

Development and evaluation of a contextualized self-learning module in disaster readiness and risk reduction



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ABSTRACT

Developing effective learning modules requires substantial effort from teachers to improve students' understanding. This study aimed to develop a contextualized self-learning module (SLM) in Disaster Readiness and Risk Reduction (DRRR) for Grade 11 STEM and GAS students. The module was designed to support independent learning, enhance higher-order thinking skills, and connect lessons to real-life situations, particularly disasters experienced in the country. The researcher, a DRRR teacher, developed the module in alignment with the Most Essential Learning Competencies (MELCs) and followed the standard SLM format prescribed by the Department of Education. The development was based on the premise that contextualized self-learning promotes meaningful learning by linking new concepts to students' lived experiences and the nation's disaster history. The SLM includes structured sections such as learning objectives, prior knowledge assessment, content discussion, enrichment activities, assessment tasks, and an answer key. Evaluation results showed that teachers rated the module highest in the statement of learning objectives (WM = 3.69) and lowest in provision for evaluation (WM = 3.59), both interpreted as very satisfactory. Similarly, experts gave the highest rating to the statement of learning objectives (WM = 3.82) and the lowest to adherence to current situations and health protocols (WM = 3.55), which were also interpreted as very satisfactory. Overall, the findings indicate that the developed contextualized SLM met acceptable quality standards for instructional materials. Feedback and recommendations from teachers and experts were incorporated to further improve the module's relevance, effectiveness, and academic value.

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1. Introduction

Teachers have always been concerned with improving their teaching strategies in order to enhance students' performance. With the implementation of the K-12 curriculum, one of its distinctive features is learner-centered instruction, which emphasizes the development of skills and practices that support lifelong and independent learning. One of the instructional tools commonly used by educators is the learning module. Developing a learning module requires considerable effort from teachers because it aims to support and

facilitate students' learning processes (Moradi et al., 2018).

Preparing learning materials that help students understand lessons is an important responsibility of teachers. A learning module is an instructional tool that presents course materials in a logical and sequential order, guiding students through the content and assessments determined by the instructor. It is designed to allow learners to explore knowledge independently and to demonstrate their understanding through active learning experiences. Such experiences help students understand the real-life applications of concepts such as disaster readiness and risk reduction. In addition, learning modules can enhance learners' higher-order thinking skills (Osman and Lee, 2014).

In preparation for the School Year 2020-2021, the Department of Education (DepEd) in the Philippines introduced Self-Learning Modules (SLMs) together with alternative learning delivery modalities to support different types of learners across the country. The integration of SLMs with

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alternative learning delivery approaches, including modular learning, television-based instruction, radio-based instruction, blended learning, and online learning, was intended to ensure that all learners could access quality basic education. This initiative was particularly important because face-to-face classes were prohibited due to the public health situation (Jou et al., 2022).

The COVID-19 pandemic created significant challenges for both teachers and students. As a result, both groups needed to adapt to a new educational environment. One major adjustment was the development and use of self-learning modules, which became a key tool for delivering instruction during distance learning.

One of the core subjects offered to Grade 11 Senior High School students is Disaster Readiness and Risk Reduction (DRRR). This subject is offered under the STEM and GAS strands and focuses on applying scientific knowledge to solve practical problems related to the physical environment. The course aims to bridge the gap between theoretical science and everyday life. Its content includes the basic concepts of disasters and disaster risk, exposure and vulnerability, the basic concept of hazards, earthquake hazards, volcano hazards and other geological hazards, hydrometeorological hazards, fire hazards, and the concepts of Disaster Risk Reduction (DRRR) and Disaster Risk Reduction Management (DRRM).

In this study, the researcher developed a contextualized self-learning module for Grade 11 students in the STEM and GAS strands, focusing on DRRR. As a DRRR teacher, the researcher believes that contextualized self-learning modules can serve as effective learning tools in distance learning environments. Such modules can help students connect new knowledge with real-life experiences, particularly by referring to disasters that have occurred in the Philippines and by integrating relevant historical events. For example, the module may refer to the 1990 earthquake that struck Central Luzon, which affected areas such as Cabanatuan City in Nueva Ecija, as well as the eruption of Mount Pinatubo in Zambales in 1991.

