



VALIDATION AND UTILIZATION OF THE CONTEXTUALIZED DISASTER READINESS AND RISK REDUCTION (DRRR) MODULES

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ABSTRACT

The Philippines suffers from a multitude of deadly natural disasters because it is located along the Pacific Ring of Fire. Basic education advocates environmental awareness at all levels which cover learners' understanding and sensitivity to the environment and environmental challenges. The study focused on how DRRR modules were validated by experts and how teachers were able to successfully implement them in their classrooms. The research was descriptive involving both qualitative and quantitative analyses. The triangulation technique was employed which utilized the evaluation tool for the modules, interview, and observations. Quantitative data were analyzed with descriptive statistics and qualitative data were coded. This involved five (5) panel experts and 47 secondary school teacher-users. Results revealed that: (1) the contextualized DRRR modules provided very adequately for content and content accuracy, clarity, and appropriateness as evaluated by the experts. The teacher-users evaluated it as very much acceptable, applicable, and useful; (2) the major themes in terms of clarity, activities and content accuracy of the modules included comprehensible vocabulary; contextualized topics/indigenized materials; informative and student-centered activities. Moreover, in terms of its usefulness, the major themes encompassed disaster preparedness; learning insights/values integration and maximizes students' participation; (3) the predominant themes to improve the modules included the visual considerations; accessibility of materials and enhancement of the concepts and topics. Hence, this investigation explains that the contextualized DRR modules are valid, reliable, acceptable, applicable, accurate and useful as revealed from the data and major themes. Thus, there is a need for all the teachers to utilize the modules across all levels for the learners to become aware and ready during disasters thereby reducing the risk and severe impact of disasters.

Keywords: validation, utilization, DRRR, modules

INTRODUCTION

Today, there is a great need for environmental literacy among learners as it serves as a meaningful and relevant at all levels to become engaged in real-world issues. Viewing environmental issues to the world and that teenage people who are interested in exploring the area can acquire the skills they would need to be creative problem solvers and powerful advocates of saving the environment.

According to the Annual Disaster Statistical Review (2016), the number of natural disasters worldwide in 2015 was 376, with 330 being natural disasters in 2014. These natural disasters resulted in 22,765 deaths and 110.3 million casualties worldwide with estimated economic losses at US\$ 70.3 billion. Over the past decade, China, the USA, India, the Philippines, and Indonesia have accounted for the top five greatest concentrations of natural disasters in nations.

P – ISSN 2651 - 7701 | E – ISSN 2651 – 771X | www.ioer-imrj.com

LOQUILLANO, J.T., POTANE, J.D., MERCADO, L.L., *Validation and Utilization of the Contextualized Disaster Readiness and Risk Reduction (DRRM) Modules*, pp. 89 - 98



In the Philippines, there is an average of 100 to 200 earthquakes per year due to its position on two large tectonic plates. The country is vulnerable to frequent hazards such as typhoons, storm surges, earthquakes, volcanic eruptions, floods, and landslides. Typhoon flooding happens regularly in the country's 7000 islands. Large-scale disasters like Typhoon Ondoy in 2009 and Typhoon Sendong in 2011 have their impacts magnified by the rapid growth and unsustainable construction practices (Montejo, 2015).

According to the National Disaster Risk Reduction and Management Council (NDRRMC), the death toll due to Yolanda has reached 6,300 and the number of injured stood at 28,689, and 1,061 people are still unaccounted for. NDRRMC reports that the cumulative losses will total 39.8 billion pesos, with 20 billion pesos in infrastructure and 20.2 billion pesos in agriculture.

With pressing problems, there is a need to create scientific-based and contextualized interventions to reduce and minimize the effect of disasters. The United Nations report (2015) claimed that coping with risks, whether natural or due to human behavior, is one of the biggest challenges of our times. Earthquakes and typhoons cannot be avoided. But scientific experience and technological know-how can mitigate human misery and losses to natural and built environments. Disasters can be both avoided and minimized if the appropriate technologies are used. It is on the above premise that this study is conceptualized to create, provide an evidence-based tool, utilize and gauge the effectiveness of a crafted scientific knowledge intervention known as Disaster Readiness and Risk Reduction (DRRR) modules.

