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Development of a Risk Communication in Massive Open Online Course (MOOC) Module for Nurses: A Process Description

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ABSTRACT

Risk communication is necessary for any emergency response to disseminate information and increase public risk perception. Although communication skills are a core competency of nurses, they are learned only during nursing studies and do not include risk communication skills, particularly in global health emergencies. Massive Open Online Course (MOOC) modules can help improve learners' critical-thinking, problem-solving and interpersonal skills. However, research has revealed that the MOOC module on risk communication for nurses has not been developed recently. This study created a module on risk communication in global health emergencies using the extended Massive Open Online Course (xMOOC) framework. The module was developed based on Thiagarajan and Semmel's (1974) 4D development model (i.e. Define, design, develop and disseminate). Due to time and financial constraints, however, the model was modified to have only three stages: define, design and develop. The validity of the produced xMOOC module was evaluated by six subject matter experts using evaluation checklists, and the results were analysed using two methods: the percentage calculation method (PCM) and the content validity index (CVI). The PCM scores for the module content and the xMOOC course design were 85.4% and 95.83%, respectively, and the CVI for the module content was 0.95, and for the xMOOC course design, 0.92. Both types of content validity tests showed that this xMOOC module had excellent content validity and could be used to improve risk communication knowledge and skills in future nursing educational programmes. Due to the implementation of this xMOOC module, the continuing nursing education programme has gained increased attractiveness as well as significance on a worldwide basis.

Keywords: *MOOC module, Risk communication, Global health emergencies, Nurses*

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INTRODUCTION

Global health emergencies such as pandemics require effective communication to reduce damage and prevent disease spread (1, 2). Nurses are at the forefront of providing accurate and verified information to the public to help them respond to crises (3). Improper nurse communication causes over 30% of medical errors (4). To address this issue and improve

care, communication skills training should be part of nurses' continuing education (4, 5). For nurses to adapt to the evolving healthcare environment, they must continue their education. They might disregard continuing education due to their work burden and family obligations, as well as the high cost of such education (6). Moreover, traditional face-to-face classes may be impractical because of work schedules and pandemics. Thus, continuing nursing education should be innovative and flexible.

Technology has changed how professionals, including nurses, access and acquire further knowledge. E-learning offers flexible and accessible digital platforms for continuing education (7). Thus, nurses who wish to learn more may prefer it. In particular, promising e-learning platforms for continuing education are Massive Open Online Courses (MOOCs), which offer nurses numerous formats of instructional content for pedagogical flexibility and time management. MOOCs have the potential to increase nursing education and lifelong learning, as well as improve the quality and safety of healthcare (5). In Malaysia, all registered nurses are required to collect 25 continuing professional development (CPD) credit points annually to renew their licences. Regardless of this, their participation is hindered by several obstacles. Therefore, MOOCs can offer continuing nursing education and promote their career development.

In the realm of continuing education for public health emergencies, one area that MOOCs could potentially address is risk communication. Traditional nursing programmes often neglect to provide adequate training in this specialised area (3). Risk communication focuses on the transmission of information concerning health, safety, and environmental hazards, and it differs from ordinary communication in that it specifically addresses potential adverse impacts. This field is essential for enabling individuals and groups to make informed decisions about how to address risks, particularly in the context of public health issues, environmental disasters, and other high-risk situations. To ensure effective communication and empower individuals to make informed decisions about their safety and well-being, a specific set of skills must be mastered (8).

Effective communication is a critical component of managing global health emergencies, and nurses play a crucial role in disseminating vital information to the public. However, challenges persist in providing continuing nursing education, including limited access, high costs, and time constraints. E-learning platforms like MOOCs can offer flexible and accessible opportunities for nurses to expand their knowledge. A dedicated MOOC module on risk communication skills training for global health emergencies is necessary to address the gap in traditional nursing programmes. Such training is critical for nurses to be well-prepared to handle the challenges posed by public health crises. In light of this need, this study proposes an MOOC module for risk communication in global health emergencies.

