ENSTORYING GLOBAL HEALTH LANDSCAPES OF LEARNING:

A REVIEW AND ANALYSIS OF COMPLEXLY COEVOLVING PRACTICE

by

KARI ELLER

(Under the Direction of Karen E. Watkins)

ABSTRACT

As the intensity and frequency of wicked challenges faced by vulnerable communities continue to rise, collaborative, bottom-up approaches to support global health and well-being are imperative. Informal and incidental learning (IIL) can offer pathways for progress in an increasingly digital world. Today, IIL calls us to consider how technological tools can expand the reach of learning processes to organizational networks that share and generate knowledge in evolving contexts.

The overall purpose of my four-article dissertation research is to advance scholarship and praxis of informal and incidental virtual learning (IIVL) as an educational strategy to provide needed training for diverse (health)care workers and improve health outcomes. The first article reviews one variation of IIVL, global health virtual communities of practice (VCoP), and proposes a typology of their functioning. The second article conducts a mixed methods evaluation of a digital peer learning-to-action model used for continuing professional development to improve health outcomes of a neglected tropical disease. The third article conceptually explores the features of VCoPs and provides insight into how they may combine and intersect with those of digital learning networks (DLNs) to address critical issues of global

concern. The fourth article conducts a mixed methods exploration of organizational learning culture and the ways in which a digital peer learning-to-action model enhance network capacity to provide mental health and psychosocial support.

Findings from this research hold significance for global health leadership, working to advance continuous professional development opportunities valued by practitioners across its multiple landscapes of learning. For methodologists, policymakers, and funding bodies, this research shares contextualized health outcomes connected to the comprehensive evaluation of large-scale, multinational, and inter-organizational learning events. For health professionals, findings provide timely insight into how IIVL can support health initiatives in their contexts.

INDEX WORDS: virtual communities of practice (VCoPs), digital learning networks (DLNs), global health, informal and incidental (virtual) learning, peer learning-to-action, complexity, mixed methods research, health outcomes

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DOCTOR OF PHILOSOPHY

ATHENS, GEORGIA

2025

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May 2025

DEDICATION

For all who have widened the path, for all who work relentlessly in hope for global health and well-being, and for all who dare to dream–your light has limitless power to better our world. It has inspired mine.

ACKNOWLEDGEMENTS

First and foremost, I offer my praise and thanks to God. It is by God's grace that I have traversed the mountainous journey of doctoral studies and been transformed for the road ahead. Along the way, so many people accompanied me, and I have much to be grateful for.

To my husband, Justin Eller, and son, Everette Eller Fisher, I thank you for always being right by my side. You listened to every new proposal and iteration, shared in my excitement when I succeeded, and grounded me in love when I needed to try again. Your care and support gave me the strength to keep moving forward. To my immediate and extended family and friends worldwide, your presence and prayers have been a source of positive energy. You are the driving power behind my 'why.'

To my major professor, Dr. Karen Watkins, and committee members, Dr. Henriette Lundgren, Dr. Giovanni Dazzo, and Dr. Juliet Sekandi, your expert guidance has been invaluable to me and strengthened the resolve of each article in this dissertation. A special thanks also goes to Dr. Aliki Nicolaides, who has been a part of my doctoral journey at the University of Georgia (UGA) from the beginning until the end. It is because of the kindness, encouragement, and great examples you have all set that I have accomplished more than I originally believed possible.

To all my doctoral professors at UGA, former doctoral advisors and professors at the University of Nebraska–Lincoln, all other professors who have influenced my academic path, former work colleagues, and life teachers, you have been foundational to my education–thank you for the numerous opportunities you created for growth and development. As I think and write, I can hear your words and wisdom, challenging and echoing in my own.

To all my doctoral peers–some of whom have now graduated, some of whom will graduate alongside me, and some of whom will continue on–you have also been my teachers and the very best classmates, writing partners, and project team members. Your companionship and friendship made the journey a very special one I hold dear.

Since August 2023, I have held a graduate assistantship with The Geneva Learning Foundation (TGLF), which contributed greatly to my success in completing this degree and the quality of research I have conducted. To Reda Sadki, Charlotte Mbuh, Ian Jones, Séverine Jacomy Vité, Yuliia Yushchenko, María Fernanda Monzón, Jenny Sequeira, Ian Steed, others a part of the TGLF team, and the thousands of healthcare professionals, educators, and social workers participating in TGLF facilitated programming and activities, thank you for allowing me to be a part of this great work, for sharing your time, knowledge, and skills with me, and for all that you do every day to make the world a better place. You taught me how to network and partner in new ways and, as you do for everyone, made me feel welcome and needed.

As part of my work with TGLF, I had the opportunity to collaborate in research with amazing people. To Julie Jacobson, Nicole Vecchio, Caroline Pensotti, Amy Nwoku, Alan Brooks, and others a part of the Bridges to Development team, it was an honor to work with you. Our meetings always brought me joy, made me curious to learn more, and were a constant reminder that together, we can do great things.

My deepest appreciation to everyone mentioned and unmentioned here who has made a difference in my life. I will carry all the hope-filled gifts you have shared with me as I set out again and seek out ways to pass them on in all that I do.

TABLE OF CONTENTS

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER 1: INTRODUCTION

Our 21st century is riddled with wicked challenges, and vulnerable, poor, and disadvantaged communities in low and middle-income countries disproportionately suffer their effects (Benevolenza & DeRigne, 2019). Simply stated, "global health is public health" (Hibberd & Galea, 2017), and supporting global health requires "collaborative transnational research and action for promoting health for all" (Beaglehole, 2010). Global public health initiatives utilize "modern medicine, communication, and technology" (Macarthur, n.d.). Yet, initiatives and training have historically followed a top-down approach. Given the complexity of the world's wicked problems, the use of top-down approaches in the global public health sphere has led to logistical challenges, motivational concerns, barriers to implementation, and questions of sustainability (Adeyi, 2023; Pulido-Velazquez et al., 2022; Rodrigues & Shepherd, 2022; Tagini, 2023; Watkins et al., 2022).

During unpredictable, uncertain, and disruptive times like the global COVID-19 pandemic, informal and incidental learning (IIL) can help us find a way to keep moving forward (Watkins & Marsick, 2021). IIL's evolvement to include a complexity lens and "match technological advancement" (Barefield & Nicolaides, 2023, p. 164) calls for a paradigmatic shift considering how we "might learn differently in a digital and artificial-intelligence-dominated landscape" (Watkins & Marsick, 2021, p. 95). Research on the unique efforts of The Geneva Learning Foundation (TGLF), a Swiss non-profit organization with the mission to "research, develop, and scale up new ways to learn and lead against critical threats to our societies" (TGLF, 2024a) provided insight into IIL's potential to support health professionals virtually. Amidst the

backdrop of our global COVID-19 pandemic, TGLF combined peer learning, remote learning, social learning, and networked learning to effect scalable health training-to-implementation change for sub-national immunization staff. This investigation offered a micro glance at the empirical impact of the informal and incidental virtual learning (IIVL) and called for its further exploration (Watkins et al., 2022).

As part of my doctoral journey, I have had the privilege of supporting qualitative analysis as a graduate research assistant for TGLF. Throughout 2023-2024, I followed TGLF communications, listened in to the community reading of the Open-Source Manifesto 2.0, a declaration for investment in global health professionals (TGLF, 2023b), and attended numerous Insights events where analyzed data from scholars' contributions were distilled and shared back to the community. I participated in TGLF programming like Teach to Reach: Connect, the Zero-Dose Learning Hub Inter-country Peer Exchange, and the Climate Change and Health event, as well as events leading up to and/or following each of the ones listed. I joined TGLF team meetings to learn more about the interconnected nature of the global health field, and I supported the development of new health projects like the climate change-related health initiative in Burkina Faso to support a women-led intersectoral response to anemia. For each of the TGLF programmatic events listed above, I conducted qualitative analysis on thousands of lines of data, and with each additional experience, I became more and more intrigued with TGLF's peer learning-to-action model to support health professionals around the globe.

From one event to the next, I have paid attention to participants' contributions, whether shared aloud or in writing, related to their experience of learning with TGLF, and at every point throughout the learning cycle, communications never stopped. Albeit an in-chat message sent from one peer to another during an event connecting to an experience, a thought-provoking

question asked to a presenter, a social media post for encouragement, an email sharing an idea, or any other imaginable communicative combination, scholars felt free to reach out and did so regularly. The open-ended pre- and post-event survey questions I analyzed were designed to learn about the challenges scholars faced in their communities, the strategies they utilized to address them, what they found most valuable in TGLF programming, and how they felt their participation was changing them both personally and professionally. Participants' contributions, like the one summarized below from Wasnam Faye, a TGLF scholar and health professional from Senegal (Faye et al., 2023), exemplify what has captured my attention in TGLF's peer learning-to-action model. Overwhelmingly, as Wasnam shared, I have found scholars' contributions and communications about their TGLF learning experience to be a dynamism that synergistically fuels their ability and that of other scholars to keep advancing with their work, even when facing difficult circumstances.

Vaccine Angels: A Synthesis of Wasnam Faye's Contribution

> In 2019, I suddenly found myself in charge of the Pout-Diack public health post in the Thiès Health District of Senegal. As a midwife, I was responsible for everything related to maternal and child health in the facility, including immunization. To start with, I knew very little about immunization, just what I had been taught in school. However, we did not learn how to organize and manage vaccination sessions, what tools are needed, or how to use them. When I came to my health post, I just continued doing what was already being done, which was waiting for caregivers to come with their babies. The post was supposed to serve 8,900 people in seven villages, but it was only being used by people from the village in which it was located, and even there, coverage was not great. Out of 20 children in the village, we found that only three had had their Bacillus

Calmette-Guerin (BCG) jabs. We had access to vaccines, the health post was staffed, and the children were present, so why were people not coming to the facility for vaccination?

I applied to the Ministry of Health for training on immunization, but those requests take time to be processed. My first contact with The Geneva Learning Foundation (TGLF) was in 2019 when I applied to join a WHO Scholar course. Once I joined TGLF's program, I heard a peer share how he used to drive more than 12 kilometers on his bike to organize outreach vaccination sessions, and it dawned on me that I could do something to change my situation. Feeling the value of connecting and learning with other health professionals, I kept participating by joining other TGLF events like the Teach to Reach conference, the COVID-19 Peer Hub, and the Movement for Immunization Agenda 2030 (IA2030) activities.

When I started, I needed help with the basics, including how to record daily immunization data, and I was fortunate to get help from several scholars. To improve vaccination coverage in my area, I began talking with and listening to mothers, community members, and religious leaders, and I decided to implement a plan suggested by a second-year student trainee who had lived in the community on an internship working in my facility. She attended all TGLF sessions with me, and what I learned through the platform I shared with her. The program trained approximately 30 volunteer "vaccine angels," who collected immunization cards for children due to receive certain antigens and worked out a good time for us to run a vaccination clinic in the village. Following vaccinations, we then talked about other health issues like nutrition and held health education sessions on topics like how to hold and breastfeed babies. We also began using staff differently, having everyone sit around the table, look at various

indicators, and discuss what we could do to improve things. Our community relays appreciated the change, and religious leaders and village dignitaries pledged to help us champion the cause financially and by using their platforms to help raise awareness. Although strikes and other disruptions held us back a bit, we boosted the first dose of the measles-rubella vaccine (MR1) from 5% to 65% in a little over a year, and for Penta3, we went from 8.3% to 82% without any additional resources.

Through the IA2030 Movement, I heard about people immunizing themselves in public as a way of showing people that vaccination is safe. So, my niece, my little sister, and I all got vaccinated for COVID-19 in front of people in the public square. I also heard a story of someone who had increased HPV vaccination from 10% to 25% in 2 months by integrating screening for cervical cancer with HPV vaccination awareness, and I thought, I have the vaccine sitting in the fridge and the right equipment, that's something I could do, too. I would never have thought to do that if it hadn't been for my involvement in the Movement.

Participating in TGLF events and keeping in touch with peers, like through the small group communication in my country's Telegram group, have helped me to stay motivated in my day-to-day work. I have always felt there is help at hand, and I have shared resources and offered advice to peers as well. If the district plans a meeting at the same time as a TGLF event and I am unable to attend, I will watch the recording later. To international donors, I would say that people are achieving amazing things on a shoestring, often as volunteers. Give us the opportunity, and we can perform miracles.

For further information about TGLF's philosophy and model, see Appendix A.

Problem Statement

With the strengthened intensity and frequency of the world's wicked problems, the tides of global public health are changing. Speaking to the health impacts of climate change alone, we are seeing increases in both direct effects (e.g., heat stroke, dehydration) resulting from extreme weather exposure and indirect effects (e.g., malnutrition, depression/anxiety) arising from reactions and responses to environmental changes (Haines & Ebi, 2019; Intergovernmental Panel on Climate Change, 2022; Romanello et al., 2022; World Health Organization, 2023). In the field of global health, research that seeks near-complete certainty of interventions and outcomes (e.g., randomized controlled trials) has been the deferred-to reality. Although such measures have proven their rigor, they can be costly, time-consuming, resource-draining, exclusionist, and not appropriate measures for every situation (Mielke & Rohde, n.d.; Monti et al., 2018). Moreover, the contextual and interdisciplinary relevance of such measures as well as their effective implementation in the realm of public health remains unclear (MacDonald et al., 2016). To best mitigate and adapt to the global health impact of climate change or any other of the world's wicked problems, renewed educational approaches and ambitious actions are needed to improve health outcomes (United Nations Climate Change, 2022), yet which approaches to use and how to use them remains unclear in the field.

Situating My Research: A Positionality Statement

Inspired by the phenomenon that is TGLF and wanting to give back to a community that has openly shared its work with me and countless others, I decided to dedicate my dissertation to learning more about and furthering its learning science in the field of global health. As a doctoral student studying learning, leadership, and organization development and as a TGLF Insights Team member, my inside/outside connections to this research have been key to its success.

Having a foot in academia and the other in community-based non-profit work has allowed me to analyze data up-close and from a distance. While my connection is a strength, and this research has been of my own volition, I disclose my involvement in the work of TGLF for consideration.

As an emerging learning scientist in the field of global health and well-being, I realize there is much I do not know about the health needs of people in low– and middle–income countries and the interventions that will best support them. For this reason, throughout the entire research process, I asked questions as they emerged, sought out diverse connections, and met with other students, TGLF alumni, and researchers in the field. Throughout my life, I have lived in many places around the world. I am proud of my growing worldview and perspectives. However, I do not presume my perspectives and insights into research findings are like those of my colleagues or the individuals within this research. To position findings from perspectives other than mine alone, the research is grounded in the voices of the participants themselves and was conducted alongside other quantitative and mixed methods researchers.

Conceptual Framework

A transformative paradigm recognizes that "realities are constructed and shaped by social, political, cultural, economic, and racial/ethnic values...(and)...which reality will be privileged in a research context" is a matter of power and privilege (Mertens, 2007, p. 212). Thus, this research elevates participants' narratives alongside the stories of their contributions mathematically expressed. Doing so serves as a framework to guide the research (Patton, 2018) and ensure its alignment with TGLF community values. For this purpose, the research embraces a transformative mixed methods approach (Jackson et al., 2018; Kemmis & Wilkinson, 1998; Mertens, 2007).

Theoretical Framework

This dissertation draws primarily upon the foundational theory of informal and incidental learning (IIL) (Marsick & Watkins, 1990, 2018) to explain learning and development. It uses the theories of connectivism (Siemens, 2012) and learning organizations (Watkins & Marsick, 1993, 1997), which build on IIL variations, to report findings. Other theories linked to this work and referenced in its conclusion include complex adaptive systems (Dooley, 1997; Holland, 2006; Obolensky, 2014) and enactivism (Begg, 1999; Fenwick, 2000; Justice & Yorks, 2018; Varela et al., 1991).

Informal and Incidental Learning

Found at the core of adult education, informal and incidental Learning (IIL) has strong roots in the contributions of education philosophers John Dewey, Mary Parker Follet, Eduard Lindeman, and Kurt Lewin (Conlon, 2004; Lewin, 1935; Lindeman, 1926). Their works lifted the importance of informal learning; however, it was not until the 1950s that the term formally began to grow in popularity with the publication of "Informal Adult Education" (Knowles, 1950). Diligently working throughout the years, educational theorists began to tease out the differences between formal and informal learning, using their research, experiences, and what they learned from the contributions of others to advance the field. As a result, various definitional strands of informal learning exist (Eraut, 2014; Livingstone, 2001; Overwien, 2010; Schugurensky, 2015; Tough, 2002); however, Marsick and Watkins' re-cognized model (Marsick & Watkins, 2018) best fits the context of my research. Victoria Marsick and Karen Watkins began their theoretical journey to advance informal and incidental learning (IIL) in the workplace in the 1990s. In their original definition of IIL, they contrasted formal and informal learning, stating:

> Formal learning is typically institutionally-sponsored, classroom-based, and highly structured. Informal learning, a category that includes incidental learning, may occur in institutions, but it is not typically classroom-based or highly structured, and control of learning rests primarily in the hands of the learner. Incidental learning…is defined…as a by-product of some other activity, such as task accomplishment, interpersonal interaction, sensing the organizational culture, trial-and-error experimentation, or even formal learning. Informal learning can be deliberately encouraged by an organisation or it can take place despite an environment not highly conducive to learning. Incidental learning, on the other hand, almost always takes place although people are not always conscious of it (Marsick & Watkins, 1990, p. 12).

