Development and Pilot Implementation of the Online Certification of Universal Newborn Hearing Screening Personnel

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ABSTRACT

Objective. The current paper aimed to discuss developing the online newborn hearing screening certification course and revisions made from pre-pandemic face-to-face strategies to the online implementation in response to COVID-19 limitations. Furthermore, it aimed to create recommendations for the refinement of the course.

Methods. The development of the adaptation consisted of document review, focus group discussions among program faculty before and after implementation, which covered the demand for the certification course, opportunities for adaptation, situational limitations, and online implementation advantages and concerns. In addition, a cost-benefit analysis of the online course was done.

Results. The certification course was developed within a month and retained the same learning objectives going into an online implementation. One significant change was the addition of a *local experience module* which allowed for the participation of regional newborn hearing screening coordinators. More resources were required from both instructors and learners to implement successfully. Due to the asynchronous nature of the online course, the evaluation scheme was adapted accordingly. However, teaching strategies were limited. The pricing of the course was also not optimal.

Conclusion. Although there were merits in adapting the certification course to the online learning platform, there were areas for refinement. These were the alignment of all course modules to learning objectives, the addition of varied teaching methods, and the revision of pricing for the course.

Keywords: Newborn Hearing Screening, Certifying Course, Online Learning, Learning Management System

INTRODUCTION

All newborn hearing screening personnel in the Philippines must pass a certification course implemented by the Newborn Hearing Screening Reference Center (NHSRC) before joining the universal newborn hearing screening program enacted through RA 9709. This ensured standardized training among the screeners before integration into the program, as the minimum requirement for screening personnel in the Philippines is a high school degree and does not require any formal training in audiology.[1] The certification course familiarizes participants on their roles, responsibilities, and objectives in the universal newborn hearing screening program instead of the procedural training on using an otoacoustic emission or automated

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auditory brainstem response device given by the equipment manufacturer or distributor.

Before the COVID-19 pandemic, these certification courses were offered monthly in-person wherein a certain institution, hospital, or region may host the course. The study was composed of five lectures, a written exam, and a practical exam, all done in one day. Several changes were made since the first certification course was implemented in 2011. For example, a lecture on PhilHealth Updates was deemed necessary as the process and requirements for claims in the Philippine National Health Insurance System evolved. Furthermore, supplementary multimedia materials for different lectures were made and implemented; however, its acceptability among participants was left undocumented. Again, its eventual exclusion was also undocumented.

Due to COVID-19 prevention protocols, the implementation of the certification course was suspended from March to June 2020. Therefore, on May 30, 2020, the NHSRC decided to adapt the certification course using an online learning management system called Canvas (https://www.canvas.instructure.com) with which the NHSRC is affiliated.

Various studies have also shown that web-based training was an effective and acceptable way of training, even in medical settings.[2-4] Instructional design can be significantly impacted when delivering training or learning services in an online modality. For example, in a study by Margaryan, Bianco, and LittleJohn, massive open online courses (MOOCs) were evaluated for their instructional quality by assessing their adherence to principles of instruction by Merill.[5,6] Findings showed that most MOOCs were sequenced and presented well; however overall, instructional design quality was low which could have limited the transfer of learning to real-life situations.

The current paper discussed the development of the online course and revisions made from the face-to-face to the online implementation of the system in response to the global pandemic. Moreover, the study aimed to document recommendations and its rationale for the refinement of the newborn hearing screening personnel certification course, its educational, administrative, operational, and fiscal features for the approval of the National Technical Working Group for the Universal Newborn Hearing Screening Program. Lastly, the process may serve as a model for other educational endeavors adopting remote learning.

METHODS

Focus Group Discussion among Program Faculty regarding the Certification Course

On May 30, 2020, a focus group discussion took place wherein program faculty explored ways on how the institute could continue addressing the demand for newborn hearing screeners in the country despite the challenges brought about by the pandemic. Health, safety, and economic concerns were considered, along with the best teaching and learning strategies. In the end, the group agreed that shifting to remote learning would be ideal for all stakeholders. The team also explored Canvas, an online learning platform, and Zoom, a cloud-based communications application for the online course.

Syllabi and other records of the newborn hearing screening personnel certification course pre-COVID-19 were reviewed. According to the content, teams were then appointed to further discuss and address the gaps in the pre-COVID-19 certification course in the current needs and situation. This included the formulation of learning objectives, determination of content, identification of teaching/learning strategies, allotment of time, identification of resources, and development of the evaluation scheme. The teams were also instructed to work within the parameters of the pre-COVID syllabi so as not to necessitate review and approval of the National Technical Working Group for the Universal Newborn Hearing Screening Program.

Each team created pre-recorded learning materials for each module and then reviewed the materials for all modules before implementation.

Implementation of Online Program

Upon the approval of the Department of Health, the online adaptation of the certification course was launched last June 2020. The online system was implemented monthly, utilizing an asynchronous model where contents were accessible to participants at their own pace within a given timeframe (within a month). As an overview, the program was divided into several processes: Registration, Online Course and Assessment, and Program Evaluation. All registration and confirmation were accomplished via email, and the participants were given access to the Canvas platform for the month they were enrolled in. In addition, accessible on the platform were the learning modules which were pre-recorded lectures, written examination and instructions for the practical test, feedback forms, and other related documents.