METHODOLOGY

In this study, the design and development of a MOOC module on risk communication in global health emergencies was based on the framework of the extended Massive Open Online Course (xMOOC) approach and adapted Thiagarajan and Semmel's (1974) 4D development model (define, design, develop and disseminate) but was modified into a 3D model (define, design and develop) due to time and financial constraints. Figure 1 shows the flow diagram of the xMOOC module development process.

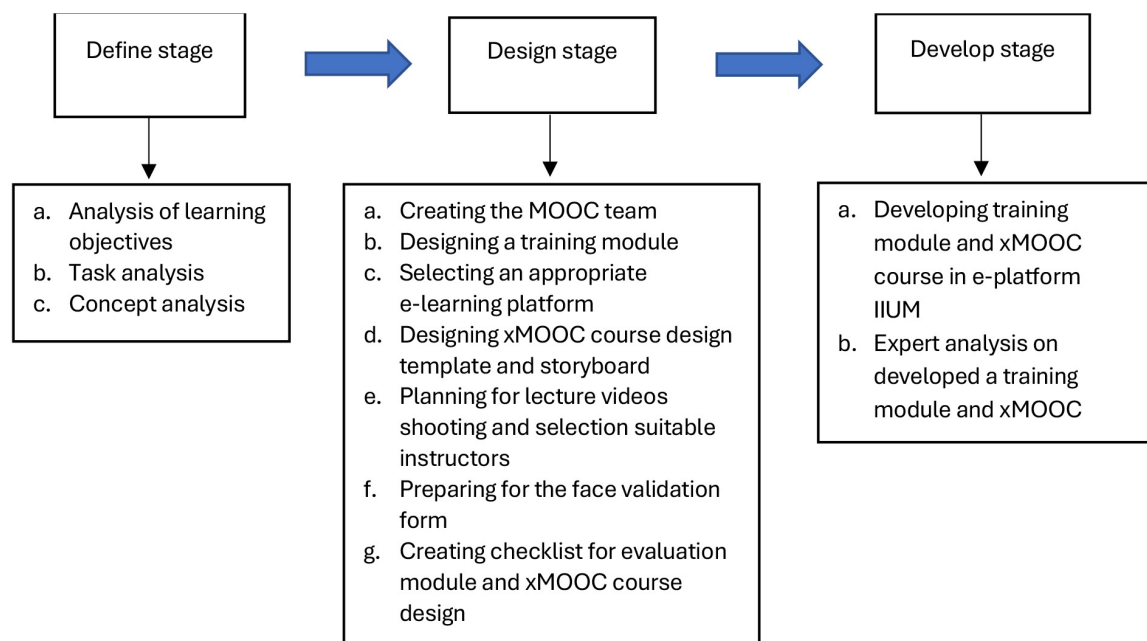


Figure 1: Flow diagram of (xMOOC) module development process.

Define Stage

In this stage, a preliminary analysis was conducted to establish and define the necessary learning conditions for the development of the MOOC module. This analysis was broken down into three sub-analyses: (a) analysis of the learning objectives to determine the competencies and indicators of learning achievement that the learners needed to achieve; (b) task analysis, through a systematic literature review (SLR), to determine relevant content of the module and design features of the xMOOC; and (c) concept analysis, conducted through a focus group discussion (FGD), to identify the most appropriate content, teaching–learning strategies and activities, and to systematically organise them in order to make the xMOOC module as an interactive teaching tool.

Design Stage

In this stage, the xMOOC module on risk communication in global health emergencies was designed. The process involved the following steps: (a) creation of the MOOC team; (b) design of the xMOOC module based on the findings from the concept analysis conducted in the ‘Define’ stage; (c) selection of the appropriate e-learning platform for the xMOOC; (d) creation of the xMOOC design template and storyboard; (e) planning for recording of the lecture videos and selection of suitable instructors; (f) preparation of the face validation form for validating the evaluation checklists that were used to determine the module and xMOOC design validity; and (g) creation of the evaluation checklists for the evaluation module and the xMOOC design validity.

