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Technological innovation in international training and advancing health services: Two cases during the COVID-19 pandemic

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Abstract

Over the past three years, the COVID-19 pandemic has limited onsite international activities and challenged us to plan and implement new ways of collaboration. We reviewed our online trials during this period to better understand how to continue knowledge and skills transfer using digital technologies. In this cross-national case study, we compare two illustrative cases: Japanese experts training Indonesian health professionals for participatory school health education, and Swiss experts training Malagasy health providers for respectful obstetric and newborn emergencies. We first describe our cases, referring to Vargo's framework in summarizing reports on digital technology usage. Second, we draw commonalities between the two cases. Third, we offer recommendations for efficient and effective international collaboration using new technologies gleaned from these experiences during the pandemic. For both cases, basic digital technologies, such as online meetings and e-mailing, were used, and training sessions were successfully conducted for local professionals. Trusting relationships between the training and participant groups were in place before the pandemic. This led to enthusiasm for continuing learning even after the pandemic started. Our case comparison presents the usefulness of digital technologies for continuing international collaboration, and highlights the importance of human factors, such as trusting relationships and enthusiasm to pursue a shared goal, as the basic condition for success.

Introduction

The COVID-19 pandemic that began in 2020 has restricted onsite international activities and challenged us to plan and implement new ways of collaboration. According to the Global Strategy on Digital Health 2020-2025 published by the World Health Organization (WHO), innovative use of digital information and communications technologies will be an essential enabling factor ensuring that one billion more people benefit from Universal Health Coverage, one billion more people are better protected for health emergencies, and one billion more people enjoy better health and well-being. Digital transformation of health care has proven potential to enhance health outcomes by improving medical diagnosis and data-based treatment, but also through the creation of more evidence-based knowledge, skills and competence for professionals so they can provide better health care. Three years have passed since the start of the pandemic, and it is time that we review our experiences with online trials to continue knowledge and skills transfer using digital technologies.

The literature identifies positive changes as well as the challenges of switching to online/hybrid training. More resources, including human resources and outsourcing, are needed initially to set up new online courses, and content must be modified to fit to a new teaching mode (Seymour-Walsh, 2020). Training must be provided to increase digital skills of faculty. However, once a high-performance digital platform is developed, it can remain in place for several years and attract learners who were previously not available (for various reasons, including travel cost, distance, and regional conflicts) for in-person training (Joos, 2020). Distance learning can make training more equitable and provide unique opportunities for people to exchange ideas (Ibragimo, 2022). On the other hand, some people may find it difficult to get involved in virtual learning, familiarize themselves with the required digital skills, balance learning and work, and adjust to time differences (Wijesooriya, 2020). In addition, the mental and physical health conditions of attendees needed special attention during the pandemic (Cleland, 2020).

Here we present two cases: Japanese experts training Indonesian health professionals for participatory school health education, and Swiss experts training Malagasy health providers for respectful obstetric and newborn emergency care. We focus on how new technologies were used to maintain international collaborative professional training during the pandemic. There are vast differences in the cultural and socioeconomic features in the countries involved, but the participants shared similar positive and negative experiences as they underwent the trainings.

Vargo and colleagues (2021) conducted a rapid review on digital technology usage during the pandemic in various health-related fields, summarizing four topics: 1) the specific digital technologies that were used, 2) the specific populations who used these technologies, 3) the specific activities where they applied the technologies, and 4) the

activities' effects. We use this framework to describe our cases and draw practical recommendations to promote digital skills transfer in international collaboration.

Methods

This is a cross-national case study. We used two cases of professional training, one between Japan and Indonesia and one between Switzerland and Madagascar (Table 1), applying methods from our previous research (Benski, 2021; Henning, 2015). The case study does not test a hypothesis; rather, it facilitates the construction of generalizable claims (Gomez, 2011). We first describe our cases according to Vargo's framework. Second, we draw lessons learned from the two cases. Third, we offer recommendations for efficient and effective international collaborative professional learning using new technologies under conditions such as the COVID-19 pandemic.

Japan-Indonesia case

This case involves a participatory school health project named Creative Health, targeting elementary school students. The project was launched in Japan after the Fukushima nuclear accident in 2011, and in line with the Sendai Framework for Disaster Risk Reduction, to equip students with competencies and skills to live and engage within their communities. The model was originally imported from the United Kingdom to Japan (Goto 2020) and adapted and expanded by adding teaching components (Goto 2022).

Creative Health consists of three workshops using arts and various interactive activities. In the BODY workshop, students learn about their own bodies by sharing what they already know, presenting scripted storyboards about medical discoveries, and measuring and graphing their own heart rates. In the FOOD workshop, students learn through cooking, quizzes, and drawing how their meals play a part in their lives and health. In the ACT workshop, students use participatory theater methods to express their ideas about food and health in their local community (Lloyd Williams and Goto, 2022). We collaborated with teachers and a local board of education to provide training for the teachers who run the workshops (Goto 2020).