The original model was later reconceptualized to further emphasize "the pervasive influence of context on all aspects of the model…" (Cseh et al., 1999; Marsick et al., 2011, p. 67) and again, in 2008 to incorporate the social dimension of learning (Marsick et al., 2008). Overall, the 2008 model became "a looser, non-linear framework that contains learners in interaction with self, one another, and the environment as they set, modify, and pursue learning goals" (Marsick et al., 2011, p. 73). In 2018, the model was re-cognized to consider not only individual processes and the social and organizational context, but the impact of technological tools to expand IIL's reach and connect neural, social, and organizational networks. Connections to this model placed emphasis on how IIL may simultaneously "remain open and fluid," creatively holding its paradoxical tensions to allow for continuous, generative response; one that is mindfully "more diffuse than traditionally framed" (Scully-Russ et al., 2018, pp. 111, 113). Marsick and Watkins saw the model's new focus to "examine, in particular, the nested, interactive nature of learning at multiple levels (individual, collective, team, organization, society) and across multiple planes

(crossing functional and role boundaries, disciplines, and lines of authority), as people learn and grow interactively within social contexts" (Marsick & Watkins, 2018, p. 10). The re-cognized model is at the center of the practice I will research in the field of global health, and for this reason it provides a theoretical base of all articles in my dissertation. In the following sections, I examine empirical global health research and outcomes relating to the use of informal and incidental learning that incorporates virtual elements through digital technologies.

Informal and Incidental Virtual Learning (IIVL) in Global Health. A search for empirical studies published from 2020-2025 on the use of informal and incidental virtual learning (IIVL) in global health surfaced 13 articles detailed in Table 1. These studies were conducted in the contexts of human resource development/health professions education (Anderson et al., 2020; Udedibia, 2020) and varied healthcare programs at medical centers or institutions (Bøje & Ludvigsen, 2020; Curran et al., 2024; Floren et al., 2023; Grehan et al., 2023; Hargreaves et al., 2022; Lynch et al., 2023; Siriviriyanun & Chaiyasat, 2022; Vaid et al., 2023; Wee et al., 2023). They report findings related to the use of informal and incidental virtual learning practices from the perspectives of healthcare workers (Anderson et al., 2020; Bøje & Ludvigsen, 2020; Curran et al., 2024; Floren et al., 2023; Grehan et al., 2023; Hargreaves et al., 2022; Siriviriyanun & Chaiyasat, 2022; Vaid et al., 2023; Wee et al., 2023), senior healthcare organization leaders (Udedibia, 2020), patients and their carers (Lynch et al., 2023; Muijsenberg et al., 2023), and healthcare service users at large (Mbunge et al., 2022).

Table 1

IIVL in Global Health 2020-2025

Author(s) & Year Title	Methodology Data Collected Analysis	Country Participants Sample	IIVL Related Findings
Anderson et al., 2020 An evaluation of social learning and learner outcomes in a massive open online course (MOOC): A healthcare sector case study	• Mixed methods • Surveys and interviews • Quan: paired samples t-test, comparison of means test, Chi-square test, and correlation analysis; Qual: inductive thematic analysis (Braun & Clarke, 2006)	• Multi-national (more than 3 countries) • MOOC "School for Health and Care Radicals" participants • T1 (n=639); T2 (n=113); Interviews (n=14)	"Our evaluation...confirms the importance of professional and workplace context on acceptance and use of social learning technologies...shows that the achievement of knowledge-related learner outcomes is unaffected by participation in social learning through these social media technologies...indicates that social media can contribute to important affective, attitudinal, and values-based outcomes....provide(s) evidence that MOOC-enabled social learning can have additional learner benefits...we conclude...enhanced attitudinal or 'affective' learner outcomes that would not otherwise have been achieved." (pp. 230-231)
Bøje & Ludvigsen, 2020 Non-formal patient handover education for healthcare professionals: A scoping review	• Systematic review • Studies examining non-formal patient handover learning (variety of settings, facilities, and locations) • JBI methodology (Peters et al., 2020)	• Multi-national (more than 3 countries) • Varied, mostly nurses and interprofessional healthcare groups • Studies (n=14)	"Simulation was the most reported didactic used in patient handover learning programs in this review, and literature suggests that learners can benefit from learning at their own pace and with continuous feedback." (p. 970)
Curran et al., 2024 A phenomenological study of postgraduate medical trainees' incidental learning experiences and psychological well-being during the COVID-19 pandemic	• Descriptive phenomenology • Interviews • Inductive thematic analysis (Sundler et al., 2019)	• Canada • Post-graduate medical trainees • Residents (n=8)	"Trainees reported that virtual learning improved their educational experiences in unique ways, increased engagement and attendance, and enabled regular meetings and learning when in person options were unavailable. Trainees also reported enhanced self directed learning skills, greater ownership of and leadership in their education, and increased confidence and experience with virtual care. Some also reported a perceived increase in elements of emotional intelligence (e.g., self awareness, empathy, and compassion)....Although some experiences were challenging, there was a perception that such experiences led to new learnings that were beneficial to one's professional development and future

Author(s) & Year Title	Methodology Data Collected Analysis	Country Participants Sample	IIVL Related Findings
			career, as well as implications for future training provided to trainees." (p. 1)
Floren et al., 2023 Medical residents' informal learning from pharmacists in the clinical workplace	• Mixed methods • Surveys • Quan: percentages, Chi-square tests; Qual: directed qualitative content analysis (Hsieh & Shannon, 2005)	• The United States and the Netherlands • Resident physicians from USCF, UMN, and UMCU • Respondents (n=173)	"Residents from the United States (US) utilized pharmacists and Up-To-Date, whereas Dutch residents preferentially utilized the online Dutch medication information site and EHR-embedded medication resources...Pharmacists provided residents with a wide range of useful information, much of which is integrated into the medication resources in the Dutch EHR-based decision-support system...Intentionally designing residents' training to include opportunities for interactions with pharmacists could potentially positively impact residents' informal workplace learning." (p. 701)
Grehan et al., 2023 The evolution of mandatory continuing professional development (CPD) for diagnostic radiographers in Ireland - A longitudinal study	• Mixed methods • Longitudinal surveys • Quan: descriptive statistics, Chi-square test; Qual: adapted thematic analysis (Braun & Clarke)	• Ireland • Diagnostic radiographers • Survey 1 (n=453); Survey 2 (n=534); Survey 3 (n=216)	"Respondents reported increased engagement with online courses between Survey 1 (27.8%) and Survey 2 (49.1%), and increased confidence in engaging with fully online courses was noted. In Survey 1, less than half of respondents (49.6%) selected either "very" or "absolutely" for their confidence level in online learning, increasing to 53.3% by Survey 2...In Survey 3, when participants were asked about their confidence in undertaking online learning, specifically since the start of the pandemic, the majority (52.6%) reported that their confidence had increased. A further 7.1% offered that despite never attending an online course, they "would be interested" in doing so." (p. 1057)
Hargreaves et al., 2022 Microsoft Teams and team performance in the COVID-19 pandemic within an NHS Trust Community Service in North-West England	• Mixed methods • Surveys and interviews • Quan: descriptive statistics; Qual: thematic analysis "...in line with the factors affecting virtual performance" (p. 87)	• United Kingdom • Nursing, therapy, mental health and administrative staff • Respondents (n=27)	"The findings indicate that Teams made a positive impact to the team at a time of heightened clinical pressures and working in unfamiliar environments without the supportive benefits of face-to-face contact with colleagues in terms of incidental knowledge sharing and health and wellbeing...Further developments were needed to make virtual meetings more accessible for introverted colleagues, support asynchronous communication, address training needs and support leaders to adapt and operate in higher virtuality." (p. 80)
Lynch et al., 2023	• General qualitative approach	• South and Western Australia	"Therefore, health professionals possess the skills and have capacity to effectively

Author(s) & Year Title	Methodology Data Collected Analysis	Country Participants Sample	IIVL Related Findings
Is learning being supported when information is provided to informal carers during inpatient stroke rehabilitation? A qualitative study	• Interviews • Directed qualitative content analysis (Hsieh & Shannon, 2005)	• Stroke survivors, their carers, and rehabiltation team members • Interviewees (n=37)	facilitate learning when they are mindful of learning goals. We would argue that health professionals should be mindful that all interactions with carers and people with stroke are potential learning opportunities, and if viewed as such (i.e. by acknowledging the existing knowledge and skills held by carer, checking in with carers about their information needs, providing the right context for learning and gauging carers' understanding when information is provided) could lead to better learning outcomes for people new to the caring role." (p. 3920)
Mbunge et al., 2022 Virtual healthcare services and digital health technologies deployed during coronavirus disease 2019 (COVID-19) pandemic in South Africa: A systematic review	• Systematic review • Studies examining "...smart digital health technologies to provide virtual healthcare services delivery in South Africa during COVID-19" (p. 103) • PRISMA (Moher et al., 2009)	• South Africa • Virtual healthcare services users • Studies (n=24)	"...South Africa adopted digital technologies such as SMS-based solutions, mobile health applications, telemedicine and telehealth, WhatsApp-based systems, artificial intelligence and chatbots and robotics to provide healthcare services during COVID-19 pandemic. These innovative technologies have been used for various purposes including screening infectious and non-infectious diseases, disease surveillance and monitoring, medication and treatment compliance, creating awareness and communication. The study also revealed that teleconsultation and e-prescription, telelaboratory and telepharmacy, teleeducation and teletraining, teledermatology, teleradiology, telecardiology, teleophthalmology, teleneurology, telerehabilitation, teleoncology and telepsychiatry are among virtual healthcare services delivered through digital health technologies during COVID-19 in South Africa. However, these smart digital health technologies face several impediments such as infrastructural and technological barriers, organization and financial barriers, policy and regulatory barriers as well as cultural barriers...Although COVID-19 has invigorated the use of digital health technologies, there are still some shortcomings." (p. 102)
Muijsenberg et al., 2023 Methods to assess adults' learning styles and	• Scoping review • Studies examining factors affecting	• Multi-national (more than 3 countries)	"Healthcare professionals should recognize that the learning process is complex and that learner-centered education is a shared responsibility. On

Author(s) & Year Title	Methodology Data Collected Analysis	Country Participants Sample	IIVL Related Findings
factors affecting learning in health education: A scoping review	learning styles and learning styles assessment "for adult patients and their significant others" in health education (p. 1) • JBI (Peters et al., 2017) and PRIMSMA-ScR (Tricco et al., 2018)	• Varied patients and their carers • Studies (n=45)	the one hand, patients and their significant others need to be actively involved in education by indicating their needs and preferences. On the other hand, the educator fulfills an important role in supporting patients and their significant others to express their needs and to learn. Patients and their significant others may face multiple challenges to learn, and therefore the health educator is responsible for creating an environment that takes into account these challenges" (p. 18)
Siriviriyanun & Chaiyasat, 2022 The sustainable professional development contribution: Registered nurses' informal learning experiences in Thailand, Australia and USA	• Phenomenology • Interviews • Thematic analysis (Braun & Clarke, 2006)	• Thailand, Australia and the United States • Registered nurses • Interviewees (n=7)	"Based on the participants' responses, some of them pointed out that in-house training programs and workshops were not physically organized to prevent the spread of COVID-19; therefore, they have created different means of informal learning through online platforms and social networking sites (e.g. Facebook, YouTube, TikTok inter alia), or even self-paced learning materials provided by the hospital to obtain updated information and new knowledge which could be useful for nursing professional practices. Sharing their knowledge with those co-workers who were willing to learn from others frequently occurred during the crisis of COVID-19. It can be noted that the flexibility and individualized nature of informal learning enable nurses to generate learning relevant to their role, which can be embedded into their career advancement and professional practices..." (p. 21)
Udedibia, 2020 Short-term informal leadership learning: A critical realist case study	• Critical realist case study • Interviews and document review • Context-Mechanisms-Outcomes framework (Pawson & Tilley, 1997)	• Canada • Senior healthcare organization senior leaders restructuring their organizations • Interviewees (n=24)	"Invest in a form of leadership learning that delivers by impacting leadership learning in ways that outcomes meet needs. What this research offers is that there is an opportunity for organizations to consider short-term informal leadership learning as one form of leadership learning that may meet their objectives..."Short-term informal learning holds the potential to enable learning to contribute more to leadership emergence and growth." (p. 294)
Vaid et al., 2023 Making decisions "in the dark": Learning through	• Constructivist grounded theory • Interviews and	• The United States • Emergency department and	"Findings showed that the burden of decision making for physicians was influenced by the physical, emotional, relational, and situational context of the

Author(s) & Year Title	Methodology Data Collected Analysis	Country Participants Sample	IIVL Related Findings
uncertainty in clinical practice during Covid-19	document review • Modified grounded theory (Miles et al., 2019; Varpio et al., 2020)	intensive care unit physicians • Interviewees (n=12)	CLE. The themes that emerged for decision making and IIL were interdependent. Prominent among the patterns for decision making were ways to simplify the problem by applying prior knowledge, using pattern recognition, and cross-checking with team members. Patterns for IIL emerged through trial and error, which included thoughtful experimentation, consulting alternative sources of information, accumulating knowledge, and 'poking at the periphery' of clinical practice...Complexity and uncertainty are rife in clinical practice and this study made visible decision-making patterns and IIL approaches that can be built into formal curricula. Making implicit uncertainty explicit by recognizing it, naming it, and practicing navigating it may better prepare learners for the uncertainty posed by the clinical practice environment." (pp.. 1-2)
Wee et al., 2023 How do factors in fixed clinical teams affect informal learning among Emergency Medicine Residents	• General qualitative approach • Interviews • Template analysis (Brooks et al., 2015)	• Singapore • Emergency department residents working in the Fixed Team system of hospital during COVID-19 • Interviewees (n=15)	"Our study found that FTs resulted in more (informal) communication channels (e.g. WhatsApp) being formed which was not present in NFTs, resulting in more learning activities including sharing ideas, resources and experiences...FTs resulted in open communication and quality feedback which was well received...Our study showed that working in a FTs led to more customised learning...improved communications and strengthened relationships in a bidirectional manner involving teacher and learner alike, supports a shift from a predominantly teacher to learner type of dynamics to a team learning dynamics where all team members can learn with and from one another. This is important because informal learning takes place effectively when learning from past mistakes and feedback exchange occurs..."

Collectively considered, they share a story of how IIVL is being increasingly adopted worldwide, provides emotional learning support, addresses uncertainty in the unknown, and

gives leadership mechanisms for continuous learning and change. Simultaneously, they present challenges to its use and IIVL gaps in research.

Increased Interest and Use of IIVL. Two systematic reviews (Bøje and Ludvigsen, 2020; Mbunge et al., 2022) and one mixed methods investigation (Grehan et al., 2023) explored the increased interest and use of IIVL. Although these studies were published in the last five years, Bøje and Ludvigsen (2020) report findings dating from studies published between 2005-2018, Mbunge et al. (2022) from 2018-2021, and Grehan et al. (2023), from 2015-2023.

Systematically reviewing 14 studies conducted across eight countries, Bøje and Ludvigsen (2020), found simulations, described as incorporating virtual, online, e-learning programs, and/or hybrid trainings, to be the most reported heuristic for patient handover learning programs. For participants like nurses and interprofessional healthcare groups, these simulations led to studies reporting outcomes ranging from the first to the third Kirkpatrick levels (Level 1/reaction, n=6; Level 2/learning, n=6; Level 3/behavior, n=6). However, the authors claimed the need for studies to report fourth-level outcomes (results) and to link findings to how handover programs are conducted (e.g., formal or informal).

Grehan et al. (2023) analyzed longitudinal surveys on the continuing professional development (CPD) preferences and needs of diagnostic radiographers in Ireland. Over eight years, the authors collected data during three time points (Survey 1, n=453; Survey 2, n=534; Survey 3, n=216). From Survey 1 to Survey 2, they reported a 3.7% increase in participants' 'very confident' or 'absolutely confident' online learning levels and a 21.3% increase in their online engagement. In Survey 3 (post-start of the pandemic), they reported 52.6% of participants shared increases in their online learning confidence levels, and "a further 7.1% offered that despite never attending an online course, they 'would be interested' in doing so." (p. 1057)

Systematically reviewing 24 studies, Mbunge et al. (2022) explored how smart digital technologies support (virtual) learning and healthcare connections in South Africa. During the pandemic, they explained that the use of IIVL bridged gaps to essential healthcare services for community members and fulfilled the training needs of healthcare workers. However, they also shared how learning through digital technologies was sometimes barred or challenged due to limited funding, equipment shortages, and confidentiality concerns. To improve IIVL and address healthcare disparities, the authors recommended the expanded use of low-cost and abundant technologies (e.g., cellular phones) and expressed the need for heightened data privacy and security policies.

