Theorizing Media and Information Literacy: Emotional Communication through Art for Young People during Unusual Life Experiences

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Abstract

This study applies the new social change theory called Media and Information Literacy Expansion (MIL^{x}), as developed by Grizzle and Hamada (2019), to the UNESCO Media and Information Literacy (MIL) Cities framework (UNESCO, 2019). MIL^{x} considers MIL competencies, acquisition, and application by individuals, groups, and institutions simultaneously. MIL^{x} also models the potential multiplier outcomes of this approach when MIL is integrated with other social competences. MIL^{X} proposes that we cannot reach optimal social value proposition, value enhancement, and value expansion if MIL interventions only focus on individuals. The study also explores the likely positive changes in outcomes when MIL^{X} is united with emotional competencies as another variable in the model. Specifically, this paper focuses on MIL$^{\mathbf{X}}$ incorporating "emotional literacy" (Singh & Duraiappah, 2020) and the interaction that occurs in the selected target group of children and youth, their peers, their families, and the institutions with which they engage. A practical design of MIL$^{\mathbf{X}}$ demonstrates how MIL can correspond with efforts to counter disinformation and misinformation with deeper changes in mindset (Cinzia et al., 2015). It theorizes how, with MIL$^{\mathbf{X}}$, emotional communication through art

1 The contribution to this chapter is connected to the author's work as a Program Specialist in the Section for Media and Information Literacy and Media Development, UNESCO. However, the ideas and opinions expressed are not necessarily those of UNESCO and do not commit the Organization as such.

creates a synergistic effect on individuals, groups, and institutions. Art is widely used for psychological therapy because it can identify relationships between physical and psychological states. We used an art-based research methodology to theorize communication from the individual to society based on empirical analysis. Data from youth and children's responses to the 2011 tsunami catastrophe area in Ishinomaki, Japan, were analyzed in this context. Further research is required to strengthen the findings to actualize the strong emotional dimensions that exist in people's engagement in the information ecology toward and beyond the 2030 Agenda for Sustainable Development Goals.

Keywords: Media and Information Literacy expansion (MIL^{X}); youth, children's psychological needs; emotional communication through art; emotional literacy; emotional intelligence; social literacy; unusual life.

Introduction

This article explores how media and information literacy (MIL) complements the emotional resilience of youth and children during unusual life experiences, such as the COVID-19 pandemic and those who have become refugees. Traditional models of MIL have two limitations in these and similar circumstances. One is how literacy simultaneously reaches each youth/child (individuals) versus families, communities, and institutions (groups). During unusual life experiences, psychological needs are heightened not only for children but also for adults, their families, and actors in institutions who work collectively with the affected people (Šakan et al., 2020). Accordingly, addressing these psychosocial needs in combination with critical thinking competencies through MIL is essential to surmount the negative context and related disinformation and misinformation that surrounds the experience, as with COVID-19 (Prime, Wade and Browne, 2020; Kimura, 2020; Hamada, Grizzle and Oyeleye, 2020). Another consideration is how MIL achieves social competences, such as social/emotional literacy, health literacy, science literacy, and intercultural and interreligious competencies. A simple question is as follows: "what is different between people who have knowledge of MIL and those who do not during COVID-19 life?" We postulate that "there are differences in how they relate to disinformation related to COVID-19, for example but also that some people with such knowledge still get caught in the web of disinformation." We consider that a dearth of emotional facets in MIL knowledge is a main reason. Emotions are omnipresent, and it is necessary to create a balanced interaction between the rational brain or thinking brain and the emotional or feeling brain (Goleman, 1995). Therefore, MIL models should incorporate social and emotional literacy aspects to generate synergetic operations among youth/children, their peers, families, communities, and the institutions with which they interact.

Kofoworola et al. (2020) suggest that artistic edutainment in MIL^X for children creates a synergistic effect of understanding among children, friends, and families as it enhances and extends positive emotions from the child to other family members. The suggestion allows MIL to integrate emotional literacy, intercultural dialog, and interreligious dialog into individuals, groups, and institutions. Thus, this paper investigates a theory that covers the psychological aspects of MIL in unusual life situations. We mainly used arts-based research methodology (McNiff, 2011) as per an empirical analysis of the tsunami disaster that occurred in Japan on March 11, 2011. The arts-based research is a methodology that is simultaneously theoretical and empirical.

A key research question is as follows: when emotional literacy and psychological therapy are also synergized with MIL^X and UNESCO #MIL City, what are the possible outcomes or benefits to individuals, groups, and institutions in unusual life situations?

This study is organized into four sections, which are as follows. Theoretical Section 1 includes MIL^X in unusual life experiences and explains the basic idea by reconsidering the application of Maslow's hierarchy of needs. Here, the interrelation among the central concepts of MIL^X and MIL Cities and how emotional literacy relates to them is theorized. Theoretical Section 2 further dissects how emotional literacy is reflected in the concept of communication through art and relates to emotional responses. Here, we theorize emotional communication through art in a tsunami catastrophe area and involve MIL^X. In Section 3, we present additional methods as well as data analysis and discuss and clarify the context of children in a tsunami area and how arts integrated with MIL can help survivors be resilient, then share some empirical findings. This section is simultaneously theoretical and empirical in nature. Finally, we close with a further discussion and the conclusion.

Theoretical Section 1: Central concepts of MILx, MIL Cities, and the relation of emotional literacy

Media and Information Literacy Expansion (MILX) in unusual life: Reflections on Maslow's hierarchy of needs

As a starting point in contemplating MIL^X and how reasoning processes correspond with emotional processes, could Maslow's hierarchy of needs (Maslow, 1943), an authoritative foundational hierarchical model of human motivation, invite some rethinking in terms of its modes of application during unusual life circumstances? A general understanding, in ascending order, shown in Figure 1, is that, first, there

are the *basic needs* (physiological: food, water, warmth, and rest plus security and safety), and then, there are the *psychological needs* (love/belonging, esteem, and feeling of accomplishment). Two considerations emerge here. First, unmistakably, cognition or thinking, whether conscious or unconscious, is implicit in this renowned pyramidal illustration. Maslow theorized that people desire to increase their intelligence; consequently, they pursue new information or knowledge[2]. The desire to understand themselves, the world around them, and their place in it is cognition in action. This argument corresponds to Laws 2 and 4 of the UNESCO Five Laws of MIL (Grizzle and Singh, 2016).

- **Law 2:** Every citizen is a creator of information/knowledge and has a message. They must be empowered to access new information/knowledge and to express themselves. MIL is for all—women and men equally—and a nexus of human rights.
- **Law 4:** Every citizen wants to know and understand new information, knowledge, and messages as well as to communicate, even if she/he is not aware, admits, or expresses that he/she does. Her/his rights must however never be compromised.

"It is most likely reasonable to believe that the need to know and to understand is a basic need in Maslow's opinion and ignorance of this need apparently is a big gap in almost all resources" (Saeednia, 2009, p.3). Kenyon (2004) and other authors sought to correct this by adding the need to know and to understand in a revised model of Maslow's hierarchy (as cited in Saeednia, 2009).

However, our basic and psychological needs are mediated by media and digital technologies. With what benefits and how should critical thinking competencies (knowledge, skills, attitudes, and values) about all types of information intermingling with this group of needs be more explicit and superimposed on the model? Second, could it be that based on experiences, the ascending order from basic to psychological needs requires reconsideration? Is it possible for people's resilience and flourishing after catastrophes, such as the tsunami (Kamakura, 2013) and during COVID-19 experiences (Hamada, Grizzle, and Oyeleye, 2020), to benefit from addressing basic and psychological needs simultaneously?