Develop Stage

In this stage, a risk communication in global health emergencies xMOOC module was produced. In an xMOOC module, learning materials are offered in small units for a four-

week study time to make them easy for learners to comprehend and absorb. These learning materials include short videos that explain a specific topic, with lecture notes, followed by further readings and a quiz to encourage learners to apply what they learned.

This xMOOC module was produced in two steps. The first step was the development of the xMOOC course (including video lectures, computer-marked assignments and quizzes) on the e-learning platform of the International Islamic University Malaysia (IIUM)—Integrated Teaching and Learning Environment System (iTa’LeEM) <https://italeemc21-arc.iium.edu.my>, and the provision of supporting materials, such as lecture notes and further readings, as well as scenario-based discussions. The recommended length of the videos for this course is five to seven minutes, which corresponds to the fundamental principle of multimedia. Multimedia was founded on the principle that various media formats must be seamlessly incorporated into an engaging and cohesive experience. This principle underscores the potential of integrating text, images, video, audio, and interactive components to augment the efficacy of learning and communication by stimulating various senses in the audience (9). As the videos had to support the overall course, the course design also had to be in place. The difficulty of the content flow ranged from simple to complex. Scenario-based discussions were included to encourage active and distributed learning among learners. Moreover, telegram groups or other social media groups may be used to facilitate the participants’ social learning.

The second step in this develop stage was the conduct of an expert analysis of the validity of the design and content of the xMOOC module on risk communication in global health emergencies for nurses. For this expert analysis, two quantitative methods were used: the percentage calculation method (PCM) and the content validity index (CVI).