Emotional Learning Support. Two of the studies reviewed (Anderson et al., 2020; Curran et al., 2024) discussed affective or emotional outcomes related to the use of IIVL and two expressed how IIVL filled in gaps when the emotional toll of learning was high (Lynch et al., 2023; Muijsenberg et al., 2024). Anderson et al. (2020) analyzed data from a massive open online course designed to scale social learning for "health and care radicals" (p. 213). The survey and interview data included participants from more than three different countries (T1, n=639; T2, n=113; Interviews, n=14). In particular, the authors investigated how participants' use of social media (Facebook and Twitter) impacted their experiences and outcomes. 35% of MOOC participants (n=426) joined the Facebook group, publishing 240 original posts with higher activity levels (e.g., posts, likes, and responses) at the beginning and end of the course. Tweets related to the program attracted 1,686 followers, made 20,786,339 impressions, and reached a total of 35,044 unique accounts. Despite this engagement, social media did not significantly affect participants' anticipated learning outcomes. However, it was found to promote unanticipated ones, specifically "attitudinal or 'affective' learner outcomes that would not

otherwise have been achieved," such as empathy and confidence (p. 231). Qualitative analysis further revealed social media extended opportunities "to reflect and distil tacit knowledge" and discussed how it encouraged "alignment with a shared purpose" (p. 226). For participants is challenging contexts experiencing "a very low ebb (for example, being close to leaving their job)" social media use was also found to renew their motivation and energy to continue leading change (p. 226).

Curran et al. (2024) interviewed eight post-graduate medical trainees working in health programs across Canada about their incidental virtual learning experiences and psychological well-being during the COVID-19 pandemic. For all participants, IIVL was found to enhance their "self directed learning skills…ownership of and leadership in their education, and…confidence and experience with virtual care" (p. 1). For some participants, IIVL was also linked to perceived improvements in emotional intelligence elements like compassion, self-awareness, self-regulation, and resilience. The authors further reported trainees expressing a "slight culture change…more acceptance of others taking time off and the importance of personal health and safety" (p. 7). Despite challenging circumstances like isolation from other trainees/staff and the lack of in-person opportunities for team cohesion, through IIVL trainees found new learning they felt benefitted their careers and developed a stronger sense of confidence in providing virtual care.

Lynch et al. (2023) interviewed 37 stroke survivors, their carers, and rehabilitation team members in Australia to learn how information about care was provided. Rehabilitation team members were found to focus on providing and ensuring carers' understanding of safety-related care information. Given the time constraints of rehabilitation team members and other factors like the emotional toll of supporting loved ones who survived a stroke, the authors found that

carers relied on multiple learning resources for additional information, including online materials and social media. To improve carers' preparation to support their loved ones post-discharge, it was recommended that team members develop tailored approaches, providing information and motivating carer's connections to multiple modalities for continuous learning.

Similarly, in a scoping review of 45 studies including research conducted in more than three different countries, Muijsenberg et al. (2023) found patients and their carers also preferred tailored, multimodal, and interactive learning. Healthcare providers and education specialists were found to share important information during visits. In-between visits, participants indicated wanting written information (online or printed), visual information (e.g., tv programs, videos), and expressed interest in texting and/or talking "face-to-face" with knowledgeable others either one-on-one or in group settings (p. 14). In some of the studies the authors reviewed, participants also indicated a preference for other technology-based options like e-learning. For participants facing multiple learning challenges (e.g., health literacy, illness), it was viewed as particularly beneficial to have continuous opportunities for learning. Concluding, the authors reiterated the complexity and shared process of learning, and the need to take learning preferences into consideration.

***Uncertainty in the Unknown*.** Amid the uncertainty of the COVID-19 pandemic, healthcare workers found themselves carrying heavier than normal burdens. As shared in four studies, this meant turning to informal and incidental virtual learning strategies to pivot and adapt quickly (Hargreaves et al., 2022; Siriviriyanun and Chaiyasat, 2022; Vaid et al., 2023; Wee et al., 2023). Hargreaves et al. (2022) shared that the use of Microsoft Teams made a "positive impact" among 27 nursing therapy, mental health, and administrative staff in a United Kingdom National Community Health Service (p. 80). 93% of respondents reported its use supported

knowledge sharing, 81% camaraderie/social capital, and 74% access to senior staff. Overall, e-leadership through Microsoft Teams helped bridge the gaps in healthcare workers' ability to collaborate when it was unsafe to do so in person, offering them communication "at the touch of a button" (p. 87). However, the authors also found mixed responses to its use and recommended that healthcare leaders develop strategies for engaging more introverted colleagues and creating additional opportunities for incidental learning.

Siriviriyanun and Chaiyasat (2022) investigated seven registered nurses' lived informal learning experiences in Thailand, Australia, and the United States. Especially during the pandemic, the nurses expressed how online platforms and social networking services like "Facebook, YouTube, TikTok inter alia" enhanced their professional development opportunities by allowing them access to information as needed in ways they found valuable (p. 21). Specific outcomes nurses connected to their informal learning through these and other modalities included their improved adaptability to "fluid situations" (p. 12), acceptance of more advanced tasks, increased chances of survival, ability to uphold high professional standards of care, and a growing sense of confidence, competency, and self-efficacy.

Wee et al. (2023) interviewed 15 emergency department residents working in newly formed fixed teams of a hospital in Singapore during the pandemic. Overall, fixed teams' reliance on social network channels was found to improve residents' "communication and camaraderie" (p. 25). Through increased opportunities for receiving performance feedback and sharing "ideas, resources, and experiences," residents experienced more personalized learning and were exposed to diverse subspecialties (p. 30). Strengthened bidirectional learning and social dynamics, led residents to report outcomes like greater familiarity and trust with team members.

However, to encourage variance of perspectives and potentially address decreases in motivation over time, the authors suggested practitioners consider fixed team member rotation.

Vaid et al. (2023) explored the emergence of decision-making and informal and incidental learning in the complex interdependency that is a clinical learning environment (CLE). Characterized by "personal, social, organizational, physical, and virtual" factors, the CLE brought great uncertainty during the pandemic for the 12 interviewed emergency department and intensive care unit physicians (p. 2). As their routines and the decision-making burdens they faced morphed, the authors found physicians leaned heavily on the results of IIL strategies, like careful trial and error experimentation for "sensemaking" and "sensebreaking" to improve patient care and health outcomes (p. 7). To improve medical students' capacity to navigate uncertainty, they recommended that IIL opportunities be intentionally included in the curricula.

***Mechanisms for Continuous Learning and Change*.** Two studies (Floren et al., 2023; Udedibia, 2020) investigated how IIVL could provide mechanisms for continuous learning and change. Udedibia (2020) interviewed 24 senior healthcare leaders in Canada and conducted an organizational document review to investigate how short-term informal leadership learning can address rapid changes in organizational demands during restructuring. Mechanisms identified in the framework used for analysis like peer networks and online forums were found to support leaders' connection and peer exchange. These affordances surfaced tacit contextual knowledge they valued and provided them with opportunities for reflection individually and with others. Outcomes reported from engagement in such mechanisms included reconceptualization of leadership, expanding sense of their accountabilities, and growing awareness of themselves.

Floren et al. (2023), conducted a mixed methods study, surveying 173 resident physicians from three different medical centers in the United States and the Netherlands during the COVID-

19 pandemic. The authors explored mechanisms of physicians' IIVL, finding cultural variances in their preferences. While Dutch residents tended to consult online medication information sites and embedded medication resources as learning mechanisms, United States residents opted for more informal interactions with pharmacists. Pharmacists were found to provide "residents with a wide range of useful information, much of which is integrated into the medication resources in the Dutch EHR-based decision-support system" (p. 701). The authors could not confirm if informal interactions with pharmacists impacted Dutch residents' learning about medications from their responses. However, "a majority of residents across contexts reported…they wanted even more opportunities to learn from pharmacists" (p. 708). Thus, the authors' recommended pharmacists' intentional inclusion in training programs, especially in ways they can "model how they integrate online resources in their own clinical decision-making processes" (p. 708).

IIVL Challenges and Gaps. IIVL is increasingly used for learning interventions (Bøje and Ludvigsen, 2020; Grehan et al., 2023; Mbunge et al., 2022). Yet, technological inequities continue to exist, and funding is needed to expand technological infrastructure for the continued adoption of IIVL strategies (Mbunge et al., 2022). IIVL supports a variety of anticipated and potentially unanticipated learning outcomes like increases in affective or emotional intelligence (Anderson et al., 2020; Curran et al., 2024), which build (inter)professional relationships. However, little is known about how to design, continually adapt, and facilitate interventions to meet learner preferences and needs in ways that optimize performance and outcomes (Floren et al., 2023; Muijsenberg et al., 2023; Wee et al., 2023). For example, Hargreaves et al. (2022) discussed the need to "make virtual meetings more accessible for introverted colleagues, support asynchronous communication, address training needs and support leaders to adapt and operate in higher virtuality" (p. 80). Udedibia (2020) adds to this thought the importance of contextual

considerations. In the midst of challenging situations learners face, regardless of the level on which they occur, we must also ask, "What factors may overwhelm leaders and in what ways?" (p. 297). As shared by Bøje and Ludvigsen (2020) health educators and leaders must therefore, "continuously question methods across the lifelong learning span of a healthcare professional" (p. 971).

Looking across these studies for best practices and recommendations on the type of research that can support such investigation, reveals the need to collect data at different time points from interprofessional teams using IIVL across multiple contexts and cultures. Although all studies reviewed incorporated IIVL strategies, one study described multiple and met the best practices previously stated (Anderson et al., 2020). However, this study focused on individual learner outcomes. Overwhelmingly, the challenges presented in these studies and their reported findings indicate gaps in understanding how multiple IIVL strategies in healthcare trainings and interventions are carried out, and how they affect outcomes "at both the individual and the organization/systems levels" (Curran et al., 2024, p. 9). They also reveal a gap in understanding how learning organizations adopt and adapt IIVL to meet individual, team, organizational, and societal needs as a mechanism for change.

Connectivism

Connectivism posits learning occurs through digital collaboration and networks of people making (new) links to information (Corbett & Spinello, 2020). It understands digital technologies are "altering (rewiring) our brains" (Siemens, 2012, p. 1) and shares that by embracing it, we can connect to "…specialized information sets, and the connections that enable us to learn more (which) are more important than our current state of knowing" (Siemens, 2012, p. 5). Thus, in connectivism, there is an emphasis on nodes and networks–expanding them,

filling their structural holes (Burt, 2004) through diverse opinions/specialized information, and using technology in the knowledge distribution process (i.e., meaning-making and sensemaking) (UGA Mary Frances Early College of Education, 2021).

Living in the digital age, characterized by an abundance of never-ending input, knowing how to evaluate, navigate, synthesize, and tap into different streams of information are important skills linked to knowledge creation and individual/organizational innovation. Siemens (2012) considers this information pipeline to be the "knowledge economy, the flow of information…the equivalent of the oil pipe in an industrialized economy…(and) a river that meanders through the ecology of an organization" (p. 5). Thus, connectivism calls our attention to where information stagnates and where it flows freely, beginning with an individual view and expanding outward to see how/if "small worlds of knowledge are apparent in the exponential impact" (Siemens, 2012; UGA Mary Frances Early College of Education, 2021).

Learning Organizations (LOs)

Learning organizations (LOs) or organizations that continually are learning from and adapting to changing circumstances have been a topic of discussion by many scholars (Chai & Dirani, 2018; Marsick & Watkins, 2003; Marsick, 2013; Sadegh Sharifirad, 2011; Tuncali Yaman, 2020; Yang et al., 2004). This dissertation references Watkins' and Marsick's (1993) systemic lens of organizational learning, which integrates most aspects of LO literature (Song et al., 2009). They defined the LO as "one that learns continuously and transforms itself" (p. 8) and outlined its seven dimensions or action imperatives for change (Table 1), bringing needed clarity to the field.

Table 2

Watkins' and Marsick's Dimensions of the Learning Organization

Action Imperative (Dimension)	Definition
Create continuous learning opportunities (CL)	Learning is designed into work so people can learn on the job; opportunities are provided for ongoing education and growth
Promote inquiry and dialogue (DI)	People express their views and listen and inquire into the views of others; questioning, feedback, and experimentation are supported
Encourage collaboration and team learning (TL)	Work is designed to encourage groups to access different modes of thinking, groups learn and work together, and collaboration is valued and rewarded
Establish systems to capture and share learning (ES)	Both high- and low-technology systems to share learning are created and integrated with work, access is provided, and systems are maintained
Empower people toward a collective vision (EP)	People are involved in setting, owning, and implementing joint visions; responsibility is distributed close to decision making so people are motivated to learn what they are held accountable for
Connect the organization to its environment (SC)	People are helped to see the impact of their work on the entire enterprise, to think systemically; people scan the environment and use information to adjust work practices; and the organization is linked to its community
Provide strategic leadership for learning (SL)	Leaders model, champion, and support learning; leadership uses learning strategically for business results

Note: Marsick, V. J. (2013). The dimensions of a learning organization questionnaire (DLOQ) introduction to the special issue examining DLOQ use over a decade. *Advances in Developing Human Resources, 15*(2), 130. https://doi.org/10.1177/1523422313475984

Their model depicts continuous learning and transformation of both people and structures occurs across four main levels–individual, team, organizational, and global. LOs adopting the seven dimensions promote purposeful learning that is "continuous, collaborative, connected, collective, creative, captured and codified, capacity building" (Watkins & Marsick, 1993, p. 262). Holistic implementation of these dimensions across all levels is understood to improve

organizational functioning and drive innovation, factors capable of inspiring a shift in learning culture (Watkins & Marsick, 1993).

Complex Adaptive Systems (CAS)

Complex adaptive systems (CAS) form in response to paradoxical challenges or polarities that cannot be solved. They are composed of individuals or agents working together and in their environments to achieve shared goals (Obolensky, 2014). As such, CAS are understood to be groups, organizations, or networks of change agents that influence one another and, in turn, systemic outcomes, often in non-linear and unpredictable ways (Dugan, 2017). CAS are the main focus and "primary unit of analysis in complexity leadership" (Dugan, 2017, p. 279). Examples of CAS include "social systems, ecologies, economies, cultures, politics, technologies, traffic, weather, etc." (Dooley, 1997, p. 77) as well as humans (Holland, 2006).

In CAS, clusters of agents (re)form naturally/self-organize and learn through if/then interactions at all levels of the bureaucratic superstructure (i.e., executive, organizational, production) (Dugan, 2017; Holland, 2006). With agents representing all levels and a diversity of perspectives, CAS adopts a stance of "systemic inquiry to build fuzzy, multivalent, multilevel, and multidisciplinary representations of reality" (Dooley, 1997, p. 76). At times, this state of inquiry can demonstrate equilibrium with strong cohesion between agents. However, at other times, the state can show signs of instability and friction as interactions between agents collide and push CAS to respond/grow in new ways, beyond its current understanding or ways of interactions. Feedback loops built into the process reinforce the state of its inquiry and set the rhythm of its movement (Dooley, 1997).

Within and across each of the examples of CAS listed above, it can be said that their changing, dynamic interactions over time lead to organizational adaptation or evolution. CAS's

"order is emergent as opposed to predetermined, and the system's state is irreversible and often unpredictable" (Dooley, 1997, p. 83). CAS's ability to learn, influence, and transform differentiates it from traditional teams that can be described by their parts, even when those parts are interconnected and moving. In CAS, "the parts do not describe the whole," much like water, after being combined with other ingredients, can no longer be separated from bread (Dugan, 2017, p. 280). As agents interact and CAS evolve, new capacities are developed (Dooley, 1997).

Enactivism

"…the rationalist says 'I think', the empiricist says 'I observe', and the enactivist says 'I act'" (Begg, 1999, p. 73). Enactivism is one of several experiential theories that refer to learning as "embodied, embedded, enacted, or extended" (Carney et al., 2020, p. 77). A metaphor used to describe enactivism is the "paths that exist only as they are laid down in walking" (Varela et al., 1991, p. 205). Instead of problem-solving, enactivism is about bringing forth the world to address the challenges at hand and does so "through a network consisting of multiple levels of interconnected, sensorimotor subnetworks" (Varela et al., 1991, p. 206). Enactivism begins when we take in information sensorily, and we learn with each other through interactions and reflection (feedback) in our cultural environment, which is both biological and human-made. It views learning to occur ecosystemically through the combination of these premises, across multiple interstices, or the small spaces created by their collision (Fenwick, 2000; Varela et al., 1991). Enactivism understands learning and changing to occur because of "intentional tinkering" (Fenwick, 2000, p. 261) between the structurally coupled systems (Maturana & Varela, 1987), which influence our behaviors or steps. Their encounter, like that of Myles Horton and Paolo Freire (Horton et al., 1990) as they actively wrote a book together aloud, creates something more than the sum of their parts, changing each contributor, the behaviors of those around them, and

the environmental energy in the process. This enmeshed combination of transformation coherently shifts the now, which in turn, influences the future, and to see their impact, they must be taken together, never alone.

