Developing a Comprehensive Mixed Methods Evaluation to Address Contextual Complexities of a MOOC

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Abstract: *Massive open online courses (MOOCs) are gaining popularity, yet they are rarely evaluated using mixed methods that consider the complexity of participants' demographics, geographic spread, and MOOC design and curricula. In this article, we critically reflect on evaluating the Mixed Methods International Research Association (MMIRA) MOOC. A literature review on MOOCs and how they are evaluated is presented along with a logic model. After a description of the MMIRA MOOC and the multi-phase mixed methods evaluation design, the logic model is used to reflect on conducting a mixed methods evaluation. We conclude with the challenges experienced when evaluating amidst a MOOC's complexities.*

Keywords: *complexity, integration, logic model, massive open online course, mixed methods evaluation*

Résumé : *Les cours en ligne ouverts à tous (CLOT) gagnent en popularité. Cependant, peu sont évalués en utilisant des méthodes mixtes, qui prennent en compte la complexité de la démographie des participantes et des participants et leur dispersion géographique, ainsi que la conception et le contenu des CLOT. L'objet du présent article est de réfléchir de manière critique à l'évaluation du CLOT de la* Mixed Methods International Research Association *(MMIRA). Une recension des écrits sur les CLOT et leur évaluation est présentée avec un modèle logique. Après une description du CLOT du MMIRA et de la conception de l'évaluation par méthodes mixtes à multiples phases, le modèle logique est utilisé pour réfléchir à la mise en œuvre*

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d'une évaluation par méthodes mixtes. Nous concluons par une discussion sur les défis rencontrés lors de l'évaluation en raison des complexités inhérentes à un CLOT.

Mots clés : *cours en ligne ouverts et massifs, évaluation avec méthodes mixtes, complexité, modèle logique, intégration*

Massive Open Online Courses (MOOCs) offer learning opportunities to large numbers of users online. The benefits of MOOCs include no prerequisites, easy registration processes, and free access (Johansson & Frolov, 2014). MOOCs use a wide range of formats: from small private systems hosted for organizational users to community-driven systems developed and managed by users themselves (Sinclair et al., 2015; Yousef et al., 2015). Despite the open access, MOOC user-retention and completion rates are dismal (Bozkurt et al., 2017; Foley et al., 2019; Khalil & Ebner, 2014; Meinert et al., 2018). This may in part be due to the contextual complexities (Poth, 2018) of MOOCs, such as participants' demographics, geographic spread, and MOOC design and curricula. In particular, users' cultural diversity including differences in expectations of what good teaching looks like, varied professional development needs in mixed methods (MM), and Internet capabilities around the world can greatly affect participants' experience. Further diversity can be found in the content generation, design, and implementation based on best practices for online teaching and learning, and in an online system that allows for dynamic educational content, user navigation, and efficient troubleshooting (cf. Douglas et al., 2019; Greene et al., 2015; Mingming & Yanli, 2014). MOOC evaluations, however, do not yet regularly use methodological approaches that address these complexities. Existing evaluations are characterized by a reliance on single methodological approaches (e.g., quantitative research alone), lack a comprehensive logic model to guide the evaluation process, and evaluate single areas of study (e.g., teaching) perhaps to avoid the contextual complexities involved in the development and implementation of MOOCs as described above (Foley et al., 2019; Meinert et al., 2018).

The purpose of this article is to share the development of a complex-sensitive (Poth, 2018), comprehensive MM evaluation of the Mixed Methods International Research Association (MMIRA) MOOC, and to offer a critical reflection of the lessons learned during the evaluation process. The aim of the MMIRA MOOC is to provide free education to MMIRA members about MM in order to meet the need for such opportunities globally. Organized into thematic "Seasons," the MMIRA MOOC offers 10 modules: five in the "core" (or novice-level topics) and five in the "specialized" (intermediate to advanced topics) areas in the field and application of MM research (Shannon-Baker & Musoke, 2019). Evaluations of the MMIRA MOOC used a multi-phase mixed methods design (Creswell & Plano Clark, 2017), including a beta testing before launching the MOOC (early 2019) and evaluations of each module and the collection of modules in a given season (at the end of each Season, e.g., March 2020, September 2020). In so doing, we

contribute to the focus of the special issue by illustrating an example of a complex MM evaluation of a MOOC.

In this article, we first provide a conceptual grounding in addressing complexity in MM research (Poth, 2018, 2020). This is followed by a brief review of the literature about MOOCs, including how they are structured, used, and typically evaluated. Next is a description of why logic models should be used in complex evaluations and the logic model (Sartorius, 1991) used to assess the MMIRA MOOC evaluation processes. The authors then outline the development of the MMIRA MOOC and its past evaluations, including a beta testing, evaluations of individual modules, and evaluations of each Season. The past evaluations are then assessed using the logic model to analyze the inputs, processes, outputs, and outcomes to identify areas of strength and improvement for future evaluations. The article concludes with lessons learned for how online educational evaluations can address complexity in research contexts and research problems.