In our discussions, we note that emotions can be both positive and negative. Stimulating and feeding negative emotions, especially in the absence of critical thinking, can lead to objectionable actions. Demonstratively, the positive emotions and thinking about youth and children's future dreams ought to be brought to the fore when addressing their psychological needs. Many studies focus on the negative

2 Climbing Maslow, https://climbingmaslow.org/blogs/the-concept-behind-the-brand/the-concept-behind-the-brand. Accessed on January 29, 2022.

emotions of the children, such as post-traumatic stress disorder (Hamada, M., Tsubaki, M., and Suzuki, T., 2020). Equally, much MIL research emphasizes critical thinking about societal ills and challenges rather than social opportunities and positive social developments (Buckingham, 2018; Narjes et al., 2015). This article delineates two ideas of the practical design of MIL Expansion (explained in detail further on) on UNESCO #MIL Cities during COVID-19 emergencies and theorizing emotional communication through art in an area ravaged by tsunami-induced catastrophes.

All these considerations have implications for Sustainable Development Goals (SDGs). It is important for communication about SDGs and the post-SDGs agenda to highlight MIL and the social emotional literacy of all peoples. We believe this can strengthen "futures literacy," perceiving, seeing our place in, and charting paths to the futures[3] we want beyond the 2030 Agenda.

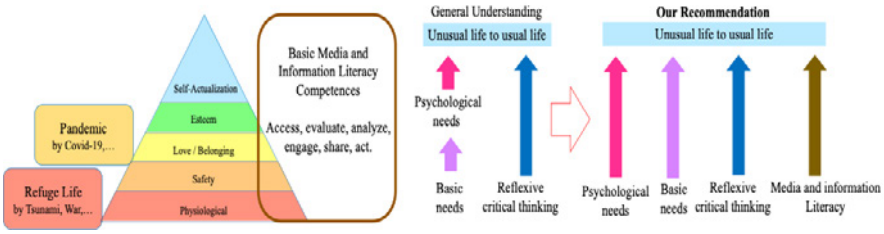

Figure 1. *Reconsideration of the application of Maslow's hierarchy of needs*

MIL Expansion on UNESCO #MIL Cities during unusual life

MIL Expansion (MIL^{X}), shown in Figure 2, expands literacy from individuals to individuals only, group, and institutions simultaneously and integrates MIL with social competences (Grizzle, 2017; see also Kuzmin, Parkashova et al., 2017), including the emotional dimension. MIL^{X} proposes that we cannot reach optimal social value proposition, value enhancement, and value expansion if MIL interventions focus only on individuals (Grizzle and Hamada, 2019).

MIL^{X} applied to the reconsideration of Maslow's hierarchy of needs is one of the suggested solutions. Let us take this a step further. MIL^{X} addresses individuals, groups, and communities of people in their physical and virtual environments. If we use cities in this context to encapsulate people and their physical and virtual environments, the cities become a living unit. How people relate to information

3 Futures Literacy: An essential competency for the 21st century. https://en.unesco.org/futuresliteracy/about. Accessed on January 29, 2022.

in unusual or urgent life circumstances becomes a factor then of their individual faculties as well as the multiple layers of responses within collective living units, cities. UNESCO #MIL Cities (UNESCO, 2018) is an initiative about creative learning in MIL in city life and spaces. Figure 3 submits how, by applying the combined UNESCO MIL^{X} with the UNESCO MIL Cities Framework, actors can help people to better assimilate information and thereby build their resilience against disinformation and misinformation so as to better handle crisis situations.

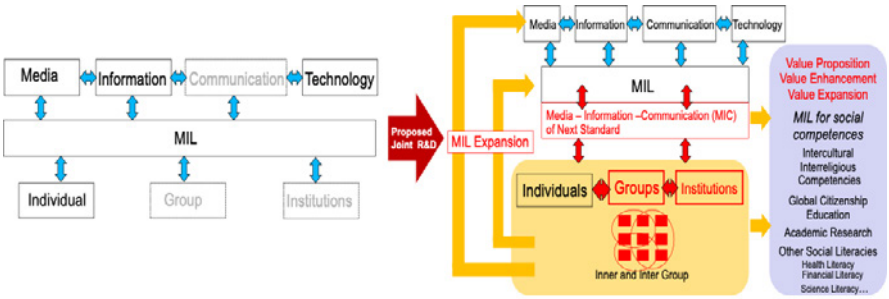

Figure 2. *MIL Expansion (MIL^{X}) (Grizzle and Hamada, 2019)*

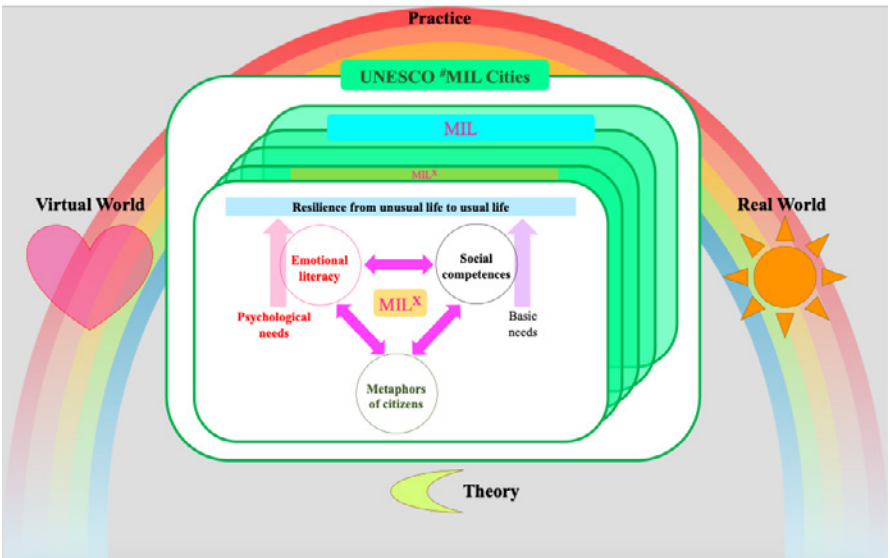

Figure 3. *MIL^{X} on UNESCO #MIL Cities during unusual life*

This practical design shows how to implement MIL^{X} with the emotional aspects of adults, youth, and children during their unusual experiences. The COVID-19 pandemic is an assumed unusual life experience. It helps cities with people who are

media and information literate, with a high level of emotional and social literacy, to resist disinformation and misinformation and heightens people's ability to satisfy and sustain their psychological and basic needs. Some experts call this situational awareness (Endsley, 2015). The International Code Council (2021) has applied this concept to how to effectively provide accurate information to people so that they can make decisions about their safety after and during emergencies in tall buildings. In times of public health emergencies, using formal information sources as situational awareness is crucial because situational awareness can increase public health behavior significantly (Qazi et al., 2020). The experiences of the COVID-19 pandemic draw attention to the lack of people's prior knowledge of such a global crisis, as well as the little information available at the beginning of the emergency. Thus, MIL^{X} applied to the MIL Cities model in Figure 3 also implies the necessary progression of situational information in Figure 4 below.

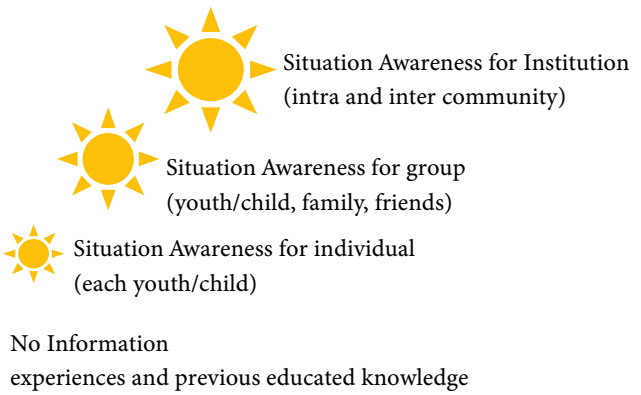

Figure 4. *Situational awareness on MIL^{X} for disinformation and misinformation*

Therefore, by incorporating emotional literacy and social literacy into MIL^{X}, improved or augmented situation awareness could be achieved. The proposition here is that practical design outputs will lead to better engagement with information, media, and technology (See Figure 5). In the next section, we exemplify how specific social competencies, such as intercultural and interreligious competencies, can affect information engagement.