"The enactivist perspective insists that learning cannot be understood except in terms of co-emergence: Each participant's understandings are entwined with the other's, and individual knowledge co-emerges with collective knowledge" (Fenwick, 2000, p. 263). The enactivist framework analyzes the structure of a system and the interactions within it, "to make transparent the mechanisms by which such coupling actually unfolds and thereby how specific regularities arise" (Varela et al., 1991, p. 206). It views learning as a "hybrid of cognitive and affective response to an enacted encounter with materiality" (Scully-Russ et al., 2018, p. 108). In this type of encounter, readiness to engage is about how one pays attention to messy ecosystemic entanglement that occurs (non)linearly throughout time (Justice & Yorks, 2018).

Dissertation Structure and Purpose

The overall purpose of my four-article dissertation research is to advance scholarship and praxis of informal and incidental virtual learning (IIVL). Specifically, it aims to demonstrate and analyze its use as an educational strategy to improve health outcomes. The first article is a conceptual review, documenting and analyzing how global health virtual communities of practice (VCoPs) from 2018-2023 used IIVL to develop programs and engage general members. It explains how their programming was conducted and evolved to meet shifting community needs, leading to a typology of VCoP functioning (Eller, 2024b). This work fills an evidence gap

in different VCoP programmatic design combinations and provides a foundation for their future evaluation.

The second article is a mixed methods evaluation of The Geneva Learning Foundation's (TGLF) peer learning-to-action model, which uses customized sequencing of IIVL strategies support interprofessional training needs. This research explores the model's impact on the personal and professional development of healthcare workers combatting a neglected tropical disease and its related community healthcare outreach and outcomes in Sub-Saharan Africa (Eller et al., 2025a). The results offer insight into how peer learning using digital technologies can provide and extend support to practitioners that exponentially scales the effect of local plans they develop. This contribution further adds to the evidence base of how participatory methodologies can dismantle historical power imbalances and foster sustainable change.

The third chapter is a conceptual piece, providing needed information on the ecosystemic connections of (virtual) CoPs and (digital) learning networks. It describes how unique IIVL variations can create new learning pathways and proposes new terms for organizations and networks to differentiate the scale and scope of their work. This contribution challenges the field of human resource development to (re)consider how 21st century training can be more expressive, evolving, expansive, equity-minded, engaging, embodied, embedded, and empowering (Eller, 2024a).

The fourth chapter is a mixed methods exploration of organizational learning culture and the ways in which TGLF's peer learning-to-action model using digital technologies can enhance network capacity. Findings from the study report on the organizational learning dimensions of healthcare, social workers, and educators supporting children affected by the war in Ukraine. Findings also express participant-valued program features, and mental health and psychosocial

outcomes resulting from the application of psychological first aid. This work adds a macrosystemic view of the model's reach and the potential of IIVL to influence network development. It also contributes timely knowledge that can serve frontline practitioners facing extreme circumstances (Eller et al., 2025b).

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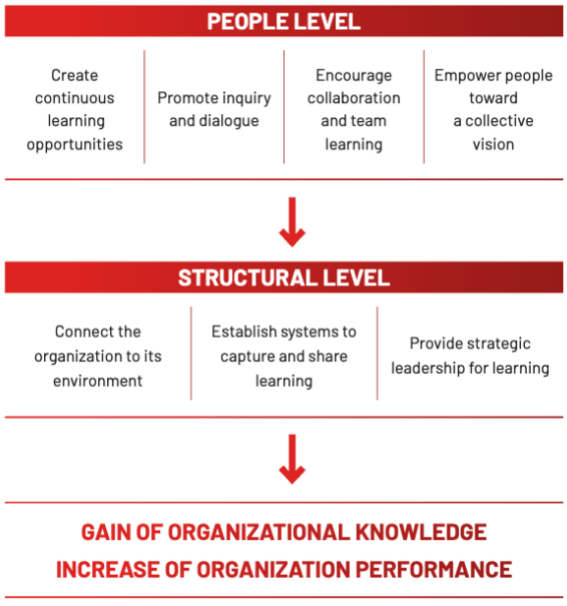
Appendix A: TGLF's Peer Learning-to-Action Model

Education as a Philosophy of Change

The Geneva Learning Foundation (TGLF) recognizes the complexity of the global health ecosystem and views education as a philosophy for change. Change, as TGLF has learned, happens best when health professionals are active producers of knowledge, learning with each other from the wheelbase of their education and experiences (Cope & Kalantzis, 2013). Diverging from traditional cascade training models, TGLF's specific theory of change (TOC) is rooted in its peer learning-to-action model. The model, developed by Reda Sadki, uses digital technologies to build upon an organizational learning base (Marsick & Watkins, 1993; 1997; see Figure 1) and embrace a digital-first, community-led approach.

Figure 1

TGLF's Evidence-based Framework



Note: The Geneva Learning Foundation. (2022). *Introduction to the Geneva Learning Foundation (1.0)*. https://doi.org/https://doi.org/10.5281/zenodo.7057015

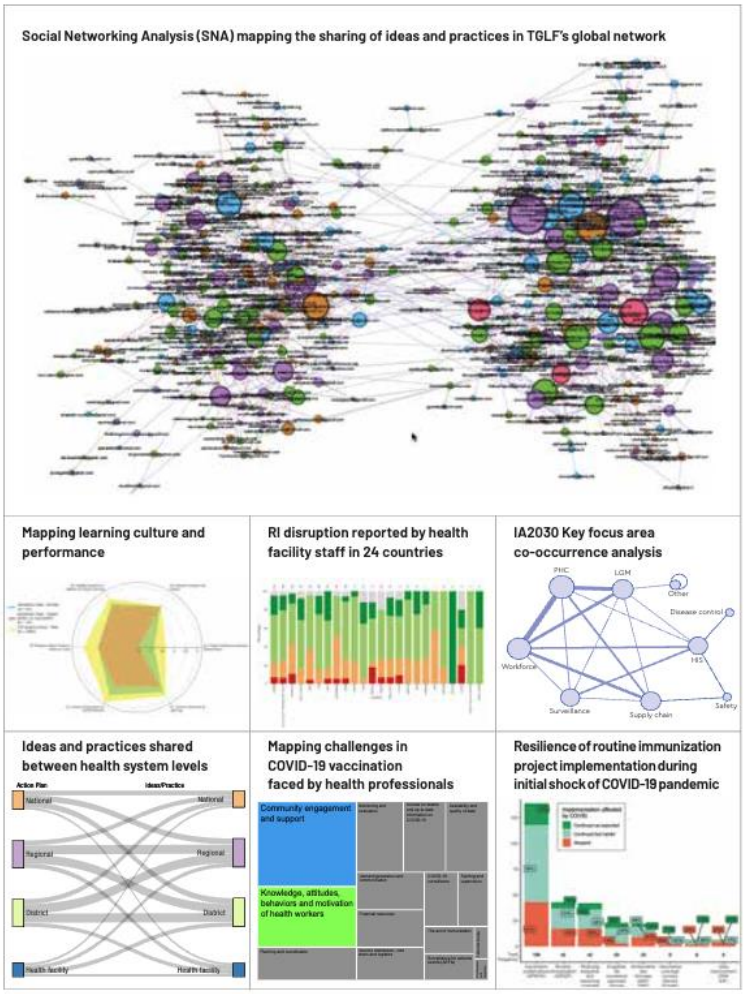
TGLF's model is a paradigmatic shift in global health education empowering practitioners from "all levels of the health system – not only the national authorities – to recognize what change is needed, (and) to lead this change where they work…(which) accelerates progress toward country goals and strengthens or can help rebuild civil society fabric" (Sadki, 2024). Drawing upon learning science, the model connects and supports programming for over 50,000 interdisciplinary and interprofessional health workers (TGLF, 2023b). Through partnerships with international organizations like the Wellcome Trust, Gavi, and the International Federation of Red Cross and Red Crescent Societies, TGLF continues to expand and evolve its programming in stride with the global challenges we face (TGLF, 2024b). Program offerings throughout the year on topics, such as immunization, climate change, and mental health encourage practitioners to connect and collaborate through peer, remote, social, and networked learning (Watkins et al., 2022).

> TGLF's full learning cycle (FLC) is a series of events and communications designed to help scholars meet, network, and learn with thousands of fellow health workers, building consciousness of commonalities, intrinsic motivation, and momentum to lead change, from awareness and implementation to results and documented impact (TGLF, 2023a).

Multi-directional feedback loops embedded in the FLC (see Figure 2) mean health workers become co-designers of TGLF programming and knowledge contributors to global health problem-solving, strengthening our collective capacity for transformation (Douthwaite et al., 2020; Magnifico et al., 2013; Sadki, 2024; Steen et al., 2020; TGLF, 2024a).

Figure 2

TGLF Information Flows



Note: The Geneva Learning Foundation. (2022). *Introduction to the Geneva Learning Foundation (1.0)*. https://doi.org/https://doi.org/10.5281/zenodo.7057015

Reflecting on co-design in TGLF FLC programming, Reda Sadki, TGLF president shared,

> We don't know what the program design will look like until we've collected the applications and analyzed what people share about their biggest challenges because it's all challenge-based…there may be some things that surprise us. And so, we adapt every part of the design, and we keep doing that every day throughout the program, so there's

> no disconnect between the design and the implementation (Watkins & Marsick, 2023, pp. 57–58).

Participation in TGLF's model is possible for many diverse health workers through provisions made (i.e., low-bandwidth, mobile-friendly design, language translation, closed captioning, session recordings), which support their inclusion (TGLF, 2024b). TGLF participants interact in the FLC in ways they are interested in and able. Primarily, they engage synchronously and asynchronously, although they may also gather in person as opportunities arise.

At lower levels of involvement, health workers connect by watching recordings of live-streamed FLC events, attending them, and/or using TGLF insights from the analysis of health worker contributions. Sharing their ideas, questions, observations, challenges, strategies, and findings through TGLF platforms and programming, they move into greater involvement. Although some TGLF events are gatherings that take ~an hour to a day, others are longer (TGLF, 2024b). Events spanning several weeks engage participants in investigative processes like participatory action research (Call-Cummings & Ross, 2022). These processes typically begin with the identification of contextual challenges using situational analysis methodologies (Jallad et al., 2022; Mintchev et al., 2022). Once challenges are identified, health workers begin developing and implementing local plans supported by global guidance to improve health outcomes. At and between stages of this process, health workers learn with each other about manifestations of challenges in different contexts, analyze their experiences, and make suggestions to strengthen project design. Spending time together, health workers form circles of support, which has also led to the development of country- and interest-based scholar groups or associations. During all TGLF FLC events, health workers are invited to join upcoming events. As they continue to join in more programming/events and contribute, they reach even higher

levels of engagement, often crossing digital paths with scholars from different domains (TGLF, 2024b).

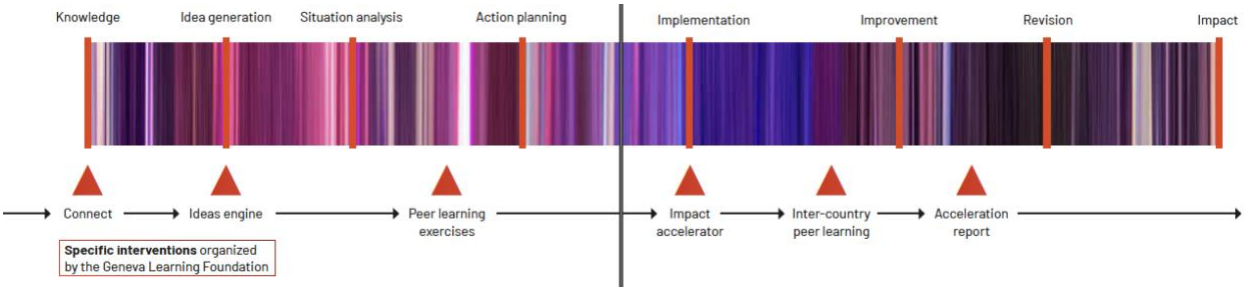
Regardless of health workers' level of engagement, their interactions contribute toward the development of collective intelligence (Hogan et al., 2023), which can be used to address complex health challenges and lead local action. In this way, TGLF's peer learning-to-action model capitalizes on the motivated actions of thousands of health workers to drive improvements in health outreach, outcomes, and community well-being. Thus, the model redefines how learning takes place and evidence is generated through "hybrid networks fusing digital and physical approaches" (The Geneva Learning Foundation, 2022a).

A Full Learning Cycle of Events

TGLF programming is a full learning cycle (FLC) of events. Core events in the FLC are divided into two phases (see Figure 3). Each phase follows a sequential flow of events for a selected topic. Throughout the FLC, participants and newcomers may connect with TGLF events and communications either asynchronously or synchronously at any point. Moreover, the FLC is followed for various topics, which may overlap. This makes it possible for participants to simultaneously engage in more than one topic or series of events. It is also important to note that TGLF FLC core events are interspersed with "overarching practices" like technical support sessions, remote coffees, partner briefings, and communications, which keep participants inspired and knowledge flowing (Watkins & Marsick, 2023).

Figure 3

TGLF's Learning-to-Impact Pathway



Note: The Geneva Learning Foundation. (2022a). *Information brief for partners (November 2022): The Geneva Learning Foundation (1.0)*. https://doi.org/10.5281/zenodo.7316466

Recordings of each FLC event, communications related to the events, and publications resulting from insights gathered on the events may be found on TGLF's YouTube Channel (@TheGenevaLearningFoundation), website (learning.foundation), LinkedIn page (https://www.linkedin.com/company/geneva-learning-foundation/), Telegram account (@GenevaLearning), Facebook page (https://www.facebook.com/DigitalScholar/), X account (@DigitalScholarX), and Zenodo community page (https://zenodo.org/communities/tglf/).

Connect events. At the beginning of the learning cycle, connect events like opening ceremonies and inaugural lectures tap into health workers' intrinsic motivation by encouraging them to reflect and share (i.e., experiences, photos, ideas/questions). At first, the peer learning-to-action model can be challenging for health workers new to peer learning. Reflecting on how TGLF FLC participants have reacted to its peer learning-to-action model, Reda Sadki, TGLF president said,

> These events are ideal opportunities to connect with the network on a specific topic (i.e., immunization, climate change) as key information and the latest research are presented. During these events, participants begin the gathering process, and existing knowledge is shared both by presenters and/or participants. That has sometimes led to opposition when

> people understand to what extent we flipped the prevailing model around. Some people really embrace it. Others get really scared (Watkins & Marsick, 2023, p. 59).

For this reason, the central task during connect events is building community. Connect events are designed for participants to taste the wealth of knowledge and expertise in the room and become more comfortable with the learning process. In general, connect events stir positive movement and energy, allowing health workers to begin contributing in small but meaningful ways.

Ideas Engine (IE). Early in programming as participants develop local plans to improve health outcomes, the Ideas Engine (IE) provides a platform for them to share ideas and receive initial feedback from their peers (see Figure 4). As practitioners read what others have written, they may be inspired with new ideas or learn of opportunities for collaboration. Feedback given in the IE also helps idea holders to see strengths and areas of growth in their planning.

Figure 4

Ideas Engine Platform

Note: TGLF. (2024b). The Geneva Learning Foundation. learning.foundation

Peer Learning Exercises. Peer learning exercises help participants build capacity to address difficult challenges. In these exercises or activities, participants work together to brainstorm solutions to a given scenario. In one specific peer learning exercise, the hackathon, an individual shares contextual information crucial to the challenge they are facing. Then, participants ask clarifying questions and share details of how their own relevant experiences may support the challenge owner. They do so without making prescriptive statements about what should or should not be done to solve the problem. The goal is idea generation and by taking turns presenting challenges, potential solutions are revealed (Watkins et al., 2022).