Through a participatory process of working with the Local Government Unit (LGU), the Division of Cagayan de Oro City has studied the current state of awareness in disaster danger, how to minimize (if not prevent) human and economic casualties, and the possible socio-economic impacts of natural hazards. The development of the DRRR module advocated the inclusion of environmental education across all levels by incorporating scientific expertise and the solution of practical problems. Moreover, the contents and learning competencies of these modules were

aligned with the K-12 Basic Education Curriculum Senior High School-Core Subject (Disaster Readiness and Risk Reduction).

The modules were designed in consonance to Republic Act No. 9729 (Climate Change Act of 2009), Republic Act No.10121 (Philippine Disaster Risk Reduction and Management Act of 2012), and Republic Act 9512 (Promote Environmental Awareness and Education Act of 2008) that seek to avoid or minimize the ill impacts of man-made, natural disasters and calamities.

In coordination with the City Disaster Risk Reduction Management Council (CDRRMC), DepEd Cagayan de Oro City R and D experts and DepEd Scholar-writers developed the contextualized DRRR modules. These modules were designed to bridge the gap between theoretical science and everyday life. These modules were utilized in senior high school as one of their core subjects. This led also to promote and integrate environmental education across grade levels.

The K-12 Basic Education Senior High School Curriculum- Core Subject (DRRR) Guide (CG) served as the ultimate foundation for module contents, content requirements, performance standards, and learning competencies. The modules were localized considering that most of the situations cited depict Cagayan de Oro City. Some of the unique features of the modules are the following: (1) it can be self-learning modules; (2) self-regulated activities where students can follow even without the presence of the teacher; (3) each module can stand by itself if what is desired by the readers; (4) addresses the problems encountered by the teachers in integrating DRRR in their classes because of the lack of skills, competence, and training; (5) structure of the module allows flexibility in undertaking future training opportunities since each module contains its supporting information with the appropriate assessment.

The contents of the contextualized modules are the following: (1) basic concept of disaster and disaster risk; (2) exposure and vulnerability; (3) concept of hazards; (4) earthquake hazards; (5) volcano hazards; (6) other related geological hazards, rain-induced landslide,



and sinkholes; (7) hydro-meteorological hazards; (8) fire hazards; (9) Disaster Risk Reduction; and (10) Laws and Policies of Disaster Risk Reduction Management Council.

The modules were created by DepEd scholars whose expertise is in research and development. The writers were directed by R & D experts and officials. Expert-based evaluations have tested the modules. They reviewed numerous R & D studies about DRRM, scholars both local and abroad, and officials in CDRRM. The modules were also analyzed for plagiarism.

OBJECTIVES OF THE STUDY

The study validated and utilized the contextualized Disaster Readiness and Risk Reduction Modules (DRRR) in the Division of Cagayan de Oro City. Specifically, this study determined the following: 1) evaluation ratings from the panel of experts and teacher-users; 2) insights and experiences of teacher-users when they utilize the modules; and 3) comments and suggestions of the panel of experts and teacher-users to improve the modules.

METHODOLOGY

The main aspects of the development process were anchored on Merrill (1937) and Glaser (1976), and the concepts of the R&D model of Alberto (2002) which follows four stages: designing, writing, validating, and revising. The headings and subheadings were patterned of the PROJECT EASE of the department.

The participants of the study were the 5-panel experts who evaluated the materials and purposely selected 47 secondary school teacher-users of the contextualized DRRM materials. The researchers used focus group discussions (FGDs) to evaluate the learning experiences of the teacher-users.

Triangulation technique was employed in this study. Evaluation tools for the modules, document analysis, interview, and observations were the main sources of data. The researchers discussed the ethical parameters surrounding the analysis. Both data have been handled with the utmost confidentiality. The researchers used a

signed consent document for the subjects. The consent form consists of two parts. Part One is a one-page paper that includes the title of the research, author's name, author's classification, a brief introduction to the project, goals of the study, participant selection and voluntary participation. On the other hand, Part 2 covers a certificate of agreement where conditions agreed upon are reflected and the participants placed their initials on a certain clause.

