

Integration of Disaster Risk Reduction in the Curriculum of Philippine Educational Institution

Minda I. Cabilao-Valencia^{1,2}, Mohammad Ali¹, Enok Maryani¹, Nana Supriatna¹

¹Universitas Pendidikan Indonesia, ²Philippine Normal University

¹Bandung, Indonesia, ²Manila, Philippines

valencia.mc@pnu.edu.ph, emaa.laith@upi.edu

Abstract—Filipinos regularly experience the brunt of hazards and are trapped in a never-ending cycle of disaster, displacement and rebuilding. The schools are certainly relevant in the discourse and practice of disaster risk reduction (DRR). This study examined the various efforts in integrating DRR in the curriculum among educational institutions in the Philippines. Based on the literature review and interview with DRR experts, the following contents emerged: overview of DRR, and initiatives of Philippine schools in mainstreaming DRR in the curriculum of basic and tertiary levels. Findings show that efforts on DRR implementation in Philippine schools is bolstered with the passage of international and national laws on DRR. The subject matter is also invariably integrated in the curriculum at the basic and tertiary levels. It is recommended that DRR should be offered as a mandatory subject for all learners in the schools, basic education teachers and teacher educators should be capacitated to handle DRR subject, accurate and updated resource materials should be used, and an interdisciplinary approach or knowledge from both physical/natural sciences and social sciences be adopted in analyzing natural disasters. It is hoped that this study will highlight the crucial role of educational institutions in building a culture of safety.

Keywords—disaster risk reduction; curriculum

I. INTRODUCTION

The frequency and intensity of natural hazards has become a recurring phenomenon worldwide. Based on the data from the United Nations Office for Disaster Risk Reduction [1], in 2011 alone, there were 302 hazards which resulted in disasters that claimed almost 30,000 lives, affected 206 million people and inflicted damages worth an estimated US\$366 billion. Experts attribute this calamity to climate change or global warming. The effects of these hazards are disastrous and have changed people's lives especially those in developing economies such as the Philippines.

The Philippines is susceptible to geological and hydro meteorological hazards because of its location on a hazardous spot on this planet. It is situated within the western rim of the Pacific Ring of Fire which is the world's hub of volcanic network and tectonic plates, and the Western Pacific Typhoon Belt where of the world's destructive typhoons originate. It is not surprising that the Philippines is ranked second out of 173 countries, after Vanuatu and Tonga, in terms of vulnerability to disaster risks and natural hazards [2].

The costs are staggering. According to the Asian Development Bank, losses from typhoons and earthquakes amount to USD1.6 billion a year [3]. The World Bank also reports that the annual typhoons shave 0.8 percentage off the Philippines' annual GDP growth [3]. In addition, the toll in terms of loss of human lives cannot be under-emphasized. These hazards and disasters have caused overwhelming damage to the economy and devastating loss of life. In 1990, a powerful 7.8 magnitude earthquake hit Northern and Central Luzon killing more than 2,000 people. The following year, a 600 year-dormant Mount Pinatubo erupted several times causing serious damages again in Central Luzon.

Tropical cyclones, particularly typhoons, and the sequential effects of rain, floods and landslides are the most prevalent types of hydro meteorological hazards in the country. An average of 20 typhoons annually enter the Philippine territory, five of which are destructive. In 2009, typhoon Ondoy (international name Ketsana) brought torrential rain and caused flooding in Metro Manila and was responsible for hundreds of death and damages amounting to more than PhP10 billion.

The Philippines also endured in 2013 typhoon Yolanda (international name Haiyan), one of the world's strongest typhoons. The super typhoon killed more than 6,000 people, displaced thousands of residents in central Philippines, and destroyed some 4,000 schools. The Kinetic Analysis Corp, a US-based hazard-research company, estimates that total losses after typhoon Yolanda amount to between US\$12 and US\$15 billion or about five percent of economic output [3]. Recently, super typhoon Ompong (international name Mangkhut) slammed the northern tip of the Philippines. Mangkhut was the strongest typhoon on the planet in 2018, bringing ferocious gale-force winds of more than 200 kph, and pounding rains in the Philippines before slamming into Hong Kong and Macau. The typhoon caused flooding and massive landslides, and left almost 100 people dead in the Philippines.