RESULTS

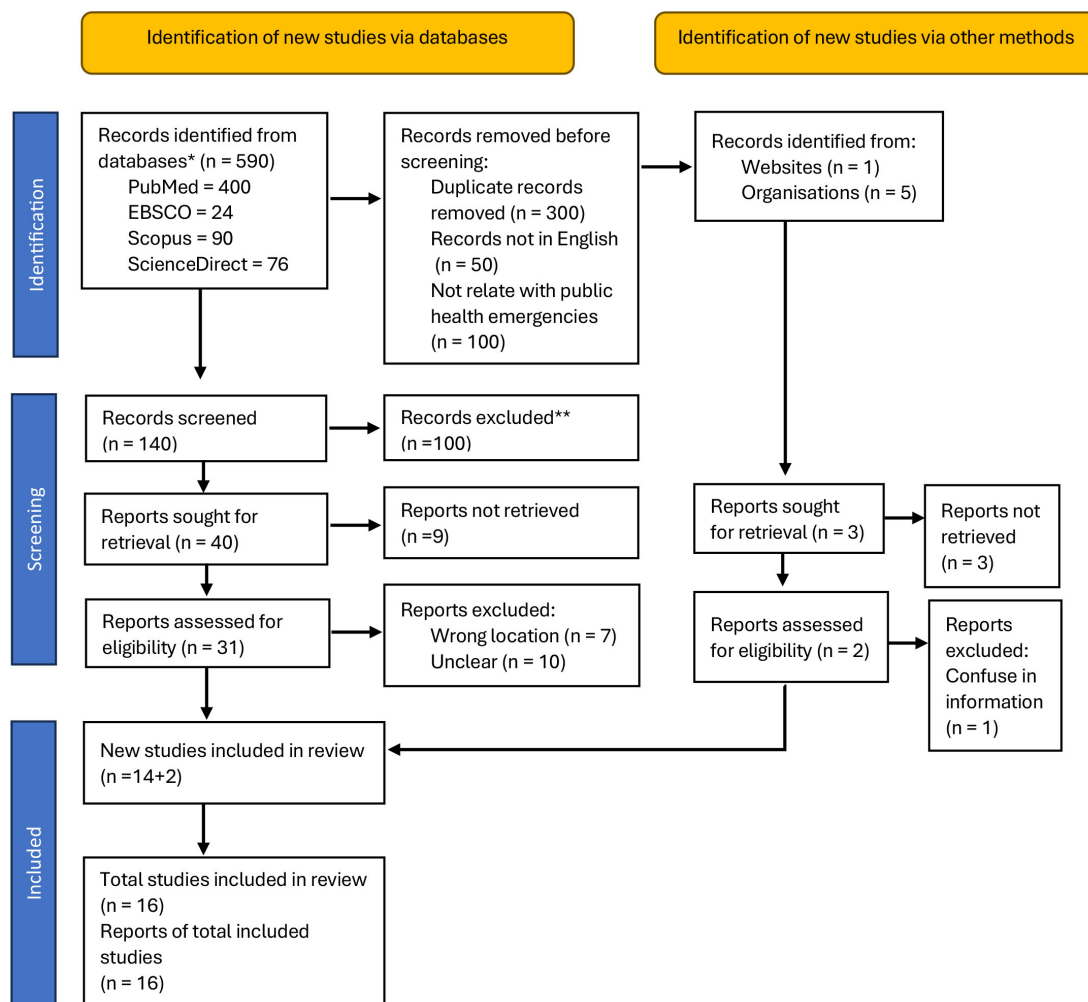
Define Stage

To identify the content and design features of the MOOC module on risk communication in global health emergencies, an SLR was conducted from 2015 to 2022. The literature was selected from the PubMed, EBSCO, Scopus and ScienceDirect databases using the primary search terms: risk communication, public health emergencies, risk communication strategies, models of risk communication, theories in risk communication, and risk communication and community engagement. The identified papers were screened before they were included in the SLR, in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). The inclusion criteria were as follows: full-text publication in English, publication between 2015 and 2022, and peer review. Sixteen papers were included. After thematic analysis of the SLR findings, the following seven themes emerged: definition of risk communication, risk communication model, risk communication theories, risk communication strategies, challenges in risk communication, the role of media in risk communication, and community engagement in risk communication. Furthermore, from this SLR, the following guided questions were extracted for the FGD:

- a. Why are risk communication skills needed among nurses?
- b. What will happen if nurses do not have risk communication skills?
- c. How can we improve the risk communication skills of nurses?
- d. How can we design a training module for nurses on risk communication skills for global health emergencies?

- e. What course design is suitable for nurses for their professional development and lifelong learning?
- f. What course contents or topics should be included in a training module for nurses on risk communication skills for global health emergencies?

These questions were used for the FGD, to explore particular aspects of the subject matter experts relevant ideas for the risk communication module. Five main themes emerged from the FGD data that were analysed using content analysis: (a) drawbacks of lack of risk communication skills, (b) approaches to improving risk communication skills, (c) module design, (d) teaching and learning strategies, and (e) course contents or topics. The results of the FGD served as the preliminary data for the design of the risk communication in global health emergencies xMOOC module with relevant teaching and learning components. In addition, they provided various enlightening insights into the relevant teaching methodologies during a pandemic for improving nurses' risk communication skills. Figure 2 shows the flow diagram of the SLR for relevant contents of the risk communication in global health emergencies MOOC module using the PRISMA 2020 framework.



Note: *The number of records identified from each database; **If an automation tool was used, the number of records was excluded.

Figure 2: PRISMA 2020 flow diagram for the systematic literature review to identify relevant contents of the risk communication in global health emergencies xMOOC module.

Design Stage

The findings at each step of the design stage are as follows:

Step 1: Creating the MOOC team

The MOOC team had 13 members with various career and educational backgrounds. Five of them were nursing lecturers (three were highly experienced in nursing education and emergency nursing, and two were experienced in nursing education), two were registered nurses, one was an information technology (IT) technician, two were emergency physicians who specialised in public health medicine, two were educational lecturers with expertise in instructional design technology, and one was a lecturer at the Centre for Professional Development who specialised in applied sciences and technologies.

Step 2: Designing a training module

The final title of the training module was “Training Module: Risk Communication During Global Health Emergencies for Nurses”. It had five chapters, namely, Chapter 1: Introduction to Risk Communication, Chapter 2: Communication Models and Techniques, and Risk Communication Theories, Chapter 3: Principles and Guidelines for Risk Communication, Chapter 4: Managing Information During an Emergency, and Chapter 5: Risk Communication and Community Engagement. A pre-training knowledge assessment and a post-training self-assessment with answers were included before and at the end of the module, respectively. Based on the experts’ suggestions, some modifications were made in the module, such as adding subtopics to the main topics.