The project was then exported again, from Japan to Indonesia.[1] After evaluating the project outcomes in Japan (Goto 2022), we started planning the implementation with a collaborating university in Indonesia. Diponegoro University in Indonesia had a long-standing educational collaboration with Kagoshima University in Japan, dispatching their young faculty to study in a doctoral program. At the same time, researchers at Kagoshima and Fukushima Universities had a long-term research collaboration for projects in another Asian country.

[1] This project was approved by the Ethics Committee of Fukushima Medical University (General 2020-060, 16 July 2020).

Our initial plan was to carry out onsite, in-person trainings in Indonesia beginning with the ACT workshop. This was discussed in 2019 in person by the Japanese expert and the local team. However, the plan was changed to a hybrid training model due to travel restrictions during the pandemic (Table 2). The hybrid training involved facilitators participating online and trainees gathered in one place. It was coordinated by an Indonesian faculty member residing in Japan. The first online training of the ACT workshop was conducted in January 2022. It was a two-hour training segment facilitated by the UK-based researcher who had developed the original workshop. There were 14 participants, including five teaching faculty, two graduate students, and seven medical students. Immediately after the training, the local team piloted the ACT workshop at local schools in Indonesia. Participants' opinions were collected in writing after the training, and field surveys were received from 23 participants (including the five teaching faculty, two graduate students, six medical students, and ten local school teachers). The text data from these surveys were analyzed using a free text mining software (KH Coder, Version 3). Used words were categorized and color-coded by the co-occurrence network.

Switzerland-Madagascar case

This case was a simulation-based training on respectful emergency obstetric and neonatal care that was delivered in an innovative hybrid manner during the COVID-19 pandemic. The training was tailored to the needs of maternity department staff at a peripheral district hospital in the northwest of Madagascar, the Centre Hospitalier Régional de District (CHRD). The hospital's staff and medical directors had requested respectful emergency obstetric and newborn care training from Geneva University Hospital (HUG), a Swiss academic medical hospital. Four institutions partnered to respond to CHRD's request: CHRD, HUG, the Madagascar Ministry of Health, and Enfants du Monde (a Swiss NGO). Before the pandemic, the partners had agreed to utilize a simulation-based training methodology, which had not previously been introduced in Madagascar.

When the COVID-19 pandemic hit, the partnership had to adapt its plans when the Swiss experts could no longer travel to Madagascar to conduct the simulation training in-person. The partners spent significant time determining how to deliver the planned training using technology. Eventually, they developed additional instructional videos and experimented with how to position cameras and screens to allow for hybrid participation. They also decided to add a training-of-trainers component to involve local trainers from the capital who could participate in person. The simulation-based training took place between June and September 2021, with evaluation activities following.

The project was implemented in three phases (Table 3). Phase 1 was a training of trainers (TOT) for 10 trainers identified by the Ministry of Health; this was conducted remotely by Swiss partners. Phases 2 and 3 were the training of 13 staff members at CHRD. Phase 2

was theoretical and didactic training, while Phase 3 focused on conducting and debriefing simulations of obstetric and neonatal emergency scenarios. Phases 2 and 3 were conducted in a hybrid manner: the trainees and some trainers met in person at CHRD, and other trainers participated remotely from Antananarivo and Switzerland.

Results

Table 4 presents the two cases using the framework from Vargo and colleagues (2021). In the Indonesia-Japan case, e-mail communication and an online meeting system (Zoom) were used to prepare for the training. Documents describing the training flow and required pre-training preparation were sent prior to an online preparatory meeting for core members. For practicing the theater method, an audiovisual system was needed. Several cameras were set up at a training site, with large screens for the training participants to see the trainers and vice versa. High-quality microphones and speakers were also required for both sides to communicate smoothly during the session.

Of the 23 participants, 21 provided written opinions about what they learned from the training. Frequently-used words were placed into one of three categories:

- "children's creativity" (child, creativity, express, workshop, idea, and have)
- "children's opinions" (student, think, convey, work, and way)
- "fun learning" (learn, be, fun, new, thing, also, and food)

These quotes from the surveys highlight common opinions:

- *"We had the opportunity to learn how to help children to express their creativity, accompany them, and hopefully encourage them to be braver to express their idea."* (university student)
- *"Learn to accept various opinions that will be conveyed by students."* (school teacher)
- *"Learning is not only material, but also discovery of new things that are more fun and very useful for student development."* (school teacher).