These hazards are remarkable with the massive destruction effected in the country's environment, economy, livelihood, and lives. In all likelihood, children are the most affected, schooling systems are disrupted, therefore affecting the fundamental right of children to education [1,4]. The schools are always affected since massive flooding and strong typhoons destroy school buildings or blow away classroom roofs thereby disrupting students' classes and compromising future opportunities.

For a disaster-prone country like the Philippines, it is therefore imperative to raise awareness and increase knowledge about the environment and its problems such as natural hazards and disasters. The educational institution is one of the strategic launch pads for training and preparing young people and teachers for disaster risk reduction (DRR). Education is crucial because it provides students and teachers the opportunity to acquire and learn new knowledge, skills, attitudes, and values they need to develop, survive and thrive in any environmental challenges such as natural disasters. It is undeniable that the schools are relevant in DRR discourse and practice.

A. Related Studies on Disaster Risk Reduction and Various Disciplines

The literature on DRR came from the field of DRR itself, especially its practitioners [5-9]. Special focus is on the organizational structure of DRR management (DRRM) to expedite the implementation of DRR programs and policies. In terms of determining DRR competencies in various academic disciplines, there has been much interest in integrating such competencies in the field of nursing [10-16]. This is due to the practical application of DRR competencies in dealing with emergency situations such as natural disasters. The same is true with other disaster responders such as those in the medical field, in mental health and in social work [17-19]. It is noticeable that such DRR competencies are not part of the undergraduate curricula in most schools [20-23].

There are also studies that stress the establishment of accreditation policies and standards as to what constitutes a genuine DRR education or training, especially in higher education [24-27]. Some scholars and institutions have also looked into the integration of DRR competencies in other countries [1,28-33].

For this study, the focus is on the numerous efforts to integrate DRR in the curriculum of educational institutions in the Philippines. Based on the literature and interview with experts, the following contents emerged: overview of DRR, and initiatives of Philippine schools in mainstreaming DRR in the curriculum of basic and tertiary levels.

II. METHODOLOGY

A. Research Design/Method

Using a qualitative content analysis, this study examined the various initiatives to integrate DRR in the curriculum of Philippine educational institutions. Most of the data from this study were obtained through a review of DRR literature. The latter consisted of DRR laws and executive orders enacted by international organizations and the Philippine government, department orders and memoranda passed by education agencies, reports from concerned agencies, and related studies. Data from the literature were enhanced and validated from interviews with concerned faculty members, and experts on education, DRR and social development.

B. Research Participants

The research participants were chosen based on their expertise as educators and years of experience as implementer of DRR policies. Interviews were conducted with two (2) faculty members from Philippine Normal University, two (2) basic education teachers, and two (2) DRR experts from the Philippine weather and climate agencies.

C. Data Analysis

The data on DRR integration in the curriculum in the Philippines were examined using content analysis. Data analysis simultaneously took place as early as during the process of obtaining the data. In the analysis, not all information provided by the informants or the reviewed literature were included in the discussion. The data were winnowed and organized in such a way that the research question was answered. Analysis was focused on the content or topics that emerged which were later organized into various categories. In this case, all information pertaining to DRR integration in basic and tertiary education levels in the Philippines were considered.

III. RESULTS AND DISCUSSION

Based on the literature and interviews, the recurring contents that emerged are as follows: overview of DRR which includes the basic DRR concepts and international instruments; and initiatives of Philippine education institutions in DRR integration in the curriculum of basic and tertiary levels.