FRAMING COMPLEXITY IN MIXED METHODS RESEARCH

Poth (2018) defines complexity as a "research system" where its elements "interact in multiple, nonlinear ways without direction. The outcomes of these interactions are impossible to predict with any accuracy, yet patterns of behaviour from the system can be documented retrospectively" (p. 5). MM researchers may use a "complex-sensitive approach" to their studies by remaining flexible in the face of emergent issues and dynamics that arise while engaging in research (Poth, 2018, 2020):

> Under conditions of complexity, mixed methods researchers need to continually adapt their responses since conditions are constantly changing and unpredictable. . . . Similarly, adaptive responses are needed for responding appropriately to evolving conditions in study contexts, interactions, integrations, and outcomes. The stakes of employing adaptive responses are high—if we do not adapt as we go, then the methodological cohesion we seek cannot be maintained. (Poth, 2018, p. 289)

Complexity within a system can be observed across five dimensions (features of the research problem, research contexts, research integration designs, capacities of the research interactions, and evidence of the research outcomes) and at three levels in each dimension (low, moderate, and high) (Poth, 2018). Differentiating the dimensions of complexity allows researchers to identify specific areas in which their research/evaluation system may have more or less complexity.

REVIEW OF THE LITERATURE

MOOCs are gaining popularity as a method for online education. Universities and academic institutions are utilizing MOOCs to allow thousands of students to engage in learning activities online. In the following subsections, we will describe

some common formats and functions for MOOCs and how they are typically evaluated.

Types of MOOCs

Among the many types of MOOCs, two are common: cMOOCs and xMOOCs (Kesima & Altınpulluk, 2015). cMOOCs assume that social interactions support mutual learning (Sinclair et al., 2015). In cMOOCs, learning resources are often provided. However, participants are generally responsible for coming up with their own learning objectives. Each participant's learning objectives, time, and background determines the level of participation. As such, there are no assessments in the MOOC, nor any decision about passing or failing the course. xMOOCs are courses constructed by major institutions for online access, which are similar to traditional university courses (Sinclair et al., 2015). They are often expert-led courses that focus on knowledge duplication for large groups of participants. Often there are learning objectives and assessments.

In addition, there are other types of MOOCs, such as sMOOC, referring to semi-massive open online courses; aMOOC, meaning adaptive MOOC, using computers as interactive teaching devices; bMOOC refers to blended learning, incorporating MOOC-based instruction into face-to-face instruction (Yousef et al., 2015); and SPOC, which refers to Small Private Online Courses that support blended learning and flipped classroom learning (Sinclair et al., 2015). The evaluation approach of a given MOOC will depend on the type of MOOC and the pedagogical aims.

Approaches to the evaluation of MOOCs

Quantitative approaches

Evaluations of MOOCs often use a single methodological approach, mostly quantitative research, focusing on one or two areas for the evaluation, such as retention and completion of the MOOC. High dropout rates are a commonly evaluated issue for MOOCs (Onah et al., 2014). For example, Perna et al. (2014) investigated course completion across 16 MOOC courses at the University of Pennsylvania using descriptive statistics. Out of 710,385 registrants across the 16 MOOC courses, only 5–18% of the registrants completed the course. A study by Hone and El Said (2016) surveyed 379 students in Cairo taking a MOOC and reported that 122 participants, 32.2%, completed the course. This retention rate was explained by significant predictors, such as perceived effectiveness of the course and interaction with the instructor. In addition, learners who passed the midpoint of a MOOC were more likely to complete the course (Hone & El Said, 2016). Greene et al. (2015) collected pre-course surveys and the results of the MOOC course from 33,938 participants and found that previous engagement with MOOCs, level of schooling, connection of the MOOC to current academic programs, and hours intended to be spent on the MOOC showed significant positive correlation to retention.

Other quantitative studies have reported common issues with MOOCs (Mingming & Yanli, 2014). For instance, learners' limited access to instructor support when they encountered difficulties is one important issue (Mingming & Yanli, 2014). One quantitative investigation with 50 respondents found that learners were generally satisfied with the usability and effectiveness of blended learning types of MOOC environments, or bMOOC (Yousef et al., 2015). Although quantitative approaches to MOOC evaluations offer interpretations of the factors that relate to student engagement and satisfaction, these studies often fail to include the voices of the MOOC stakeholders (e.g., instructors, student users) that are highlighted more in qualitative and mixed methods evaluations.

Qualitative and mixed methods approaches

Qualitative approaches in MOOC evaluations are very limited. One study by Douglas et al. (2019) interviewed MOOC instructors about the information they used to evaluate their own MOOCs. They found that instructors have access to quantitative data but are interested in collecting more qualitative data to evaluate their MOOCs. This study points to the widespread issue of a lack of qualitative data involved in MOOC evaluations (Douglas et al., 2019).

There is also little use of MM research approaches in evaluating MOOCs. One study by Zhu et al. (2019) used a sequential mixed methods design (Creswell & Plano Clark, 2017) to investigate instructors' motivations for offering MOOCs and their self-evaluation of the strengths of their MOOCs. The researchers surveyed MOOC instructors worldwide ($n = 143$), followed by interviews ($n = 12$). They found the primary motivations for instructors to offer MOOCs were their own growth and needs (Zhu et al., 2019). Another MM research evaluation investigated the use of MOOCs in a blended learning environment at the undergraduate level using surveys and focus groups (Torres-Coronas & Vidal-Blasco, 2017). They reported that their model improved the quality of students' education, enhanced their academic performance, and supported instructors in developing their process of teaching and learning. However, this study did not specify how they integrated the quantitative and qualitative data, nor did it identify a specific MMR design for their evaluation.