The training was followed by an immediate adaptation in the form of a workshop protocol in a local language, implementation at local schools, and evaluation of the outcome by university faculty and students. The results were reported at an international conference, and university students developed a short video of their workshops for the promotion of the program. Based on the successful implementation of the ACT workshop, another hybrid training for the BODY workshop was conducted, and its implementation at local schools is underway.

In the Switzerland-Madagascar case, both the hybrid format for simulation-based training and the course content on respectful emergency obstetric and neonatal care were well-received by the CHRD participants, as well as by the trainers in the capital. The trainees felt that the main benefit of simulation-based training was the opportunity to immediately

debrief after each simulation exercise, and they noted that they received useful feedback from all observers, whether onsite or participating remotely. All CHRD participants reported that they had improved their knowledge of management of obstetric emergencies, and 91% felt they had improved communication with their colleagues. Partners also provided positive feedback about other ad hoc activities and their experiences working together. We have extended the project for three years in order to offer training in emergency respectful obstetric and newborn care to all district health providers working in maternal and newborn health.

The project also resulted in expanded national-level awareness and engagement in the partnership and facilitated capacity building among Malagasy nationals to conduct simulation-based training. The TOT participants' involvement also smoothed the process of ensuring that the content and tools developed for the training were fully aligned with national standards for maternal and neonatal care. Their participation also made it feasible for the partners to agree to a request that had been voiced by the CHRD staff: to conduct the simulations in Malagasy, rather than French, to make the scenarios more realistic. The partners have agreed to continue collaborating to improve health outcomes among mothers and babies in Ambanja district.

Discussion

For both cases, basic digital technologies such as online meetings, e-mail, digital communication tools, and real-time simulation were used to plan and implement training sessions for local professionals. Trusting relationships between the training and participant groups were in place before the pandemic, which led to enthusiasm for continuing learning even after the pandemic started. Our cases present the usefulness of digital technologies—and, at the same time, underscore the importance of human factors to pursue a shared goal (Figure 1).

Using technology-assisted communication for planning and redesigning the training to allow remote participation resulted in better outcomes: innovative trainings that are based on international protocols and best practices, tailored to local needs and capacities, and delivered by a combined team of local and non-local trainers. The partnerships' activities were deemed useful by participants in both cases. In a narrative review by Khurshid and colleagues (2020), they listed and described online modes that were reported on in previous research. Interestingly, these tools required independent learning and participation of trainees. For example, in a "flipped curriculum/flipped classroom," instructional content was delivered online before class, and class time was used for practice. Another review, by Bridgwood and colleagues (2023) summarized the benefits of virtual learning, which included engagement and autonomy in learning that participants used to shape their own learning. Our case studies and these reviews suggest that

technology-assisted training could be a way forward for facilitating active learning, increasing ownership of learned skills, and fostering local adaptations.

For successful implementation of virtual learning, substantial organizational commitment and collaboration among participants and trainers are needed. Our detailed analysis of the structure of the Madagascar partnership presented the importance of building strong international partnerships through sharing common values and goals for program implementation, active engagement of all team members, and mutual respect (Benski, 2023).

Access to high-quality digital technology requires sufficient financial support for digital tools and good internet connections, as well as for skilled staff to manage the technology. Team members must be able to rely on the technology to be able to see and hear each other during activities, with non-verbal movements in sync while participating in specific actions during simulation scenarios. For the Indonesian case, instructors needed to observe the processes that participants used when creating a performance in order to provide appropriate and timely instructions. Through preparatory meetings, local members understood the training's content and goals and self-prepared a training room equipped with multiple cameras and a stable internet connection, which led to smooth implementation.

It is clear that technical aspects are very important in determining the success of distance learning. Our cases emphasize that human factors are also fundamental. They illustrate that the combination of trusting relationships and shared goals among international collaborators with utilizing digital tools for professional training enhances autonomy in learning, thus leading to successful local application of learned knowledge and skills. Mitchell and Kan (2019) stated that training would be changed by technology and that face-to-face training would be replaced by locally-customized distance learning which "will not be seen as a one-time effort but a continuous stream of training updates for each health worker." Even post-pandemic, we can continue to benefit from digital-assisted training. The COVID-19 pandemic opened the door to creating many scenarios and opportunities for professional learning in remote areas where training resources are lacking, including those with complicated health environments, epidemics, or armed conflicts.