Using contextualized materials can make lessons more meaningful and relevant to students' lives. It can also encourage the development of self-study habits, strengthen students' self-confidence, and support the development of independent thinking. For this reason, the present study aimed to develop

and evaluate a contextualized self-learning module for Disaster Readiness and Risk Reduction.

The study examined the process of developing the contextualized self-learning module in DRRR and evaluated the developed module based on several aspects, including the clarity of learning objectives, the quality and organization of content, the provision for evaluation, the clarity of presented ideas, technical aspects, additional features of the module, and its alignment with current situations and health protocols. The study also investigated whether there was a significant difference between the evaluations provided by teachers and experts. In addition, the study collected suggestions from evaluators to further improve the developed contextualized self-learning module.

This study conceptualizes the development and evaluation of a contextualized self-learning module in Disaster Readiness and Risk Reduction (DRRR) as an instructional tool designed for learners in the STEM and GAS strands. The module aims to help students understand the concepts and ideas presented in the lesson in a more meaningful way. This is achieved by connecting new knowledge with real-life situations that reflect students' experiences, particularly disasters that frequently occur in the country.

The conceptual framework of the study illustrates the process of developing and evaluating the contextualized self-learning module in DRRR. The development of the module follows the standard format used by the Department of Education for preparing self-learning modules. This format is based on DepEd Order No. 18, series of 2020, titled "Policy Guidelines for the Provision of Learning Resources in the Implementation of the Basic Education Continuity Plan." The policy establishes the standards and specifications for providing learning resources to support the implementation of the Basic Education Learning Continuity Plan (BE-LCP).

The developed self-learning module is evaluated based on several criteria. These criteria include the clarity of the learning objectives, the quality and organization of the content, the provision of evaluation activities, the clarity of the ideas presented, the technical aspects of the module, other relevant features of the module, and its adherence to the current situation and required health protocols. Fig. 1 on the next page presents the paradigm of the study.

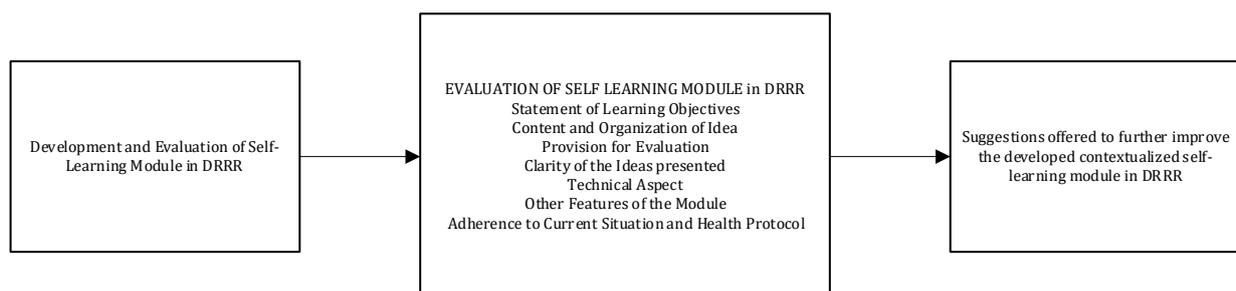


Fig. 1: Conceptual framework for the development and evaluation of the DRRR self-learning module

2. Literature review

Instructional materials play an important role in supporting the teaching and learning process. They extend learners' experiences by reinforcing and supplementing the teacher's verbal explanations. These materials help make learning more meaningful by clarifying concepts, emphasizing important points, and facilitating the transmission of knowledge, skills, and attitudes. Because of these functions, instructional materials have a significant influence on students' learning outcomes. Instructional materials may be developed in the form of modules or self-learning materials that are designed to be user-friendly, allowing students to study independently with minimal guidance from teachers (Dio and Madrazo, 2020).

Ganiron (2015) explains that approaches focusing on self-learning and individualized instruction are not always applied in traditional classroom settings. In response to this limitation, module-based learning resources have been widely used at the elementary, secondary, and higher education levels in both European and developing countries. These modules provide an alternative method of instruction that supports independent learning.