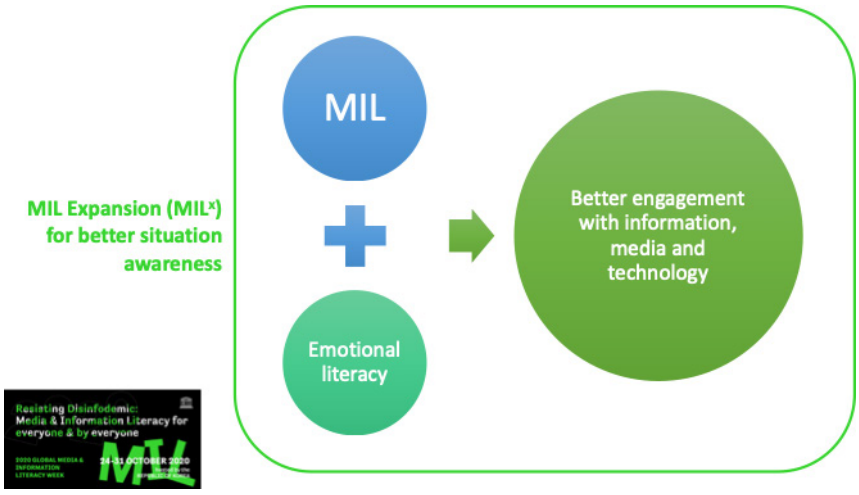

Figure 5. *Practical design of MIL^{X} in the COVID-19 context*

Practical design of MIL^{X} from emotional literacy to other social competences

In the model of MIL^{X} in Figure 2, we posit that MIL can enhance other social competencies, such as intercultural and interreligious competencies, health literacy, financial literacy, and science literacy. Here, we focus on how the lack of intercultural and interreligious competencies can be a barrier to information assimilation (Chibas Ortiz, 2019; Grizzle, 2018). An interview with a refugee youth and children's therapist was conducted in October 2018 at Caritas Luxembourg ONG. The information garnered was used as background for the study. Some main difficulties the therapists identified in helping these persons and enabling them to help themselves are summarized as follows (Hamada, 2018).

a. Addressing issues around intercultural dialog and interreligious dialog: Therapy for refugee youth/children is different from general therapy because of gaps in intercultural understanding and language barriers.
b. Emotional literacy: Compounded stress generates emotional disassociation in that they guard not only their bodies (basic needs) but also their emotions, the future they want, etc. More explicitly, it is not so much that they "guard" emotions and desires for the future but that they are buried under a mountain of stress and clouded by mistrust. At the beginning, recovering their emotions by communicating comprehensible words is important.
c. Unusual life to usual life: Progressing from the unusual life experiences of being a refugee requires a minimum of one year of therapy. This can lead to "their whole lives [being] changed."

d. Use of art, music, and drawing: The therapists use art, particularly during the early events of a camp, to help refugee children recover their emotions. The importance of knowledge change in the youth and children is a key means to an end but also an end itself. There is a long scholarship of art therapy to treat persons suffering from trauma (Schouten, 2014).

The most difficult aspect of therapy for refugee youth and children is the differences in cultures and language barriers. Beiser et al. (2015) and Trovao (2012) indicate that new knowledge provides opportunities to generate intercultural and interreligious competencies and thus aids dialog. Applying MIL^{X} to these situations expands the outcomes of knowledge change.

Box 1 Intercultural content during the COVID-19 crisis

Here we offer an example of a practical design for intercultural and interreligious dialog. ANILINGO and Animation Summer Camp are led by the organization IYIN-CREATIVE in Nigeria. ANILINGO is an animation series and mobile application that promotes native languages and cultures by engaging children through cartoons using figures they identify with and in a language they understand.

During the COVID-19 crisis, the organization has used cartoons as a way of educating children to stay safe. Seeing characters that look like them is very important to transmitting their message, particularly for the children of African descent. The content is now remotely accessible and updated regularly to give the children something new to look forward to.

Animation Summer Camp, Figure 8, has been educating children in Nigeria by teaching them how to create cartoon productions that bring stories and emotions to life against negative contexts, including COVID-19. They have been doing this since 2014 (IYIN-CREATIVE, Animation Summer Camp).

The campers are introduced to 2D and 3D animation as a tool for creatively telling stories of their own. The stories they tell through animation are, in some cases, reflective of their experiences and give them an avenue to release unexpressed emotions. Parents view their children's perspective through their projects, fostering better understanding. The 2020 camp was virtual and focused on the campers reflecting how COVID-19 affected them socially and emotionally.

These considerations illustrate that by helping children and youth stimulate positive emotions through animation, art, and entertainment, they accomplish knowledge change that broadens their intercultural and interreligious understanding.

Theoretical Section 2: Specifying emotional literacy, the concept of communication through art, and emotional responses

Theorizing emotional communication through art in a tsunami-induced catastrophe area: Enveloping MILX

Art is widely used as psychological therapy because it can bridge communication from individual to society (McNiff, 2011). Thus, we draw on arts therapy to respond to certain dimensions of the main research question. By comparing MIL and MIL^{X}, we construct a theory while analyzing the emotional responses by way of creating art in terms of communication from individual to society. The data set comes from youth and children from the 2011 tsunami catastrophe area in Ishinomaki, Japan, focusing on the area most damaged by the tsunami. We theorize emotional communication through art by utilizing an arts-based research methodology that is simultaneously theoretical and empirical.

Emotions transmitted through art have been studied since the early 1900s (Bartsch and Hübner, 2005). Information is transmitted even in emotional communication. However, what security systems can be developed to guard against manipulation online and offline? Theorizing emotional communication through art is introduced in this section. Here, we reflect on the synergetic possibilities of youth and children's positive emotions when MIL^{x} is introduced. MIL^{x} should operate bi-directionally, on critical thinking and social competences, such as emotional literacy, and with emotional communication through art considered to illuminate this bidirectional operation.

Experience speaks powerfully although isolated individual experiences might not be an exact science. Here, we offer an anecdote to prompt the reader's memory regarding similar experiences. As we amalgamate our individual experience, we approximate scientific methods. This experience is from one of the co-authors named at the end:

> Sometime in 2021, during one of the periods of a slight ease in the social restrictions due to the COVID-19 pandemic, I had the opportunity to meet with some young people for our monthly social activities. We were to have a meal together after a long time [of] not being able to do so due to social restrictions. I was to lead discussions with the young people in that meeting. I was so excited that I was also the one to prepare the meal for that day (Well, I shall not lie, I am married, so I anticipated help from my wife also, but I was committed to the bulk of the work…gender equality…). Back to the main point. Stay with me. On my wife's advice, I had already resolved, in my head, a simple meal to prepare given my very demanding schedule. Then, on the eve of the meeting, after we had already

> made all the necessary purchases, I was on Facebook browsing (my do nothing time, little thinking, rest my frontal lobe some, playful—but not for too long). I came across this video of a woman and man preparing chicken legs tantalizingly wrapped in bacon and potatoes, etc. The video was less than five minutes long, and, at the end, I have never seen something so succulent online for a while. At least I rarely stopped to take notice. I hope that you are salivating as I am now. Now of watching the video, I had a eureka moment. I must prepare this for the young people. It is easy, I thought. After all, I watch[ed] the video two times. Now recall that we had already shopped for all that was needed! Convinced and super excited, I was determined to prepare the exact meal as I saw in the video. I boldly and confidently approached my wife and shared my newly found genius idea. You can imagine the response… 'Don't be stupid, there is no way you can prepare that for tomorrow [the day of the meeting],' she gently warned. Now, of course I am not stupid. I consider myself a slightly sophisticated user of information, media, and digital technologies, having studied information systems, media and communication and having engaged in research and practice of MIL. Yet, I was ultra-convinced by a short video (obviously a summary of a much more complicated and longer preparation process) that I could defy my wife's better and experiential judgment. To shorten the story, I ventured into what I only soon realized was the unknown. Did a second round of shopping for all that was needed…With the benefit of her more rational thinking in command at the time, my wife abandoned me, somewhat…I continued with the emotional feeling side of my brain firing on high speed…Then a second eureka moment, two or three hours in[to] the process, I allowed myself to be duped by a short video! Call[ed] my mom for help as the potatoes were getting black…wife came to rescue but with some distance for me to learn a lesson…She asked to see the video that I had watched but we failed to fine it again on Facebook…I was too "emotional" to [make] a mental note of the source…I did learn my lesson. One I 'knew' very well from before, given much study…five more hours, with the second round of preparation the next morning (day the meeting). Some eight hours to prepare checking legs…It was not as easy as I thought…I needed 'emotional self-regulation' before starting this project based a decision driven by emotions…My thinking brain was obscured by my feeling brain" (Alton Grizzle).