Impact Accelerator (IA). For health workers desiring continued community support for action plan implementation, the Impact Accelerator (IA) invites them into a deeper process of accountability and collective critique. This process follows four main stages: commit, measure, share, and mobilize. Through peer sharing, expert consultations, and weekly progress check-ins, participants act on their pledges[1] to support and hold one another accountable. Their actions are testament to the belief that it is possible to advance faster and better together than by working alone. Reda Sadki, TGLF president reflected,

> It's four weeks of goal setting. People initially set broad goals like, 'By the end of the month, I will have improved immunization coverage.' We help them set specific goals: e.g., 'By the end of the month, I will have presented the project to my boss and secured

[1] The impact accelerator pledge for the Immunization Agenda 2030 Movement states, "I am committed to work for a world where everyone, everywhere, fully benefits from vaccines to improve health and wellbeing. As a Scholar, I hereby solemnly pledge to: [1] Work with others to transform projects led by Scholars into action and results that will improve outcomes. [2] To share my success as well as my challenges by reporting on a regular basis on my progress toward implementation. [3] Support fellow Scholars in doing the same, while upholding the highest standard of integrity and behavior. I make this pledge for the health of children and families in my country and everywhere" (The Geneva Learning Foundation, 2021).

> some funding'— and even that may be very ambitious! We help people figure out what they can actually do within the constraints they have. After these steps there's ongoing longitudinal reporting. Basically, we'll call you back and ask, what happened to that project you were doing? Did you finish it? Did you get stuck? If so, why? What evidence do you have that it's made a difference? You share that with us and if you have good news to share, we'll probably invite you to an inspirational event for the next cycle. (Watkins & Marsick, 2023, p. 57).

Inter-country peer dialogues and rapid learning events. These events invite conversations between scholar groups from two different countries at a time with input from others listening in. During the dialogues, scholars review their contexts, what they have learned through their action planning, how they have innovatively responded, failed attempts and successful interventions, and invite questions/comments to further their thinking and work.

Acceleration Report Events. Ahead of report publication, early insights from the analysis of participants' contributions are shared and they engage with peers in processes of collective sense-making. Acceleration report events continue supporting health workers through actualized information to improve strategies. However, they also provide other health partners like funders and national level planners with timely information on current health worker challenges and priorities.

Teach to Reach. Although not shown in Figure 3, Teach to Reach is TGLF's signature event–a virtual conference in English and French with a series of synchronous and asynchronous events and activities leading up to and after the main event. Occurring several times throughout the year, it brings participants across all domains together to learn from and with one another. Several weeks before Teach to Reach, health workers share experiences by submitting online

responses to weekly targeted questions, and partner organizations and sponsors hold synchronous meetings to prepare for the event. Additionally, a series of lightning chats or brief, informal, and synchronous talks with globally recognized subject matter experts are held. The purpose of these talks is for health workers to begin conversing and asking questions on the topics that will be discussed. During Teach to Reach, health workers attend plenaries and themed sessions. Through these offerings, they stay up to date on the latest global health trends, learn from the work of other health workers, share their experiences connected to the topics, and hold insightful conversations across borders and disciplines. Participants may further engage in Teach to Reach through networking sessions where they are paired one-to-one at random with one or more health workers. The feeling that arises from connecting with such a large group of like-minded individuals and the powerful stories shared during these events catalyzes innovation and creates an impelling call for collective action. Following the event, participants share reflections on their experience through an online survey and synchronous gatherings to discuss how they have applied what they learned and collaboratively reflect.

Evidence-generating Benefits

TGLF's peer learning-to-action model generates highly granular data from thousands of settings in 100+ countries–a critical advantage, especially during times of crisis. Participants' "unique learning experiences generate not just data points but complex stories about what it takes to make change actually happen" (The Geneva Learning Foundation, 2022b). Hyperlocal contributions may stem from health workers' responses/reflections on themselves, observations/experiences in their local communities, and research they conducted in the context of their work. This data is collected in the form of TGLF-developed pre/post-event surveys, weekly or mid-point check-in questionnaires, presentations/narratives, event chat messages,

ideas/comments and questions shared aloud during events, results from their action plan initiatives, and more. After health workers contribute to a given topic, TGLF prioritizes the rapid return of analytical insight on this data to the health workers that shared them and the world at large (TGLF, 2024b).

TGLF's evidence generation maintains standards of scholarly rigor while prioritizing real-world impact. Analysis of health workers' empirical findings follow mixed methods approaches and robust ethical guidelines aligned with best practices of the field. The return of health worker contributions may take the form of reports, case studies, and other open-access publications. Although health worker contributions are not always published in peer-reviewed journals, all publications undergo extensive quality assurance checks to demonstrate internal and external integrity (TGLF, 2024b).

Open Research. TGLF's model encourages timely dissemination and transparency about its analytic processes. Its commitment to making large data sets of health worker contributions accessible align with the practice of open research (Vicente-Saez & Martinez-Fuentes, 2018). Open-access data and the insight gained from its analysis can establish evidence-based and non-traditional outputs to maximize real-world impact for global health challenges. As such, it lays the foundation for new policy pathways in emerging fields like climate and health. Learning to connect and connecting to learn through TGLF's peer learning-to-action model, health workers build the type of global and local bridges that can shift historically ingrained global health hierarchies of evidence into landscapes of learning for the benefit of all (Call-Cummings & Ross, 2022; Hogan et al., 2023; Jallad et al., 2022; Mintchev et al., 2022; TGLF, 2024b; Wenger-Trayner et al., 2014).

CHAPTER 2: ARTICLE ONE

LEARNING TO (CO)EVOLVE: A CONCEPTUAL REVIEW AND TYPOLOGY OF NETWORK DESIGN IN GLOBAL HEALTH VIRTUAL COMMUNITIES OF PRACTICE[1]

[1] Eller, K. 2024. *International Journal of Information, Knowledge, and Management.* 19: 1-21. Reprinted here with permission of publisher.

Abstract

Aim/Purpose. This conceptual review analyzes the designs of global health virtual communities of practice (VCoPs) programming reported in the empirical literature and proposes a new typology of their functioning. The purpose of this review is to provide clarity on VCoP learning stages of (co)evolution and insight into VCoP (re)development efforts to best meet member, organization, and network needs against an ever-evolving landscape of complexity in global health. **Background.** Since the COVID-19 pandemic, the field of global health has seen an uptick in the use of VCoPs to support continuous learning and improve health outcomes. However, evidence of how different combinations of programmatic designs impact opportunities for learning and development is lacking, and how VCoPs evolve as learning networks has yet to be explored. **Methodology.** Following an extensive search for literature in six databases, thematic analysis was conducted on 13 articles meeting the inclusion criteria. This led to the development and discussion of a new typology of VCoP phases of learning (co)evolution. **Contribution.** Knowledge gained from this review and the new categorization of VCoPs can support the functioning and evaluation of global health training programs. It can also provide a foundation for future research on how VCoPs influence the culture of learning organizations and networks. **Findings.** Synthesis of findings resulted in the categorization of global health VCoPs into five stages (slightly evolving, somewhat revolving, moderately revolving, highly revolving, and coevolving) across four design domains (network development, general member engagement before/after sessions, general member engagement during sessions, and session leadership). All global health VCoPs reviewed showed signs of adaptation and recommended future evolution. **Recommendations for Practitioners.** VCoP practitioners should pay close attention to how the structured flexibility of partnerships, design, and relationship development/accountability may

promote or hinder VCoP's continued evolution. Practitioners should shift perspective from short to mid- and long-term VCoP planning. **Recommendations for Researchers.** The new typology can stimulate further research to strengthen the clarity of language and findings related to VCoP functioning. **Impact on Society.** VCoPs are utilized by academic institutions, the private sector, non-profit organizations, the government, and other entities to fill gaps in adult learning at scale. The contextual implementation of findings from this study may impact VCoP design and drive improvements in opportunities for learning, global health, and well-being.

Future Research. Moving forward, future research could explore how VCoP evaluations relate to different stages of learning, consider evaluation stages across the totality of VCoP programming design, and explore how best to capture VCoP (long-term) impact attributed to health outcomes and the culture of learning organizations and networks.

Keywords: global health, virtual community of practice, continuous learning, complexity

Introduction

For over two decades, Virtual Communities of Practice (VCoPs) have served across societal sectors as mechanisms to manage knowledge and sustain innovation (Dubé et al., 2006). Using primarily digital interactions like videoconferencing and discussion boards, VCoPs "transcend space and time" (Dubé et al., 2006, p. 69; Wenger-Trayner & Wenger-Trayner, 2015), connecting people in different geographical areas around a shared domain and practice. Open-ended responses about engagement in VCoP events and activities like the ones below provide a snapshot of the value participants may assign to their programming.

- "The experience sharing, the discussion on a peer challenge, the different interventions (facilitators, peers) allowed me throughout the session to improve my work (the way to performance). This sharing was very rewarding, because we learn a lot by helping others and/or by sharing with others" (K. E. Watkins et al., 2022, p. 5).
- "It was about the knowledge sharing … advocacy … the support roles and … trying to collate information from various authoritative sources" (Mullan et al., 2022, p. 266).
- [The program was helpful because …] "Explaining an idea to others helps to identify its most important aspects" (Nguyen et al., 2023, p. 6).
- "This was the best! So cool to hear what everyone is doing! Lots of innovation during this difficult time. Seriously-this should be happening more often to share ideas" (Silverstein et al., 2022, p. 5).

Like learning in Communities of Practice (CoPs), learning in VCoPs can be informal, incidental, and span local to international levels (K. E. Watkins et al., 2018; Wenger-Trayner & Wenger-Trayner, 2015). Thus, the nature of VCoPs makes it easy to bridge the gap between "typically resource-rich, usually urban, academic centers and those in resource-scarce, usually

remote and rural areas" (Masroori et al., 2022, p. 2). As such, VCoPs have been utilized by academic institutions, the private sector, non-profit organizations, the government, and other entities to fill gaps in adult learning, providing opportunities like continuing professional development, interprofessional education, and continuing medical education (Masroori et al., 2022; Shaw et al., 2022; Wenger-Trayner & Wenger-Trayner, 2015).

In the field of global health, VCoPs have sought to unite and support health professionals in their collective efforts to improve healthcare processes and outcomes (Barnett et al., 2012; Masroori et al., 2022; Shaw et al., 2022). Individuals participating in global health VCoPs may be community health workers, nurses, doctors, allied health professionals, or other positions connected to or supporting healthcare. These individuals may operate in local to international contexts and work privately or for healthcare entities like hospitals, consulting firms, educational/research centers, epidemiology offices, ministries of health, or global health organizations/alliances (Shaw et al., 2022). While global health VCoPs offer new possibilities to fill the structural holes (Burt, 2004) dug by wicked challenges like climate change, no one community is the same, and their designs vary from more formal to informal learning experiences (Dubé et al., 2006; Shaw et al., 2022; Wenger-Trayner & Wenger-Trayner, 2015). Numerous frameworks and guiding principles have supported the development and evaluation of global health VCoPs across various healthcare challenges. However, even among VCoPs with similar healthcare challenges, methodological and theoretical differences are not well documented (Shaw et al., 2022), and a typology of how they function amid complexity is lacking (Sibbald et al., 2022). Furthermore, VCoPs promote networked learning in the community, but how they evolve as learning networks (Carvalho & Goodyear, 2014) has yet to be explored.

Given the versatility of VCoPs to serve a variety of purposes and the seemingly endless

possibilities of their composition, numerous interdisciplinary studies have documented different aspects of the VCoP design process. These studies discuss VCoP design concepts, such as the need for emerging designs (Amaratunga, 2014), learner-centered considerations (Murad et al., 2016), iterative, systemic development (D. R. Watkins et al., 2017), community-based principles (Romero-Mas et al., 2020), and the pillars of technology-based learning environments (Fragou, 2020). Dubé et al. (2006) created a typology of VCoP "key structuring characteristics" (p. 70). Their work built upon that of other CoP models, sharing the stages of development and maturation (Wenger et al., 2002) and moved beyond generalized descriptions of VCoPs to distinguish them as "unique personalities" (Dubé et al., 2006, p. 69). Whether spontaneously emerging or intentionally fostered by organizations, the authors outlined how VCoPs may be described characteristically (i.e., age, membership size) and categorized along a continuum of increasing complexity (Dubé et al., 2006, p. 72). However, while the typology created by Dubé et al. (2006) offers great insight to 'set the scene' through characteristics indicative of potential life cycle shifts of VCoPs, it does not focus on how combinations of their diverse designs may impact opportunities for learning and development. This conceptual review and typology build on the recommendation of Dubé and colleagues for future research to "cluster the VCoPs into generic types leading to the identification of different configurations of VCoPs" (Dubé et al., 2006, p. 89). By analyzing their functioning in global health, an area that saw a surge of VCoPs during the COVID-19 pandemic (Shaw et al., 2022), it aims to provide complementary and necessary information for evaluation. As the authors stated, such knowledge is needed to "analyze the challenges that specific configurations of VCoPs are more likely to face and investigate the management decisions/actions that can be taken" (Dubé et al., 2006, p. 89).

This paper begins by stating the purpose and methods for conducting a conceptual review

of the empirical literature on global health VCoPs. It proceeds by presenting the findings from a thematic analysis of global health VCoP designs. Next, it uses the findings from the review as a foundation to propose a new typology of VCoP functioning and uses the typology to categorize the evolution of the global health VCoPs conceptually reviewed. Then, a discussion integrates information from the conceptual review and typology and links findings to the broader literature on learning organizations and networks. Finally, the paper concludes with the limitations of the study, future directions for its extension, and a summary of all findings.

Research Purpose and Methods

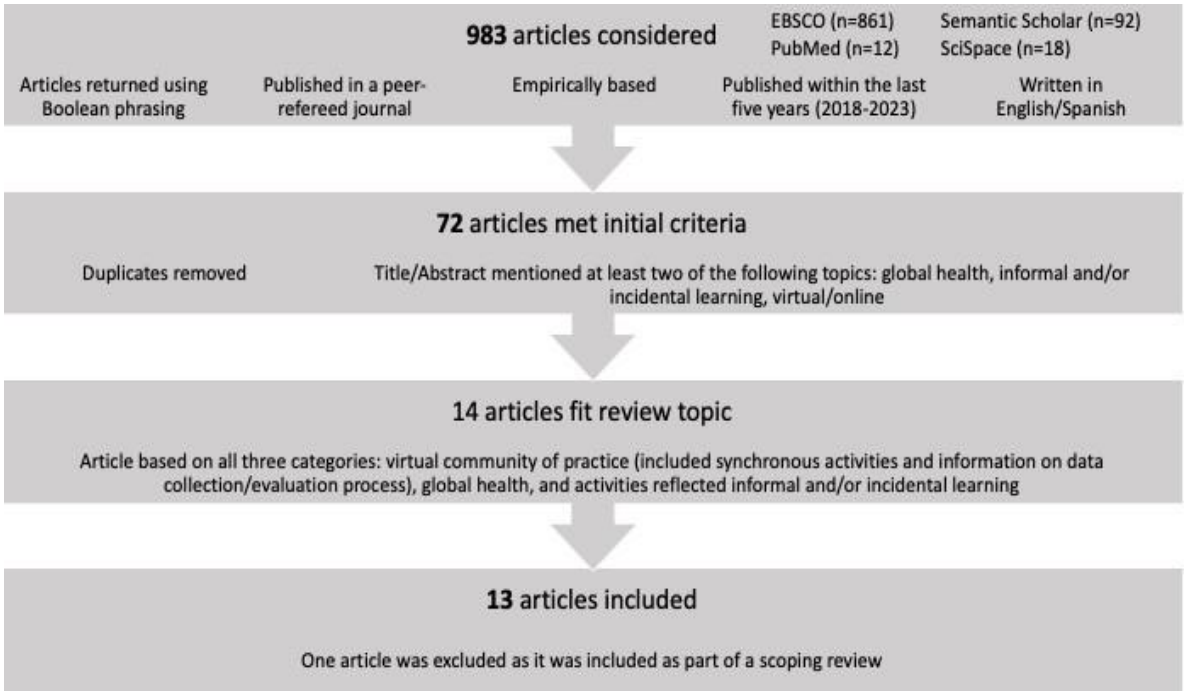
The purpose of this conceptual review is to provide clarity on VCoP learning stages of (co)evolution and insight into VCoP (re)development efforts to best meet member, organization, and network needs against an ever-evolving landscape.

To search for articles, I developed a Boolean search query that contained combinations of the search terms: (1) informal/incidental/non-formal learning/education, (2) virtual/online/digital/global community* of practice/network/learning/meeting/exchange*/peer to peer exchange*/learning experience*, and (3) global/international/world/transnational/universal/cross-cultural (public) health (sphere/education). I searched independently in the following databases/AI: EBSCO, PubMed, Google Scholar, EBSCO, Semantic Scholar, and SciSpace in September 2023. Articles meeting the following criteria were eligible for inclusion: (a) English/Spanish language, (b) published in a peer-reviewed journal, (c) empirically based, and (d) published within the last five years (2018-2023). I independently collated and screened the initial database yield of 983 returns. Following the removal of duplicates and a title/abstract review for at least two of the three main investigation areas (global health, informal and/or incidental learning, virtual/online

community/exchange/experience), a total of 72 articles were considered for full-text review. After a full-text review to focus only on articles directly related to the topic, 58 articles were excluded. Excluded articles did not discuss VCoPs with synchronous activities, include VCoP data collection/evaluation information, or reflect global health (not formal education). Of the 14 remaining articles, one additional was removed as it was referenced in a scoping review selected for this study; thus, 13 articles were included in the current review.