Self-learning materials offer several advantages. Learners can study at their own pace and according to their own schedules without interfering with their regular responsibilities. These materials can be used individually or in small and large groups, and they allow flexibility in the learning process. Self-learning materials are particularly appropriate for more mature learners because they provide greater control over the learning process. Moreover, such materials are increasingly accepted in modern educational systems that promote flexible learning environments and technology-supported instruction.

Contextualization is an important approach to learning emphasized in the K-12 curriculum. It is considered an effective strategy for engaging students in the teaching and learning process because it allows them to relate lesson content to their own experiences and environments. Contextualization makes lessons more meaningful and relevant to students' lives by linking the content taught in school with real-life contexts familiar to learners (Reyes et al., 2019).

Tomlinson and Masuhara (2004) highlight several advantages of localizing and contextualizing the curriculum. These advantages include greater cultural sensitivity, opportunities for personalization, easier access to locally available resources, and stronger relevance of learning materials to students. Localization also encourages learners and educators to feel a sense of ownership over the development and use of instructional materials.

Although self-learning materials offer many benefits, their development requires considerable time and effort, particularly in designing learning activities and outcomes that match students' needs

and contexts. In the Philippines, curriculum developers have introduced contextualization as an important approach in developing learning modules. Through this approach, subject content is aligned with instructional strategies and materials that are relevant to students' local contexts. Localization, which is an important component of contextualization, helps connect new content with students' local experiences, making learning more meaningful and effective (Garin et al., 2017).

Gedera (2022) emphasizes that instructional materials such as learning modules must follow established quality standards to ensure their effectiveness. High-quality modules should clearly present learning objectives, well-structured content, and appropriate learning activities that guide students toward achieving the intended learning outcomes. The effectiveness and validity of a learning module depend largely on the alignment between its objectives, content, and evaluation components. In addition, instructional modules should consider the needs and learning contexts of students so that the materials remain meaningful and relevant to the learning environment.

Previous studies have shown that well-designed instructional modules can improve students' academic performance, particularly in science education. Structured learning materials allow students to review concepts, practice skills, and apply knowledge through guided learning activities. These activities strengthen students' understanding of scientific concepts and support improved learning outcomes (de Jong, 2010). Instructional modules also help students recall previously learned concepts and apply them in both academic tasks and real-life situations. Furthermore, such modules often promote self-directed learning, enabling students to study independently with minimal teacher support. The integration of localized and contextualized examples can further increase students' engagement and help them connect academic concepts with everyday experiences.

Torre Franca (2017) found that the use of well-designed instructional modules can significantly improve students' knowledge and understanding of lesson topics. The study indicated that instructional modules make subject matter easier for students to understand during the teaching and learning process.

Similarly, the findings of Ganiron (2015) show that module-based materials can serve as effective instructional tools, particularly for students who experience difficulties in learning scientific concepts. The study revealed that the developed module demonstrated a very high level of validity in terms of learning objectives, content, language, and evaluation activities. In addition, students' academic performance improved after using the module, which was attributed to the clear objectives, appropriate language, and well-designed activities included in the material.

The reviewed literature and related studies helped the researcher understand the theoretical

background of the study and identify how the present research relates to previous work in the field. These studies also provided insights into the importance of contextualized instructional materials and self-learning modules in improving student learning outcomes.

3. Methodology

This study employed a descriptive research design to develop and evaluate a contextualized self-learning module in Disaster Readiness and Risk Reduction (DRRR). The module was developed through a review of existing learning resources in DRRR and with reference to the curriculum guide aligned with the Most Essential Learning Competencies (MELCs) for the subject. The developed module was intended for Grade 11 learners in the STEM and GAS strands.

The evaluation of the learning module was conducted by teachers and experts in the field using a questionnaire checklist based on a four-point Likert scale. The questionnaire was validated by field experts prior to its administration to ensure its clarity and reliability.

Purposive sampling was used in selecting the respondents. The participants were drawn from thirty-five Senior High Schools located in Congressional District 1 of Nueva Ecija that offer the STEM and GAS strands and include DRRR as part of their curriculum. Among the teacher respondents were DRRR teachers and coordinators who are directly involved in teaching the subject. In addition, science master teachers and supervisors from the Learning Resources Management and Development System (LRMDS) and Disaster Risk Reduction and Management (DRRM) served as expert evaluators of the module. All science master teachers within the congressional district were included as experts in the evaluation because the DRRR subject is categorized under the science curriculum.