This could happen to any of us. More importantly, the results are and could be more deleterious for many who engage in this type of decision-making. Goleman (1995), in his book on emotional intelligence, a term used interchangeably with emotional literacy in this article, puts it this way: He suggests that emotional intelligence requires synchronization between the emotional/feeling brain and the rational/thinking brain. Our thinking and feeling are inextricably linked. He explained that, for example, if someone hears a loud bang, this sends the feeling brain into overdrive, as it processes the bang as a threat and puts the body in state of alarm. However, we

need our thinking brain to assess whether there is a real threat; if not, it calms the feeling brain and body. He calls this emotional self-regulation.
To explain more specifically, we show on-site data of the 11,029 youth and children at the 2011 tsunami catastrophe area in Ishinomaki Japan and classify the combined quantitative analysis with qualitative analysis data. The data and classification analysis (Hamada, Tsubaki, and Suzuki, 2020) are explained in Appendix A and Appendix B.

Definition of emotional communication through art

Art, such as music, animation, and theater, has an opportunity to develop emotional resilience and positive mental well-being in children and young people (Zarobe and Bungay, 2017). Figure 6 is a drawing of the children in their refugee life caused by the tsunami on March 2011 in Japan. What do you feel by looking at this lovely drawing? The children may draw a variety of expressions or a partial expression of their emotions. This way, different emotional deductions and relations between the children and viewers may be created by means of one drawing. This section defines such kinds of emotional relations as emotional communication in art.

Figure 6. *Artwork by children in their refugee life (November 2011, Hashikami Elementary School, Kesennuma, Japan)*

Emotional communication can have bidirectional operations, as shown in Figure 7. The two directions generate a multiple-to-multiple communication of emotions from the side of the producer to the side of those watching, listening to, or reading the art. Contained here is information and messages being transmitted, as stated earlier. Information and messages transmitted through media, digital platforms, books, museums, etc. are synonymous, meaning that critical thinking through MIL is needed and can reinforce the emotional processes taking place.

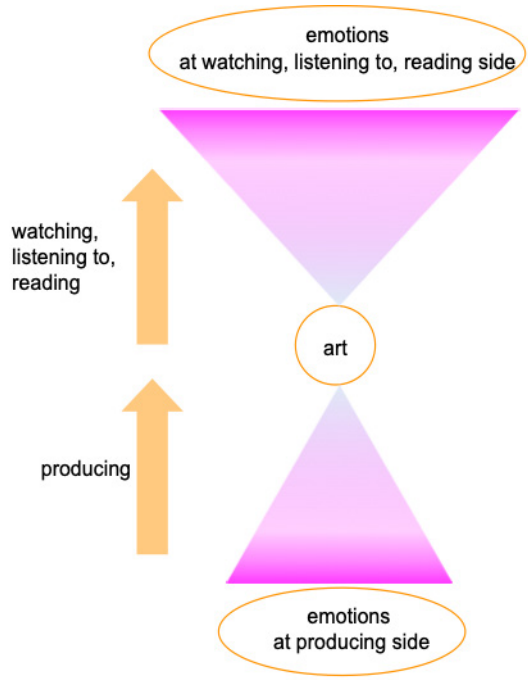

Figure 7. *Emotional communication through art*

Theorizing emotional communication through art

Emotions through art have been studied since the early 1900s (Langer, 1953). However, emotional communication has not been fully theorized (Bartsch and Hübner, 2005). We suggest that this is partly because emotional communication has not developed any theory on its effectiveness and characteristic features. Conversely, established communication theories with characteristic features have been tested and

proven (Berthon, Pitt, Katsikeas, and Berthon, 1999). For instance, Kerr et al. (2020) introduces the quantitative theory of emotion information, based on Shannon's mathematical theory of information in communication systems. They posit that the theory explains various aspects of emotional communication and opens paths for new directions in research. Here we applied the communication theory of service science to emotional communication through art (Hamada and Grizzle, 2020). In the theory of service science, the characteristic features are amorphousness or intangibility, simultaneity, and heterogeneity (Berthon, Pitt, Katsikeas, and Berthon, 1999).

Amorphousness is effectively the result of the providers' intangible activities. Simultaneity refers to the bidirectional characteristics of providing and consuming concurrently. Heterogeneity is a divergence of customers to receive services. Customers receive different emotions even on the same services.

Kurosumi and Tsubaki (2014) analyze simultaneity and heterogeneity among the learning styles of the students, educational improvements, and learning outcomes. Miyamoto and Tsubaki (2018) analyze heterogeneity between customers and service providers. Both focus on providing services classified by students' type or customers' type to improve the effectiveness of education or marketing. Relational analysis (Haraga, Tsubaki, and Suzuki, 2014) classifies students or customers into several types according to their features of how much resemblance comes from factor scores and factor loadings. This classification results in near-optimal effectiveness in each group with high-simultaneity and high-heterogeneity communication. Theorizing emotional communication, proposed in this paper, examines amorphousness, simultaneity, and heterogeneity in a similar way in connection with information, emotion, and critical thinking with MIL as a base (Hamada and Grizzle, 2020).

Tomasso (2010) scrutinizes relationships between new information and the knowledge of youth and children who have had experiences as refugees and asylum seekers. The study concludes that the youth and children have little or no portion of new information, thus not changing their knowledge significantly. The disconnection between information and knowledge also results in a lower connection among knowledge, behavior, and attitude. Servaes (2003) and Warr (2010) mention that the disconnection is caused by psychological dissociation and propose therapeutic approaches. Consequently, it is urgent to connect children's access to information with the children's knowledge change.

Interacting with information transmitted in emotional exchanges is an opportunity toward generating new knowledge (Stephens and Carmeli, 2016), and positive emotions are a part of the resolution to create intercultural and interreligious dialogs. Ljujic et al., (2013), Wilson (2013), Beiser et al. (2015), and Trovão (2012) also identified connections between new knowledge and intercultural dialog and interreligious dialog. Harris et al. (1981) conclude that children have a changing

conception of emotions and that art has an opportunity to develop resilience and positive mental well-being in children and young people (Zarobe and Bungay, 2017). The output of emotional communication and the knowledge change with the incoming information generate diversification, such as recovering emotions based on intercultural and interreligious experiences, leading to positive behavior change and attitude change (Trevor et al., 2017; Servaes, 2003; Ljujic et al., 2013; Wilson, 2013). These considerations design emotional communication through art, as shown in Figure 8 (Hamada and Grizzle, 2020). Art, in itself, transmits much new information.

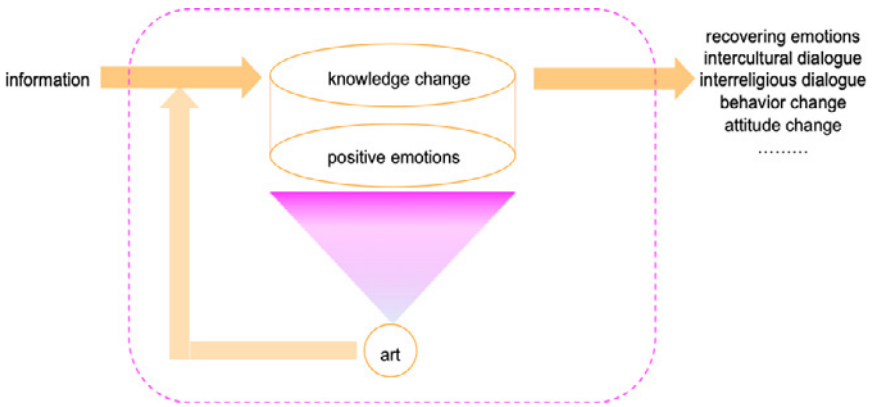

Figure 8. *Emotional communication through art*

Characteristic features of emotional communication through art

This paper assumes that amorphousness, simultaneity, and heterogeneity are fundamental characteristic features of emotional communication that are similar to elements of service science communication theory as explained above. Theorizing these features can result in an optimal performance of emotional communication through art.