A. Overview of Disaster Risk Reduction

While hazards and disasters are used interchangeably, a hazard is a precursor to a disaster. Republic Act No. 10121 [34] or the Philippine Disaster Risk Reduction and Management (DRRM) Act of 2010 defines hazard as a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihood and services, social and economic disruption, or environmental damage. Disaster normally occurs unexpectedly after a hazard. As described by the United Nations International Strategy for Disaster Reduction (UNISDR) [35], disaster pertains to “a serious disruption of the functioning of a society, causing widespread human, material, or environmental losses which exceed the ability of the affected society to cope on its own resources.” There are instances, however, when a hazard happens in a sparsely populated area and is not considered a disaster if it does not pose as a threat to humanity.

While the occurrence of natural hazards is inevitable, there are ways to prevent or reduce their deleterious effects. One mitigating measure is through the involvement of educational institutions in the entire agenda of DRR.

According to the UNISDR, DRR pertains to “the concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse

events.” In short, it is a systematic approach to identifying, assessing and reducing the risk during a disaster [35].

DRR is also concerned with areas such as disaster management, disaster mitigation, disaster preparedness, and sustainable development. Natural disasters certainly affect development. As such, for gains and process development to be sustainable, policies and programs from all sectors, including the educational institutions must espouse DRR management.

The crucial role of education as a decisive component in realizing DRR has been highlighted with the United Nations’ (UN) adoption of the Hyogo Framework for Action (HFA) 2005-2015: *Building the Resilience of Nations and Communities to Disasters* at the World Conference on Disaster in Kobe, Japan in 2005 [36,37]. Generally, the HFA is a joint framework for actions on DRR by various nations. Noteworthy is Priority Action 3 of HFA which highlights the “use of knowledge, innovation, and education to build a culture of safety and resilience at all levels” [37].

Building on the HFA, the Sendai Framework for Disaster Risk Reduction 2015-2030 was adopted at the Third UN World Conference on DRR in Sendai, Miyagi, Japan in March 2015 [38,39]. The Framework specifically states the need to mainstream and integrate DRR within and across all sectors and that the “academia, scientific and research entities and networks to focus on the disaster risk factors and scenarios, including emerging disaster risks,... increase research for regional, national and local application...” [38]. It is therefore imperative for concerned institutions to enhance the scientific and technical work or evidence based on DRR.

Both the HFA and the Sendai Agreement uphold that education and training are priority activities and strategies for DRR [36-38]. The management of effective DRR is essential in achieving sustainable development and can only be done with the cooperation of all sectors including the educational institutions. The latter certainly plays a crucial role in implementing a DRR education program which will not only benefit the students and teachers but also the community.

B. Disaster Risk Reduction in Philippine Education Institutions

In line with the international mandates on DRR and the frequent disaster occurrences, the Philippine government has crafted its own policies. In fact, long before the adoption of the Hyogo and Sendai Frameworks, the government has enacted a plan to prevent or mitigate the adverse impact of disasters in the country. In 1941, Executive Order (EO) No. 335 was passed creating the National Emergency Commission (NEC) and implementing measures to control and coordinate civilian participation during crises [40]. Since then, various legislations on disaster management have been enacted. Notable was the passage of Presidential Decree (PD) 1566 in 1978 establishing the National Disaster Coordinating Council (NDCC) as the highest policy-making body and the focal organization for disaster management in the country. This law set up the disaster coordinating councils at the regional, provincial, city, municipal and *barangay* levels. *Barangay* is the smallest administrative division in the Philippines.

In 2010, the government signed Executive Order No. 888 [41] or Strengthening Disaster Risk Reduction in the Philippines: Strategic National Action Plan (SNAP) 2009 – 2019). The SNAP functions as the roadmap, denoting the country's vision and strategic objectives with regard to DRR in the next 10 years. This document has been instrumental for the integration of DRR education in the school curricula for both secondary and tertiary levels, including the National Service Training Program (NSTP) comprising private or public, formal and non-formal, technical-vocational, indigenous learning and out-of-school youth courses and programs.