All qualitative data – including the focus group conversations – were analyzed by coding and visualization. On the other hand, all quantitative data were analyzed using appropriate descriptive statistics such as mean and standard deviation. Results obtained from in-depth interviews were thematically analyzed to uncover trends and patterns that support the quantitative data.

The responses from the evaluation conducted by the panel of experts and teacher-users were used to decide whether revisions would be made to the modules. The module is acceptable if the means value falls above 2.50. The interpretation scale for responses are as follows: (1) Experts-1:00-1:75- Strongly Disagree (the provision is not satisfied); 1.76-2.50-Disagree (the provision is slightly satisfied); 2.51-3.25 Agree (provision is satisfied adequately); 3.26-4:00 Strongly Agree (the provision is satisfied very adequately); and (2) teacher-raters- 1:00-1:75- Not at all (not acceptable/applicable/difficult to use) ; 1.76-2.50-Little (slightly adequate acceptable/applicable/slightly useful); 2.51-3.25 Much (adequate acceptable/applicable/useful); & 3.26-4:00 Very Much (highly acceptable/applicable/ useful).

RESULTS AND DISCUSSIONS

This section presents the results and analysis of the data with corresponding interpretations.

1. Evaluation ratings of the contextualized Disaster Readiness and Risk Reduction (DRRR) modules from the panel of experts and teacher-users



The developed contextualized DRRM modules were scrutinized by the panel of experts and City Disaster Risk Reduction Office Officers. The materials were validated based on their content and content accuracy, clarity, and appropriateness. The rating of the experts was the basis for revising and finalizing the whole content of the materials. The development of DRRM modules was supported by DepEd issuances which emphasized the need to develop DRRM modules that are appropriate for specific contexts. This is to increase interactive quality learning in the K-12 classroom. Teachers should enhance their skills in managing change in classroom instruction.

1.1 Content and Content Accuracy. In Table 1, most of the panel of experts strongly agreed that content and content accuracy were satisfied very adequately provided in the developed DRRM modules. Expert ratings were closely clustered. The

Table 1
Assessment of Experts on the Content and Content Accuracy of the Contextualized DRRR Modules

Criteria	\bar{x}	s.d.	VI
A. Content and Content Accuracy			
1. Present subject matter content accurately	3.60	0.58	PSVA
2. Utilize factual information in the text	4.00	0.58	PSVA
3. Present topics and information applicable to real-life situation	4.00	0.58	PSVA
4. Guide the teachers in the development of students DRRR skills and values	3.60	0.58	PSVA
5. Enable the teachers to use prior knowledge on the content of the material	4.00	0.58	PSVA
6. Help the teachers to integrate Science Investigatory Project (SIP) in their science classes	4.00	0.58	PSVA
7. Help the teachers to integrate DRRM simulation in their classes	4.00	0.58	PSVA
Overall	3.83	0.38	PSVA

The provisions for content and content accuracy were very well met. This means that the content topics in the modules are presented

accurately concerning a) presentation of subject matter, b) utilization of factual information, c) presentation of topics and information in practical lives, d) development of inquiry skills and values of students in DRRM, e) utilization of teachers' prior knowledge concerning the content of the material, and f) help the teachers to integrate DRRM concepts in their classes.

1.2 Clarity of the modules. As shown in Table 2, the developed DRRM modules are clear concerning: a) organization and sequencing of learning activities, b) target time frame, c) development of questions, c) use of standard-sized print, d) using clear and simple language directions, e) consistency of activities with educational theories and principles, f) writing of text which is suitable to the users' comprehension level.

Table 2
Mean and Standard Deviation of the Assessment of Experts on the Clarity of DRRR Modules

Criteria	\bar{x}	s.d.	VI
B. Clarity			
1. Provide learning activities that are well organized and well-sequenced	3.00	0.00	PSA
2. Have DRRM activities that are attainable within its time frame	3.00	0.00	PSA
3. Pose well-developed questions	3.60	0.55	PSA
4. Use clear and standard –sized print	4.00	0.00	PSA
5. Provide directions that are complete and written in clear and simple language	4.00	0.00	PSA
6. Provide directions that are clear and easy to follow	4.00	0.00	PSA
7. Provide activities that are consistent with DRRM theories and principles	3.60	0.55	PSA
8. Provide text which is suitable to the users' comprehension level	4.00	0.00	PSA
Overall	3.60	0.47	PSA

The responses of experts on the clarity of the constructed materials suggested that the material was highly acceptable tool for learning. The panel was firmly in favor of the efficacy of the module.