The evaluation results of the developed contextualized self-learning module were analyzed

using statistical methods. The weighted mean was used to determine the descriptive statistics and to assess the overall evaluation of the module in terms of its content and quality. Furthermore, Analysis of Variance (ANOVA) was applied to determine whether there were significant differences in the evaluation ratings among the different groups of respondents.

4. Results and discussions

4.1. Development of self-learning module

The contextualized self-learning module in Disaster Readiness and Risk Reduction (DRRR) was developed for learners in the STEM and GAS strands. In developing the module, the researcher aligned the learning competencies with the Most Essential Learning Competencies (MELCs). The development process also followed several standard guidelines used by the Department of Education for the preparation of self-learning modules.

The module was designed according to commonly used formatting standards in instructional materials. The text was prepared using Bookman Old Style with a font size of 12 to ensure readability. In addition, the structure of the module followed the typical format adopted by the Department of Education for self-learning modules. The module included several instructional sections intended to guide students through the learning process. These sections consisted of “What I Need to Know,” “What I Know,” “What’s In,” “What’s New,” “What Is It,” “What’s More,” “What I Have Learned,” “What I Can Do,” “Assessment,” “Additional Activities,” and the “Answer Key.” These components were included to support students’ understanding of the lesson and to promote independent learning.

Table 1 presents the weighted mean and the corresponding verbal descriptions of the evaluation results for the contextualized self-learning module in DRRR as assessed by teachers and experts.

Table 1: Evaluation of the contextualized self-learning module in DRRR by teachers and experts

Indicator	Teachers (WM)	Teachers (VD)	Experts (WM)	Experts (VD)
Statement of learning objectives – Average	3.69	Very satisfactory	3.82	Very satisfactory
Content and organization of ideas – Average	3.62	Very satisfactory	3.71	Very satisfactory
Provision for evaluation – Average	3.59	Very satisfactory	3.70	Very satisfactory
Clarity of ideas presented – Average	3.68	Very satisfactory	3.80	Very satisfactory
Technical aspects – Average	3.61	Very satisfactory	3.62	Very satisfactory
Other features of the module – Average	3.64	Very satisfactory	3.65	Very satisfactory
Adherence to current situation and health protocol – Average	3.63	Very satisfactory	3.55	Very satisfactory

WM: Weighted mean; VD: Verbal description; 3.25–4.00: Very satisfactory; 2.50–3.24: Satisfactory; 1.75–2.49: Below satisfactory; 1.00–1.74: Poor

4.2. Evaluation of contextualized self-learning in disaster readiness and risk reduction as evaluated by teachers and experts

For teachers, the indicator of “Statement of Learning Objectives” obtained the highest weighted mean value of 3.69 and had a verbal interpretation of “Very Satisfactory.” On the other hand, the indicator “Provision for evaluation” obtained the lowest

weighted mean of 3.59 with a verbal interpretation of “Very Satisfactory.”

For experts, the indicator “Statement of Learning Objectives” obtained the highest weighted mean value of 3.82 and had a verbal interpretation of “Very Satisfactory.” On the other hand, the indicator “Adherence to Current Situation and Health Protocol” obtained the lowest weighted mean of 3.55 with a verbal interpretation of “Very Satisfactory.”

Table 2 shows that there is no significant difference between teachers' and experts' evaluations of the contextualized self-learning module in Disaster Readiness and Risk Reduction. Teachers and experts have the same evaluation of the developed contextualized SLM in DRRR. Findings implied that experts in the person of science master teachers and LRMS and DRRM supervisors have the same evaluation of the developed contextualized self-learning module in DRRR. This is supported by their responses on Table 2, which shows that both teachers and experts strongly agreed on the items on the evaluation of self-learning modules in terms of statement of learning objectives, content and organization of ideas, provision for evaluation, clarity of the ideas presented, technical aspect, other features of the module, adherence to the current situation and health protocol.

4.3. Suggestions for improving the developed contextualized self-learning module

To improve the developed contextualized self-learning module, the evaluators provided several comments and suggestions. These suggestions were categorized by the researcher into three main areas: activities, format, and other considerations.

