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An exploratory study of how to increase citizens' preparedness for natural disasters using e-learning system: From Japanese experiences

Dr Sachiyo Kawakami, Dr Hiroko Oe, and Dr Yasuyuki Yamaoka

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1. Introduction

"Disaster preparedness refers to measures taken to prepare for and reduce the effects of disasters. That is, to predict and, where possible, prevent disasters, mitigate their impact on vulnerable populations, and respond to and effectively cope with their consequences" (The International Federation of Red Cross and Red Crescent)

1.1 Background of this study: Japanese experiences

This study aims to discuss and evaluate an e-learning in the communities in increasing people's preparedness and readiness for the natural disasters. In doing so, a case of implementation of e-learning scheme to support citizens' awareness of evacuating behaviour in the occasion of Tsunami.

Sun et al. (2013) discussed the 'Tsunami *tendenko*' as one of the critical methods which people should follow in the event of *Tsunami*. However, it has known there are a few psychological barriers to follow this rule. '*tendenko*' is a recommended method which refers to an "everyone for him/herself" mindset, which calls for individual evaluating actions, not looking after other people even family members.

The outcome of the survivors from the Great East Japan Earthquake 2011, this approach worked to mitigate the number of the victimised citizens, however, it was not easy for the residents as they felt guilty from moral and emotional obstacles (Sun et al., 2013; Hatayama and Nakai, 2020).

1.2 Research gap

Although the potential of an e-learning system in the communities to increase preparedness for the natural disasters among the citizens have attracted practitioners and researchers, actionable implications have not yet developed with practical recommendations so far.

1.3 Aim and objectives

This study aims to explore a potential implementation of e-learning system in the communities to enhance citizens' preparedness towards the natural disasters via nurturing the mindset of '*tendenko*' which has been discussed as the best strategy in case of Tsunami. To achieve this aim, three objectives were developed;

1) To review relevant academic discussions to draw key take-outs and design a semi-structured questionnaire,
2) To conduct interviews with citizens, public sectors, and other relevant stakeholders,
3) To analyse and discuss the data to develop actionable implications of e-learning system to enhance preparedness for the disasters (e.g., including '*tendenko*' mindset) to reduce the victimised damage of tsunami.

2. Academic discussion

2.1 Natural disasters and '*tendenko*'

Tsuneyoshi (2019) discussed the safety and disaster prevention programme from an education point of view. In doing so, it is proposed that '*tendenko*' behavior and is an ideal action in the disaster incidents. As noted, the mindset of '*tendenko*' has been acknowledged and recommended especially in the Tsunami incidents. However, it has also been well-known that there are psychological and ethical barriers to do so (Sun et al., 2013; Sun, 2020).

2.2 Potential of e-learning system to increase citizens' preparedness

To embed '*tendenko*' and other risk mitigation behaviour, continuous trainings and drills should be planned. In the community learning process, a supportive IT-based scheme could be useful in enhancing awareness of potential risks and preparedness for the disasters (Oe and Yamaoka, 2012). To prevail the meaning of '*tendenko*' among citizens in the communities, sharing the information with hands-on trainings are essential (Hatayama and Nakai, 2020). In doing

so, an e-learning system within the communities can contribute to deepen citizens' understanding of *'tendenko'* critically and virtually, on which citizens review and practice mitigating behaviour preparing for the natural disaster incidents. However, it is not easy to utilise IT-based scheme such as an e-learning system to achieve the aimed goal (preparedness in this context), as it has been acknowledged that there are several gaps we should conquer (Paton, 2019).

2.3 How to fill the gap between the reality and 'possible' disasters in training
To develop research questions, here is an analytical framework discussing how to support the real behaviour based on the e-learning as a virtual learning platform.