Amorphousness (intangibility) of service science is effective as the result of the providers' intangible activities (Berthon et al, 1999). The effectiveness of unearthing positive emotions, with information and critical thinking embedded, is knowledge change (Tomasso, 2010; Servaes, 2003). Therefore, amorphousness in emotional communication can be knowledge change (Hamada and Grizzle, 2020).

We consider simultaneity of emotional communication through art. The simultaneity of service science is the bidirectional characteristic of providing and consuming concurrently (Berthon, Pitt, Katsikeas, and Berthon, 1999). Simultaneity improves the effectiveness of communication (Kurosumi and Tsubaki, 2014). Emotional communication through art is designed to have this kind of bidirectional characteristic (Hamada and Grizzle, 2020).

Forward paths and backward paths, shown in Figure 9, indicate bidirectional characteristics. The sum of all the forward paths means the maximum capability of communication, from art to positive emotions and knowledge change. The forward path suggests the capability of communication through art. The sum of all the backward paths means the maximum usability of communication from positive emotions and knowledge change through art. The backward path communicates the usability of communication through art.

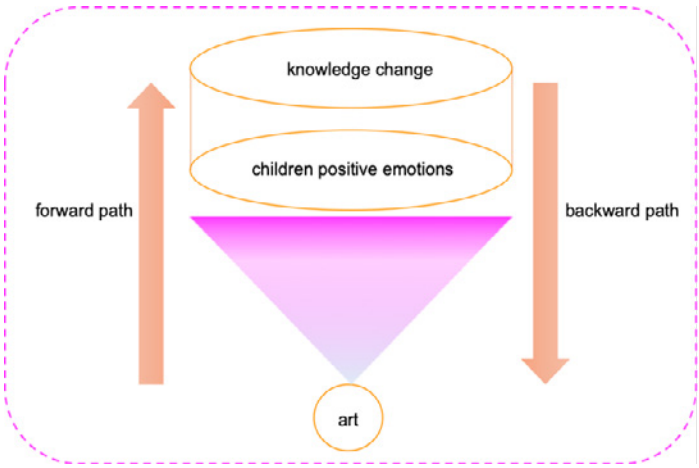

Figure 9. *Forward path and backward path of emotional communication through art*

Finally, there is the heterogeneity of emotional communication through art. Heterogeneity is the divergence of customers in receiving services (Berthon et al., 1999). Customers receive different emotions even on the same services. Heterogeneity is crucial so that providers can serve various types of customers with high quality. Kurosumi et al. (2014), Miyamoto et al. (2018), Biringen et al. (1999), and Kerr et al. (2019) explain that not only children's emotions but also their family's emotions are important to improve emotional relationships between family and children. Friends, school, and community are also positive effectors of children's positive emotions (Bonanno et al., 2004; Veronese et al., 2012). The MIL Expansion (MIL^X) theory of change, explained earlier in this chapter, brings these individual,

institutional, and communal dynamics to keep in mind when addressing information, knowledge, and critical thinking in mediated emotional communication. We posit that the heterogeneity of emotional communication through art can improve the relationships between art, children's positive emotions, positive effectors, and children's knowledge change. The emotional communication through art with positive effectors, shown in Figure 10, is characterized by high heterogeneity (Hamada and Grizzle, 2020). Children improve opportunities to attain knowledge changes.

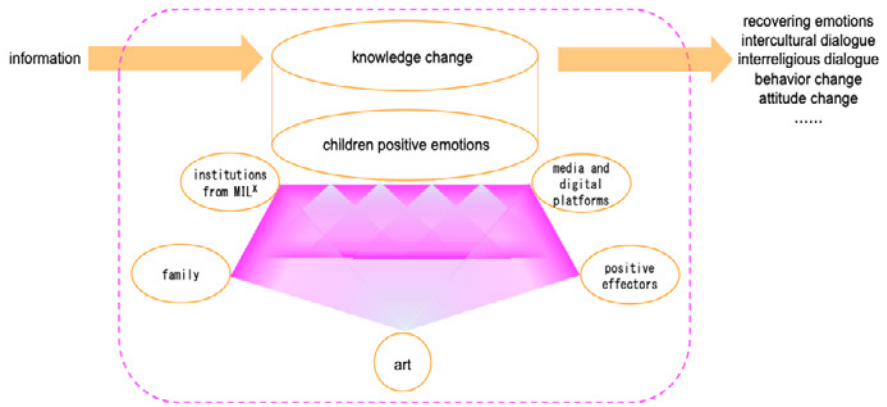

Figure 10. *Emotional communication through art with positive effectors, institutions in MIL^X, and media and digital platforms*

Section 3: Presentation of methods, data analysis, clarify of context, and empirical findings

Correspondences between MILX and emotional communication through art

Table 1 summarizes the correspondences between MIL^X and emotional communication using art. Traditional MIL focuses on an individual's competencies (Grizzle, et al. 2013) so that the emotional communication through art of Figure 9 corresponds to the MIL. MIL^X expands the literacy of individuals, groups, and institutes (Grizzle and Hamada, 2019) so that the emotional communication through art of Figure 10 corresponds to MIL^X. The emotional communication through art has a bidirectional function as well as the practical design of MIL^X.

Art is defined as the creation of forms symbolic of human feeling (Langer, 1953), and knowledge change generates social competences, such as intercultural dialog and interreligious dialog, as argued earlier. Thus, there is a capability from art to knowledge change that corresponds to the direction from emotional literacy toward the social competences of the practical design of MIL^{X} and vice versa, in relation to the usability from knowledge change toward art, which corresponds to the direction from social competences toward emotional literacy of the practical design of MIL^{X}.

Table 1. *Correspondences between MIL^{X} and emotional communication through art*

	Emotional communication on art	**Emotional communication on art with positive effects, institutions from MIL^{x} and media and digital platforms**
Media and information literacy	MIL	MIL^{x}
Capability from art to knowledge change	Direction from emotional literacy to social literacy	
Usability from knowledge change to art	From social competences to emotional literacy	

Emotional communication through art in a tsunami catastrophe area

Data shown in Appendix A (Hamada, Tsubaki, and Suzuki, 2020) were collected from a questionnaire from all elementary and junior high school students (11,029 youth and children, aged 5–15 years old), from Ishinomaki city, Japan within two years after the 2011 tsunami. A combination of factor analysis and text mining, shown in Appendix B (Hamada, Tsubaki and Suzuki, 2020), classifies the data and analyzes the paths between art and the youth/children's knowledge change. The analysis classifies 11,029 youth and children into 32 types, according to their correspondences with art, the people around them, and their positive emotions. The analysis of the youth and children in the non-tsunami area of Tokyo resulted in 16 types specific to the tsunami area (Hamada, Tsubaki, and Suzuki, 2020). Two models of Table 1, the MIL model of Figure 9 and the MIL^{X} model of Figure 10, are compared using the indicators of capability and usability. Art (music, manga, cartoon, or animation in Japan) and media (books and newspapers) are also compared.

Paths of MIL and MIL^{X} between art and youth and children's knowledge change

Art, youth/children's positive emotions, and their knowledge change of the following are considered the paths of MIL and MIL^{X} (Hamada, Grizzle, and Oyeleye, 2020).

Art: music, manga, painting, craft
Positive emotions: want to meet, want to talk, want to make people happy,
want to have gratitude, want to be useful, want to have fun,
want to have a hobby
Knowledge change: about family, about idol/heartthrob,
about contribute to peace, about interestedness,
about learning, about favorite things

The paths of MIL between art and youth/children's knowledge change, shown in Figure 11, is related to the paths of interiority of each youth and child without the people around them (Hamada, Grizzle and Oyeleye, 2020). The paths provide only music (as an art) and sports.