This implies that with this material, the DRRR teachers are guided in the teaching-learning process.

1.3 Appropriateness of the modules. Based on responses from experts, the modules allow teachers to understand and apply the concepts and principles of disaster science in their classrooms.

Table 3
Mean and Standard Deviation of the Assessment of Experts on the Appropriateness of the Contextualized DRRR modules

Criteria	\bar{x}	s.d.	VI
C. Appropriateness			
1. Are well designed and suited for teachers' learning in DRRM simulation	3.60	0.55	PSVA
2. Can motivate teachers to guide students to learn about DRRM simulation	3.60	0.55	PSVA
3. State directions at an appropriate level of difficulty	3.40	0.55	PSVA
4. Promote active involvement and interaction	4.00	0.00	PSVA
5. Help in enhancing conceptual understanding about DRRM concepts	3.40	0.55	PSVA
6. Help in developing /enhancing teachers' skills in teaching DRRM	4.00	0.00	PSVA
7. Lead the teachers to integrate DRRM simulation (SIP) in their classes	3.60	0.55	PSVA
Overall	3.66	0.48	PSVA

The method was used to assess the acceptability, applicability, and usefulness of the modules. It was found that teachers had positive responses to the modules that integrated DRRM skills and values. Teacher-users found the modules useful and relevant, most particularly in promoting and improving disaster science education.

1.4 Acceptability of the Modules. Table 4 shows that most of the DRRM teacher-users like the content. The materials were helpful, and teachers found the module exciting. The teachers consider the materials useful and important. The survey indicates that teachers agree that some material they teach is essential to their teaching.

Table 4
The Assessment of Teacher-users on the Acceptability of the Contextualized DRRM modules

Criteria	\bar{x}	s.d.	VI
D. On the material's acceptability			
1. I find the modules interesting	3.11	0.99	M
2. I am motivated to teach and integrate with my classes with the help of contextualized modules	3.43	0.68	VM
3. I am willing to teach concepts with the help of the contextualized module	3.51	0.65	VM
4. I appreciate teaching and integrating concepts through the use of the modules	3.43	0.74	VM
Overall	3.37	0.79	VM

The teachers decided that the material was important and could be implemented in real-life circumstances. Materials sparked the teachers to transform from "dispensers of knowledge" to "facilitators of learning."

1.5 Applicability of the modules. It is noted that teachers concluded that the materials were useful, inspiring, and enjoyable. The teacher's materials enhanced the growth of students' abilities, skills, or process skills and thought skills. The developed material drew teachers to incorporate skills and values in their lessons.

Table 5
The Assessment of Teacher-users on the Applicability of The Contextualized DRRM modules

Criteria	\bar{x}	s.d.	VI
E. On the material's applicability			
1. The contextualized modules are attainable	3.09	0.85	M
2. The learning activities in the modules can facilitate meaningful learning	3.30	0.71	VM
3. The modules can be applied to real-life situations	3.55	0.65	VM
Overall	3.31	0.77	VM

1.6 Usefulness of the modules. The rating means that the material is useful to teachers and students. Participants thought the contextualized modules would help students develop their DRRM skills and critical thinking skills, and that they would



inspire interest in students to study a subject for themselves, and that the activities would be hands-on, and students would be able to work together to solve the problems.

Table 6
The Assessment of Teacher-users on the Usefulness of Contextualized DRRM modules

Criteria	\bar{x}	s.d.	VI
F. On the material's usefulness			
1. The contextualized modules can enhance the development of students' skills and critical thinking skills.	4.00	0.00	VM
2. The modules can bring out students' prior knowledge	3.80	0.41	VM
3. The learning activities in the modules encourage active participation among students	3.55	0.51	VM
4. The activities in the modules can be carried out by students with little teacher supervision.	3.40	0.50	VM
5. I am challenged to develop my lessons integrating skills and values	3.75	0.44	VM
Overall	3.70	0.46	VM

The main themes were revealed from FGs conducted. Thematic analysis of Braun and Clarke (2006) was employed in this study in which each major theme was identified through a 5-stage process, namely: (1) becoming familiar with the data; (2) generating initial codes; (3) searching for themes; (4) reviewing themes, and (5) defining and naming themes. Considering the process, all critical elements from the experiences of senior high school teachers concerning the use of DRR modules were captured.