Step 3: Selecting an appropriate e-learning platform

The lead educators and the designer of the MOOC deliberated on the appropriate learning platform for this particular xMOOC using Google Meet. Subsequently, they arrived at a consensus on the chosen platform, which was then communicated to the remaining members of the team. Since the researcher is a member of the IIUM team and the xMOOC module will be offered to both IIUM and non-IIUM staff, the iTa’LeEM platform was chosen as the most appropriate e-learning platform for this module.

Step 4: Designing xMOOC course design template and storyboard

The final xMOOC course design template and storyboard were based on the learning objectives generated from the FGD. The design template included the course title, course objective, expected learning outcomes, target learners, course duration and maximum time commitment, language medium, learner prerequisites, names of the instructor, MOOC designers and lead educators, and the course’s weekly schedule and plan. The storyboard included a brief description of the course, the course syllabus and roadmap, the academic qualifications of the course leader, instructors, MOOC designer and video recorder, and information on the weekly classes.

Step 5: Planning for lecture videos shooting and selection of suitable instructors

First, the shooting room was rented from Kulliyyah of Nursing at IIUM for three months, and preparations were made for soundproofing and lighting the room and for instructor comfort during the shooting and recording. Afterwards, the module topics and the suitable

instructors, the duration of each topic's presentation based on the instructions from the storyboard, and other instructions such as the instructors' dress colours and the script for each topic were finalised. The video and audio recordings were played back in front of the instructor who was presenting at that time. If necessary or at the instructor's request, the recording or shooting was repeated. To develop the xMOOC course pages on iTa'LeEM, the final versions of all the lecture videos were transformed into YouTube videos and sent to the MOOC designer, together with all the other course materials, such as links to lecture notes, additional readings, activities such as quizzes and discussion scenarios. Throughout this time, the MOOC designer, lead educator and IT technician frequently discussed the arrangement of the topics based on the storyboard, as well as xMOOC course's quality.

Step 6: Preparing for the face validation form

The created face validation form included a rating scale table with a rating scale of 3 (good or satisfactory), 2 (sufficient or fair), and 1 (insufficient). Moreover, the experts were able to provide comments and decisions concerning the evaluation rubrics for the xMOOC course design and content.

Step 7: Creating checklists for evaluation module and the xMOOC course design

To determine the validity of the xMOOC module's content, two types of evaluation checklists were created. These are checklists for the evaluation module and checklists for the evaluation of the xMOOC course design. After face validation with two experts in instructional design and education, the experts stated that the rubric checklists have high validity and can provide sufficient guidance when assessing the module and xMOOC course design. However, experts suggested using it as a checklist rather than a rubric and some improvements to the checklists based on suggestions from these two experts such as sequences of measurement parameters. The overall decision on the checklists was sound, and the evaluation criteria for the xMOOC module and its design are adequate. The final version of the evaluation module's checklists included two specific parameters scored on a 5-points Likert scale and the evaluation checklists for xMOOC course design included eight dimensions with related criteria rated on 4-points Likert scale.

Development Stage

Step 1: Development of a training module and the xMOOC Course in the e-learning platform of IIUM

The xMOOC module was primarily developed by two lead educators and then validated by six subject matter experts from academia and industry (hospital). The developed training module was titled "Training Module: Risk Communication During Global Health Emergencies for Nurses", and it begins with an introduction, a pre-test knowledge assessment with answers related to risk communication and five chapters comprising 34 pages. Each chapter begins with its learning objectives and ends with recommended additional reading. This module concludes with a post-self-assessment session with key answers. After completing the module's final post-test, learners can decide their grades. In addition, relevant references are provided in this module. Figures 3 and 4 displayed the cover of the training module and content lists of the module.