The literature review suggests that the methodological approaches most often used to evaluate MOOCs consist primarily of conducting surveys to investigate learner outcomes and possible issues with the content and delivery (e.g., Douglas et al., 2019; Greene et al., 2015; Mingming & Yanli, 2014; Onah et al., 2014; Perna et al., 2014; Torres-Coronas & Vidal-Blasco, 2017; Zhu et al., 2019). Additionally, MOOC evaluations focus on evaluating a single dimension of the MOOC, such as completion rates or student satisfaction (e.g., Hone & El Said, 2016; Yousef et al., 2015). Although there are a range of types, sizes, and formats of MOOCs, their evaluations do not comprehensively account for the dynamic contextual factors that influence MOOC development and use. Further, these evaluations do not address complexity surrounding how evaluations of MOOCs are developed and implemented. MOOC evaluations too often rely on a single methodological approach, most often have a singular focus for the evaluation, and lack a logic

model to guide the evaluation process (Foley et al., 2019; Meinert et al., 2018). These findings point to the usefulness of a MM approach to evaluation, such as the one adopted in the current study, to account for the contextual complexities within the MMIRA MOOC.

Framing our logic model

In order to address the contextual complexities of the MMIRA MOOC, we needed a sophisticated, flexible, and comprehensive framework. Literature suggests that logic models are appropriate for evaluating complex programs (Chen, 2005; McLaughlin & Jordan, 1999; Stack et al., 2018; W. K. Kellogg Foundation, 2004). According to the W. K. Kellogg Foundation (2004), logic models, and the process of developing them, facilitate thinking, planning, and communication about the objectives and actual accomplishments of an initiative. Logic models are a visual representation of the underlying logic behind an initiative. Logic models serve as a demonstration of connections between resources, assets invested, and their ultimate results (outcomes). Literature suggests that the logic models must clearly specify each component and show the connections/pathways between planned activities and their intended outcomes in a way that is easy for the intended stakeholders to understand (Millar et al., 2001; Stack et al., 2018; W. K. Kellogg Foundation, 2004). Montague and Porteous (2013) noted that given the complex nature of many initiatives, programs develop logic models to ensure that project staff, evaluators, and other stakeholders agree on planned activities and expected outcomes before launching an evaluation. On the other hand, Knowlton and Phillips (2013) underscored that developing a logic model can serve as a participatory learning opportunity for anyone interested in developing an evaluation, supporting efforts to accomplish such tasks as the following:

- developing common language among stakeholders,
- offering highly participatory learning opportunities,
- documenting and emphasizing explicit outcomes,
- clarifying knowledge about what works and why,
- identifying important variables to measure and enable more effective use of evaluation resources,
- providing a credible reporting framework, and
- leading to improved design, planning, and management. (p. 3)

The authors also noted the usefulness of logic models to "offer the strategic means to critically review and improve thinking. And better thinking always yields better results" (pp. 3–4).

Most evaluators will be familiar with a logic model, so we will describe briefly how logic models illustrate the logical relationships between invested resources, the activities to be performed, and the resulting benefits or impact. A logic model helps projects or program designers to set project objectives/priorities based on situation analyses or needs assessments (situation), define indicators of success

(outcomes), identify key activity groups (goals), define critical assumptions underlying the projects/programs (assumptions), identify means of verifying project accomplishments (outputs), identify contextual factors that may influence evaluation processes and desired outcomes, and define resources required for implementation (inputs). To evaluate the MMIRA MOOC, we selected the Logical Framework Approach or LogFrame (Sartorius, 1991). The LogFrame is primarily a project design tool. This frame identifies a process to develop a logic model for a new program, initiative, or intervention being designed in response to a given situation or problem. Sartorius (1991) stated that proper use of the LogFrame approach necessitates first a vision for the project's goals, objectives, or impact before planning the processes, activities, and actions to reach those goals. The LogFrame was originally used by the United States Agency for International Development (USAID) during the late 1960s in order to assist the planning, management, and evaluation of development activities. Figure 1 presents an example of a logic model for a MOOC or other educational settings.

BACKGROUND ON THE MMIRA MOOC

The development of the MMIRA MOOC

The aim of MMIRA is to provide an international and interdisciplinary forum about MM research, enabling mentoring and related educational opportunities (MMIRA, 2020). The planning for MMIRA's MOOC began in 2017 by a volunteer committee of MM scholars in MMIRA (Shannon-Baker & Musoke, 2019; see Figure 2 for a timeline of the MOOC development and evaluation). The MMIRA MOOC was created to address three purposes: provide free educational resources to MMIRA members on MM, address the need for educational opportunities in MM around