Figure 1

Diagram of the article selection process



Thematic analysis was exploratory, critical, and inductive, following a six-phase process (Braun & Clarke, 2006). To minimize the risk of personal bias throughout all phases, I regularly sought and incorporated feedback from university colleagues on the review process (article search, steps, analysis) and products (codes, themes, phases, stages). All findings were grounded in verbatim quotes to further mitigate potential bias/conflict of interest. In step one (data familiarization), I

read, re-read, and took notes on VCoP characteristics and design in each article. In step two (coding), I inductively compiled a list of different VCoP design categories shared across all literature. Using the summarized list of codes, I created several spreadsheets (Tables 1-3) of VCoP design with a critical lens, viewing what was (not) shared in each study to constitute VCoP design. In step three (initial theme generation), I reviewed all collated data to see the broad VCoP design patterns and sub-patterns (i.e., (re)development). In step four (developing and reviewing themes), I combined information from all initial themes to outline a new typology of three VCoP phases of learning (i.e., evolving). In step five (refining, defining, and naming themes), I further defined and delineated the three phases into five stages (i.e., complexly coevolving) according to the collated data. Completing the analysis in step six (writing up), I used the typology to map the studies according to the stage. Additionally, I discussed the typology in reference to learning organizations and learning networks, sharing how VCoP phases are social (re)constructions of open and closed systems. The review concludes with limitations, future directions, and a summary of all findings and connections.

Thematic Analysis

Thematic analysis revealed two major themes. The first theme, structured flexibility, encompasses the array of VCoP designs and the redevelopment of (a)synchronous activities. The second theme, a hierarchy of learning in VCoPs, relates their designs to opportunities for learner engagement.

Structured Flexibility

Throughout the literature, structured flexibility was evidenced in VCoPs (1) (re)development, (2) meeting frequency, (3) (a)synchronous activities, and (4) reflection on current practice. While some VCoPs leaned more heavily on the structured side, others demonstrated

great flexibility to adapt to the global scene, members' needs, and network goals. All VCoPs reviewed showed signs of adaptation and recommended future evolution based on findings, whether more bent toward structure or flexibility.

(Re)development

The VCoP described by Gould et al. (2019), was established in 2016 when the National Syndromic Surveillance Program recognized the need to build local and state capacity beyond its technical infrastructure. However, the majority of VCoPs developed/reorganized as a result of the COVID-19 pandemic, a time in our global history characterized by a heightened need for health education to bridge research and practice on the frontlines of care (Erklauer et al., 2022; Hunt et al., 2021; Lucero et al., 2020; Masroori et al., 2022; Mullan et al., 2022; Shaw et al., 2022; Sibbald et al., 2022; Silverstein et al., 2022; Swords et al., 2021; K. E. Watkins et al., 2022; Wilson et al., 2021). Some previously established in-person CoPs flexed their structure to virtually connect with health leaders already participating in their networks (Erklauer et al., 2022; Shaw et al., 2022) while others began virtually to address contextual circumstances and goals (Hunt et al., 2021; Lucero et al., 2020; Masroori et al., 2022; Mullan et al., 2022; Nguyen et al., 2023; Shaw et al., 2022; Sibbald et al., 2022; Silverstein et al., 2022; Swords et al., 2021; K. E. Watkins et al., 2022; Wilson et al., 2021). The (re)development of VCoPs also provided structured but flexible opportunities for VCoPs to expand their networks through specific, more cost-effective ways of engagement. For example, VCoPs were more accessible to health leaders in rural areas and to health leaders who lacked transportation, funding, or the ability to travel due to reasons such as time, personal, or financial constraints (Hunt et al., 2021; Lucero et al., 2020; Masroori et al., 2022; Mullan et al., 2022; Shaw et al., 2022; Silverstein et al., 2022).

Meeting Frequency

In addition to expanding network structures and access, global health VCoPs demonstrated structured flexibility in meeting frequency to meet member needs and community goals. Studies reflected VCoPs either meeting quarterly (n=1), monthly (n=3), one to two times per week or once every two weeks (n=5), for a set number of times (n=2), or shared gathering regularly but did not state meeting frequency (n=2). Special ad hoc sessions/events also demonstrated VCoP meeting flexibility to alter sessions in response to (global) needs.

(A)synchronous Activities

VCoP's structured (a)synchronous activities flexibly provided members with various points of connection to networked knowledge. On top of virtual meetings, several studies mentioned other opportunities for VCoP synchronous engagement, including self-directed individual networking (n=2), small groups/workgroups/committees (n=2), telementoring (n=2), and ad hoc virtual or in-person sessions/events (n=6). Small groups/workgroups/committees could collaborate synchronously or asynchronously per group need/interest. In all studies (n=13), opportunities for VCoP asynchronous engagement were provided through website/repository access, with participants having access to curated resources like recorded sessions, technical references, literature, project information, and messaging/discussion boards. Other opportunities for asynchronous engagement included online forums/discussion boards and online data sharing such as emails, newsletters, and social media exchanges (n=8), and one VCoP described members' access to institutional online courses.

Table 1

(A)synchronous activities

Study information	Synchronous activities						Asynchronous activities		
First author and year	Meeting frequency [q]uarterly, [m]onthly, [w]eekly, [bw] bi-weekly, [s#] set number, [r]egularly	Webinar/videoconference call/virtual meeting/ virtual session/podcast	Individual networking	Workgroup/committee/small group *Note: collaboration could be (a)synchronous	Telementoring	Special or ad hoc (virtual or in-person) sessions/events/conferences	Website/repository	Forum/discussion board/email or data sharing	Online courses
Erklauer et al. (2022)	[M]	[X]					[X]	[X]	
Gould et al. (2019)	[M]	[X]	[X]	[X]			[X]	[X]	
Hunt et al. (2021)	[W]	[X]				[X]	[X]		
Lucero et al. (2020)	[S7]	[X]				[X]	[X]		
Masroori et al. (2022)	[W]	[X]					[X]		
Mullan et al. (2022)	[R]	[X]					[X]	[X]	
Nguyen et al. (2023)	[BW]	[X]		[X]		[X]	[X]	[X]	
Shaw et al. (2022)	[R] varied per study	[X]			[X]		[X]	[X]	
Sibbald et al. (2022)	[Q]	[X]	[X]		[X]	[X]	[X]	[X]	[X]
Silverstein et al. (2022)	[M] regular series [W] special ad hoc	[X]				[X]	[X]		
Swords et al. (2021)	[S5]	[X]					[X]	[X]	
K. E. Watkins et al. (2022)	[W]x2	[X]				[X]	[X]	[X]	
Wilson et al. (2021)	[W]	[X]					[X]		

Future Practice Recommendations

Based on study findings, partnerships, design, and relationship development/accountability were understood as essential in VCoP processes. For future VCoP practice, studies recommended their continued evolution to reflect more structured flexibility. Recommendations for the continued evolution of these areas imply a shift in perspective from short to mid- and long-term VCoP planning.

Partnerships

Focusing on new/deepened partnerships with like-minded organizations was one recommendation to support VCoP growth and lower resource intensity through technical, logistical, and accreditation support (Erklauer et al., 2022). In this regard, partnering could be understood as creating a branded platform that several organizations can use as needs arise on the same topic. As explained, this arrangement could promote social cohesion and collaboration while developing unique VCoP identities (Shaw et al., 2022). Flexible and delineated (structured) partnership was therefore seen to increase VCoP sustainability (Wilson et al., 2021).

Design

Nguyen et al. (2023) recommended that VCoPs consider frameworks that support "distributed, purpose-driven, self-organized teams" to promote cross-disciplinary mentoring/resource sharing. It was also recommended that VCoPs focus activities on community engagement (K. E. Watkins et al., 2022) in ways that promote a collaborative, team-based approach (Swords et al., 2021). Building in sufficient time for participant active engagement was further noted as needed to build community, get feedback, promote relevant topics, and make modifications (Shaw et al., 2022; Wilson et al., 2021), such as customizing online knowledge repositories to members' wants and needs (Silverstein et al., 2022).

Relationship Development and Accountability

The literature revealed a variety of perspectives about VCoP leadership accountability to relationship development with its members. Three studies contributed that VCoP leadership should focus on respect, reciprocity, and non-competitiveness (Hunt et al., 2021; Lucero et al., 2020; Shaw et al., 2022). K. E. Watkins et al. (2022) stated the importance of brokering in continuing to connect people on different healthcare system levels in knowledge exchange. Silverstein et al. (2022) highlighted the need for VCoPs to consider how members may continue interactions in between meetings, and Sibbald et al. (2022) how they may stay connected after the conclusion of programming. Silverstein et al. (2022) also shared the importance of simultaneous interpretation so that all participants can follow conversations in real-time. Speaking to mentorship, Swords et al. (2021) suggested that VCoPs consider generational approaches. Another topic discussed by several studies was the need to regularly revisit/check in with participants about concerns (Hunt et al., 2021) while simultaneously being conscientious of their motivation/dedication (Shaw et al., 2022) and strain due to issues like webinar fatigue or current global events (Wilson et al., 2021).

Hierarchy of Learning

General member engagement was influenced by VCoP design. Evidence of general member engagement was found through session analysis, and other potential (a)synchronous activities were offered. The structured flexibility of the VCoP design influenced the degree of general members' possible engagement/interaction before, during, and after synchronous sessions. The leadership of sessions indicated the directional exchange of knowledge and provided insight into the VCoP hierarchy of learning.

General VCoP Member Engagement Before/After Sessions

Notwithstanding general member assessment of knowledge used for VCoP evaluation or their use of resources via a VCoP website, all studies shared some level of opportunities for engagement before and after sessions. VCoPs in two studies encouraged general members to submit questions to presenters in advance of sessions (Hunt et al., 2021; Wilson et al., 2021), while one other study encouraged members to not only email questions but also future topics and feedback (Erklauer et al., 2022). Two additional VCoPs encouraged general members to take advantage of other network (a)synchronous activities, such as individual networking and serving on workgroups/committees (Gould et al., 2019), as well as telementoring, online courses, and ad hoc opportunities (Sibbald et al., 2022). General members in another VCoP were invited to submit a training challenge before the initial session and to support peers' plans (K. E. Watkins et al., 2022). In a small grouping of different VCoPs, general members completed a scholarship competency inventory and collaborated in small groups (Nguyen et al., 2023). VCoP general member engagement before and after sessions varied per study re-viewed by Shaw et al. (2022) and was not reported for all studies. In one study reviewed by Shaw et al. (2022), general members could submit a case for discussion and prepare before the session by reviewing the case materials (Friberger & Falkman, 2013). General member post-session engagement in another review by Shaw et al. (2022) included possible interaction through a discussion forum on a weekly question/topic (Alary Gauvreau et al., 2019). In Lucero et al. (2020), VCoP members requested session topics, and in Masroori et al. (2022), members came prepared to discuss cases on the given topic. In Silverstein et al. (2022), VCoP members discussed topics with clinical leads who invited them to the session, as well as answered questions before/after programming. Two studies reported using discussion

boards for members to pose questions (Swords et al., 2021) and to create an advocacy voice (Mullan et al., 2022).

General VCoP Member Engagement During Sessions

During VCoP sessions, general members' levels of interaction varied from listening and responding to polling questions (Erklauer et al., 2022) to participating in knowledge exchange (Gould et al., 2019). Seven studies described VCoPs where the primary form of general member engagement was knowledge exchange through a facilitated (spoken) discussion, often following a presentation (Gould et al., 2019; Lucero et al., 2020; Masroori et al., 2022; Mullan et al., 2022; Nguyen et al., 2023; Sibbald et al., 2022; Silverstein et al., 2022). In Nguyen et al. (2023), VCoP general members, during small group sessions, also self-organized into working groups where they provided each other with mutual support. VCoP general members in two studies were encouraged to listen and respond to polling questions and to ask questions/share comments via the chat and built-in features of the platform (Hunt et al., 2021; Wilson et al., 2021). In K. E. Watkins et al. (2022), general members may have been chosen as responders and, if not, listened and participated in knowledge exchange via the chat function. In Swords et al. (2021), general members listened to a presentation, after which they had an opportunity to verbally ask speakers questions and share their ideas. Shaw et al. (2022) reported varied general participant engagement during sessions for some, but not all, of the studies reviewed. Friberger and Falkman (2013), as cited in Shaw et al. (2022), stated that VCoP members engage in knowledge exchange by discussing cases presented and suggesting potential diagnoses and treatments.

Table 2

General VCoP Member Possible Engagement

First author and year	Before and/or after sessions	During sessions
Erklauer et al. (2022)	Email questions/topics/feedback: "Participants were encouraged to email questions, feedback, and topic/case recommendations for future sessions" (p. 4).	Listen and respond to polling questions: "The educational series used audience polling questions to optimize the engagement of participants and launch expert discussion" (p. 3).
Gould et al. (2019)	Contact other VCoP members for knowledge exchange; serve on workgroups/committees "… the NSSP CoP membership directory … makes it possible for members to locate and contact other members … thus facilitating discussions … Members access the NSSP CoP through the ISDS website (healthsurveillance.org), which provides access to forums for problem-solving, subject-matter experts for technical assistance, a surveillance knowledge repository, online webinars and training, and the opportunity to join workgroups and committees …" (p. 224).	[Entire session] Participate in knowledge exchange "learn from each other … share guidance, resources, technical assistance" (p. 224).
Hunt et al. (2021)	Submit questions in advance for presenters. "Participants can submit questions in advance…" (p. 224).	Listen and respond to polling questions; ask questions/share comments via chat. "… participants using multipoint videoconferencing as well as real-time polling, chat, and Q&A functions" (p. 224).
Lucero et al. (2020)	Consider questions in advance. "Gathering Grounds members support these meetings by deciding what the community focuses on and communicating what information would be most helpful at the time. Community members have requested conversations …" (p. 55).	[Entire session] Participate in knowledge exchange "they shared their experiences in their communities" (p. 54).

First author and year	Before and/or after sessions	During sessions
Masroori et al. (2022)	Not mentioned directly in the article; how- ever, in ECHO studies with similar models the article referenced, participants come to the conversation prepared to share a case on the topic in advance.	Listen to a presentation and then listen in on a knowledge exchange. "The sessions include a case presentation by a member of the community, followed by a facilitated discussion" (p. 2). Other studies referenced by the article that also use the ECHO model provided additional information "UNMHSC specialists … provide advice and clinical mentoring … Working together, the community providers and specialists manage patients following evidence-based protocols … discussions are supplemented with short didactic presentations by inter-disciplinary experts …" (Arora et al., 2011).
Mullan et al. (2022)	Basecamp discussion board. "Participants ex- pressed that the communication channels, developed with a broad range of stakeholders, gave GP members an advocacy voice across the health sector. The two-way dissemination of information was a critical feature" (p. 267).	[~Half session] Participate in knowledge exchange. "VCoP leaders perceived that their responsibilities were to provide advocacy and support, and to share information, including evidence-based information, with their members" (p. 255). "[T]he VCoP facilitated communication between themselves and other key stake- holders about what worked, what did not work, and how they were feeling" (p. 266).
Nguyen et al. (2023)	Complete scholarship competency inventory; participate in knowledge exchange. "Open- ness to sharing and flexibility with work culture and time diversity enabled each writing group to develop realistic expectations and timelines for themselves" (p. 7).	[Entire session] "… facilitators fostered open dialogue in large and small groups, encouraging active participation and enabling brainstorming" (p. 4). "… smaller CoPs to form by setting up sub-communities with shared interests (the domain), who improved their practices as they interacted regularly" (p. 2).
Shaw et al. (2022)	Varied (see Table S4 of the study)	Varied (see Table S4 of the study)

First author and year	Before and/or after sessions	During sessions
Sibbald et al. (2022)	Participate in other events/activities. "This competitive year-long program provides opportunities to take advantage of CFHI programming, to participate in virtual mentoring, and to collaborate with peers. Through the Policy Circle, members gain access to a cu- rated resource listing (academic research, literature, and newsletters), the Institute for Healthcare Improvement's (IHI) online courses, and receive financial support to at- tend a national event or conference" (p. 4).	[Entire session] Participate in knowledge exchange "share stories and learn from each other's experiences, as well as dis- cuss 'hot topics' and current events" (p. 4).
Silverstein et al. (2022)	Participants discussed VCoP participation/topics with clinical leads; participants answered survey questions about knowledge and program (used for both evaluation and pro- gram adaptation) (p. 3).	[Entire session] Participate in knowledge exchange. "The discussion was framed as the core component of the CLF, whose richness depended on the exchange among participants" (p. 2).
Swords et al. (2021)	Discussion boards "pose questions to discussants or to the larger forum via message boards or email" (p. 263).	Listen, ask questions to speakers, and share ideas. "The question and answer period at the end of each session allowed participants to share their own ideas and pose questions to the speakers, enabling interactive participant engagement" (p. 268).
K. E. Watkins et al. (2022)	Identify and reflect on an immunization training challenge; participate in a larger Teach to Reach (T2R) program. "The formal learning objectives of the Teach to Reach Level 1 certification were to develop an action plan to im- prove an immunization training program in relation to an immunization challenge, and then to peer review the plans of other participants to help others improve" (p. 2).	[Entire session] Listen and participate in knowledge exchange. "During each ITCH session, a 'challenge owner' was identified and the information submitted in their application was shown on screen to all participants. Peers were then invited to share their experiences in relation to this immunization training challenge ... In addition to the challenge presenters and respondents, 526 scholars were online as active listeners …" (p. 3). Also see Fig. 1: observers' section "listen and respond in chat" (p. 4).