Moreover, the government has enacted Republic Act No. 9729 [42] or the Climate Change Act of 2009, and Republic Act No. 10121 [34] or the Philippine (DRRM) Act of 2010. The latter institutionalizes the National DRRM Plan and Framework which serves as guide in implementing various efforts on DRRM in the country. DRRM Act has also all the more bolstered the integration of DRR education in the school curricula of basic and tertiary levels.

1) Disaster risk reduction at the basic education level: The Philippine Department of Education (DepEd), the agency in charge of basic education, has issued memoranda and department orders to implement the international and national laws on DRR, and to prepare its stakeholders and the community with competencies and right mindset about DRR. In 2007, the DepEd [43] passed Department Order No. 55, entitled “Prioritizing the Mainstreaming of Disaster Risk Reduction Management in the School System and Implementation of Programs and Projects Relative Therefor.” This report mandates the development of modules, lesson exemplars and materials on DRR and climate change for use at the basic education level. This policy is supplemented by DepEd Memorandum No. 175 that pushes for the “Creation of a Technical Working Group (TWG) on the Preparation of DepEd Calamity, Disaster, and Risk Management and Control Operations Manual” [44].

In 2008, the DepEd’s TWG published the Risk Reduction Resource Manual, which is a broad compilation of DRR information from various experts. The document contain information on the nature of hazards and disasters, the Philippines’ risk profile, the Philippine disaster risk management system, and the mechanisms for disaster monitoring and evaluation. Also in 2008, DepEd [45] released Memorandum No. 297, entitled “Utilization of the Disaster Risk Reduction and Resource Manual in the School System Effective SY 2008-2009.” The said policies are consistent with the HFA goals to build disaster-resilient schools, nations and communities, and ease disaster losses.

In 2013, the DepEd dispatched a document titled, “Reiterating School Disaster Risk Reduction Measures,” highlighting its obligation to institutionalize DRR practices in the schools by citing the policy direction of RA 1012 [46]. To further strengthen its policies on DRR, DepEd issued Department Order No. 37 which presents a “Comprehensive Disaster Risk Reduction and Management (DRRM) in Basic Education Framework.” This framework provides a more all-

encompassing and organized DRR programs and activities than those done in the past [47].

The Philippines' strategy of DRR mainstreaming is competency-based or that there is a given list of competencies determined by the school curriculum committee [1]. The latter would first identify the DRR core messages, then develop the key concepts, and the modules. The curriculum committee would then decide the hazards which should be included in the content and finally, develop the exemplars. These are taught with the aid of teaching and learning support materials.

Prior to the approval of the K to 12 Basic Education Curriculum in 2013, the DRR components were incorporated in both the natural sciences and social studies in Grade 7. For elementary and high school students, DRR education was not a separate subject but only a component of subjects such as science and technology and social studies.

With the adoption of the K to 12 curriculums, DepEd has offered DRR as one of the topics in "Araling Panlipunan" or Social Studies in Grade 10. In the curriculum of senior high school or Grades 11 and 12, DRR education is also integrated in "Earth and Life Science" which is a core subject to all academic tracks. In the science track, however, DRR is taught as a single subject in senior high school. This core course, "Disaster Readiness and Risk Reduction Education (DRRRE)", aims to educate students about hazards and disasters, the principles and importance of DRR, and community-based practices for managing disaster risks [48].

Noteworthy is that DRR in Grade 10 is handled by social studies teachers while DRR in Grades 11 and 12 is taught mostly by science teachers. It was reported that sometimes the subject is taught by whoever is available to teach the subject matter. The issue is if the concerned teachers have the academic preparation and competencies to discuss DRR. It is thus recommended that DRR teachers be capacitated by undergoing continuous in-service trainings.