Inputs	Activities	Outputs	Outcomes	
			Short-Term	Intermediate & Long-Term
Financial, expertise, infrastructure	Background research, planning, recruitment, implementation, and evaluation activities required to develop and implement product and determine indicators for success	Resources created: materials and procedures required for design, implementation, monitoring and evaluation	Short-term outcomes directly related to the MOOC development, use, and evaluation	Intermediate and long-term outcomes related to the MOOC development, use, and evaluation and effect on broader networks
The Situation How the MOOC responds to a community need	**The Goal** Identification of a specific larger goal for the MOOC that contextualizes the MOOC evaluation processes	**Evaluation Cycle** Characteristics and timing of the MOOC evaluation processes	**Contextual Factors** Internal and/or external factors that may influence the development and implementation of MOOC evaluation processes	**Assumptions** Assumptions related to the use and implementation of MOOC evaluation findings

Figure 1. Generic logic model for online educational systems

Note. This figure was provided in greyscale to meet the journal printed publication requirements. A colour version is available online.
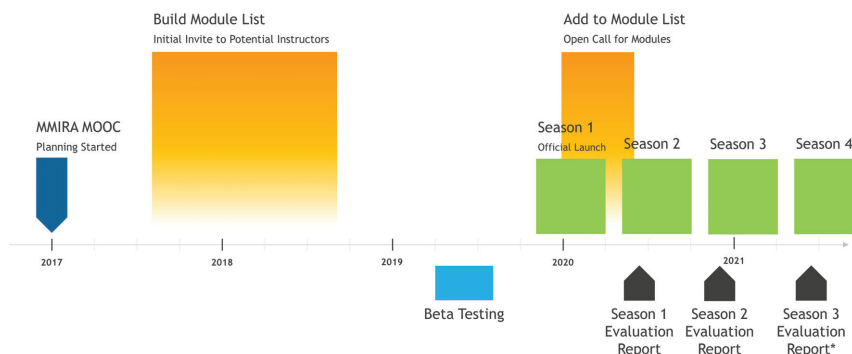
Figure 2. Timeline for the MMIRA MOOC development and evaluations

Note. This figure was provided in greyscale to meet the journal printed publication requirements. A colour version is available online.

*Indicates projected date at the time of writing this article.

the world, and provide content that reflected the topical diversity within the field of MM for students, early career researchers, scholars, and instructors.

The MMIRA MOOC is administered and overseen by a volunteer committee of MM scholars representing geographic, disciplinary, and demographic diversity (the MMIRA MOOC committee is hereafter referred to as the Committee). This Committee makes decisions about the MOOC through collaboration and dialogue around such topics as how to thematically group modules for upcoming seasons, identifying how to make changes to the MOOC processes based on previous evaluations, soliciting more modules to share, identifying how to address the high level of complexity in contextual factors (Poth, 2018) faced by MOOC users (e.g., limited access to stable Internet, download speeds), and so on. This Committee is further broken up into subcommittees for content management (prepares and uploads module materials), enrollment management (enrolls users and provides enrollment reports), advertising and promotion, and evaluation (creates and does periodic evaluations of the MOOC).

The content of the MMIRA MOOC

The MMIRA MOOC modules provided at a given time are thematically grouped into "Seasons." Each Season is offered for approximately five months at a time, with 10 modules in each Season. These modules are organized at two levels: core and specialized. The core set of modules provides foundational information about MM research. These modules are created primarily for those who are MM novices or those who need a refresher on basic MM knowledge and skills. The specialized set of modules provides more advanced or discipline-/region-specific information about the implementation of MM. These modules are created primarily for intermediate, advanced, or disciplinary-based MM researchers (Shannon-Baker & Musoke, 2019). As such, the MMIRA MOOC could be classified as a sMOOC with

Table 1. Sample modules provided in previous Seasons of the MMIRA MOOC

Sample core module titles (author, year released)	Sample specialized module titles (author, year released)
Defining Mixed Methods Research (Jennifer Greene, 2019)	Learning Analytics in Mixed Methods Research (Donggil Song, 2019)
Quantitatively Oriented Mixed Methods Research (Marcia Gail Headley, 2019)	Future of Mixed Methods Research (Sarah Munce, 2019)
Multidimensional Continua in Mixed Methods Research (Katrin Niglas, 2020)	Mixed Methods in Evaluation (Donna Mertens, 2020)
Writing Mixed Methods Research Reports (Nancy Leech, 2020)	Mixed Methods Research in the Caribbean (Loraine Cook, 2020)

elements of the xMOOC (Sinclair et al., 2015; Yousef et al., 2015). Courses with self-assessments are developed by MM research experts and delivered to MMIRA members. The MOOC enrolled 117 members for the first Season. See Table 1 for a sample of the modules previously offered.

Each module contains the same types of materials: a video lecture series on the topic, references for recommended readings, a study guide of key terms and questions related to the topic, and additional resources for further learning in the area. Some modules also include preview videos on the content. Each module was created by one or two instructors who have expertise in the area covered in the module. Video lectures are recorded by the instructor(s) and may include screen casting, demonstrations, and/or other visuals. The video lectures for each module includes one to three videos that are approximately 10 minutes each. All videos have transcriptions in the language spoken by the instructor(s).