First author and year	Before and/or after sessions	During sessions
Wilson et al. (2021)	Submit questions in advance for presenters. "Panelists provided additional expertise and perspective during the panel discussion by answering questions submitted in advance by participants during registration" (p. s100).	Listen and respond to polling questions; ask questions/share comments via chat/built-in feature. "Participants responded to each polling question on their device ... Participants submitted questions during the session through the question and answer feature (Q&A), where a team of subject matter experts from the CDC and WHO and the session's speakers and panelists could type answers. The team responsible for monitoring the Q&As during the session would inform session moderators if any submitted questions should be answered during the panel discussion. Participants used the Chat feature for any questions or comments on logistics or connectivity" (p. s100).

Note: General member engagement is not considered to be members' evaluation of sessions, (knowledge) assessments used for VCoP evaluation, or access/use of resources via a website.

Leadership of Sessions

Analysis of session leadership provided indicators of VCoP hierarchical structure in practice. Studies described sessions to be led/presented by members with different types/levels of authority/expertise (n=3) or a combination of experts and members (n=9). In VCoPs combining expert and general member voices, there was variance in the voice(s), with some being heard more loudly than others (n=4) and, in five cases, heard more equally through the shared distribution of leadership tasks. In Erklauer et al. (2022), session speakers were chosen content experts, and panelists were members selected by the speakers tacitly understood to have expertise on the topic. In Lucero et al. (2020), sessions were member-driven, and all were encouraged to share. Based on members' interests, the VCoP also invited community experts to share; however, only one presentation led by an expert was described. The VCoP described in Masroori et al. (2022) outlined

how interprofessional clinicians in rural areas connected hub team members who discussed cases with members and provided expert advice. Mullan et al. (2022) explained that the VCoP structure has "bi-directional knowledge translation" (p. 268), with conversations exchanged between leaders from the top-down and the bottom-up. In Nguyen et al. (2023), the VCoP hosted a core series of webinars and workshops (led by multidisciplinary staff) and small group sessions (led by members). General VCoP members described in Sib- bald et al. (2022) both exchanged and received information from health leaders who were members and health leaders connected to the larger program. In Silverstein et al. (2022), healthcare professionals/experts were recruited to facilitate and present. However, they later led a discussion among all general VCoP members. The VCoP reported by Wilson et al. (2021) incorporated expert speakers to discuss guidelines/norms, field-based speakers on implementing guidelines, and panelists with subject matter expertise for additional perspective. VCoP general members could submit questions before and during the session, which experts answered. Hunt et al. (2021) emphasized that presenters and panelists were "recruited based on their lived experiences;" however, the moderated discussion included "a panel of experts," which extended to "professional organization leaders" (p. 224). In three VCoPs, session leadership was only member-driven (Gould et al., 2019; Swords et al., 2021; K. E. Watkins et al., 2022). In these VCoPs, member conversations/actions were centered around sharing guidance/advice, resources, technical assistance, lived experiences/interests, and needs/challenges. In the studies reviewed by Shaw et al. (2022), session leadership again showed variance between experts and leaders. For example, VCoP general members/participants were co-researchers and co-facilitators (Galheigo et al., 2019), and experts were invited to be session speakers (Wolbrink et al., 2017).

Table 3

Leadership of Sessions

First author and year	Sessions led /presented by	Leader/presenter description
Erklauer et al. (2022)	EXPERTS and MEMBERS	"Lead speakers for each session were identified through group consensus by the planning committee based on their contributions to the literature or participation in the development of PNCC clinical guidelines. Along with the planning committee, the lead speakers selected members to serve as the panelists for the subsequent case- based discussion, delineate learning objectives, and identify clinical cases … The first session was a didactic lecture delivered by a con- tent expert … This was followed by a second session, an in-depth expert panel discussion … led by the previous session's speaker." (p. 3)
Gould et al. (2019)	MEMBERS	"Monthly conference calls are member-driven and bring together various stakeholders to spark collaborative efforts and to share guidance, resources, and technical assistance…" (p.226)
Hunt et al. (2021)	MEMBERS and EXPERTS	"COVID-19 Clinical Rounds presenters and panelists are recruited based on their lived experiences, not their reputation as experts or speakers … Presentations are followed by a moderated discussion with a panel of experts consisting of the presenters, previous presenters, and professional organization leaders" (p. 224).
Lucero et al. (2020)	MEMBERS and EXPERTS	"We have worked to integrate a mixture of expert knowledge sharing and more fluid community conversations through online meetings to balance the requests and interests of I-CP members" (p.57). Only one expert session was described (pp. 54-55).
Masroori et al. (2022)	EXPERTS and MEMBERS	"It connects interprofessional expert clinicians (hub team members) … with interprofessional clinicians in rural, remote and underserved areas. The sessions include a case presentation by a member of the community, followed by a facilitated discussion. The facilitator rotates weekly and is selected from the expert hub" (p. 2).
Mullan et al. (2022)	EXPERTS and MEMBERS	"The VCoP was conceptualized as a network of networks of GP and general practices (or community of communities) … A tiered structure was used to facilitate the movement of information from centralized authorities out to local networks, and just as importantly, sharing of experience concerning guideline and policy ap- plication among the VCoP members" (p. 264).

First author and year	Sessions led /presented by	Leader/presenter description
Nguyen et al. (2023)	EXPERTS and MEMBERS	"The CPD program consisted of virtual sessions hosted twice monthly: a Core Series of webinars and workshops … and a CoPs session of small group activities for exploration of inquiries, formation of collaborations, and scholarship consultations …" (p. 3). "At the start of the GHS-CoP, members completed a scholarship- competency inventory, adapted from the Academic Competencies for Medical Faculty by Harris et al. (2007), to advise member base- line skills and identify members with expertise to serve as coaches for small group activities, collaborative projects, and RAISE Symposium activities" (p. 3).
Shaw et al. (2022)	VARIED	"Facilitators or leaders were reported to drive the community and encourage members to participate. They may, for example, coordinate the preparation and conduction of meetings [46]. The Swedish Oral Medicine Network's monthly meetings were led by a chairperson, but the meeting's facilitation rotated among core members [43]. For a VCoP formed for the purpose of General Practitioners' continuing professional development, the facilitation team comprised specialist physicians, senior GPs, a dedicated content facilitator, and an information technology administrator [48] …" (p. 7).
Sibbald et al. (2022)	EXPERTS and MEMBERS	"One of the most important aspects of the Policy Circle is the regular opportunities to connect with and learn from peers and healthcare leaders across Canada [31] … Each Policy Circle member is matched with a mentor who is aligned with their interests or goals and has extensive policy and practice experience and expertise" (p. 4).
Silverstein et al. (2022)	EXPERTS and MEMBERS	"Clinical Leads recruited health care professionals from their site to facilitate. Facilitators had demonstrated knowledge, experience, or leadership related to the topic, and the facilitator role rotated be- tween NGOs. Facilitators presented at the start of a session, establishing a foundation of knowledge before encouraging a discussion among participants by having them share their personal experiences, successes, and challenges … With the emergence of the COVID-19...invited content experts facilitated these sessions…" (p. 2)
Swords et al. (2021)	MEMBERS	Each webinar was presented by members representing different levels and roles within the health system (i.e., surgeons, nursing di- rectors, intensive care consultants, speech pathologists, patients, and families).

First author and year	Sessions led /presented by	Leader/presenter description
K. E. Watkins et al. (2022)	MEMBERS	"A typical 30-min session involved one T2R participant presenting their challenge and the other attendees problem solving or providing counsel from their own experience or context … Facilitators kept the momentum and helped focus the learning" (p. 3).
Wilson et al. (2021)	EXPERTS and MEMBERS	"Speakers from the WHO and CDC focused on normative guidance and operational considerations, and field-based speakers shared their experiences in implementing IPC recommendations in their local healthcare context...Panelists provided additional expertise and perspective during the panel discussion by answering questions submitted in advance by participants during registration or submitted live during the session. Participants submitted questions during the session through the question and answer feature (Q&A), where a team of subject matter experts from the CDC and WHO and the session's speakers and panelists could type answers" (p. s100).

Note: Primary contributions/guidance are capitalized. [MEMBERS] and [members] listed are understood to possess different types/levels of authority/expertise.

A Typology of VCoP Learning (Co)Evolution

A new typology of VCoP learning (co)evolution was created by combining general member engagement and leadership of sessions. This new typology maps VCoP structured flexibility along a continuum of three phases (evolving VCoPs, revolving VCoPs, and coevolving VCoPs) and five stages (slightly evolving, somewhat revolving, moderately revolving, highly revolving, and coevolving). Categorization of VCoPs' stage of (co)evolution considers their design across the four domains of network development, general member engagement before/after sessions, general member engagement during sessions, and session leadership.

Slightly Evolving VCoPs

On the far-left end of the continuum are "slightly evolving" VCoPs. VCoPs in this stage retain a more top-down/cascade approach, digitalizing traditional training sessions and resources

offered. At this end of the continuum, VCoPs are led by individuals/groups considered experts in the field with/without authoritative power. In this stage, general member engagement before/after sessions involves members contacting experts or leader(ship) through email. Alternatively, members may individually prepare for sessions by considering questions and topics. During sessions, general member engagement is closed and occurs through non-verbal sharing during sessions.

Somewhat Revolving

In "somewhat revolving" VCoPs, the network shows elements of moving from digitalization of training to adaptation of training as leadership provides one additional (a)synchronous connection beyond a website or repository to better meet member/network needs. Leadership of sessions is primarily directed by experts, with some leadership tasks directed by members. In this stage, general member engagement before/after sessions involves members discussing and reaching out to experts/leader(ship) about topics, questions, and feedback. During sessions, general member engagement may be either closed or open but continues to be non-verbal.

Moderately Revolving

In "moderately revolving" VCoPs, the network reflects adaptive elements as leadership provides two additional (a)synchronous connections beyond a website or repository to better meet member/network needs. Leadership of sessions in moderately revolving VCoPs is equally tasked to experts and members. In this stage, general members may engage before/after sessions through discussion boards open to all involved in the VCoP. During sessions, general member engagement may occur through closed/open or non-verbal/verbal communication.

Highly Revolving

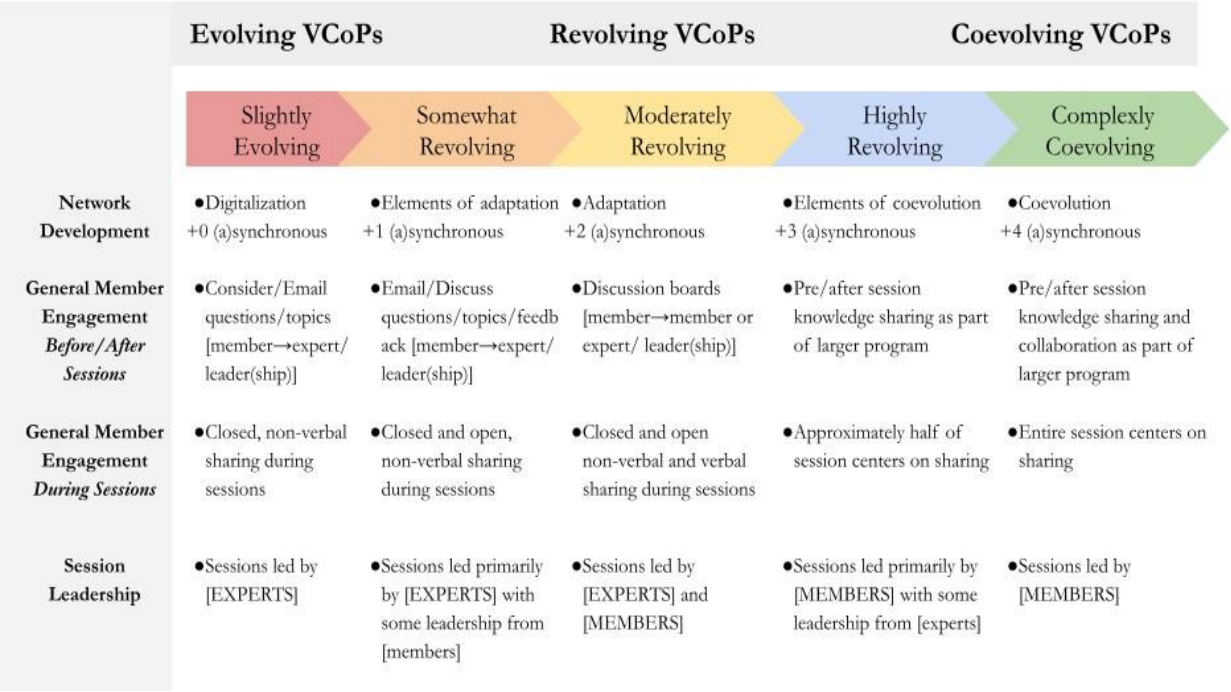
In "highly revolving" VCoPs, three additional (a)synchronous connections beyond a website or repository are provided as the network reflects a movement toward coevolution to better meet member/network needs. Leadership of sessions in highly revolving VCoPs is led primarily by members, with some leadership from experts. In this stage, before/after the session, general member engagement occurs (non)verbally through sharing as part of a larger program. For general members in highly revolving VCoPs, approximately half of sessions center on sharing.

Complexly Coevolving

On the far-right end of the continuum are "complexly coevolving" VCoPs that respond to paradoxical challenges by operating fully as complex adaptive systems (Dooley, 1997; Dugan, 2017; Obolensky, 2014). In this stage of VCoP learning, all members are seen as leaders, and the network embraces the power of ongoing feedback loops, spanning boundaries and self-organizing to meet members' needs. Collectively, the VCoP coevolves four or more additional (a)synchronous connections beyond a website or repository to meet member/network needs. In this stage of VCoPs, before/after sessions, general member engagement and collaboration occur as part of a larger program, and the entirety of member engagement during sessions centers on sharing.

Figure 2

Continuum of VCoP Learning (Co)Evolution



Note: Experts are understood to be content specialists with/without authoritative power. Members are understood to have varying types/levels of expertise/authority. Capitalization within the figure indicates primary leadership/focus.

VCoP Categorization

With this groundwork, VCoPs, as described in studies for this review, were categorized for each of the four domains. An overall designation was calculated by averaging their categorization across domains. The overall designation of three VCoPs fell into the slightly evolving stage (Erklauer et al., 2022; Masroori et al., 2022; Wilson et al., 2021), one into the somewhat revolving stage (Hunt et al., 2021), four into the moderately revolving stage (Lucero et al., 2020; Mullan et al., 2022; Silverstein et al., 2022; Swords et al., 2021), and four into the complexly coevolving stage (Gould et al., 2019; Nguyen et al., 2023; Sibbald et al., 2022; K. E. Watkins et al., 2022). No VCoPs were found to enter the highly revolving stage as an overall

designation; however, five studies were highly revolving for one or more domains (Gould et al., 2019; Lucero et al., 2020; Mullan et al., 2022; Nguyen et al., 2023; Silverstein et al., 2022). One article (Shaw et al., 2022) was excluded from categorization as the VCoPs it reviewed covered many different types of design.

Overall, 83% of studies categorized (n=10 studies; Erklauer et al., 2022; Gould et al., 2019; Hunt et al., 2021; Masroori et al., 2022; Mullan et al., 2022; Nguyen et al., 2023; Sibbald et al., 2022; Silverstein et al., 2022; K. E. Watkins et al., 2022; Wilson et al., 2021) were within one standard deviation of the mean (M=3.02) and 17% of studies categorized (n=2 studies; Lucero et al., 2020; Swords et al., 2021) were within two standard deviations of the mean. Studies within two standard deviations of the mean showed higher categorization in the domains of general member engagement during sessions and session leadership. Lucero et al. (2020) received lower categorization on network development (2 - somewhat revolving) and general member engagement before/after sessions (1 - slightly revolving) and higher categorization on general member engagement during sessions (5 - complexly coevolving) and session leadership (4 - highly revolving). This VCoP began registration in January 2020 and held its first meeting in April 2020. Between VCoP initiation and publication of the article (June 2020), the community had little time to determine and develop (a)synchronous activities to meet member/network needs. Although this community of practice was virtual and is included as such within the current review, it is described within the article as an Indigenous community of practice (I-CP). Describing the development of the I-CP, the authors discuss the importance of indigenous methods and ways of knowing/being, as well as factors that could have influenced how general member engagement was approached before/after sessions. Swords et al. (2021) categorized in three out of four domains as somewhat and moderately revolving; however, the VCoP broke from the structure as

session presentations were led by all membership levels.