A detailed description of the contents and evaluation process are discussed in the following sections.

After going through the modules and taking the written examination, participants must submit their practical exam video to the course secretariat via email, then forwarded and assigned it to the examiners. Feedback for passers and non-passers was provided, and those who did not pass were given a second chance to schedule an online session via Zoom. A course coordinator was tasked to oversee the status and progress of the participants, address inquiries and related concerns. Finally, results of the practical exam were submitted to the course secretariat, which consolidated all requirements and the final list of passers at the end of each month. An end-of-the-month program evaluation attended by the faculty was convened after every course cycle. Focus group discussions were held to review program highlights, processes, logistics, outcomes, and issues encountered.

Cost-Benefit Analysis

A five-year cost-benefit analysis was done to compare the cost of in-person and online universal newborn hearing screening personnel certification courses. A cost matrix developed by Bartley and Golek was used to categorize and organize expenses.[7] Finally, the benefit was measured as monetary gains of the NHSRC from the implementation of the course.

RESULTS

Discussion among the program faculty of the NHSRC resulted in the decision to adopt the certification course on an online platform to address the demand for more certified personnel by institutions around the country. Upon reviewing the available documents, including financial records of previous implementations, Department of Health-approved syllabus, and learning and evaluation materials used in pre-COVID courses. These revealed that although initial plans for implementing the system were set for 30 participants per session, there were instances wherein classes could accommodate up to 100 participants. It was then seen that an online platform could potentially meet this capacity.

This served as the basis for the one-month adaptation period of the modules onto Canvas. A consensus among team members was reached in the finalization of the adapted materials produced.

Learning Objectives

The online course was developed based on the existing face-to-face system. There were no differences in the targeted objectives to which other course components (i.e., content or lectures and assessment) were built. In general,

the certification course was conducted to ensure compliance of Newborn Hearing Screening Centers (NHSCs) to operational standards outlined in the RA 9709 Manual of Operations (MOP). In addition, it provided all personnel involved in the Universal Newborn Hearing Screening Program (UNHSP) with the theoretical and procedural knowledge needed to implement a standardized and sustainable program. The specific objectives described in Table 1 established the course's six main topics or units (as discussed in the next section, *Content)*. However, not all of the objectives translated to a specific module. Instead, it combined some of the goals. Specifically, objectives 2 and 5 were connected and were covered in module 2 of the course. No module directly addressed objective 4 (*to counsel parents)*; discussion on this was limited to explaining the results rather than the attitudinal aspect of counseling.

Content

Content of the certification course largely remained the same between modes of implementation. However, there was some variability in the subtopics discussed under Hearing Tests for Infants and Hearing Interventions for Infants when a regional institution hosted the course in the face-to-face setting. *However, this strategy in the variability of subtopics discussed has been practiced in the face-to-face environment as* resource speakers tended to insert extra talking points or examples regarding the topic, some specific to the experience in the region. This contrasted with the online implementation where the topics and resource speakers were fixed (recorded).

A key difference in the content of the online implementation was the addition of the Local Experience module. The module aimed to feature the universal newborn

Table 1. Comparison of Learning Objectives

Face to Face	Online
General Objective To hold an Integrated Orientation and Updates to RA 9709 and Category A Newborn Hearing Screening Personnel Certifying Course for 80 personnel from private and public facilities.	*General Objective* To hold an Integrated Orientation and Updates to RA 9709 and Category A Newborn Hearing Screening Personnel Certifying Course for 80 personnel from private and public facilities.
Specific Objectives 1. To gain knowledge about the history and updates on RA 9709. 2. To know the available confirmatory hearing diagnostic tests in the area and the entire country. 3. To know the available interventions and support systems in the area and the entire country. 4. To be able to counsel parents or guardians about universal hearing screening, hearing loss and get consent to administer a hearing screening method, using otoacoustic emissions or automated auditory brainstem response 5. To be able to know how to use an otoacoustic emissions device (OAE) or automated auditory brainstem response (AABR) in newborns 6. To be able to fill out the Newborn Hearing Screening Registry Form and transmit results to the Newborn Hearing Screening Reference Center 7. To be able to know about Newborn Hearing Screening Philhealth Claims	*Specific Objectives* 1. To gain knowledge about the history and updates on RA 9709. 2. To know the available confirmatory hearing diagnostic tests in the area and the entire country. 3. To know the available interventions and support systems in the area and the entire country. 4. To be able to counsel parents or guardians about universal hearing screening, hearing loss and get consent to administer a hearing screening method, using otoacoustic emissions or automated auditory brainstem response 5. To be able to know how to use an otoacoustic emissions device (OAE) or automated auditory brainstem response (AABR) in newborns 6. To be able to fill out the Newborn Hearing Screening Registry Form and transmit results to the Newborn Hearing Screening Reference Center 7. To be able to know about Newborn Hearing Screening Philhealth Claims