SUMMARY OF THE PREVIOUS EVALUATION OF THE MMIRA MOOC

Since the MOOC was created in service to the organizational goal of MMIRA around advancing members' proficiency in MM, designing, implementing, and refining a comprehensive evaluation process are paramount. Consequently, the Committee used an iterative multi-phase mixed methods design (Creswell & Plano Clark, 2017) to evaluate the MOOC across each stage of design and imple-mentation, which aimed to improve user experience. In all evaluations, survey and qualitative responses from open-ended questions were sought concurrently from users. This process first began with beta testing prior to launching the MOOC, and using the feedback provided, it improved the MOOC and developed the individual-level as well as the seasonal-level evaluations. In this case, Season 1 evaluation findings will be used to refine Season 2 evaluations, and to improve module-level experiences (with Season 1 having been completed at the time of the initial writing of this article). See Figure 3 for the cycle of evaluations.
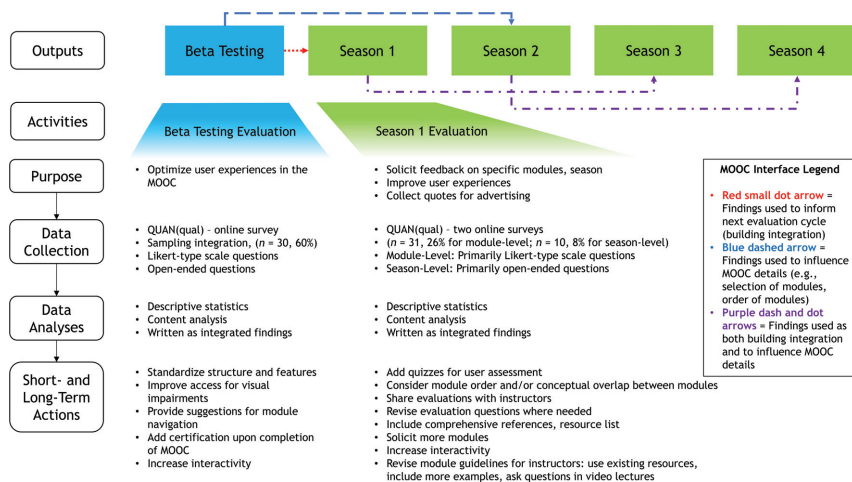
	Beta Testing	Season 1	Season 2	Season 3	Season 4
Outputs					

	Beta Testing Evaluation	**Season 1 Evaluation**	
Activities			

	Beta Testing Evaluation	Season 1 Evaluation	**MOOC Interface Legend**
Purpose	• Optimize user experiences in the MOOC	• Solicit feedback on specific modules, season • Improve user experiences • Collect quotes for advertising	**Red small dot arrow =** Findings used to inform next evaluation cycle (building integration)
Data Collection	• QUAN(qual) – online survey • Sampling integration, (n = 30, 60%) • Likert-type scale questions • Open-ended questions	• QUAN(qual) – two online surveys • (n = 31, 26% for module-level; n = 10, 8% for season-level) • Module-Level: Primarily Likert-type scale questions • Season-Level: Primarily open-ended questions	**Blue dashed arrow =** Findings used to influence MOOC details (e.g., selection of modules, order of modules)
Data Analyses	• Descriptive statistics • Content analysis • Written as integrated findings	• Descriptive statistics • Content analysis • Written as integrated findings	**Purple dash and dot arrows =** Findings used as both building integration and to influence MOOC details
Short- and Long-Term Actions	• Standardize structure and features • Improve access for visual impairments • Provide suggestions for module navigation • Add certification upon completion of MOOC • Increase interactivity	• Add quizzes for user assessment • Consider module order and/or conceptual overlap between modules • Share evaluations with instructors • Revise evaluation questions where needed • Include comprehensive references, resource list • Solicit more quotes • Increase interactivity • Revise module guidelines for instructors: use existing resources, include more examples, ask questions in video lectures	

Figure 3. Iterative MOOC evaluation cycles with evaluation procedures for the beta testing and Season 1 evaluations

Note. This figure was provided in greyscale to meet the journal printed publication requirements. A colour version is available online.

Description of the beta testing procedures

Prior to the public launch of the MOOC, beta testing was conducted to optimize user experiences between March and July 2019. Initially, using free beta testing resources (e.g., Centercode, 2019), a detailed standard operating procedure manual was developed to determine the objectives of the beta tests, outline the beta testers' expectations, outline a feasible timeline in which the beta test would be carried out, detail beta tester recruitment procedures and the methodology that would be employed, and determine the analytic procedure that would be used to assess the data. The evaluation form was tailored using the "Feedback Capture Grid," an analytic tool used to assess user feedback about a prototype in software or technology development (Interaction Design Foundation, 2019). The Grid captured the likes, criticisms, and ideas for MOOC improvement from beta testers.

The beta testing evaluation form was hosted on Google Forms. The evaluation assessed the readiness of the MOOC by evaluating the usability of the Moodle platform that is currently being used to host the MOOC (e.g., broken links, video quality, ease of access, usability of the interface across multiple platforms and Internet browsers across geographical regions), overall course design, and user satisfaction with course content. Each question was assessed on a Likert-type scale that ranged from disagree strongly to agree strongly (see Table 2). Additionally, short-answer open-ended questions were added about the applicability of the material, ease of access and use, time spent completing the sample modules, what was enjoyable about the content and platform, and what required further refinement. Finally, demographic information was collected to ensure responses

Table 2. Sample of the beta testing questions used

Example closed-ended questions[a]
I like the way this course was designed
It was easy to navigate through the modules
My understanding of mixed methods has improved

Examples of open-ended questions
What did you like best about the way the modules and content were designed?
What would you improve or change about the course?
Would you recommend this MOOC to others interested in learning mixed methods research? Please explain.