2. Summary of participants' insights about the module in terms of clarity, usefulness, activities and content accuracy

2.1 Comprehensible Vocabulary. Most of the participants find the vocabulary and usage of words easy to understand. This encouraged the students to get more involved. Findings revealed that reading comprehension and vocabulary were related simultaneously to students' achievement. Thus, if a student does not know the meaning of a

sufficient proportion of the words in the text, comprehension is impossible which inhibits them to actively engage in the learning process (Sedita 2005). Students, therefore, should be introduced to simple words to avoid difficulty in comprehending text and for them to actively perform and participate in every activity.

One of the participants stated that: *".... the words used in the module are simple and it can easily be understood by the learners... that is why they can easily relate with the activities being discussed/ presented."* (p.7)

Other participants stressed that: *".... because the words being used are understandable, the learners were very participative and courageous to do the activities..."* (p. 1,2,3).

One obstacle to why students struggle to perform a task is comprehension. That is why it is a challenge for all teachers to simplify and classroom activities and use clear words for the students to comprehend. It is through this method that the students can understand the concepts and be an integral part of the learning process.

2.2 Contextualized topics/indigenized materials. Most of the teachers found the module useful because it dealt with related topics/scenarios in Cagayan de Oro. Like Tropical Storm Sendong last December 2011; Typhoon Pablo last December 2012 and Typhoon Yolanda which hit the Philippines in November 2013.

As commented by the participants: *".... topics are localized; materials can be found within the surroundings and can easily be discussed with families, neighbors, and communities."*

DepEd Order 35 s. 2016 highlighted the matching of curriculum content and instructional strategies relevant to learners. Teachers should look for ways to relate teaching and learning to the needs, desires, and aspirations of learners. By relating the new lesson to the local experiences that are familiar to students, learning will become more effective and relevant. Diversifying the curriculum by contextualizing it through



indigenization is necessary. The integration of diverse cultures in the K-12 curriculum is a crucial strategy for student inclusion and ensuring the relevance of education processes for all. The Enhanced Basic Education Act of 2013 (RA 10533 sect. 5-h) also requires curricula to be adaptable and versatile enough to allow the school to adapt to local needs. The cited mandates reinforce the argument that module-based instruction is more efficient and more substantive than conventional instruction.

2.3 Informative. Republic Act 10121 and DepEd Order No. 21 s. 2015 established the framework of communication and information management and guided DepEd offices and DRRM coordinators. The goals include providing feedback to regions and schools division about how to respond to emergencies and promoting immediate and effective information flow during emergencies. The contextualized module offers enough knowledge to avoid or minimize the ill impacts of man-made, natural disasters and calamities.

One of the participants revealed that: *“...information about disaster preparation and risk mitigation is in the modules, which I consider very insightful.*

The module provides valuable knowledge on disaster preparedness.

2.4 Student-centered activities/aligned to K to 12 skills. Most participants thought that DRR modules are learners-centered and provide an opportunity for learners to become self-regulated and innovative in all learning endeavors. Hence, this motivates the students to learn because it allows them to learn the content by doing. Thus, one of the participants revealed that: *“the activities were student-centered which led to self-discovery and teacher acts as a facilitator.”*

The aforesaid claim is consistent with DepEd’s vision which aims to create a learner-centered public institution. In adherence to its vision, the division of Cagayan de Oro City created an innovative project known as Learners-Centered Learning Classroom(LC²) which emphasizes a

learners-centered and performance-based output that is considered as an authentic assessment for all learners.

3. Summary of the participants’ insights on the usefulness of modules in understanding the basic concept of DRRM.

3.1 Disaster Preparedness. The capacity to deal with unexpected incidents is dependent on an individual's preparedness, experience, and understanding. Determining students' understanding of disasters and designing activities to enhance knowledge of disasters would contribute to disaster management. Parallel to this concept, several participants in FGs reported that the contextualized modules are useful.