Table 2. Comparison of Content

Face to Face	Online

1. Introduction to RA 9709
   a. What is newborn hearing screening
   b. The rationale of RA 9709
   c. Categories of Newborn Hearing Screening Centers
   d. Requirements for Newborn Hearing Screening Centers
2. Hearing Tests for Infants
   a. Prevalence of hearing loss in newborns
   b. Importance of Hearing Screening
   c. Methods for Newborn Hearing Screening
      i. Otoacoustic Emission
      ii. Automated Acoustic Brainstem Response
   d. Stop Criteria
   e. Methods of Confirmatory Hearing Assessment
3. Hearing Interventions for Infants
   a. Importance of early intervention
   b. Members of Intervention Team
   c. Audiological Intervention
      i. Listening Devices
         1. Hearing Aids
         2. Implantable Hearing Devices
   d. Speech and Language Intervention
      i. Auditory Verbal
      ii. Auditory Oral
      iii. Visual Communication
      iv. Total Communication
      v. Alternative and Augmentative Communication
4. Reporting and Registry
   a. The rationale of good clinical documentation
   b. Accomplishing the Newborn Hearing Screening Registry Card
   c. Newborn Hearing Screening Online Registry
   d. Newborn Hearing Screening Excel Sheet
   e. Supply of Newborn Hearing Screening Registry Cards
5. PhilHealth and Updates
   a. Who can avail of newborn hearing screening under Philhealth?
   b. Can the infant be covered for the Newborn Care Package even without newborn hearing screening?
   c. What are the attachments needed to claim for newborn hearing screening?
   d. What will we do when there is a fortuitous event?
   e. Can a reader's fee be collected for OAE or AABR
   f. Will PhilHealth cover for confirmatory testing and intervention?
   g. What are the services offered under the z-package for hearing impaired children?
   h. Who is entitled to avail of the Z-package for children with hearing impairment?
	1. Introduction to RA 9709
	   a. What is newborn hearing screening
	   b. The rationale of RA 9709
	   c. Categories of Newborn Hearing Screening Centers
	   d. Requirements for Newborn Hearing Screening Centers
	2. Hearing Tests for Infants
	   a. Prevalence of hearing loss in newborns
	   b. Importance of Hearing Screening
	      i. Roles of each center category
	   c. Methods for Newborn Hearing Screening
	      i. Otoacoustic Emission
	      ii. Automated Acoustic Brainstem Response
	   d. Stop Criteria
	   e. Methods of Confirmatory Hearing Assessment
	3. Hearing Interventions for Infants
	   a. Importance of early intervention
	   b. Members of Intervention Team
	   c. Audiological Intervention
	      i. Listening Devices
	         1. Hearing Aids
	         2. Implantable Hearing Devices
	   d. Speech and Language Intervention
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	   d. What will we do when there is a fortuitous event?
	   e. Can a reader's fee be collected for OAE or AABR
	   f. Will PhilHealth cover for confirmatory testing and intervention?
	   g. What are the services offered under the z-package for hearing impaired children?
	   h. Who is entitled to avail of the Z-package for children with hearing impairment?
	6. Local experience
	   a. Summary of the role of screeners
	   b. Prevalence of hearing loss in the Philippines
	   c. Estimated cases of hearing loss in Metro Manila
	   d. Nationwide Distribution of Accredited Centers
	   e. Distribution of Category A, B, C, and D centers in Metro Manila

hearing screening act in each region or locality. These were to be prepared by the regional coordinators of the universal newborn hearing screening program.

However, it is worthy to note that each module did not state specific learning objectives; instead, it showed an overview of topics to be covered.

Table 2 shows the comparison of content from the face-to-face implementation to online.

Teaching Strategies

Teaching strategies in the face-to-face implementation is composed of a combination of straight lectures and lecture/discussions. Due to the physical setting of the mode of execution, participants can ask questions and ask for clarifications regarding the lecture. However, there is no variety in teaching strategy beyond this. Therefore, demonstrations on the use of the device were not included.

Due to the electronic training format, the online implementation utilized programmed instruction as a teaching strategy, enabling participants to go through the course at their own pace. When all modules were accomplished, the written examination was programmed to be available for the learner. Only when the written exam was finished were the instructions for the practical test given. However, in each module, the teaching strategy employed is straight lecture-only because real-time discussions cannot be done in a self-paced learning experience. There were discussion boards open for any questions and a learner-instructor instant messaging feature available on the learning management system used; however, these have not been utilized by participants.

Table 3 shows the comparison of teaching strategies from face-to-face implementation to online.

Resources

The online implementation of the certifying utilized remote learning resources. Both instructors and participants needed to create a Canvas and Zoom account before starting a run of the course. Access to the certification course was given by the course coordinator and was only limited to participants and examiners who were invited in each run. Zoom accounts were required among examiners to schedule practical examination sessions with participants who chose to use the modality. Alternatively, participants can opt to submit videos of themselves performing the practical examination, which will require them to have essential video editing software available to them. Thus, a reliable internet connection was necessary for both instructor, examiner, and participant.