How to fill the gap between the reality and 'possible' disasters
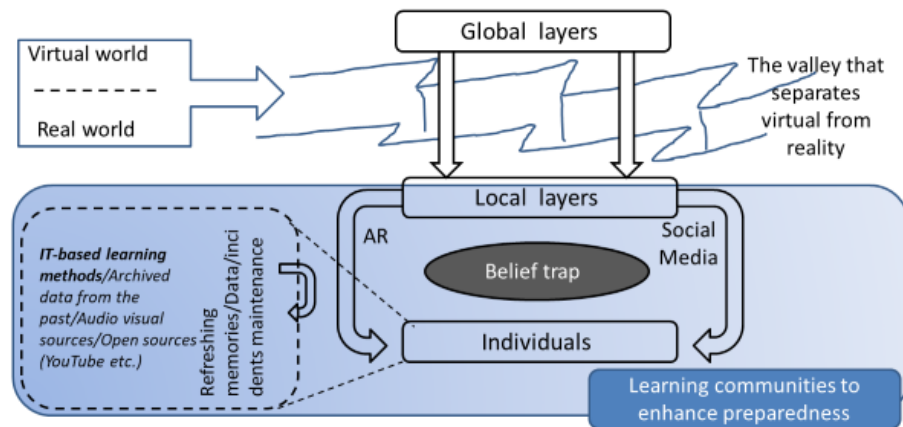
3. Interviews and findings
The qualitative method was applied to this study. Based on the semi-structured questionnaire, eight interviews were conducted including two from local councils which have implemented an e-learning system and citizens, both who have and haven't experienced the e-learning systems as a training activity for increasing preparedness for the occasions of tsunami (**Appendix A**).

The interviews were recorded and transcribed. The attained data was analysed using a text mining software NVivo 11 to develop key themes how to utilise and design to enhance learning outcome; a) impact of visualisation, b) continuity, c) pre- and post-activities, and d) collaboration with the local icons.

Moreover, it was also found that the local councils and the advisors have acknowledged that stand-alone community-based learning activities cannot maximise the impact of e-learning. They stated that it should be more helpful to share experiences and knowledge on a collaborative learning basis within a broader geographical area, collaborating with neighbor communities as mutual learning opportunities.

4. Discussion and conclusion
In the context of risk management of natural disasters, communities should be redesigned as 'learning organisations' with the enhanced usability and effectiveness of e-learning system to increase preparedness. A conceptual framework with key themes is proposed as **Appendix B**.

E-learning system in the communities to support citizens' preparedness for the natural disasters should be investigated with a different scope from that of the subjects taught at schools. It is critical to fill the psychological gap how to learn and embed the e-learning outcome in the real behavioural change which is required in the real disaster occasions. During the interviews, citizens mentioned the same statements *'After time passed, we forget what happened in reality. We maybe aim to forget the tragedies subconsciously.'* Japan is a country of natural disasters. E-learning system also can enhance the links of learning platforms to protect citizens within the region: e-learning systems can perform as an action learning platform to increasing collaborative preparedness towards natural disasters.

Appendix A: A list of participants (interviewees)

ID		
1	Local council (Area A: town of Kochi Prefecture)	
2	Local council (Area B: town of Fukui Prefecture)	
3	Citizen, e-learner (Area A)	
4	Citizen, e-learner (Area B)	
5	Citizen, not experienced e-learning (Area A)	
6	Citizen, not experienced e-learning (Area B)	
7	Advisor (disaster damage mitigation)	Professor of NITEC
8	Advisor (e-learning system and educational technology)	Researcher of Aoyama Gakuin University