With regard to the activities included in the module, several improvements were recommended. The evaluators suggested reducing the number of activities assigned to students so that learners would not become bored or overwhelmed. They also recommended that the activities should be designed in a way that is easier for students to understand and

complete. Another suggestion was to focus more on Higher Order Thinking Skills (HOTS), particularly in the pre-test and post-test sections of the module. In addition, the evaluators recommended providing parallel activities for learners who are using purely modular learning. For activities such as word hunt exercises, they also suggested including hints to guide students in identifying the correct answers.

In terms of format, the evaluators proposed several modifications. They recommended that the answer key be provided on a separate sheet. Illustrations taken from online sources should either be replaced or properly referenced. Pagination should also be added throughout the module to improve organization and navigation. In addition, they suggested revising the layout of the "What Is It" section in Module 3. For multiple-choice questions, the evaluators recommended providing at least four answer options. They also emphasized that typographical errors should be carefully corrected to maintain the quality of the module. The evaluators also offered additional suggestions related to referencing and documentation. They recommended using Commission on Higher Education Memorandum Orders (CMOs) when appropriate for references. When using sources such as Wikipedia, the accuracy and reliability of the information should be carefully verified. Furthermore, they advised observing proper document presentation standards. If the module is an original work, the Department of Education logo should not be used; instead, an appropriate local or institutional logo should be included.

Table 2: Analysis of variance testing differences between teachers and experts

Indicator	Sum of squares (between)	df	Mean square	F	Sig. (p-value)
Statement of learning objectives	3.821	1	3.821	1.074	0.304
Content and organization of ideas	6.971	1	6.971	0.536	0.467
Provision for evaluation	0.917	1	0.917	0.627	0.432
Clarity of ideas presented	3.045	1	3.045	0.935	0.338
Technical aspects	0.007	1	0.007	0.002	0.969
Other features of the module	0.037	1	0.037	0.009	0.925
Adherence to current situation and health protocol	0.510	1	0.510	0.291	0.592

5. Conclusion

The findings of the study indicate that the development of a contextualized self-learning module in Disaster Readiness and Risk Reduction can serve as an effective learning material for distance learning. The module helps students build connections between lesson content and their real-life experiences, particularly in situations related to disasters that commonly occur in the country. Through contextualized examples and structured activities, the module supports meaningful learning and enhances students' understanding of the subject.

The developed contextualized self-learning module was found to meet the required standards of quality and acceptability in module development. Based on the evaluation conducted, the module demonstrated satisfactory quality in terms of learning objectives, content organization, clarity of

ideas, evaluation components, technical aspects, and overall structure.

The results also showed that both teachers and expert evaluators provided similar assessments of the developed module. Their evaluations were consistent across several aspects, including the statement of learning objectives, the organization and presentation of content, the provision of evaluation activities, the clarity of the ideas presented, the technical features of the module, other module components, and its alignment with current situations and required health protocols.

Although the contextualized self-learning module was highly accepted by the respondents, the evaluators still provided several suggestions for improvement. These comments and recommendations serve as useful guidance for further refining the module so that it becomes more scholarly, effective, and relevant as a learning

material for students studying Disaster Readiness and Risk Reduction.

List of abbreviations

ANOVA	Analysis of variance
BE-LCP	Basic education learning continuity plan
CMO	Commission on higher education memorandum order
DepEd	Department of education
DRRM	Disaster risk reduction management
DRRR	Disaster readiness and risk reduction
GAS	General academic strand
HOTS	Higher order thinking skills
LRMDS	Learning resources management and development system
MELCs	Most essential learning competencies
SLM	Self-learning module
STEM	Science, technology, engineering, and mathematics
VD	Verbal description
WM	Weighted mean

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Compliance with ethical standards

Ethical considerations

Permission to conduct the study was obtained from the Schools Division Superintendent of the Schools Division of Nueva Ecija, with the endorsement of the Thesis Adviser and the Dean of the Graduate School. Participation was voluntary, and informed consent was obtained from all respondents prior to data collection. The identities of participants were kept anonymous, and all data were treated with confidentiality and used solely for research purposes. Data collection was conducted in accordance with the health and safety protocols stipulated in DepEd Memorandum No. 034, s. 2020.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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