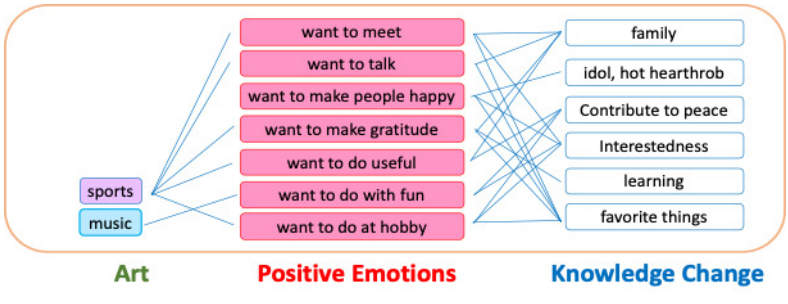

Figure 11. *Paths of MIL*

MIL^{X} expands the intra-paths outside each youth and child with the intra- and inter-relations of the people (Hamada, Grizzle and Oyeleye, 2020). The paths all have art, shown in Figure 12, and music as an intra-path; and music, manga, painting, and craft, as an inter-path.

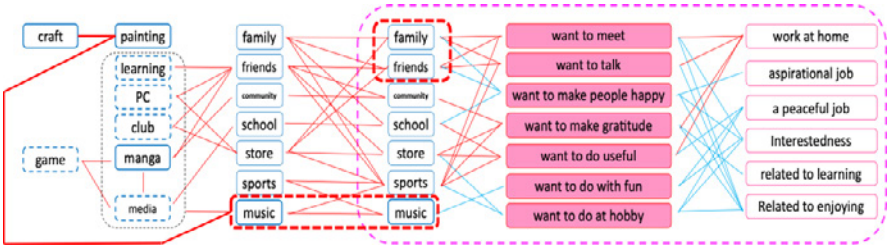

Figure 12. *Paths of MIL^X*

Capability of MIL and MIL^X

Table 2 compares the result of emotional communication through art on MIL and MIL^X and indicates the maximum capability, the sum of all capability, and all forward paths of MIL in Figure 11 and all forward paths of MIL^X in Figure 12 (Hamada and Grizzle, 2020). MIL generates a small capability, 9.0% by music, 0% by manga, and 10.7% by the media. MIL^X expands the capability with 61.2% by music, 75.5% by manga, and 30.6% by the media. By means of MIL^X, art makes extreme gains in capability when compared with the media. The combination of music and manga heightens capability from 9.0% by MIL to 95.8% by MIL^X; music and the media from 19.7% by MIL to 76.7% by MIL^X; manga and media from 10.7% by MIL to 100% by MIL^X; and music, manga, and media from 19.7% by MIL to 100% by MIL^X.

The deduction here that calls for further research is that emotional communication through art with MIL^X can extremely improve its effectiveness and amorphousness. In addition, the capability of MIL^X finds a synergistic effect on youth and children, their family, their friends, and institutions in the practical design shown in Figure 2.

Table 2. *Maximum capability of MIL and MIL^{x}*

	MIL	MIL^{x}
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%)

Usability of emotional communication through art

The usability paths of MIL in areas with little damage by the tsunami are shown in Figure 13 below. There is no connection from knowledge change to art. MIL^{x} can create usability with youth and children's intra-relations with their families and friends, as shown in Figure 14. The knowledge change regarding working at home can connect to art and interrelations via families and friends based on MIL^{x}.

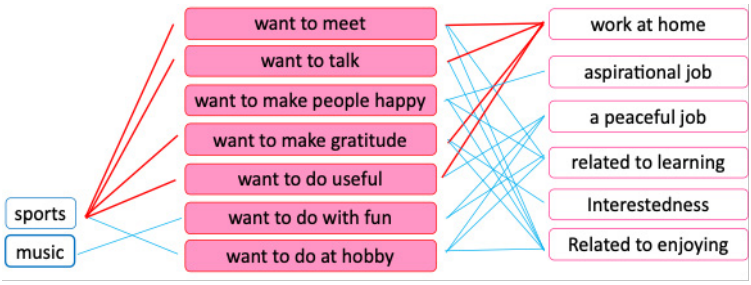

Figure 13. *Usability of MIL in areas with little damage*

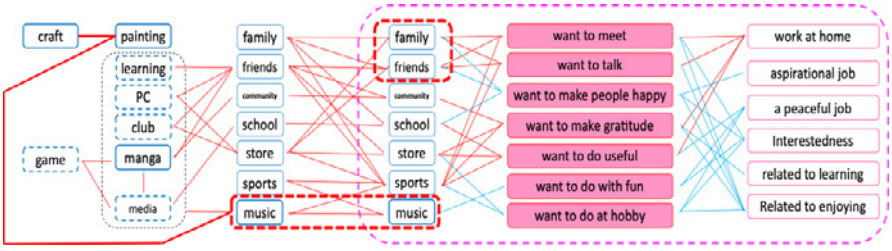

Figure 14. *Usability of MIL^{X} in areas with little damage*

The usability paths of MIL in areas with much damage, shown in Figure 15, have a connection to music from knowledge change. MIL^{X} can expand the usability in a way similar to that in areas with little damage. However, the youth/children's relations with their families and friends become their interrelations. The knowledge change can connect to music directly inside their intra-relations and connect to their interrelations via their families and friends by MIL^{X} (Figure 16).

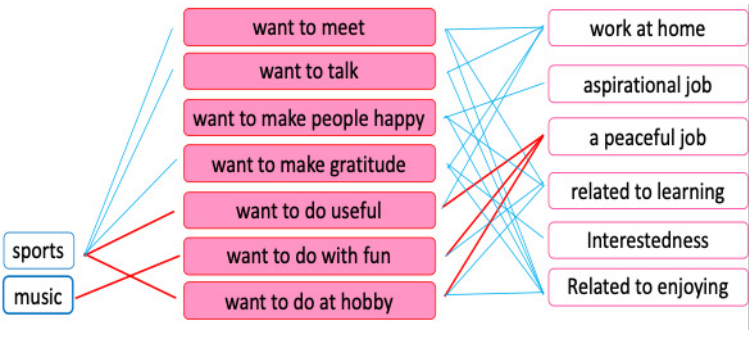

Figure 15. *Usability of MIL in areas with more damage*

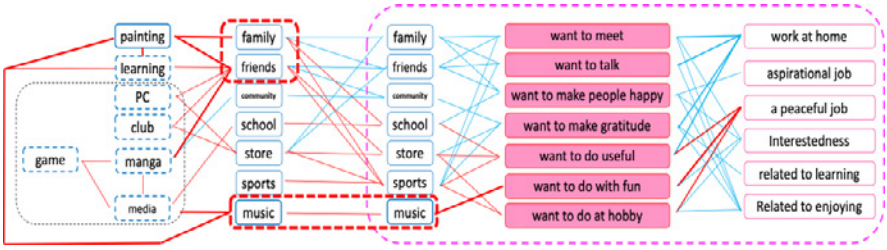

Figure 16. *Usability of MIL^{X} in areas with more damage*

Table 3 below compares the result of usability of emotional communication through art based on MIL and MIL^{X} and indicates the maximum usability, the sum of all usability, and all backward paths of MIL in Figure 13 and Figure 15, as well as all backward paths of MIL^{X} in Figure 14 and Figure 16. MIL generates small usability, only 20.0% by music in areas with much damage; MIL^{X} expands the maximum usability, up to 100%, with 56% areas with little damage; and 44% in areas with much more damage. The percentages are similar to those of youth and children in areas with much more physical damage, with 60% usability in areas with little damage and with 40% usability in areas with much more damage. Thus, MIL^{X} seems to spill over in relation to effectiveness, regardless of the physical damages.

It seems that emotional communication through art with MIL^{X} can significantly improve its effectiveness and amorphousness, which is the same as the capability. In addition, the usability of MIL^{X} finds synergistic effect among youth, children, their families, and their friends in the practical design shown in Figure 2, from social competences toward emotional literacy.