There was also more reading material provided in the online implementation. However, it lacked the newborn hearing screening leaflets for parents that the face-to-face implementation offered.

Table 4 shows the comparison of resources from face-to-face implementation to online.

Evaluation Method

Written and practical examinations were given to assess if the participants exhibited the theoretical and psychomotor components essential to newborn hearing screening. Each participant must pass both tests to become an NHSRC-certified newborn hearing screener.

Table 5 summarizes the comparison of evaluation schemes from face-to-face implementation to online.

Written Examination

The written examination in the face-to-face courses consisted of 25 multiple-choice questions. It included items related to the different lectures, except Hearing Intervention for Infants. In actual tests, participants were given question and answer sheets. They may refer to their notes during the examination but needed to return the question sheets to the coordinator once they were finished to avoid test leakage.

The online written examination also consists of 25 multiple-choice questions. It contained items on the different topics discussed in the recorded lectures in the online course, except Local Experience. During the development phase, the lecturers were requested to submit ten essential questions on their assigned topic to the coordinator. All of these were encoded in Canvas.

Table 3. Comparison of Teaching Strategies

Face to Face	Online
1. Introduction to RA 9709 - Lecture 2. Hearing Tests for Infants - Lecture/Discussion 3. Hearing Interventions for Infants - Lecture 4. Reporting and Registry - Lecture/Discussion 5. PhilHealth and Updates - Lecture/Discussion	*Programmed Instruction* 1. Introduction to RA 9709 - Lecture 2. Hearing Tests for Infants - Lecture 3. Hearing Interventions for Infants - Lecture 4. Reporting and Registry - Lecture 5. PhilHealth and Updates - Lecture 6. Local experience - Lecture

Table 4. Comparison of Resources

Face to Face	Online
Instructor 1. Laptop 2. LCD projector 3. Projector screen 4. Sound system *Participant* 1. Paper and writing materials 2. RA 9709 Manual of Operations 3. Program Schedule 4. Newborn Hearing Screening Leaflets for Parents	*Instructor* 1. Recorded PowerPoint presentations in video format 2. Canvas account 3. Zoom account *Participant* 1. Computer with reliable internet connection 2. Canvas account 3. Basic video editing software 4. Device Certification List 5. RA 9709 Manual of Operations 6. PhilHealth Circular 2018-2021 (Enhancement of Newborn Care Package) 7. PhilHealth Z Benefits for Children with Hearing Impairment Circular

Table 5. Comparison of Evaluation Method

Face to Face	Online
Written Exam	***Written Exam***
1. 25 item multiple-choice written examination	1. 25 item multiple-choice written examination
2. The passing score for the written examination is 17 points	2. The passing score for the written examination is 17 points
Practical Exam	***Practical Exam***
1. 12-point practical examination checklist	1. 17-point practical examination checklist
2. The passing score for the practical examination is 9	2. The passing score for the practical examination is 16.5

Table 6. Cost-Benefit

Scenario	NHSRC Cost (30 pax)	Cost for Participant	5-Year ROI (IRR)
Online Only	₱68,389.97	Full Course: ₱1,500.00 Update: ₱500.00	-21.4% (N/A)
Face-To-Face (Pre-COVID)	₱43,554.86	Full Course: ₱3,500.00 Update: ₱2,000.00	160.12% (N/A)
Face-To Face (During COVID)	₱139,763.86	Full Course: ₱4,000.00 Update: ₱2,500.00	1.34% (958.00%)
Face-To-Face (Post-COVID)	₱81,289.97	Full Course: ₱2,500.00 Update: ₱1,000.00	1.07% (19.00%)

During an actual examination, Canvas randomly selected five items under each topic. These items were then presented to the participants one by one in no particular order. In this implementation, a person will not be able to change his or her answer once he or she has submitted a response and moved on to the next question.

All participants were given 30 minutes to complete the written exam in both the face-to-face and online delivery modes. Moreover, those who failed to obtain a score of at least 17 points were notified either personally during in-person courses or through Canvas by the course coordinator and were given the option to retake the exam should he or she wish to re-enroll in the exam next run.

Practical Examination

The content of the practical examination for both modes of implementation was similar. They touched on crucial elements of newborn hearing screening from start to finish (i.e., introduction, preparation of equipment, actual screening using a device, saving and printing of results, counseling, and reporting of results). However, the online version has a total of 17 points versus its face-to-face counterpart with just 12 points. The addition of 5 items in the online practical examination was due to two significant reasons: to add more weight to certain aspects of newborn hearing screening and to include an item following the safety guidelines because of the pandemic.

Each participant was given a practical exam form showing the test items during the face-to-face courses and then was assigned to an audiologist-examiner. He or she will perform the hearing screening using his or her facility's device with an adult acting as the infant. Each audiologist-examiner assessed the examinee as he or she performed the procedures. Feedback on the performance was given immediately. Participants who did not meet the passing score of 9 points were given another chance to take the test after all other examinees have finished. If they did not pass the exam on the second try, they had the option to re-enroll in the course during its next run.