Appendix B: A framework proposed from this study

A framework of the e-learning system in the context of increasing disaster preparedness
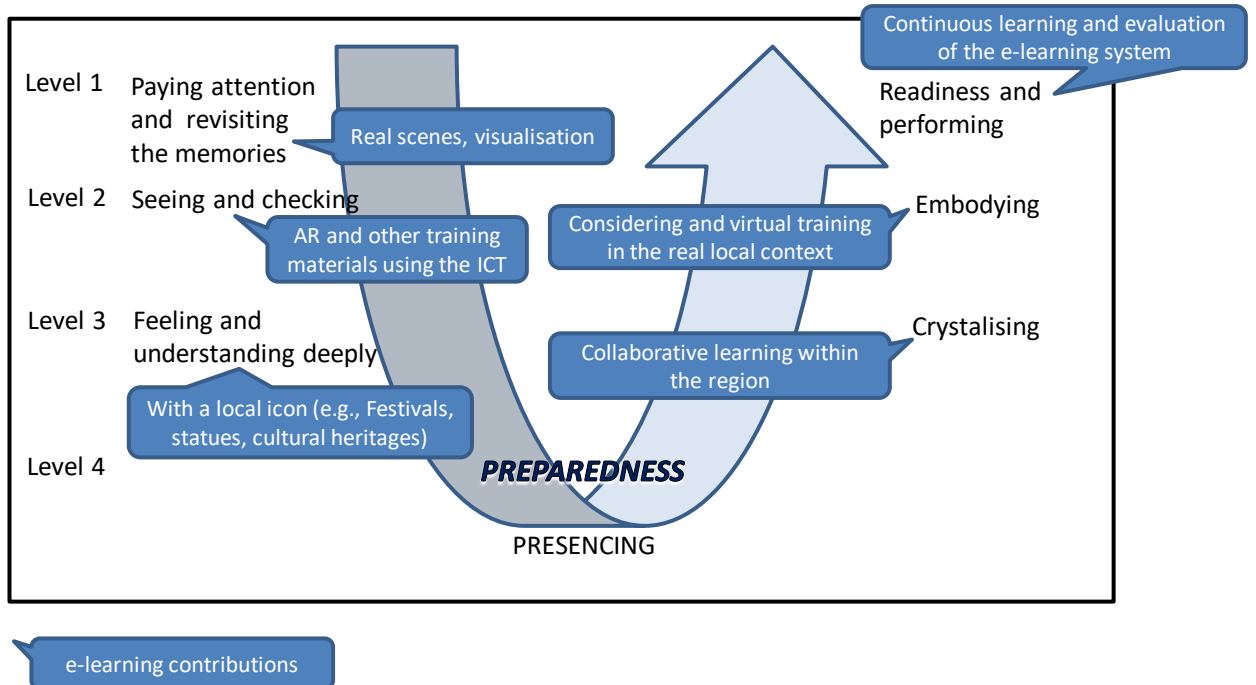
References

Hatayama, M., & Nakai, F. (2020). Using Computer Simulation for Effective Tsunami Risk Communication. In Disaster Risk Communication (pp. 39-50). Springer, Singapore.

Ono, S., & Kimura, M. (2019). For Gaming-Based Consensus Building: Problem Formulation of Snowfall Disaster Mitigation in a Japanese Rural Area. In Neo-Simulation and Gaming Toward Active Learning (pp. 365-373). Springer, Singapore.

Paton, D. (2019). Disaster risk reduction: Psychological perspectives on preparedness. Australian journal of psychology, 71(4), 327-341.

Sun, Y., Yamori, K., Tanisawa, R., & Kondo, S. (2013). Consciousness of disaster risk and tsunami evacuation: a questionnaire survey in Okitsu, Kochi Prefecture. Journal of Natural Disaster Science, 34(2), 127-141.

Sun, Y. (2020). New Approaches Toward Tsunami Risk Preparedness in Japan. In Disaster Risk Communication (pp. 17-38). Springer, Singapore.

Tsuneyoshi, R. (2019). Safety and Disaster Prevention Education as Education for Life. Tokkatsu: The Japanese Educational Model Of Holistic Education, 69.

*********Bio of the authors * * * * *

Dr Sachiyo Kawakami (sahi-k@u-fukui.ac.jp)

Sachiyo is currently a Post-doc researcher at Fukui University (2017-). She holds a doctoral degree (Doctor of Engineering, Department of Engineering, Nuclear and Energy Safety Engineering Graduate School, University of Fukui). She also used to work for the Institute of Nuclear Safety, Incorporated, Mihama-Cho, Fukui (2014-2017)

Dr Hiroko Oe (hoe@bournemouth.ac.uk)

Hiroko is a senior lecturer of marketing management at the Business School, Bournemouth University (2013-). She holds a doctoral degree (Doctor of Science in Civil Engineering and ICT from the Graduate School of International Telecommunications Studies, Waseda University). She also used to work for the Yokohama National University as a Professor of Management and Cabinet Office of Japan.

Dr Yasuyuki Yamaoka (yamaoka-y@ouj.ac.jp)

Yasuyuki is a post-doctoral researcher at the Open University of Japan (2015-). He holds a doctoral degree (PhD of Engineering, the Graduate School of Nagoya Institute of technology). He used to work for the I.B.M. Japan as a customer service specialist and also has been serving as a certified quality of management assessor in japan.

To Hooper-L@ulster.ac.uk
    margaret.ross@solent.ac.uk
    margaret.ross@bcs.ac.uk