Development of a multilingual educational platform for cross-nation real-time distant interaction in youth disaster preparedness between Indonesia and Japan

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Abstract. The increasing prevalence and cross-national nature of disasters means countries have much to learn from each other in terms of Disaster Risk Reduction (DRR). However, cross-nation mutual learning are often hindered by distance and language barriers. Japan and Indonesia, as countries with significant similarities and differences in terms of disaster profile, socioeconomic and cultural conditions, embody both the potentials and barriers for mutual learning. To help surmount these barriers, this paper describes the project plan to develop a multilingual educational platform for cross-nation, real-time distant interaction in youth disaster preparedness between Indonesia and Japan. The platform is designed for both mobile and web-based applications, with interfaces in Indonesian, English and Japanese to facilitate language barriers. The design consists of three main elements. First, an interactive assessment module is used to measure knowledge and preparedness. Second, a series of multimedia eLearning modules allow participants to increase their knowledge and capacity in DRR. Finally, a set of gamified educational materials is developed to allow an immersive and collaborative learning experience. To facilitate mutual learning across countries, this module includes an online multiplayer serious game where participants from different countries work together in various disaster simulation scenarios, utilizing skills they learnt from the eLearning modules. The use and implementation of this platform is hoped to increase local DRR capacities and awareness, grow networks of mutual learning among youth in Indonesia and Japan, and add to creative methods for DRR education. Evaluation will also increase knowledge regarding similarities, differences, and potential synergies in DRR across local and cross national levels in Indonesia and Japan.

1. Introduction: Mutual Learning in Youth Disaster Education
The increasingly global movement of people and cross border nature of disaster emphasizes the importance to study similarities, differences, potential synergies and gaps between DRR capabilities, education and effort within and across nations [1][2]. Prior studies have revealed differing cognitive and social biases that impacts disaster preparedness, response and recovery. Existing dynamics of local wisdom and cultural tradition potentially contributes to resilience towards disasters, but also potential biases that can hinder optimal response.

Mutual learning between countries can look beyond “level” of disaster preparedness to different aspects and types of preparedness and perceptions of it, including differing cognitive biases and
culture based obstacles, in order to develop mutual understanding and learning to anticipate these differences and biases.

The DRR education of children and youth is a key focal point that can sustainably increase communities resilience towards disasters and foster relationships and mutual learning across different places or countries. Prior studies have shown that children and youth can play a focal role in influencing their family and surrounding in disaster preparedness, reaction and recovery [1][3].

2. Literature Review: Mechanisms of Mutual Learning in Disaster Risk Reduction

There are multiple comparative cross-national studies on DRR education and the impact of socioeconomic or cultural differences to DRR [3][4][5]. However, most prior studies stop short of actual facilitating or direct interaction with relevant communities due to distance and language barriers. Some studies conducted physical exchange of people between countries, which can lead to a high level of immersion and understanding of each other, but they are limited to a small number of people and a short amount of time.

There has also been multiple serious games application as a tool for DRR education, such as the “Forecast-Based humanitarian decision” project funded by CKDN Action Lab Grant across Africa [6] and other settings with various emphasis including on immersion [7], emotions [8], or situated learning [9]. However, these games are generally conducted either face to face locally, or individually if online [10]. While these applications generate learning and immersion in the community and individual level, cross learning between different communities are only filtered through the lens of the game facilitators. More direct interaction between communities is hoped to bring better common understanding and mutual learning, as well as potentially reveal new insights for DRR in different areas.

3. Mutual Learning Potential for Youth and Children Disaster Education in Japan and Indonesia

The Sendai Framework is encouraging member states to empower multiple stakeholders especially youth, women, people with disability, elderly and indigenous people for better DRR. They might need special needs in disaster, therefore they can be the future leaders of community resilience.

In Japan, the general DRR education is integrated within school curricula. Meanwhile, in Indonesia, while there are national events and individual initiatives, there is not yet a routine explicit inclusion of DRR in the school curricula [11]. Some insertions are implicit within natural sciences subject, but in general only introduce passive knowledge regarding disasters. In both countries, community based DRR education efforts tend to be fragmented and do not necessarily communicate or exchange knowledge with one another.

Both Indonesia and Japan have high incidence of natural hazards, such as earthquakes, volcanoes and floods. Both countries also possess diverse sociocultural variance across the nation. Different areas in Indonesia and Japan also has different local wisdom adaptations due to exposure to past disasters. Finally, both countries have cultural/philosophical tradition that potentially contributes to both resilience towards disasters, but also potential biases that can hinder optimal response.

This co-presence of high disaster risk, with significant common ground and differences in socioeconomic dynamics and geographical contexts, make Indonesia and Japan ideal partners for mutual learning on DRR education. While there are significant differences in terms of climate, level of development, social norms and culture, it is important to share the common knowledge as well as understanding individual local context within and across the countries.