[a] These questions used a Likert-type scale: disagree strongly, disagree, somewhat disagree, somewhat agree, agree, and agree strongly.

ranged in experiences with MM and online education as well as accessibility to the Internet globally (cf. National Institutes of Health, 2009).

Beta testing was conducted over a period of three months and in three waves. About 50 MMIRA members volunteered in total; the first group of 15 beta testers initiated the testing and were given four weeks to complete their evaluation. Prior to the launch of the second wave of beta testers, the feedback from the first group was assessed to determine if the evaluation form required further refinement, including addressing any raised technical issues. Since no issues were found with the original beta testing instrument, the same assessment was carried out for the second and third waves.

In total, 30 complete responses were recorded; survey results were analyzed using descriptive statistics, while content analysis was used to analyze open-ended data. The merged findings were used to refine the MOOC and in part to develop our current evaluation procedures. Finally, a report was generated and shared with the Committee, the MMIRA Board, MMIRA members, and the beta testers. Data related to suggestions for improvement were transformed into actionable steps that the Committee could reasonably address in the short-term prior to launch. Examples included standardizing module structure, improving access by including a site reader for visually impaired users, and providing suggested guidelines for navigating the MOOC for new MM practitioners (Figure 3). For the long term, suggestions included improving student interactivity and providing MM research certification (Figure 3).

Description of module-level evaluation after launch

The first season of the MOOC was opened to users from October 1, 2019, to March 1, 2020. After finishing each module, users were invited to complete the evaluations for each of the modules. Of 117 registered MOOC users, 31 (26%) (Figure 3) respondents completed the voluntary module-level evaluations that

Table 3. Sample of the closed-ended questions[a] used in the module-level evaluation

Module objectives listed were met in this module.
The instructor clearly presented the concepts and knowledge in the video.
I would recommend this module to others.

[a] These questions used a Likert-type scale: strongly disagree, disagree, agree, and strongly agree.

were provided for after each module completed (see Table 3 for a sample of the prompts in the module-level evaluation). The number of evaluation responses from users across the 10 modules ranged between 13 and 23. The module-level evaluation focused on collecting information about each module to identify potential changes required to improve user experience in subsequent Seasons. Additionally, a few questions addressing suggestions for improvement that emerged during the beta testing phase were included in the evaluation. The questions assessed whether the changes made from beta testing and implemented prior to the MMIRA MOOC launch required further refinement; these included aesthetics of the learning platform and organization of each module.

As a result, the evaluation, which is hosted in Moodle, consisted of four closed-ended questions that focused on users' perspectives on the clarity of instruction, meeting stated learning objectives, and relevance of additional resources. Each question was rated on a Likert scale ranging from disagree strongly (score = 1) to agree strongly (score = 4) with no midpoint. The fifth question was open-ended, giving participants the opportunity to express additional opinions as well as provide clarity about their previous closed-ended answer choices. In addition to student evaluations, Moodle analytics relating to module use were evaluated to explore topic popularity. Similar to the beta testing, descriptive statistics and content analyses were used to analyze survey-related and open-ended responses, respectively, and findings were merged to develop recommendations.

Findings from the evaluations were circulated to Committee members, including members of the MMIRA Board. Examples of short-term recommendations included adding quiz items to each module for future Seasons, organizing modules that optimized learning and usage, and including modules that did not greatly overlap in subject matter (Figure 3). Long-term recommendations included adding additional questions in the evaluation that capture reasons for choosing a particular topic area for study, increasing module interactivity, providing feedback to instructors about user experiences, and improving availability of additional resources to students related to each module topic (Figure 3).

Description of Season-level evaluation after launch

Users were also invited to assess the whole Season. The purpose of this evaluation was to administer a summative evaluation about users' overall experiences and

solicit recommendations for changes and new module topics for the future. Despite having 117 users enroll in the MOOC, only 10 out of 117 (8%) users voluntarily completed the evaluation. The Season-level evaluation consisted of eight questions. The first two questions were focused on self-evaluation, where participants were asked to assess their achievement of goal completion using closed-ended questions. The last six questions, two of which were closed-ended (see Table 4), were about user experiences with the Moodle platform and the effectiveness of the learning materials for users' future application or implementation. Further, we sought to learn more about the strengths of the Season and areas requiring further refinement. Recommendations for improvement were also provided by users for upcoming Seasons. Similar to the module-level evaluations, users completed the evaluation in Moodle. A similar analytic approach was used to evaluate the findings and findings were merged to populate recommendations for improvement (Figure 3).

Findings from the Season-level evaluation were similarly shared with the Committee and with the MMIRA Executive Board. Short-term recommendations included using quotes from both the module- and Season-level evaluations to help promote and advertise the MOOC and adding quiz items to the modules to assess users' learning. Long-term recommendations included increasing user interactivity in the MOOC as a whole, revising the instructor guidelines to use more examples and share larger lists of additional resources, and soliciting more modules to include in future Seasons.