The foregoing also shows that DRR is invariably integrated at the basic education level. Since the DRR topic is merely integrated in the course offerings, a comprehensive discussion might be wanting. In addition, much of DRR discussion are at the secondary level, particularly those under the science strand. A recent study about the impact of disaster education among Grade 11 students in selected schools in Metro Manila reveal that they have high levels of disaster-related knowledge, preparedness and readiness, adaptation, and awareness but low level of disaster risk perception [49]. It was surmised that this could be due to the effect of the integration of disaster education in the senior high school science curriculum. As such, there should be a move to make the DRR subject mandatory not only for those in the science track but for all academic strands such as those taking up Humanities and Social Sciences (HUMSS) and Accounting and Business Management (ABM), among others. This is to ensure that all high school students are capacitated on DRR and would respond appropriately when disaster strikes. Related to this is that learners should be provided with accurate, adequate and updated resource materials about the subject matter.

2) *Disaster risk reduction at the tertiary level:* The frequency of disasters has actually resulted in the strengthening of the country's DRR and management system. Republic Act No. 9163 [50] or the National Service Training Program (NSTP) Act of 2001 calls for efficient, resilient, and responsive volunteer citizens, who are prepared to help the country and its constituents to reduce or prevent disaster risks. The law provides that all tertiary students will take up NSTP as an academic subject. One of the areas in the NSTP course outline is DRR. Through the NSTP, all students in the tertiary level are thus provided with vital information about disaster, and acquire the necessary skills on DRR.

In the case of the Philippine Normal University (PNU), a teacher education institution (TEI), "Disaster Risk Reduction and Management" is being offered as one of the elective courses in the Outcomes-Based Teacher Education Curriculum. The PNU's Faculty of Science, Technology and Mathematics (FSTEM) handles the subject. The core competence of science teachers is heavily theoretical rather than the solution of practical problems during disasters.

The PNU's FSTEM also currently offers a "Certificate Program in Teaching Disaster Management" (CPTDM). The customized program aims to equip disaster volunteers, trainers, coordinators, and teachers with content and pedagogical knowledge in teaching disaster management. One group of identified target clientele are teachers from various disciplines (e.g. Physical Education, Health, and Biology). Noteworthy is that teachers from the social sciences are not included in the target clientele [51].

With regard to social science subjects in PNU, DRR is discussed as just one of the issues in geography subjects. However, there is no single subject devoted to a comprehensive discussion of DRR.

Other universities such as the Ateneo de Manila University offers a master's degree program on Disaster Risk and Resilience (MDRR). The program, which is handled by the Departments of Environmental Science, and Sociology and Anthropology, aims to train experts to manage and implement DRR concerns in local and global arena. Aside from the theories and concepts, the MDDR provides innovative and practical learning opportunities for students.

The above-mentioned shows that at the tertiary level, DRR discussion is merely one of the many areas examined under the NSTP. There might not be enough time to extensively discuss DRR. Unless one is enrolled in a specialization course on DRR, not everybody has the chance to have a holistic grasp about the subject. There should thus be a mandatory DRR subject or course, which should be taken up by all students at the tertiary level.

In the case of TEIs, which train future teachers in the basic education level, there should be a DRR subject which will be required for all pre-service teachers. As explained by Luna [52], all would be teachers should be familiar with DRR and have the capability to teach elementary and high school students. Hence, all teacher educators should also be capacitated and equipped to teach DRR.

Moreover, the approach in teaching DRR subject should be interdisciplinary and involve specialists both from the physical/natural and social sciences. Since disasters ultimately affect the people, DRR topics in the academe must ensure that both the natural and social aspects of disasters are taken into consideration. The issue about disaster is traditionally handled by the physical and natural sciences when in reality people are the most affected after a disaster. It is a known fact that understanding the scientific facet of a hazard and the resulting disaster cannot be underemphasized. However, equally important is a discussion of those who will certainly bear the brunt of these disasters. Understanding the behavior of people before, during, and after a disaster should thus be part of disaster management and this requires the expertise of the social sciences. Knowledge from both the physical/natural sciences and social sciences is thus crucial in addressing the attendant problems of natural disasters.