Table 3. *Maximum usability of MIL and MIL^{X}*

	MIL	MIL^{X}	Physial damage
In little damaged places	0%	56%	60% similar to non-Tsunami area, Tokyo
In much damaged places	20%	44%	40% With specific in Tsunami area, Ishinomaki
Total	20%	100%	100%

Conclusion

Our research question is how UNESCO #MIL City can bridge emotional literacy and social competences, such as psychological therapy, to create synergistic effects on individuals/groups/institutions. The empirical analysis of the 2011 tsunami area showed the possibility of using MIL^{X} to intervene in the relationships between positive emotions and knowledge change in youth and children in a #MIL City.

An interview with a therapist of refugee children in Caritas Luxembourg in October 2018 aided with exploring the different effects of art and media. The therapists used art, such as music and drawing, but did not use media, especially in the first series of events in the camps. This was on the basis that recovering children exploring emotions by communicating using familiar words was important for the refugee children. In what is similar to their experiences, our findings seem to suggest that art via MIL^{X} can provide significantly more opportunities to expand the capability and usability of youth and children's emotional communication than the media can because art, such as drawing and animation, can create the synergy effects among youth/children, their families, and their friends, based on MIL^{X}. We further explored the different culture and language barriers. Our practical design and theory explain how MIL^{X} can stimulate children's knowledge change. This allows children to expand their opportunities to obtain intercultural dialog as well as interreligious dialog.

Based on the data from youth and children's responses to the 2011 tsunami catastrophe area in Ishinomaki, Japan, the relation factor analysis (Appendix B), a quantitative analysis, can detect all the combinations of high factor loadings among art, children's positive emotions, and knowledge change. Therefore, the result of relations analysis means the maximum capability and maximum usability of the emotional communication through art without positive effectors, as in Figure 12 (Hamada, Tsubaki, and Suzuki, 2020).

Thus, the analysis by factor analysis is equivalent to the application for the ordinal MIL; its results are equivalent to those of the ordinal MIL.

The text mining, a qualitative analysis (Appendix B), can detect connections around the high factor scores of the factor analysis. Therefore, the relation analysis, combined factor analysis, and text mining, an analysis combining quantitative analysis and qualitative analysis, can detect all the combinations among art, positive effectors, children's positive emotions, and knowledge change. Therefore, the result of relationship analysis by factor analysis and text mining suggests the maximum capability and usability of emotional communication on art with positive effectors in Figure 14 (Hamada, Tsubaki and, Suzuki, 2020).

Thus, the analysis by factor analysis and text mining is equivalent to the application of MIL^{X}, and its results are equivalent to those of MIL^{X}.

The findings suggest that MIL^{X} can expand the capability and usability between emotions and art activities in youth and children even in unusual life. It could be one of UNESCO #MIL City's applications to aid emotional well-being in youth and children.

This article first shows the practical design of MIL^{X} as a theory of change to address disinformation and misinformation during our unusual life experiences, such as COVID-19. It then theorizes the emotional communication through art in a tsunami area. During unusual life experiences, the basic needs and psychological needs ought to be addressed simultaneously. The synergistic effects are resilient positive emotions among youth/children, their families, and their friends, which are important for our psychological needs.

Communication regarding achieving the SDGs has big gaps to address in respect of emotional communication. Incorporating emotional literacy or intelligence in MIL and MIL^{X} may strengthen our consideration toward the post-SDGs agenda. Much more research in this area is required.

Appendix A: Children's data in a city damaged by the tsunami in Japan (Hamada, Tsubaki, and Suzuki, 2020)

Oral inquiry

An oral inquiry 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's positive emotions among the positive effectors and the children's interests in the library properties, as in Figure 21. This study focuses on the children's positive emotions, such as their future dreams in Figure 21 against the negative context of the tsunami catastrophe.

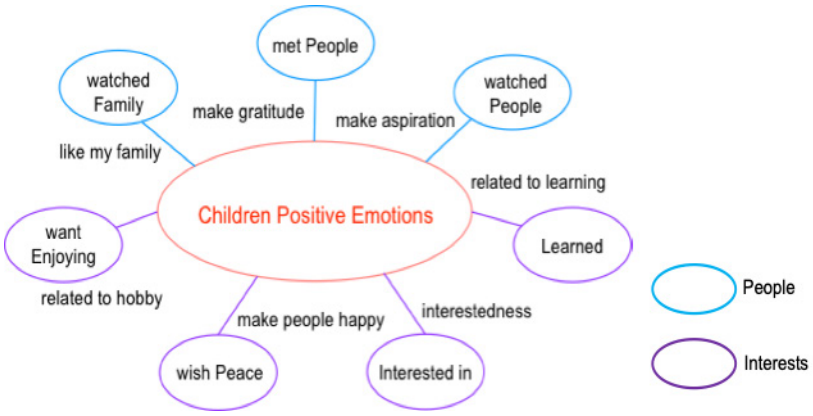

Figure 21. *Principal relations of the children's positive emotions*

Data collection

The data collection is summarized in Table 4. The data were collected by a questionnaire, which reflects oral inquiries. All the elementary and junior high schools in Isinomaki City, the area most damaged by the March 11, 2011, tsunami, were selected. The total number of children was 11,029 (42 elementary schools with N = 7,121; 21 junior high schools with N = 3,908) from 5 to 15 years old. To find the heterogeneity, specifically in the tsunami area, the children in non-tsunami area, (Tokyo) were selected. The number of children in Tokyo (N = 2108), Choufu City, and Tachikawa City, is reliable, with less than 3% error at 95% reliability. The data were collected by the questionnaire within two years after the tsunami.

Table 4. *Data collection*

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)

Appendix B: Relation analysis combining quantitative analysis with qualitative analysis (Hamada, Tsubaki and Suzuki, 2020)

An image of relation analysis combining quantitative analysis with qualitative analysis

As shown in Figure 22, the input of the relationship analysis is a multi-point, Likert-type scale question, and the output is the people group classified by services', such as library services, usage. The relationship analysis, such as that on usage based on factor loading of multiple-choice variables in quantitative analysis, classifies the people and the services. This study classifies the children's positive emotions, the people, and the library services by combining text mining with factor loading and combining qualitative and quantitative analyses.

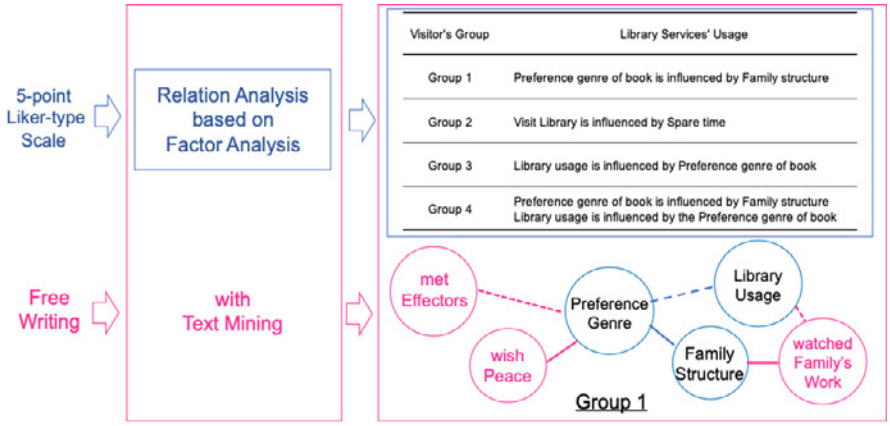

Figure 22. *An image of relation analysis combining quantitative analysis with qualitative analysis*

Relation analysis by factor analysis

Fabrigar and Wegener (2012) used the principal method, promax rotation, and parallel analysis criteria on factor analysis. The relation analysis of Haraga, Tsubaki, and Suzuki (2014) is based on the factor analysis to classify the people in the services. This study conducts a factor analysis and relation analysis by comparing the children at two separate areas of the tsunami area—Ishinomaki and the non-tsunami area in Tokyo. The classification is proceeded by five steps, as shown in Figure 23 (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's 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 modeling the structural equation for the repeat data at two time points.