Figure 3: Cover photo of the training module.

| CONTENTS | |
|-----------------------------------------------------------------------------|--------------------------------------------------------------|
| Introduction (about module) | |
| Pre-Test Knowledge Assessment | |
| Chapter 1: Introduction of Risk Communication | |
| 1.1 | Definition of risk communication |
| 1.2 | The importance of risk communication |
| 1.3 | Types of risk communication |
| 1.4 | Goals of risk communication |
| Chapter 2: Communication Models, Techniques and Risk Communication Theories | |
| 2.1 | Communication model |
| 2.2 | Communication techniques |
| 2.3 | Risk communication theory |
| 2.3.1 | Risk perception/outrage theory |
| 2.3.2 | Trust determination theory |
| 2.3.3 | Mental noise theory |
| 2.3.4 | Negative dominance theory |
| Chapter 3: Principles and Guidelines for Risk Communication | |
| 3.1 | Principles of risk communication |
| 3.2 | Guidelines for risk communication |
| 3.2.1 | Three “M” of risk communication |
| 3.2.2 | Risk communication strategies |
| 3.2.3 | Challenges for risk communication |
| Chapter 4: Managing information during an emergency | |
| 4.1 | Working with the media |
| 4.2 | Working with stakeholder/partner |
| 4.3 | Rumour management |
| Chapter 5: Risk communication and community engagement | |
| 5.1 | Risk communication and community engagement (RCCE) readiness |
| Conclusion | |
| Post Self-assessment | |
| References | |

Figure 4: Content list of the training module.

The four-week xMOOC course was designed by two lead educators, a MOOC designer and a video recorder based on the training module content. It was titled “Risk Communication During Global Health Emergencies for Nurses”. Learners can access this course on iTa’LeEM by using their guest username. On the course’s landing page, general guidelines and available staff resources are mentioned. This xMOOC course has a total duration of four weeks. Each week, a content summary is given, together with the total study time allocated for that week, the expected learning outcomes, and the lecture videos, lecture notes, learning activities such as quizzes or scenario-based discussions, and additional readings. Figures 5 and 6 show screenshots of the developed xMOOC course on iTa’LeEM.

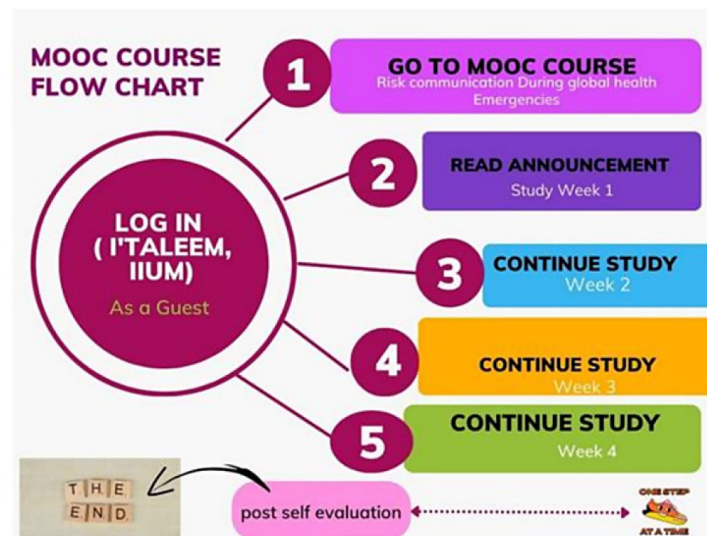


Figure 5: xMOOC course flow chart.

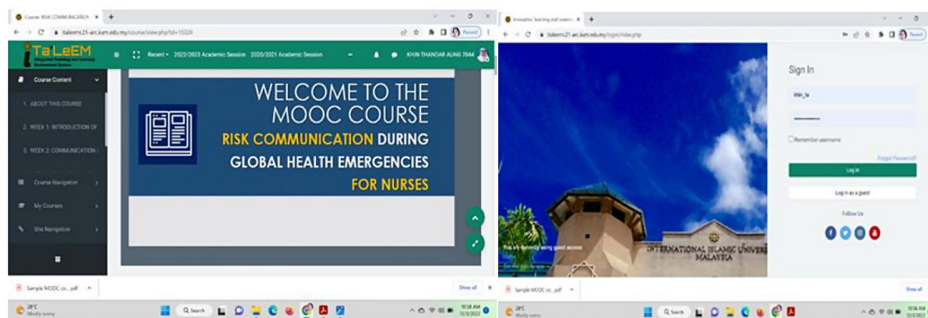


Figure 6: Screenshots of the login page and xMOOC course page.