IV. CONCLUSION

The Philippines' susceptibility to natural events results in high level of risks. Various international and national initiatives on DRR have all the more bolstered the different institutions' resolve to address the effects of these natural vulnerabilities. All sectors, including the educational institution, have done their part in raising and enhancing awareness among the academic community and its stakeholders about the significance of DRR. Through the integration of DRR into the curriculum, the education institution becomes a venue to prepare its stakeholders from a perspective of strengthening of values, citizenship, and social sensibility.

Schools prevent or mitigate disaster risks and strengthen the capacities of learners and other vulnerable groups and communities to respond accordingly. In a way, education becomes a mechanism to equip and prepare learners to become reliable and responsive citizens. As the school takes action to manage disaster risks, it contributes to the development of a culture of safety. As learners begin to appreciate their importance in mitigating disaster risks and ensuring the safety of others, they all the more acquire a sense of integrity, responsibility and nationalism.

REFERENCES

- [1] D. Selby and F. Kagawa, *Disaster Risk Reduction in School Curricula: Case Studies from Thirty Countries*, Paris: UNESCO, 2012.
- [2] World Risk Report, "Analysis and prospects" Bündnis Entwicklung Hilft." 2017. [Online]. Retrieved from: <http://www.welthungerhilfe.de/en/about-us/media-centre/artikel/mediathek/worldriskreport-2017.html>, accessed on 19 July 2018.
- [3] A. Tsang and L. Frey, "The Economic cost of typhoon Haiyan," *Financial Times*. The Financial Times Limited." 2013. [Online], Retrieved from: <http://www.ft.com/>, accessed on 12 June 2018.
- [4] P. Berse, "The Mainstreaming of disaster education in school systems," 2015. [Online]. Retrieved from: ateneo.edu/news/research/mainstreaming-disaster-education-school, accessed on 26 May 2018.
- [5] D.E. Alexander, "Resilience and disaster risk reduction: an etymological journey," *Natural Hazards and Earth System Sciences*, vol.13, 2013.
- [6] T. Seneviratne, R. Amaratunga, R. Haigh, and C. Pathirage, "Knowledge management for disaster

resilience: Identification of key success factors," 2010. Retrieved from: <https://usir.salford.ac.uk/9759/>, accessed on 20 June 2018.