Three of the participants revealed that: *“... the module guides us what to do during a disaster (p.4) ... it is flexible and it provides future information (p.7) and it has a self-regulating activity that made us prepare some mitigating factors (p.11).*

Hence, the above statements support the argument that the modules contain activities that are useful to disaster preparedness.

Science plays a significant role in disaster risk management by offering comprehensive, evidence-based mechanisms and a range of information systems. It is vital to all individuals to have a basic understanding of disaster risk reduction management for them to be prepared and resilient in times of disaster. Hence, the participants' responses indicated that the use of the modules strengthened their awareness of disaster preparedness.

3.2 Learning Insights/Values Integration. Participants noted that the modules provided learning insights and value integration is evident.

Two of the participants revealed that: *“...it provides sharing of lessons learned especially those who were victims of disaster (p.6) ...it provides value integration- the desire to finish one’s study to change one’s way of living (p.8) and*



emphasizes the value of cooperation to save lives (p.12).

Thus, learning occurs through a values education mechanism that is reinforced in the home, school, and environment. Therefore, the skills and expertise students learn in school are now being extended to their personal lives.

3.3 Maximizes students' participation. Most of the teacher-participants articulated that the contextualized modules maximize students' participation. All activities ignited their interest to become more focused and more participative in the teaching-learning process.

Two of the teachers- participants mentioned that: ... "the said modules are very useful since the students *were very interested and participative in the teaching-learning process (p.10,14) ...*" *it was helpful because the examples that were given guided the students on what to do in every activity,*" (p.4).

Student-centered instruction includes constructive learning and an inquiry approach. This approach emphasizes the individual's characteristics in assessing the role of the student as an active participant (Acikgoz, 2002). In this direction, students can directly engage with the learning experience by living within the focus of the teaching process. Class tasks include activating prior knowledge and organizing new information into a logical structure. Thus, activities need to be applied correctly.

4. Summary of the participants' suggestions to improve the DRRR modules

4.1 Visual Considerations. One of the dominating themes that repeatedly emerged in FGs was the visual considerations to enhance the DRRR modules.

Three of the participants articulated that: ... " *the pictures should be colored since most students are visual...concepts are best captured when it is espoused with a colorful illustration (p.2,6,12).*

Other participants added that ... " *maps should be bigger especially places that have fault line for*

the students to understand why such places are always shaking.

The theory of Learning Styles by Dunn & Dunn acknowledges that there are visual learners who learn best in images. Hence, teachers are required to consider different learning styles in planning and developing events that support all learners. Some learn better when teachers use visual representation to optimize the teaching-learning process. Thus, anchored on the arguments strengthened the need to consider the visual aspects in improving the modules to address the multiple learning styles of the students.

4.2 Accessibility of materials/links. The overarching theme that likewise repeatedly emerged in the focus groups was the accessibility of materials and links.

Most of the participants stated that: " *the links that were provided should be accessible; provision of teacher's manual should be considered;and that all videos in the links should be grouped in 1 CD (downloaded videos) (p.3,7,11).*

The need for teaching materials is dictated by the emergence of new information technology and the cultural environment. Therefore, all teaching materials should be open to teachers and learners.

4.3 Enhancement of DRRR concepts/topics. Another predominant theme that was unveiled to improve the modules was the enhancement of concepts and topics.

Some of the participants articulated that: "...*learners should have a deep understanding of the concepts and the first aid measures should be incorporated in the module (p. 1, 7,8).* Indeed, input from teachers and learners at every stage would be helpful to enhance the quality of the modules.

CONCLUSIONS

Based on the findings of the study, the following conclusions were drawn.



1. The contextualized modules were acceptable, applicable, and useful for the learners.
2. The use of modules could help teachers teach the basic concepts and principles of DRRM.
3. Learning modules offer opportunities for learners to learn fundamental principles of disaster preparation.

RECOMMENDATIONS

In the light of the findings and conclusions in the study, the researchers present the following recommendations.

1. The teachers could use the developed and validated modules to promote optimal learning of disaster preparation and risk reduction concepts.
2. Schools may use the modules particularly for teachers who have experienced difficulties teaching DRRM concepts.
3. Educators could enrich the content of the modules customized to their settings.
4. There could be a further study of the modules.

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