Step 2: Expert analysis on developed a training module and MOOC course design

Six subject matter experts from academic and industrial (i.e. hospital) settings were asked to analyse the validity of the design and content of the developed xMOOC module using their PCM scores and CVIs, with the validated evaluation checklists. These experts had different professional and educational backgrounds: (two emergency physicians, three nursing lecturers, and one nurse manager [i.e. a matron]). The PCM scores for the module design and content were 95.83% and 85.4%, respectively; and the CVIs for the module design and content were 0.92 and 0.95, respectively. Both types of content validity tests showed that the xMOOC module had excellent content validity.

DISCUSSION

This study describes the development of an xMOOC module specifically designed for nurses, focusing on risk communication in global health emergencies. The design methodology utilised an integrated basis. The implementation used the xMOOC framework, which prioritises online learning components, and an adapted version of Thiagarajan and Semmel's (1974) 4D model (define, design, develop, disseminate). The disseminate phase was excluded in this study, leading to the creating of a 3D model through the define, design,

and develop phases. The module's design and content were subsequently evaluated for validity. The assessment produced outstanding findings, with validity scores of 0.92% and 0.95% for design and content, respectively.

The development process of this module shares similarities with prior research. Notably, Pratama et al. (10) developed a learning module using a comparable 3D (define, design, develop) approach based on the Self Organised Learning Environments (SOLE) model. Their module, however, focused on rotation dynamics and equality of rigid bodies and employed augmented reality for instructional materials. Similar to the current study, their evaluation indicated a well-designed module (85.96% average score) that was positively perceived by students (90.01% average score).

Another relevant study (11) adopted a similar 3D development model (modified from a 4D model) to create an interactive e-learning module on materials for the periodic system. This e-module achieved high validity scores across content (90%), presentation (93%), language (84%) and graphics (100%), demonstrating its strong potential for educational use.

Beyond core training, the xMOOC module offers nurses a valuable online learning experience. This format equips them with transferable risk communication skills readily applicable to real-world high-risk scenarios encountered in their practice. Furthermore, MOOCs inherently possess the advantages of open access and continuous updateability, positioning them as a potentially superior alternative to traditional training methods.

Research by Anderko et al. (3) underscores nurses' interest in acquiring risk communication expertise. This interest stems from their perceived need for better preparedness in situations demanding such skills. They emphasize the importance of training in risk communication fundamentals, coupled with research into the impact of such training.

In essence, this study introduces a well-designed and validated xMOOC module specifically tailored for nurses and their need for risk communication skills in global health emergencies. The development process effectively leveraged established frameworks, and the results demonstrate the module's strengths in design and content validity. By offering this training, nurses can acquire the knowledge and skills necessary to craft impactful risk communication messages. These messages have the potential to improve communication outcomes, strengthen organisational trust, alleviate public anxieties, and empower key stakeholders to make informed decisions during global health emergencies.

CONCLUSION

The xMOOC module on risk communication in global health emergencies is expected to be extremely advantageous, as it will introduce novel ideas and improve risk communication skills among nurses in a rapidly evolving healthcare setting. Moreover, this module greatly enhances the ability to effectively handle public health emergencies by equipping nurses with essential knowledge and skills in risk communication. It is recommended to enhance effective risk management by creating more modules covering issues such as risk analysis, surveillance and monitoring of hazards, and the ethics and values relevant to public health emergencies.

ACKNOWLEDGEMENTS

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ETHICAL APPROVAL

Ethical approval was obtained from the relevant authorities at SASMEC and the IIUM Ethical Committee (IREC 2021-010).

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