- [7] NDRRMP, "National Disaster Risk Reduction and Management Plan (NDRRMP) 2011-2028," Manila, 2011, unpublished.
- [8] NDRRMC and OCD, "Disaster preparedness guidebook," National Disaster Risk Reduction and Management (NDRRMC) and Office of Civil Defense (OCD), Quezon City, n.d., unpublished.
- [9] T. Pathranarakul, "An integrated approach to natural disaster management," *Disaster Prevention and Management: An International Journal*, vol. 15, pp. 396 – 413, 2006.
- [10] A.Putra, S. Kep, W. Petpichetchian, and K. Maneewat, "Public health nurses' roles and competencies in disaster management," *Nurse Media Journal of Nursing*, vol. 1, pp. 1-14, January 2011.
- [11] M. Alharbi, "Competencies, scope of practice in disaster," *International Journal of Science and Research (IJSR)*, vol. 4, November 2015.
- [12] F. Abdelalim and A. Ibrahim, "Nurses knowledge, attitudes, practices and familiarity regarding disaster and emergency preparedness – Saudi Arabia," *American Journal of Nursing Science*. vol. 3, no. 2, pp. 18-25, 2014.
- [13] A. Loke and O. Fung, "Nurses' competencies in disaster nursing: Implications for curriculum development and public health," *International Journal of Environmental Research and Public Health*, vol. 11, 2014.
- [14] G. Diab and S. Mabrouk G. Diab and S. Mabrouk, "The effect of guidance booklet on knowledge and attitudes of nurses regarding disaster preparedness at hospitals," *Journal of Nursing Education and Practice*, vol. 5, no. 9, 2015.
- [15] P. Menegat and R. Witt, "Primary health care nurses' competencies in rural disasters caused by floods," *Rural and Remote Health*, vol. 18, pp. 44-50, 2018.
- [16] K. Natareno, "Disaster knowledge and awareness of nurses related to triage in mass casualty incidents," 2018. [Online]. Retrieved from: <https://digitalcommons.ric.edu/etd/268>, accessed on 20 June 2018.
- [17] K. Maripe and R. Sinkamba, "Social work education and disaster risk reduction in Botswana," *International Journal of Multidisciplinary Academic Research*, vol. 2, no. 2, 2014.
- [18] A.Galappatti and S. Richardson, "Linking mental health and psychosocial support and disaster risk reduction: applying a wellbeing lens to disaster risk reduction," *Intervention*, vol. 14, no. 3, pp. 223 – 231, 2016.
- [19] J. Swathi, P. González, and R. Delgado, "Disaster management and primary health care: implications for medical education," *International Journal of Medical Education*, 2017.
- [20] K. Gebbie and K. Qureshi, "Emergency and disaster preparedness: Core competencies for nurses: What every nurse should but may not know," *The American Journal of Nursing*, vol. 102, issue 1, pp. 46-51, 2002.
- [21] L. Healy, "Incorporating disaster content in the curriculum," 2009. Retrieved from: <http://www.iassw-aiets.org>, accessed on 24 July 2018.
- [22] S. Chan, "Development and evaluation of an undergraduate training course for developing international council of nurses disaster nursing competencies in China," 2010. [Online]. Retrieved from: <https://doi:10.1111/j.1547-5069.2010.01363>, accessed on 24 July 2018.
- [23] G. Ng, "Disaster work in China: Tasks and competences for social workers," *Social Work Education*, vol. 31, no. 5, 2012.
- [24] M. Thayaparan, M. Siriwardena, C.I. Malalgoda, D. Amaratunga, i. Lill, and A. Kaklauskas, "Enhancing post-disaster reconstruction capacity through lifelong learning in higher education," *Disaster Prevention and Management*, vol. 24, issue 3, pp.338-354, 2015.
- [25] L. Boshier, K. Chmutina, and J. Von Meding, "Disaster risk reduction as a professional competency. A review of related training and education provision for built environment practitioners in the UK and Australia," *International Conference on Building Resilience*, Auckland, New Zealand, 7-9 September 2016.
- [26] S.L. Hemstock, L.A. Buliruarua, E.Y. Chan, G. Chan, D. Combes, H. Jacot, and T. Hatch, "Accredited qualifications for capacity development in disaster risk reduction and climate change adaptation," *Australasian Journal of Disaster and Trauma Studies*, vol. 20, no. 1, 2016.

