. However, we recommend that we ought to start the resilience of the basic needs and the psychological needs simultaneously after catastrophes such as the Tsunami (Kamakura, 2013). And our experiences recommend that the psychological needs should focus on the children positive emotions like their future dreams against the negative context of the Tsunami catastrophe, although many studies focus on the negative emotions of the children such as PTSD (Post traumatic stress disorder).

The theory also shows that the positive influencers impact between the children positive emotions and their interests as the libraries' properties. The mobile libraries, (Nissan and Shanti Volunteer Association, 2012) and (Kamakura, 2013), offer almost the optimal maximum capability for the community development with a combination of the manga, books and the positive influencers around the children. The mobile libraries also offer almost the optimal usability for the children with the positive influencers especially in the locations much damaged by the Tsunami. Therefore, the capability and usability of theory explain the reasons why many children and people borrow the books from the mobile libraries. According to (Kamakura, 2013), when the mobile library launches on July 17, 2011, the people in mainly the temporary housing areas for victims and some elementary schools can check out a maximum five books at a time from 1,500 to 2,000 books. As well as children's books, the mobile library offers novels, how-to books, and manga (cartoon, comic books). In addition, the mobile library sets up a tent in the back of car and provide a space to have tea. Users can browse alone or chat with friends as they like. The people can relax and enjoy themselves there.

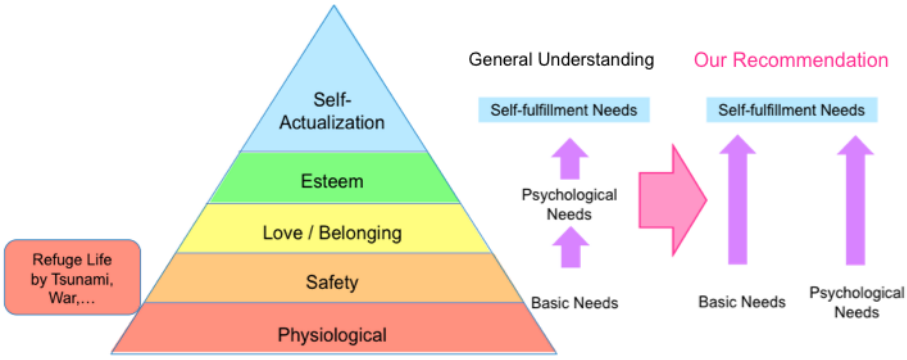


Figure 14. Maslow's hierarchy of needs, and our recommendation

6. Limitations of the Study and Recommendations for Future Study

This study examines the community development by the mobile libraries in the Tsunami area, Japan. The data are so precious that we can focus on the children positive emotions for their future, while many studies examine the negative psychological aspects. Considering cultural differences are important when we examine the community development in other countries. But our experiences recommend that resilience of the basic needs and the psychological needs ought to start simultaneously for the asylum seekers such as the refugees' children by the war nowadays. And we recommend that the psychological needs should be positive like focusing on the children future dreams, not negative. In this aspect, the emotional communication on art for the refugee children (Hamada and Grizzle, 2020) has an opportunity to analyze in detail of the psychological needs such as art therapy by means of the library properties. These future studies correspond to the media and information literacy expansion (MIL^X); integrating MIL (Media and Information Literacy) with social competencies such as youths'/children therapy and disaster management. This integration initiative aims to reach MIL for all citizens, audiences and users-groups, individuals as well as institutions (Grizzle and Hamada, 2019).

7. Conclusion

The mobile libraries at the Tsunami area foster not only the library properties but also the space where the people can relax (Kamakura, 2013). And the libraries rent manga and books (Kamakura, 2013). We theoretically find out that their experiences are almost optimal performance of the mobile libraries. The maximum capability of the mobile libraries is 100% for the children by means of the combination of manga and books with the positive influencers. And the positive influencers generate high effect usability for the children especially in the locations much damaged by the Tsunami. The mobile libraries visit some schools in the Tsunami area (Kamakura, 2013). We theoretically find out that schools directly impact the children interests toward books & newspaper in the Tsunami area.

We recommend that we ought to start the resilience of the basic needs and the psychological needs simultaneously after catastrophes such as the Tsunami (Kamakura, 2013). We also theoretically find out that the community development by the mobile libraries generate the children positive emotions. The classification by the children future dream doesn't finds out these results. And the relationship analysis by factor loading partly finds out the results. The relationship analysis by factor loading and text mining finds out the results. The 11029 children are classified into 32 groups by the relationship analysis. Comparing the relationships of the children in non-Tsunami area, Tokyo, results in that 16 groups are with specific in the Tsunami area. The positive influencers of family, friends and community much impact the relationships between the children positive emotions and their interests of the 16 groups. Therefore, we also recommend that the community development by the mobile libraries ought to consider not only the libraries' properties but also the positive influencers around the children. And we recommend that the mobile libraries and schools have an opportunity to generate a synergy effect on the children interests toward books and newspaper.

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Appendix: Questionnaire

Category	5-point Likert-type scale questions	Free writing response
1. Tell us your dreams!		
1.1 What are your dreams for the future?	I'd like to work at home	Free writing
	I'd like a job where I meet people	
	I'd like an aspirational job	
	I'd like a peaceful job	
	I'd like a job related to learning something	
	I'd like a job where I am interested in something	
	I'd like a job related to something I enjoy	
1.2 Why are they your dreams?	I like meeting people	Free writing
	I like talking to people	
	I like enjoying myself	
	I like to be useful	
	I like being proud of what I do	
	I'd like to be in the news headlines	
	I'd like to give something back	
	I'd like to brighten people's lives	
1.3 How long have you had these dreams?	Since I was little	Free writing
	Since I witnessed someone doing it	
	Since I saw it on TV	
	Since I learnt about it	
	Since I saw it in a newspaper, etc.	
	Since I realised it is good to be peaceful	
	Since I started liking it	
2. When do you feel good?	When I've had delicious food	Free writing
	When I'm laughing hard	
	When I admire my clothes in the mirror	
	When I feel useful by helping someone	
	When something gets me excited	
3. How do you spend your time when you're not watching TV'	With my family	Free writing
	With my friends	
	Doing something with the neighbours	
	Shopping	
	Computer games	
	Using the computer	
	Homework or studying	
	Listening to music or playing an instrument	
	Learning something	
	Club activities	
	Sports	
	Reading comics	
	Reading novels or newspapers	
4. What do you do while watching TV?	Homework or studying	Free writing
	Talk on the phone	
	Eat	
	Use the computer	
	Write emails	
	Read novels or newspapers	
	Play computer games	
5. Why do you watch TV?	Because the family does	Free writing
	Because my friends talk about it	
	Because I want to watch a recording later	
	Because there's someone on I like	
	Because I want to hear the music	
	Because I want to watch sports	
	Because I want to watch animated cartoons	
	Because I want to watch the news	
	Because I want to watch something interesting	
6. Tell us what you use when you watch and listen to?	I watch TV a lot	Free writing
	I often use the computer	
	I read books a lot	
	I often listen to people's conversations or stories	
	I play a lot of computer games	
	I listen to a lot of music on my music player	
	I often read newspapers	
	I often use my mobile phone	