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Table 1. Two cases of international collaborative training

	Japan - Indonesia	**Switzerland - Madagascar**
Flow of skills transfer	From Japan to Indonesia	From Switzerland to Madagascar
Transferred knowledge and skills	Participatory school health workshop • Aims and expected outcomes of the workshop • What to prepare for the workshop to take place at local elementary schools • How to facilitate the workshop with class teachers and children	E-simulation-Based Training on Respectful Emergency Obstetric and Neonatal Care • Behavior changes and management of emergencies in obstetric and newborn care • How to organize a simulation-based training and practice a debriefing • How to maintain a strong partnership to ensure efficient collaboration
Trainers	Health and sociology experts in Japan and the United Kingdom	• Obstetrician and neonatologist expert from Geneva University Hospital • Respectful care expert from the Swiss NGO Enfants du Monde • Skilled trainers based in Antananarivo
Trainees	Faculty and students at a medical school	Health providers working in maternal and newborn health at the district hospital
Language	English and Indonesian	Malagasy and French
Reference	Goto et al. 2022	Benski et al. 2022 (submitted)

Table 2. Overview of a half-day hybrid training in Indonesia

Preparatory online meeting (30 mins)
• Among the core local members and facilitators • Confirm the training flow and preparation of tools and settings listed below
Preparation of tools and settings
• Open space (gym), large sheets of papers (one per group), and marker pens (different colors) • Large screen to project training instructions via a computer connected to internet, a microphone, and a speaker • Two facilitators • Slides explaining the project
Hybrid training (120 mins)
1. Explanation about the workshop • Project history and aims • Workshop flow 2. Experiencing the workshop[a] • Greeting in a circle • Warm-up exercise • Discuss in groups about local foods • Pick one favorite topic and create a short drama scene • Show the scenes to teach other • Closing activity 3. Review • Sit back in circle for questions and answers
Follow-up
• Revise the workshop to local context and aims • Ethical review application at the local institute • Pilot testing of the workshop at local schools • Evaluation and reporting of the pilot workshop

a. The content of the workshop is explained in detail previously (Goto 2020).

Table 3. Overview of online training in Madagascar

Phase	Dates	Activity	Locations of participating individuals
Phase 1	15-18 June 2021	Remote TOT for 10 MOH trainers	Antananarivo, Geneva
Evaluation	19-25 July 2021	Baseline data collection	Ambanja
Phase 2	23-25 July 2021	Didactic training sessions on respectful emergency obstetric and neonatal care	Ambanja (one person from Antananarivo), Antananarivo, Geneva
Phase 3	31 August - 8 September 2021	Group 1: simulation-based training (6 topics and role play)	Ambanja, Antananarivo, Geneva
Phase 3	13-21 September 2021	Group 2: simulation-based training (6 topics and roleplay)	Ambanja, Antananarivo, Geneva
Evaluation	24 November 2021	Feedback workshop	WHO/MOH/HUG/ CHRDA/EDM
Evaluation	5-7 July 2022	Focus group discussions with training participants for qualitative evaluation	Ambanja (including one person from Switzerland), Antananarivo, Geneva

TOT: Training of trainers, MOH: Ministry of Health, WHO: World Health Organization, HUG: Hôpitaux Universitaires de Genève, CHRDA: Centre Hospitalier de Référence du District de Ambanja, EDM: Enfants du Monde

Table 4. Commonalities in usage of digital technologies in two cases

	Japan - Indonesia	**Switzerland - Madagascar**
1. Specific digital technologies that were used	• For planning: Online meeting (Zoom) and e-mailing • For implementation: Online meeting (Zoom) and the audiovisual set up at a training site	• For planning: Group chats (Messenger app and WhatsApp) • For implementation: Hybrid meetings (Zoom, Teams, and Moodle)
2. Specific populations who used these technologies	Facilitators (university faculty and students) of school health workshop, and the workshop trainers (university faculty/researchers) in Japan and the United Kingdom	Facilitators at MOH, trainers in Antananarivo, facilitators at the district hospital (a midwife and an IT expert), health providers/participants in Ambanja, university specialists in Switzerland, and NGO members in Switzerland
3. Specific activities that they applied the technologies	Training of trainers and its preparation	Training of trainers Training of trainees Preparation of the e-learning and simulation-based training
4. Activities' effects	• Development of a local workshop protocol in a local language • Immediate implementation at local schools • Conference presentation and development of a video clip for the project promotion • Subsequent training	• Development of simulation scenarios in local language • Extended national level engagement and involvement of local trainers from the capital • Additional training focused on technical skills and interprofessional - teamwork

Figure 1. Summary of key points

Conditions	• International capacity-building project • Restricted access of overseas professionals to a local community			
Training flow	Training planning →	Training tool development →	Online/Hybrid training →	Review and evaluation
Technology factors	• Digital communication tools	• Digital communication tools • Audiovisual aids	• Digital communication tools • Stable and fast internet • connection • Audiovisual aids	• Digital communication tools
Human factors	• Sharing the same goal and passion • Trusting network	• Development of easy-to-understand teaching materials adapted to the local context	• Knowledge and skills learning	• Further application in local fields