- [27] M. Rumsewicz, "Teaching emergency and disaster management in Australia: Standards for higher education providers," Australian Journal of Emergency Management, Monograph No. 1, July 2017.
- [28] M. Petal and Y. Izadkhah, "Concept note: Formal and informal education for disaster risk reduction," International Conference on School Safety, Islamabad, May 2008.
- [29] UNESCO and UNICEF, "Towards a learning culture of safety and resilience technical guidance for integrating disaster risk reduction in the school curriculum," Paris: UNESCO and UNICEF, 2009.
- [30] D. Alrazeeni, "Saudi EMS students' perception of and attitudes toward their preparedness for disaster management," Journal of Education and Practice, vol. 6, no. 35, 2015.
- [31] M. Villasana, B. Cárdenas, M. Adriaenséns, A.C. Treviño, and J. Lozano, "Mainstreaming disaster risk management in higher education," Ad-Minister, no. 28, pp. 243-253, Jan-June 2016.
- [32] Myanmar MoE and MSWRR, "Guidance on mainstreaming disaster risk reduction in the education sector. Myanmar – Rural Settings," Ministry of Education (MoE) and Ministry of Social Welfare, Relief and Resettlement (MSWRR) of Myanmar, n.d., unpublished.
- [33] E. Haulle and W. Rugumamu, "Linking school environment to geo disaster risk reduction for sustainable development in Tanzania," International Journal of Humanities and Social Science Education, vol. 2, pp. 91-98, 2015.
- [34] Republic Act No. 10121, "Philippine Disaster Risk Reduction and Management Act of 2010," 2010. [Online]. Retrieved from: https://aboutphilippines.org/files/PRB-M1-RA_10121.pdf, accessed on 20 May 2018.
- [35] UNISDR, "UNISDR terminology and disaster risk reduction," 2009. [Online]. Retrieved from: <https://www.unisdr.org/we/inform/publications/7817>, accessed on 20 May 2018.
- [36] UN, "Hyogo Framework for Action 2005–2015: Building the Resilience of Nations and Communities to Disasters," 2005. [Online]. Retrieved from: <https://www.unisdr.org/we/coordinate/hfa>, accessed on 21 May 2018.
- [37] UNISDR, "Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters," 2005. [Online]. Retrieved from: <http://www.unisdr.org/we/coordinate/hfa>, Accessed on 25 July 2018.
- [38] UN, "Sendai Framework for Disaster Risk Reduction 2015-2030," 2015. [Online]. Retrieved from: http://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf, accessed on 25 July 2018.
- [39] UNISDR, "Sendai Framework for Disaster Risk Reduction 2015-2030" Geneva, 2015. [Online]. Retrieved from: http://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf, accessed on 24 July 2018.
- [40] Commission on Audit (COA), "Disaster management practices in the Philippines: An assessment," n.d. [Online]. https://www.coa.gov.ph/disaster_audit/doc/National.pdf, accessed on 10 May 2018.
- [41] Executive Order No. 888, "Strengthening Disaster Risk Reduction in the Philippines: Strategic National Action Plan (SNAP) 2009 – 2019," 2010. [Online]. Retrieved from: <https://www.officialgazette.gov.ph/.../executive-order-no-888-s-2010>, accessed on 22 May 2018.
- [42] Republic Act No. 9729, "Climate Change Act of 2009," 2009. [Online]. Retrieved from: https://www.lawphil.net/statutes/repacts/ra2009/ra_9729_2009.html, accessed on 25 May 2018.
- [43] Department of Education, Department Order No. 55: "Prioritizing the Mainstreaming of Disaster Risk Reduction Management in the School and Implementation of Programs and Projects Relative Therefore," 2007a, unpublished.
- [44] Department of Education, Memorandum No. 175: "Creation of a Technical Working Group (TWG) on the Preparation of DepED Calamity, Disaster, and Risk Management and Control Operations Manual," 2007b, unpublished.
- [45] Department of Education, Memorandum No. 297: "Utilization of the Disaster Risk Reduction and Resource Manual in the School System Effective SY 2008-2009," 2008, unpublished.
- [46] Department of Education, Memorandum: "Reiterating School Disaster Risk Reduction Measures," 2013, unpublished.
- [47] Department of Education, Department Order No. 37: "Comprehensive Disaster Risk Reduction and Management (DRRM) in Basic Education Framework," 2015, unpublished.
- [48] Department of Education, "K to 12 Basic Education Curriculum: Senior High School –Core Subject," 2017, unpublished.
- [49] M.A. Mamon and R.A. Suba and I. Son Jr., "Disaster risk reduction knowledge of Grade 11 students: Impact of senior high school disaster education in the Philippines," International Journal of Health System and Disaster Management, vol. 5, pp. 69-74, 2017.
- [50] Republic Act (RA) No. 9163, "An Act Establishing the National Service Training Program (NSTP) for Tertiary Level Students," 2001.
- [51] Philippine Normal University (PNU) Faculty of Science, Technology and Mathematics (FSTEM), "Certificate Program in Teaching Disaster Management (CPTDM)," PNU Manila. 2017, unpublished.
- [52] E. Luna, "Mainstreaming of disaster risk reduction in the education sector in the Philippines," 2008. [Online]. Retrieved from: https://www.preventionweb.net/files/8196_Philippines.pdf, accessed on 20 May 2018.