In online practical examinations, participants have the option to take the test synchronously or asynchronously. This was because of possible technical constraints due to connectivity issues. Synchronous assessments were done via Zoom, a video conferencing platform (https://zoom.us). Participants and examinees were given 30 minutes to complete the exam. While in asynchronous tests, participants submitted videos of themselves performing newborn hearing screening and answering questions. The duration of the videos was not to exceed 15 minutes in total.

As with face-to-face practical exams, each participant in the online courses was provided with a score sheet before the test. The version used for the online courses has more content but was based on its face-to-face counterpart. It contained not only the test items but also specific details and steps in performing the procedures. Moreover, the rubric for grading was also included in the sheet. These aimed to make the process more efficient for both the examiner and examinee and made grading more objective despite having multiple examinees.

Instructions were more specific in the online version. This was done to aid the participants in recording their video submissions.

Feedback was given immediately during synchronous assessments. While in the asynchronous method, examiners sent feedback forms via email. In cases wherein participants did not meet the passing score of at least 16.5 out of 17, they were given another opportunity to retake the exam via Zoom. If they failed after the retake, they had the option to re-enroll in the next run of the course.

The criteria for the passing score in the practical examination has been adjusted because of the following reasons: skills and behaviors expected from each participant was explained in detail on the exam sheet and, more importantly, to ensure that the participants were given certifications were competent in performing the procedures given the limitation in correcting their errors in the practical examination during remote assessments.

Cost-Benefit Analysis

The cost-benefit of pre-COVID face-to-face implementation of the certification course was initially compared against the online implementation. It was seen that the cost of the online certification course was higher than the pre-COVID face-to-face implementation. This was mainly due to the addition of a paid analysis and evaluation team. Furthermore, the current pricing of the online implementation incurred a negative 5-year return on investment. In contrast, the pricing of the face-to-face certification course incurred a significant return on investment even during the first year. The internal rate of return was not applicable in both situations as the online certification course did not incur returns—the pre-COVID face-to-face implementation results in a guaranteed return on the first year.

The cost-benefit of face-to-face implementation during and after the time of COVID was also considered. Antigen swab testing of participants, examiners, and instructors was the most significant contributor to the increased cost of face-to-face certification courses during COVID.

Table 6 shows a summary of the cost-benefit of the evaluated scenarios. Appendix A shows the cost matrix of the different systems.

DISCUSSION

Learning Objectives

The learning objectives were identical for both face-to-face and online certification courses. This was expected because the program objectives were maintained and needed within the RA 9709 Manual of Operations provisions. The bone of contention then was whether these learning objectives were achieved on the online course. Thus, alignment of learning objectives to other components of instruction was essential.[8-10]

To do so, Chatterjee & Corral recommended writing learning objectives that will explicitly state the knowledge and skills expected from the learners, which should be described using measurable and observable action words and how these elements will be assessed.[10]

As the online adaptation is continuously being evaluated and revised, defining these elements will guide the overall course design, allowing the course developers to create the contents, plan and implement teaching and assessment strategies in line with the objectives.[9-12]

Content

The online certification course content may have mainly been based on the face-to-face implementation; however, there were gaps in the course's alignment of content and learning objectives. The face-to-face certification course content addressed the first, second, third, fifth, sixth, and seventh learning objectives. On the online adaption, the addition of the local experience supplements the Hearing Tests for Infants and Hearing Interventions for Infants module in addressing learning objectives (2) To know the available confirmatory hearing diagnostic tests in the area and the entire country and (3) To know the available interventions and support systems in the area and the whole country.

Once regional coordinators create learning materials for their locality, the module will be more valuable. However, there was no additional content to address the fourth learning objective directly - To be able to counsel parents or guardians about universal newborn hearing screening, hearing loss and get consent to administer a hearing screening method, using OAE or AABR. This is a concern that should be addressed by adding a dedicated module.

Teaching Strategies

The main difference between the online and face-to-face courses in terms of teaching strategies was pre-recorded lectures versus in-person lectures. This limited interaction between the faculty and the learners resulted in the absence of real-time feedback. This was similar to the experiences of medical and dental students in the study of Mukhtar et al.[13]

Since the strategies employed in the online version were asynchronous, the inclusion of more varied teaching strategies could be beneficial in future iterations of the online certification course. In addition, utilization and promotion of available features (i.e., instant messaging, discussion boards, etc.) on Canvas can facilitate clarifying discussions among learners and instructors/coordinators.[14] The integration of formative assessment activities can also be a viable option to explore to engage learners to think critically about each lecture topic.[15] These formative assessments can include case studies, demonstrations, and end-of-module questions.