Description of levels of integration across the evaluation cycles

Levels of integration were woven across the cycles with the merging of survey and open-ended responses to develop action plans. At the beta testing phase, both the survey results and the open-ended findings were integrated in reporting as well as to develop recommendations for MOOC and user improvement. Survey data and qualitative data were collected concurrently from each user. Similarly, integration at the module level and Season level occurred during reporting and the development of the action plan for improving user experiences. Further, the integrated findings were used to improve MOOC module selection and content management (to improve quality of module delivery in Moodle), as well as to adapt evaluations to better capture effectiveness of the material in enhancing users' application of mixed methods approaches in their respective disciplines.

Table 4. Sample of the open-ended questions used in the Season-level evaluation

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Please describe what you consider to be the strengths of this season of modules.
Please describe what you feel could be improved in this season of modules if used again in the future.
What advice would you give to a potential student user who is considering joining the MMIRA MOOC?

CRITICAL REFLECTION ON ASSESSING THE PAST MMIRA MOOC EVALUATIONS

The Logic Model for MMIRA MOOC evaluation (Figure 4) illustrates the elements of the evaluation process. Starting from the inputs and the examination and acquisition of the resources needed relates not only to the initial phase of MOOC development but also to what is required to accommodate its evolution. Similarly, activities such as curriculum revitalization and modifying evaluation processes and tools will need to be continuously assessed to determine changes required, including Committee-level changes in governance and constitution. Subsequently, outputs related to content creation and delivery and advertising and promotion will require ongoing assessment and change as our user body grows. There was also a need to evaluate any increase in MM proficiency levels and continue to provide documentation for our users on this learning growth. There were also other financial, pedagogical, and philanthropic goals the Committee and MMIRA plan to realize through the MOOC.

Using the logic model to analyze the inputs, processes, outputs, and outcomes of past evaluations of the MMIRA MOOC helped us to identify several key findings. Much of the initial evaluation processes of the MMIRA MOOC used more informal approaches to evaluation. For example, the creation of a list of topics and potential instructors for those topics, a step which aimed to evaluate the

Inputs	Activities	Outputs	Outcomes	
			Short-Term	Intermediate & Long-Term

• Expertise in MMR knowledge and MOOC development
• Organizational funding for MOOC
• MOOC hosting website
• Beta testing expertise in MOOC development
• Beta testers
• Module instructors
	• Recruit instructors
	• Develop and implement:
	  • Management processes
	  • Curriculum and modules
	  • MOOC hosting site
	  • Beta testing
	  • Recruitment strategies
	  • MOOC evaluations
	• Launch MOOC
		• Beta testing survey and procedural manual
		• MOOC for entry- and advanced-level content in thematic seasonal sessions
		• Evaluation surveys and procedural manual
		• Evaluation report
		• Content assessment tool and procedural manual
		• Acknowledgement of Completion certificates for users
		• Advertising and promotional material and social media presence
			• User satisfaction experience with content and content delivery
			• Increased MMR foundational and theoretical knowledge for entry-level MMR practitioners
			• Increased competence in foundational MMR practical skills for MMR practitioners
			• Increased knowledge in specialized MMR for advanced-level MMR practitioners
				• Increase access to MMR education in settings with little to no MMR resources
				• Increase number of MMR experts in module pool
				• Increase number of disciplines represented in module pool
				• Increase MMIRA membership and thereby income to the organization
				• Increase disciplinary and cultural diversity of instructors in module pool
				• Increase number of modules
				• Identify strategies to ensure MOOC self-sustainability (financial)

The Situation Lack of access to reasonably-priced foundational mixed methods research educational opportunities	**The Goal** To increase mixed methods research knowledge and application across disciplines	**Evaluation Cycle** Formative, process, implementation, and outcome evaluations in a recursive MMR design to guide the growth of MOOC	**Contextual Factors** • Affordability of MMIRA membership • Availability of volunteer module instructors • Availability of volunteer members to run the MOOC and evaluations	**Assumptions** • Continued need for MMR educational resources • User access to dependable internet services • Consistent funding and personnel to sustain MOOC

Figure 4. Logic model applied to the MMIRA MOOC evaluations

Note. This figure was provided in greyscale to meet the journal printed publication requirements. A colour version is available online.

field of MM research to identify the important foundational elements to include in the MMIRA MOOC, was conducted via discussion and debate. At the time, the Committee did not use a specific framework or a formal evaluative process to investigate the range of topics covered or the diversity of instructors. However, more recent initiatives have implemented more formal evaluation processes. These include formalizing a beta testing phase and the module- and Season-level evaluations.

In considering more closely the elements of our logic model, we further identified that initial evaluation processes appear to focus more on the outputs and use those to guide the development of the MMIRA MOOC. For example, having an appropriate range of topics that would constitute a broad introduction to MM was a planned output in the initial formation of the MMIRA MOOC. More generally, establishing the MOOC was a specific output for the organization to meet its goal of increasing educational outreach related to MM. However, as the MOOC has progressed, the elements of the evaluation processes have grown more complex and intentional. More recent evaluation processes appear to focus more on the goal, input, and processes of the evaluation. For example, during our creation of the module- and Season-level evaluations, the evaluation team devoted time to clearly articulating the goal(s), inputs (e.g., who takes the evaluation), and the form and content of the evaluation questions. The differences in the informal versus formal evaluation processes might partially be a function of who was involved: Committee members who were focused more on the big picture engaged in informal processes toward specific outputs, whereas members devoted more to the process of running the MOOC focused more on the inputs and processes. However, it could also be a function of the development of the MOOC and/or the development of evaluation processes for the MOOC.