5. Extraction of latent factors:

We analyze the relationships by the type of the children's positive emotions, comparing the conditional probability distributions of the objective variable with the preconditions of the ordered or categorical explanatory variables by type and extract the feedback proposal about the children's positive emotions by type.

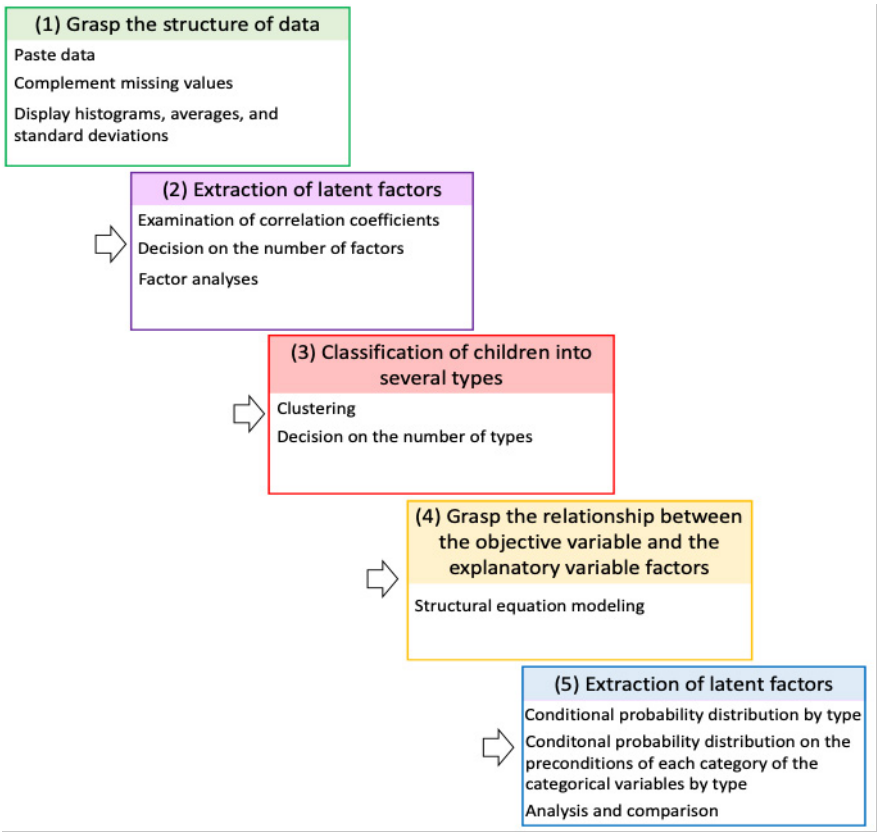

Figure 23. *Relation analysis by factor analysis*

(Haraga, Tsubaki and Suzuki, 2014) analyze the data under 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. As an example, in Table 5, the number is 12. The names of the 12 factors and the factor loading are shown in Tables 6 and 7, respectively, as examples.

The classification of children is according to the factor loading. This study shall analyze the types of children and the similarities and differences among their positive emotions, their interests, and the people around them. Based on the factor score, the pupils were clustered using the Ward method and divided into types. Figure 24 indicates the number of pupils and the average value of the factor score when there is an example of four clusters, five clusters, and six 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 ($m = 1, \ldots, M$) for group i ($i = 1, \ldots, k$), where M is the number of factor and k is the number of groups, then

- For groups assessed as "high": $f_{im} \geq 0.5$
- For groups assessed as "medium": $-0.5 \leq f_{im} < 0.5$
- 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, while approximately 30% fell both above and below these values. Before the categorization 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.

Table 5. *An example of eigenvalues, parallel analysis, cumulative contribution ratio*

	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 6. *The names of the 12 factors of Table 5*

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 7. *Factor Loading of Table 6*

	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

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	1.032	-0.586
Factor 12	-0.079	-0.026	0.048	-0.062	0.115	0.068
Pupils	312	396	255	273	115	392

Figure 24. *An example of the classification*

Relation analysis by factor analysis and text mining

The text mining can find the relationship, as in Figure 25, where black nodes denote high-frequency words; red nodes indicate low-frequency words strongly linked with black nodes; green-circled nodes indicate nodes often co-occurring with other nodes or keywords; black links signify links joining nodes with significant co-occurrence; and red-dashed links denote columns linking nodes, etc., with significant connections not located in the section linked in black.
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.

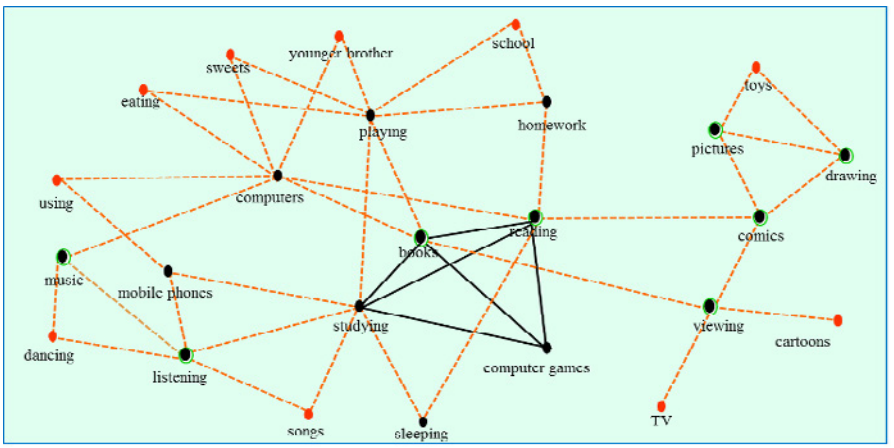

Figure 25. *An example of the relations classified by text mining*

The combination of factor loading and text mining has an opportunity to find the relationships among the children's positive emotions, their interests in the library's properties, and the people around the children. The classification is according to four processes, as in Figure 26:

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's 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's interests by text mining:

A text mining tool, such as KeyGraph, analyzes 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 this relation analysis.

The differences from the factor loading in Figure 23 are the steps shortened from five steps to four steps, with free writing data to the children's interests by text mining. The others, from Step 1. to Step 3., are the exact same procedures.

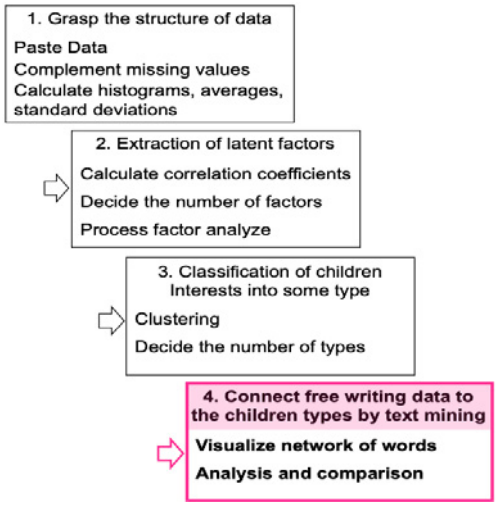

Figure 26. *Relation analysis by factor loading and text mining*

Application of MIL and MIL^{x}

The relation analysis by factor analysis, a quantitative analysis, can detect all the combinations of high factor loadings among art, children's positive emotions, and knowledge change. Therefore, the result of the relation analysis indicates the maximum capability and maximum usability of the emotional communication through art without positive effectors, as in Figure 12 (Hamada, Tsubaki and Suzuki, 2020).

Thus, the analysis by factor analysis is equivalent to the application for ordinal MIL, and its results are equivalent to those of ordinal MIL.

The text mining, a qualitative analysis, can detect connections around the high factor scores of the factor analysis. Therefore, the relation analysis, combined factor analysis, and text mining, an analysis combined quantitative analysis and qualitative analysis, can detect all the combinations among art, positive effectors, children's positive emotions, and knowledge change. Therefore, the result of relationship analysis by factor analysis and text mining indicates the maximum capability and usability of emotional communication through art with positive effectors, as in Figure 14 (Hamada, Tsubaki and Suzuki, 2020).

Thus, the analysis by factor analysis and text mining is equivalent to the application of MIL^{x}, and its results are equivalent to those of MIL^{x}.

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