Varied teaching strategies that stimulate active learning has been seen to provide better evidence of the transfer of knowledge.[16] Learning activities based on problem-based learning have developed cognitive flexibility and decision-making skills necessary in handling different situations.[17]

Resources

The online implementation of the certifying course was more resource-intensive as compared to face-to-face. A reliable internet connection was essential for both instructor, examiner, and participant.[13] Everyone involved had to meet the technical requirements such as laptops, relevant software, and Digital literacy. All these amounted to conditions that may not always be readily available among those involved.

Thus, optimal preparation must be done. Immediate access to the internet was beneficial to asynchronous learning activities, according to Hodges et al.; however, it was more impactful during long-term synchronous learning engagements.[18]

On further implementations of the universal newborn hearing screening personnel certification course, the Newborn Hearing Screening Leaflets for Parents may be included in the reference materials available on the Canvas learning platform. Furthermore, it may be beneficial to have them in each module and the recorded lecture videos to be more accessible and given context to their importance.

Evaluation Method

Evaluation methods for the online implementation of the certification course were designed to measure the competencies of the participants in administering newborn hearing screening. Changes were made in both the written and practical examination components of participant evaluation.

For the written examination, test items were randomly selected and presented. These were implemented to avoid dishonest behaviors among participants.[19] For the practical examination, the score sheet was modified using a rubric to make the process more efficient for both the examiner and examine and make grading more objective despite having multiple examinees.[20,21]

Between the implementations, it was the changes in the practical examination portion that had a more significant impact on the course. Participants had the option to submit pre-recorded videos.[22,23] With asynchronous assessment, more time was utilized to finish assessing one participant according to examiners during a meeting on the fourth month of implementation. This was due to the lack of dedicated time for assessment and the relatively variable time of video submissions of participants. Moreover, when a participant did not pass the practical exam at the first attempt, he/she and the examiner agreed on another schedule for the re-examination. As a result, the number of participants was limited in the online implementation compared to its face-to-face counterpart.

Cost-Benefit

The initial cost of 1,500 pesos per participant in the online certification course incurred a negative 5-year return. However, a 500 peso increase in the full online course can result in a 1.26% return on investment and a 17% internal rate of return. As a government institution, the NHSRC should not profit from any of its services; thus, the minimal 5-year return was more acceptable than the significant guaranteed profit of the pre-COVID face-to-face implementation.

Moreover, a 500 peso increase from the pre-COVID face-to-face implementation addressed the additional costs to implement a face-to-face course during the COVID-19 pandemic. This was mainly due to the price of the pre-COVID face-to-face implementation having a significant 5-year return on investment. However, a large consideration also was the availability of a venue that can allow 30-40 people. Therefore, after the pandemic, adding an analysis and evaluation team in the face-to-face implementation can be considered.

CONCLUSION

The present study aimed to describe the revisions made from the pre-COVID face-to-face implementation to the online learning platform to respond to the pandemic and create recommendations for refinement. There were merits to the design of the adapted certification course, such as the retention of learning objectives. This showed that the online learning platform did not impede the achievement of targeted competencies among learners. Furthermore, the addition of a local experience module opened the opportunity to engage the regional coordinators of the universal newborn hearing screening program.

However, there were still gaps in the design of the certification course itself. First, not all learning objectives were directly addressed. Second, there was the limitation of not having real-time feedback in an asynchronous learning program. Third, the inclusion of varied teaching strategies created more engaging learning experiences for learners. Fourth, the utilization of available features on Canvas increased engagement among learners. Lastly, the current pricing of the NHSRC online certification course incurred a negative return on the cost, which can be addressed through a 500 peso increase for full course participants totaling to a fee of 2,000 pesos per enrollee per course.

Statement of Authorship
All authors substantially contributed to the conception, design of the work, the acquisition, analysis, interpretation of data for the work. Drafting the work, revising it critically for important intellectual content, final approval of the version to be published, agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Author Disclosure
All authors declared no conflicts of interest.