4. Initial Game Design

The plan for the design and implementation of the project consist of several stages. The first phase of the project consists of need and specification analysis to determine commonalities, gaps and
potential synergies between Indonesia’s and Japan’s schools disaster education, preparedness and risk preference profile. This will be done both in Japan and Indonesia through a combination of literature review, expert discussion and community engagement.

The result of both literature review and expert discussion would be used to design the game features and community engagement plan, as well as synthesize further steps from the community engagement result. For the initial stage, the community engagement plan would include not only traditional survey and focus groups, but also take the form of the components for adaptive serious games to give an immersive and more engaging experience, potentially inciting thought and action that may not be revealed in the preceding methods. This will then be continued with the development and initial testing/refinement of the games, education materials and platforms.

Figure 1. Design Process

Figure 1 highlights the use case flow of the Education Platform. The educational platform will consist of 1) a set of interactive questionnaire to assess individual and group preparedness profile, 2) a set of eLearning course materials aimed to increase basic knowledge and knowhow for disaster preparedness, response and recovery, and 3) online gamified educational materials for disaster preparedness, response and recovery. The platform would be complemented by a set of offline (books & games) for application in less internet-accessible settings. While the first version

The games would be customizable and consist of both bigger picture strategy/policy making games, which would promote understanding, and games centering on more actionable items such as home preparedness. The policy recommendation would include the developed toolkit and lessons learned from their initial implementation, with recommendations on how to incorporate them into existing and future programs

5. Conclusion: Future Implementation Plan
After the initial development process, we plan to implement the developed tools for interaction between schools and volunteers in Indonesia and Japan. Prior to the implementation project would be consulted with the Indonesia national Health Crisis Center for national validity in Indonesia, and accordingly with academic authorities in Japan.

The tentative areas for implementation in Indonesia would be the Aceh Province and West Java. Aceh was chosen as an area with recent large impact disaster, 2004 Indian Ocean Tsunami, and West Java was chosen as a high risk area with experiencing 2006 Pangandaran earthquake and tsunami. In Japan, initial implementation will be focused in the Tohoku area, as an area with recent large impact disaster, 2011 Great East Japan Earthquake.

We will conduct comparative trial, with control groups exposed to more traditional (lecture
based) disaster risk reduction education method, and assess both pre and post exposure to toolkits risk perception and DRR capacities, as well as sense of understanding and potential mutual learning with other countries on DRR.

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References
[1] Global Facility for Disaster Reduction Recovery, Indonesia - National Hazard Risk 2017, https://www.gfdrr.org/en/indonesia, accessed on 25 September 2019
[2] Institute for Environment and Human Security of United Nations University, World Risk Report 2016, (Berlin: Bündnis Entwicklung Hilft, 2016) pp 46-51
[3] Tanaka K. The impact of disaster education on public preparation and mitigation for earthquakes: a cross-country comparison between Fukui, Japan and the San Francisco Bay Area, California, USA. Applied Geography. 2005 Jul 1;25(3):201-25.
[4] Mohadjer S, Mutz S, Kemp M, Gill S, Ischuk A, Ehlers T. Paired teaching approach to earthquake Education: a cross - country comparison between Dushanbe, Tajikistan and London, United Kingdom. InEGU General Assembly Conference Abstracts 2020 May (p. 11230).
[5] Selby D, Kagawa F. Disaster risk reduction in school curricula: case studies from thirty countries. 2012
[6] Climate and Development Knowledge Network, Using games to experience climate risk – Empowering Africa’s decision - makers. Final report: CDKN Action Lab Innovation Grant, 2013
[7] Indika P, Dulani M, Indushree B, and Joydeep C Educating users for disaster management : An exploratory study on using immersive training for disaster management. 2013 IEEE Int. Conf. in MOOC, Innovation and Technology in Education (MITE). IEEE, 2013
[8] Donna D D, Patrick G X, Michael L B, Jonathan H W, Matthew R G and Stephen J V Preparing for The Aftermath: Using Emotional Agents in Game-Based Training for Disaster Response, IEEE Symp. on Computational Intelligence and Games, 2008.
[9] Samantha K Emergency Management Training For Schools Through Game Based Situated Learning (Master of Science in Technology & Learning, University of Dublin, 2013)
[10] Aleksandra S N, Piotr M, Margot C, Adam , Adriana K, Junko M, Wei L, Reinhard M, Michalina K and Lukasz J An overview of serious games for disaster risk management – Prospects and limitations for informing actions to arrest increasing risk. Int. J. of disaster risk reduction 31 (2018): pp 1013-1029
[11] Badan Nasional Penanggulangan Bencana, Rencana Nasional Penanggulangan Bencana 2015 - 2019, (Jakarta: Badan Nasional Penanggulangan Bencana, 2014) p 82