Another important element that we discovered when considering our evaluation processes in relation to our logic model was the extent to which each round of evaluations (formal or informal) was related to the next cycle of evaluations or developmental stage of the MOOC (see Figure 3). Initially, each cycle fed directly into the next component in the development or evaluation of the MOOC. For example, once the Committee achieved the creation of a list of module topics and potential instructors, the next step entailed creating a set of guidelines and tips for module instructors to send with the invitations. These documents were then used to process materials as they came in, which was done by the content management team in the Committee. In the more recent, formal evaluations, however, the outputs were not directly connected to immediate outcomes. For example, the MOOC Committee collected demographic information from the student users upon enrollment (e.g., current country, scaled level of current MM knowledge). However, due to the closeness in timing for when a Season (and its evaluations) close and the next is released, it has not been possible to immediately operationalize feedback on the next evaluation cycle. At the time of writing this article, the Season 3 evaluation report was being finalized, but the recommendations from this will be implemented in future Seasons. We attribute this seeming "delay" in

outcomes or operationalizing the outputs to the timing and to our capacity as an entirely volunteer group running and evaluating the MOOC.

As with most voluntary evaluations, achieving a high response rate remains challenging. In our case, evaluation response rates for coursework completed were similarly modest (21% for module-level evaluations and less than 10% for the Season-level evaluation). Despite the low response rates for the subsequent evaluations, the collected data still provided meaningful short- and long-term recommendations to improve the MMIRA MOOC.

Another challenge involved developing short questionnaires that would improve completion rates by reducing burden while balancing the need for capturing quality data that the Committee could then operationalize. The initial module-level evaluation question items did not include self-assessments or access to discussion forums; consequently, the Committee was unable to assess improved competencies in MM. However, as questions focused on user experience, the Committee was indirectly able to assess usefulness and helpfulness of content in improving MM application and in the overall effectiveness of pedagogy used to deliver material. Additionally, including open-ended questions provided opportunities for users to include additional elaboration on their quantitative/closed-ended responses.

In summary, the initial design of the MMIRA MOOC and the MOOC evaluation processes followed a gradational approach. The MOOC designing activities involved informal discussions for identifying necessary resources to develop the online coursework from creating a curriculum, seeking and soliciting expert knowledge to develop learning material, selecting a hosting website, and evaluating the design of the program prior to launch (beta testing). Conducting a beta test enabled the Committee to streamline and improve facets of user experience. However, the process for designing the evaluation came after the MOOC launched and focused on one main short-term outcome: user satisfaction. As part of the first major educational initiative set forth by MMIRA, understanding the perceptions of the MOOC users about the design and the user interface became a priority. Efforts to assess user content knowledge as well as application and skill development were deferred and will be instituted in upcoming seasons. Despite the narrowed initial focus of the program, the popularity of the MOOC continues to grow as MMIRA membership expands. With the expansion of the program and as current recommendations (based on short-term outcomes) are instituted in upcoming Seasons, a more rigorous and comprehensive evaluative approach is required to accommodate the growing complexities of the MOOC.

CONCLUSIONS

Evaluators are increasingly trained in and use MM approaches (cf. Szanyi et al., 2012). MM approaches are particularly helpful when evaluative contexts span diverse populations (e.g., Chandna et al., 2019). Developing and running a MOOC is a complex and multidimensional process. As a result, MOOC evaluations need to similarly account for this complexity. We attempted to address this complexity

through the use of a comprehensive tool adapted from the Logical Framework Approach or LogFrame (Sartorius, 1991). Applying this logic model allowed us to critically reflect on the input, activities, and outcomes of the MMIRA MOOC as well as our application of a multi-phase MM evaluation approach. It will be particularly challenging for MM evaluations of MOOCs to meaningfully integrate data and findings (Szanyi et al., 2012). Thus, the evaluation of complex MOOCs requires the use of MM approaches to model and measure its complex input, processes, and outcomes.

However, like most evaluations, the MOOC evaluation is limited by the number of participants who volunteer to complete the evaluation elements in addition to the quality of data collected. Considering that this MOOC evaluation took place during the COVID-19 pandemic, the smaller sample sizes might have also been impacted by burnout and additional stress faced by populations globally. Taking the time to fill out an optional evaluation amidst all that was going on around the world might have been too much, especially for populations facing not only the pandemic but also continued marginalization and violence. Our evaluation was further compounded by a lack of resources to implement qualitative methods beyond the inclusion of open-ended questions on a survey, hindering the collection of rich data that is typical for qualitative research. However, these challenges highlight the importance of pursuing a mixed methods approach. Collecting both quantitative and qualitative data in evaluations provides additional sources of data that are more useful and meaningful for improving MOOCs and user experiences than using either method alone.

NOTE

1 The authors' names are listed in alphabetical order.

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