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APPENDICES

Appendix A. Cost Matrix

	Online Training				Face-To-Face (Pre-Covid)				Face-To-Face Training (Sponsored Pre-Covid)				Face-To-Face Training (Covid)				Face-To-Face (Post Covid)			
	One Time Costs		Per Session Costs		One Time Costs		Per Session Costs		One Time Costs		Per Session Costs		One Time Costs		Per Session Costs		One Time Costs		Per Session Costs	
Analysis																				
Analysis Team Costs[1]	₱0.00		₱0.00		₱0.00		₱0.00		₱0.00		₱0.00		₱1,100.00		₱33,000.00		₱0.00		₱0.00	
Office Supplies and Expenses	₱153.86		₱4,615.67		₱153.86		₱4,615.67		₱153.86		₱4,615.67		₱153.86		₱4,615.67		₱153.86		₱4,615.67	
Miscellaneous	₱500.00		₱15,000.00		₱500.00		₱15,000.00		₱500.00		₱15,000.00		₱500.00		₱15,000.00		₱500.00		₱15,000.00	
Total	₱653.86	a	₱19,615.67		₱653.86	a	₱19,615.67		₱653.86	a	₱19,615.67		₱1,753.86	a	₱52,615.67		₱653.86	a	₱19,615.67	
Design/Development																				
Design and Development Team[1]	₱152.78		₱4,583.33		₱0.00		₱0.00		₱0.00		₱0.00		₱0.00		₱0.00		₱152.78		₱4,583.33	
Design User Interfaces	₱0.00		₱0.00		₱0.00		₱0.00		₱0.00		₱0.00		₱0.00		₱0.00		₱0.00		₱0.00	
Total	₱152.78	c	₱4,583.33	d	₱0.00	c	₱0.00	d	₱0.00	c	₱0.00	d	₱0.00	c	₱0.00	d	₱152.78	c	₱4,583.33	d
Implementation																				
Instructor Costs[1]	₱300.00		₱9,000.00		₱250.00		₱7,500.00		₱250.00		₱7,500.00		₱416.67		₱12,500.00		₱250.00		₱7,500.00	
Examiners Costs	₱500.00		₱15,000.00		₱333.33		₱10,000.00		₱333.33		₱10,000.00		₱433.33		₱13,000.00		₱333.33		₱10,000.00	
Coordinators Costs	₱166.67		₱5,000.00		₱166.67		₱5,000.00		₱166.67		₱5,000.00		₱166.67		₱5,000.00		₱166.67		₱5,000.00	
Secretariat Costs	₱33.33		₱1,000.00		₱50.00		₱1,500.00		₱50.00		₱1,500.00		₱50.00		₱1,500.00		₱50.00		₱1,500.00	
Program Materials and Supplies	₱0.00		₱0.00		₱350.00		₱10,500.00		₱350.00		₱10,500.00		₱0.00		₱0.00		₱350.00		₱10,500.00	
Catering	₱0.00		₱0.00		₱280.00		₱8,400.00		₱0.00		₱0.00		₱280.00		₱8,400.00		₱280.00		₱8,400.00	
Equipment	₱0.00		₱0.00		₱0.00		₱0.00		₱0.00		₱0.00		₱87.00		₱2,610.00		₱0.00		₱0.00	
COVID Expenses	₱0.00		₱0.00		₱0.00		₱0.00		₱0.00		₱0.00		₱3,166.67		₱95,000.00		₱0.00		₱0.00	
Miscellaneous	₱0.00		₱0.00		₱0.00		₱0.00		₱866.67		₱26,000.00		₱0.00		₱0.00		₱0.00		₱0.00	
Total	₱1,000.00		₱30,000.00	g	₱1,430.00		₱42,900.00	g	₱2,016.67		₱60,500.00	g	₱4,600.33		₱138,010.00	g	₱1,430.00		₱42,900.00	g
Evaluation																				
Evaluation Team[1]	₱1,100.00		₱33,000.00		₱0.00		₱0.00		₱0.00		₱0.00		₱0.00		₱0.00		₱1,100.00		₱33,000.00	
Total	₱1,100.00		₱33,000.00	i	₱0.00		₱0.00	i	₱0.00		₱0.00	i	₱0.00		₱0.00	i	₱1,100.00		₱33,000.00	i
Grand Total																				
Fixed Costs for Training Session (a + c)	₱806.63	f	₱24,199.00	f1	₱653.86	f			₱653.86	f			₱1,753.86	f			₱806.63	f		
Per Training Session Costs (d + g + i)			₱67,583.33	e			₱42,900.00	e			₱60,500.00	e			₱138,010.00	e			₱80,483.33	e
Anticipated Number of Training Sessions			1	b			1	b			1	b			1	b			1	b
Total Overall Costs for all Sessions (e × b)	₱67,583.33	h			₱42,900.00	h			₱60,500.00	h			₱138,010.00	h			₱80,483.33	h		
Total Overall Costs (f + h)	₱68,389.97		₱91,782.33		₱43,553.86				₱61,153.86				₱139,763.86				₱81,289.97			

Appendix B. Cost-Benefit Analysis Face-to-Face Course Pre-COVID

Interest Rate – 2.48%	Full Course Fee – ₱3,500.00 Update Course Fee – ₱2,000.00		Full Course – 30 pax Update Course – 10 pax			
Year	1	2	3	4	5	
Benefits						
A	₱1,260,000.00	₱1,260,000.00	₱1,260,000.00	₱1,260,000.00	₱1,260,000.00	
B	₱240,000.00	₱240,000.00	₱240,000.00	₱240,000.00	₱240,000.00	
C						
D						
E						
Total Benefits	₱1,500,000.00	₱1,500,000.00	₱1,500,000.00	₱1,500,000.00	₱1,500,000.00	
PV Benefits	₱1,470,588.24	₱1,428,571.43	₱1,388,888.89	₱1,363,636.36	₱1,327,433.63	₱6,979,118.54
CPV Benefits	₱1,470,588.24	₱2,899,159.66	₱4,288,048.55	₱5,651,684.92	₱6,979,118.54	
Costs						
A	₱522,646.27	₱522,646.27	₱522,646.27	₱522,646.27	₱522,646.27	
B	₱54,000.00	₱54,000.00	₱54,000.00	₱54,000.00	₱54,000.00	
C						
D						
E						
Total Costs	₱576,646.27	₱576,646.27	₱576,646.27	₱576,646.27	₱576,646.27	
PV Costs	₱565,339.48	₱549,186.92	₱533,931.73	₱524,223.88	₱510,306.43	₱2,682,988.44
CPV Costs	₱565,339.48	₱1,114,526.40	₱1,648,458.13	₱2,172,682.00	₱2,682,988.44	
Total Benefits – Total Costs	₱923,353.73	₱923,353.73	₱923,353.73	₱923,353.73	₱923,353.73	
Yearly NPV	₱905,248.76	₱879,384.51	₱854,957.16	₱839,412.48	₱817,127.20	₱4,296,130.11
CNPV	₱905,248.76	₱1,784,633.27	₱2,639,590.43	₱3,479,002.91	₱4,296,130.11	
ROI						160.12%
IRR						

Appendix C. Cost-Benefit Analysis Online Course During COVID

Interest Rate – 2.48%	Full Course Fee – ₱1,500.00 Update Course Fee – ₱500.00		Full Course – 30 pax Update Course – 10 pax Retake Course – 5 pax			
Year	1	2	3	4	5	
Benefits						
A	₱540,000.00	₱540,000.00	₱540,000.00	₱540,000.00	₱540,000.00	
B	₱60,000.00	₱60,000.00	₱60,000.00	₱60,000.00	₱60,000.00	
C	₱30,000.00	₱30,000.00	₱30,000.00	₱30,000.00	₱30,000.00	
D						
E						
Total Benefits	₱630,000.00	₱630,000.00	₱630,000.00	₱630,000.00	₱630,000.00	
PV Benefits	₱617,647.06	₱600,000.00	₱583,333.33	₱572,727.27	₱557,522.12	₱2,931,229.79
CPV Benefits	₱617,647.06	₱1,217,647.06	₱1,800,980.39	₱2,373,707.66	₱2,931,229.79	
Costs						
A	₱930,679.60	₱765,679.60	₱765,679.60	₱765,679.60	₱765,679.60	
B						
C						
D						
E						
Total Costs	₱930,679.60	₱765,679.60	₱765,679.60	₱765,679.60	₱765,679.60	
PV Costs	₱912,430.98	₱729,218.67	₱708,962.59	₱696,072.36	₱677,592.57	₱3,724,277.17
CPV Costs	₱912,430.98	₱1,641,649.65	₱2,350,612.24	₱3,046,684.60	₱3,724,277.17	
Total Benefits – Total Costs	-₱300,679.60	-₱135,679.60	-₱135,679.60	-₱135,679.60	-₱135,679.60	
Yearly NPV	-₱294,783.92	-₱129,218.67	-₱125,629.26	-₱123,345.09	-₱120,070.44	-₱793,047.38
CNPV	-₱294,783.92	-₱424,002.59	-₱549,631.85	-₱672,976.94	-₱793,047.38	
ROI						-21.29%
IRR						

Appendix D. Cost-Benefit Analysis Proposed Change for Online Course During COVID

Interest Rate – 2.48%	**Full Course Fee – ₱2,000.00**					
	Update Course Fee – ₱500.00					
Year	**1**	**2**	**3**	**4**	**5**	
Benefits						
A	₱720,000.00	₱720,000.00	₱720,000.00	₱720,000.00	₱720,000.00	
B	₱60,000.00	₱60,000.00	₱60,000.00	₱60,000.00	₱60,000.00	
C	₱30,000.00	₱30,000.00	₱30,000.00	₱30,000.00	₱30,000.00	
D						
E						
Total Benefits	₱810,000.00	₱810,000.00	₱810,000.00	₱810,000.00	₱810,000.00	
PV Benefits	₱794,117.65	₱771,428.57	₱750,000.00	₱736,363.64	₱716,814.16	₱3,768,724.01
CPV Benefits	₱794,117.65	₱1,565,546.22	₱2,315,546.22	₱3,051,909.85	₱3,768,724.01	
Costs						
A	₱930,679.60	₱765,679.60	₱765,679.60	₱765,679.60	₱765,679.60	
B						
C						
D						
E						
Total Costs	₱930,679.60	₱765,679.60	₱765,679.60	₱765,679.60	₱765,679.60	
PV Costs	₱912,430.98	₱729,218.67	₱708,962.59	₱696,072.36	₱677,592.57	₱3,724,277.17
CPV Costs	₱912,430.98	₱1,641,649.65	₱2,350,612.24	₱3,046,684.60	₱3,724,277.17	
Total Benefits – Total Costs	-₱120,679.60	₱44,320.40	₱44,320.40	₱44,320.40	₱44,320.40	
Yearly NPV	-₱118,313.33	₱42,209.90	₱41,037.41	₱40,291.27	₱39,221.59	₱44,446.84
CNPV	-₱118,313.33	-₱76,103.43	-₱35,066.02	₱5,225.25	₱44,446.84	
ROI						1.19%
IRR						17%