Discussion

VCoP analysis was based on what was reported within each article; however, it is possible their design could be more complex than what was shared. Across articles, numerous terms were used to describe session leadership roles (i.e., facilitator, leader, expert, presenter, lead speaker, panelist, centralized authorities, governance). As VCoPs continue to develop toward complex coevolution, where each member is understood to be a leader/expert in their context, the choice of terms to use is challenging. Given differences in VCoP design, agreement upon leadership terms is not as important as having clear descriptions of how leadership is involved (their contributions) and how much time they are involved compared to general members. For example, if a VCoP description shares "panelists presented at the start of the session on a given topic, following which participants were encouraged to ask questions and share their ideas," this sentence does not share who the panelists were.

Furthermore, it does not reveal the content of their presentation, leaving room for misinterpretation of what the discussion looked like. Did the discussion afterward last for five or fifty minutes? Did what was presented drive the discussion (all subsequent conversations referred to only what was shared), or did it kick-start the discussion, allowing question posers to expand the brief by making connections to their contexts and other areas? All judgment calls made for the current review were based on verbatim text using a critical approach and conducted in consultation with university colleagues. How VCoP leadership and engagement are worded can paint a more open or closed picture of its design, potentially confusing readers and masking how practices are designed.

Each stage of VCoP learning shows an evolution from traditional, in-person, continued

professional development. However, it is important to consider how VCoP categorization may be affected by (the lack of) partnerships. For example, partnerships that support VCoPs with additional funding and technological/logistical support may be able to handle larger numbers of participants/members and resources to support additional (a)synchronous opportunities. Partnership hierarchical structure and openness to flex their structure may also reinforce VCoP design regarding who and how many members/participants are invited to join, what is (not) shared, how sessions are conducted, and who leads them. Additionally, the categorization of VCoPs' learning (co)evolution will change as VCoPs change their designs. VCoP categorization should not be seen as a fixed classification but rather as a starting place for VCoPs to consider their next steps. To best meet member/network needs, recommendations include consultation sessions, formative assessments, and summative evaluations (Amaratunga, 2014; D. R. Watkins et al., 2017). Although it is easy to imagine VCoPs taking progressive steps toward complexly coevolving on the continuum, contextual circumstances may mean taking more slightly evolving ones instead; the process is a dance of many entangled factors. Pairing VCoP categorization and member evaluation/feedback with the Cynefin Framework (Snowden & Boone, 2007) may help VCoP leadership make evidence-based decisions (Meagher-Stewart et al., 2012) on what changes in design could be helpful as contexts evolve. For example, during the chaos of the COVID-19 pandemic, in one study, sessions shifted from monthly to weekly sessions, and "invited content experts facilitated these sessions to offset the responsibility of facilitation from overly burdened frontline health care professionals at the NGOs" (Silverstein et al., 2022, pp. 2–3). To make changes to VCoP design, leadership must navigate "boundaries, loyalties, and power dynamics" inherent in the social landscape. This is a process that is easier said than done (Wenger-Trayner & Wenger-Trayner, 2015). Yet, designing for VCoP "aliveness" or to

"generate enough excitement, relevance, and value to attract and engage members" is what makes CoPs successful over time (Wenger et al., 2002).

CoPs are the "social fabric of a learning organization" (Wenger, 1996). When they successfully evoke aliveness, they expand our collective capacity, integrating "people and structures in order to move toward continuous learning and change" (Yang et al., 2004, p. 34). The learning organization framework outlines seven dimensions CoPs should consider across individual, team, and organizational levels as they design, including continuous learning, inquiry and dialogue, team learning, empowerment, embedded systems, system connection, and strategic leadership (K. E. Watkins & Marsick, 1993, 1996). However, CoPs have also been described as knowledge/learning networks (Hildreth & Kimble, 2004), and it is necessary to extend the conversation in this direction as well. Incorporating knowledge gleaned from research (Schreurs et al., 2019) reveals further implications of three network effects for VCoP design, including preferential attachment, reciprocity, and transitivity. These effects describe how the formation and evolution of connections influence network structure and interactions, potentially allowing for emergence. Preferential attachment, for example, through partnerships, can further reinforce social ties, providing additional advantages for those who are connected. However, (im)balance may be found in the degree of reciprocity present within social ties or the willingness of partners to engage mutually. Through high mutual engagement, groups may also demonstrate transitivity and self-organizing in ways that support network cohesion (Schreurs et al., 2019, p. 2). Yet, whether VCoPs act on the seven dimensions of a learning organization or demonstrate a positive connection to the three network effects can mean the difference between organizational/networked learning and learning organizations/networks.

Limitations and Future Directions

This review was limited to a search for empirical literature on global health VCoPs over the last five years. Although the search was thorough, only 13 articles fit the search criteria. Additional searches could be conducted over the next few years to incorporate even more recently published literature and expand the number of returns. Moving forward, future research on learning (co)evolution could explore how VCoP evaluations relate to different stages of learning, consider evaluation stages across the totality of VCoP programming design, and explore how best to capture VCoP (long-term) impact attributed to health outcomes and the culture of learning organizations and networks.

Conclusion

VCoPs showed structured flexibility in their: (1) (re)development, (2) meeting frequency, (3) (a)synchronous activities, and (4) reflection on current practice. VCoP design and session leadership influenced a continuum/hierarchy of general member engagement before, during, and after synchronous sessions. Synthesis of findings resulted in a new typology of VCoP learning (co)evolution, making it possible to categorize VCoPs into five stages (slightly evolving, somewhat revolving, moderately revolving, highly revolving, and coevolving) across four design domains (network development, general member engagement before/after sessions, general member engagement during sessions, and session leadership). Analysis revealed VCoPs in the categories of slightly evolving (n=3), somewhat revolving (n=1), moderately revolving (n=4), and complexly coevolving (n=4). No VCoPs were found to enter the highly revolving stage as an overall designation; however, five studies were highly revolving for one or more domains. Regardless of the VCoP stage, all VCoPs showed signs of adaptation and recommended future evolution. Based on these findings, practical implications for educators and policymakers include

consideration of multiple types of ongoing assessments to better understand evolving contextual needs and the evolution of VCoP designs to promote their long-term sustainability by meeting members' preferences for engagement. Through a focus on partnerships, design, and relationship accountability, global health VCoPs can emerge forth a new rhythm to ever-evolving circumstances amid complexity.

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CHAPTER 3: ARTICLE TWO

DECOLONIZING INFECTIOUS DISEASE PROGRAMS: A MIXED METHODS ANALYSIS OF A NOVEL MULTI-COUNTRY VIRTUAL TRAINING FOR FEMALE GENITAL SCHISTOSOMIASIS[1]

[1] Eller, K., Nwoku, A., Jacobson, J., Vecchio, N., Pensotti, C., Mbuh, C., and Sadki, R. Submitted to *PLOS Global Public Health*, 01/01/25.

Abstract

Female Genital Schistosomiasis (FGS) is a neglected tropical disease that is preventable and easily treated at a low cost when detected early. Existing medical curricula and continuing professional development for infectious diseases have excluded teaching about FGS, creating a knowledge gap. In 2023, The Geneva Learning Foundation's peer learning-to-action model was used to create an inclusive multi-country virtual training program for Francophone Africa to address this gap and empower local healthcare workers. During Phase 1 of the training, participants learned about FGS and developed a local action plan to address it. In Phase 2, participants received support for implementing their action plans. We conducted a mixed methods study to analyze the learning approach, document, and evaluate the implementation and outcomes of the training program. Neural connections increased FGS technical knowledge and diagnosis capacities. Over two-thirds of Phase 1 participants reported an increase and trained 2,675 colleagues. Conceptual connections strengthened action planning. About 85% of the Phase 1 participants reported that the peer review process was beneficial. Even those who perceived it as not useful had better odds of completing Phase 1. Social/external connections led to personal growth and high-level professional impacts. 756 healthcare workers from 19 countries representing all health system levels participated in Phase 1. The networks formed created valuable support systems for participants, and training certification led to opportunities for role expansion, promotion, and increased responsibilities. 146 individuals from Phase 1 participated in Phase 2. Participants reported engaging and teaching 49,088 community members about FGS. More equitable access to training and resources is needed to dismantle power imbalances in global health. Peer connections and local knowledge exchange addressed immediate educational needs across health system levels while ensuring sustainable solutions. Additional support should

be provided for women and community health workers to improve participation and completion rates.

Keywords: female genital schistosomiasis, decolonization, peer learning, continuing professional development, neglected tropical diseases

Introduction

Health professionals working primarily in low- and middle-income (LMIC) countries face diverse, complex challenges, including limited resources, inadequate infrastructure, prevalent infectious diseases, and socio-economic barriers to healthcare access (Iqbal et al., 2019). Some of these infectious diseases include neglected tropical diseases (NTDs), such as female genital schistosomiasis (FGS). First described in 1899, FGS is a chronic complication resulting from infection by *Schistosoma haematobium*, a parasitic worm (Madden & Melb, 1899). Schistosomiasis is transmitted through contact with freshwater sources contaminated with schistosome larvae and presents as an intestinal or urogenital disease (WHO, 2019). Untreated urogenital schistosomiasis can develop into FGS in women and girls (Jacobson et al., 2022).

FGS affects an estimated 56 million girls and women in sub-Saharan Africa alone (Umbelino-Walker et al., 2023; WHO, 2019). FGS is underdiagnosed with severe implications for women's sexual and reproductive health, including ectopic pregnancies, infertility, and spontaneous abortion (WHO, 2019). It is also associated with an increased risk of HIV and HPV infection, stigma, and social isolation (Shukla et al., 2023). FGS is preventable and low-cost treatment is available when detected early (Lamberti et al., 2024; Umbelino-Walker et al., 2023). Nevertheless, the disease continues to silently and disproportionately burden vulnerable communities due to gaps and inequalities in health service provision and a lack of awareness among health workers (WHO, 2019).

Existing curricula for medical education do not cover FGS or sufficiently prepare healthcare workers to manage the disease (Martinez et al., 2024; Mazigo et al., 2021). Recognizing FGS as an important social and gender justice issue that needs to be tackled, two non-profits, The Geneva Learning Foundation (TGLF) and Bridges to Development (Appendix G), collaborated to design and implement a peer-to-peer virtual training course on FGS. The

training course and support structure were designed based on TGLF's peer learning-to-action model (Watkins et al., 2022). This model, based on the core principles of informal and incidental learning (Watkins et al., 2018), optimizes the interdisciplinary and interprofessional sharing of knowledge, empowering participants to "research, develop, and scale up new ways to learn and lead against critical threats to our societies" (TGLF, 2024).

FGS Peer-to-Peer Virtual Training and Support

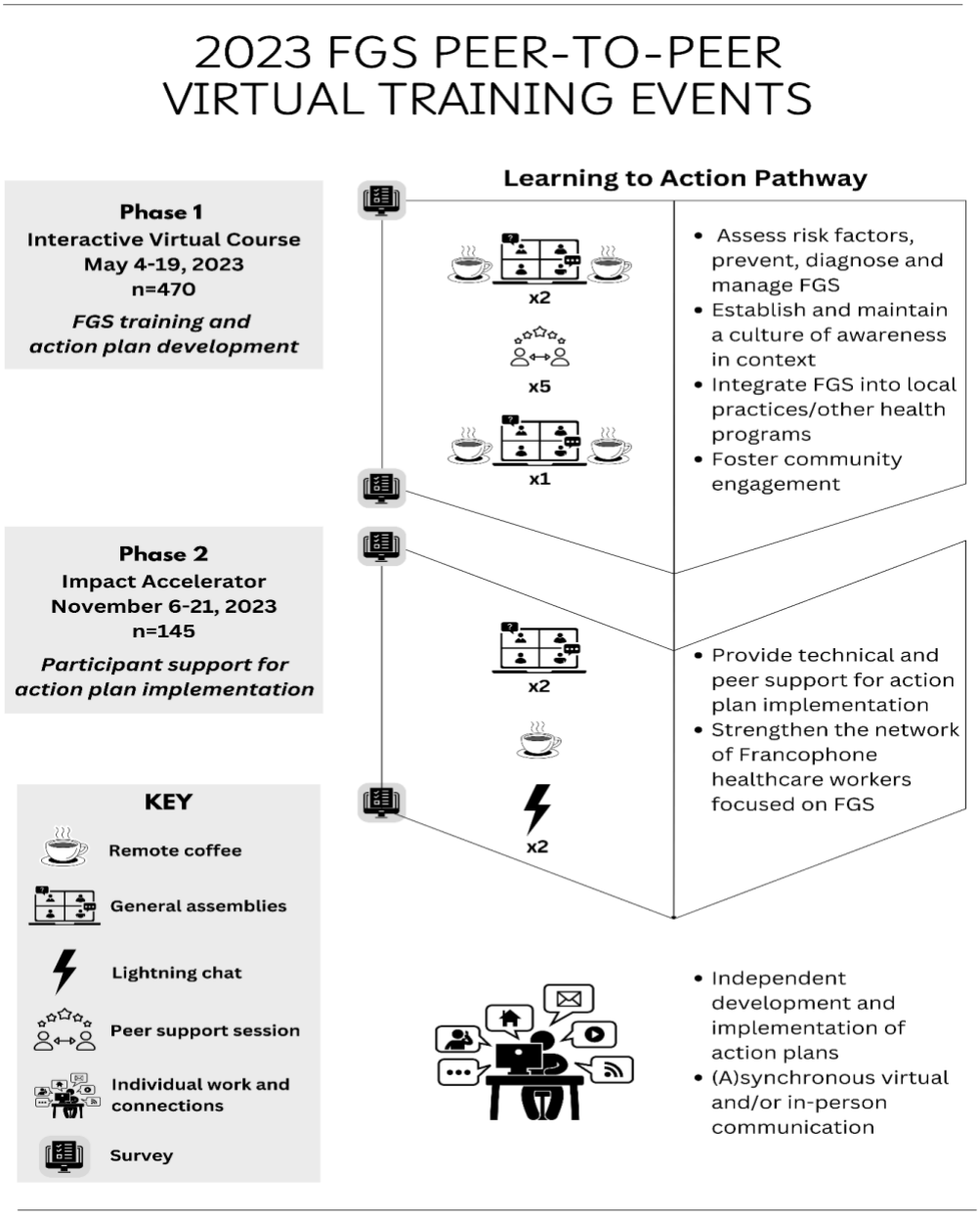
Content for the training course was based on the FGS Competency Framework, which was designed by Bridges to Development and diverse experts in collaboration with the World Health Organization to support health professionals at all health system levels (Jacobson et al., 2022). In 2021, the course, Phase 1 of the program, was piloted for Anglophone and Francophone Africa. The course trained over 300 healthcare professionals from sub-Saharan Africa on how to integrate FGS into their practice. Phase 2 emerged from the need for real-time feedback and support, allowing the team to better understand participant challenges and provide timely assistance. Participants of the 2021 course reported training an additional 2,052 healthcare professionals, treating 3,892 girls and women, and raising awareness among 120,666 people. These successes demonstrated the potential of the training approach to address this neglected disease, and in 2023, funding from the END Fund extended the training and Impact Accelerator to Francophone Africa.

Participation in the 2023 FGS peer-to-peer virtual training events was voluntary and free. Facilitators selected a diverse and balanced group of participants from training course applicants. Selection criteria included the ability and availability to connect, gender, health system tiers, and professional roles (performing and not performing pelvic exams). To achieve gender equity, females were over selected. OB/GYNs were prioritized due to the nature of the topic, and preference was also given END Fund-prioritized geographies. Events were carried out over two

phases in French and took place over seven months. All events were facilitated by TGLF with support from Bridges to Development staff. Subject matter experts (SMEs) presented the core FGS concepts and served as guides. Figure 1 depicts the overview of the events discussed below (for further details, see Appendix D).

Figure 1

2023 Training Event Schedule and Information



Phase 1: Interactive Virtual Course

During Phase 1, participants learned FGS core competencies and wrote an action plan to improve FGS outcomes in their communities. Phase 1 began with two general assemblies, during which participants had an opportunity to (1) learn about FGS, (2) discuss FGS scenarios and real-life cases, and (3) receive information on and resources for developing action plans. An optional remote coffee was provided to all participants using the same link to socialize, ask questions, and network before and after the assemblies. Subsequently, five peer support sessions were held to strengthen action plan development and for peer review. Action plans were developed and reviewed by participants and SMEs on an online platform using a provided rubric (PeerGrade, 2023). Guidance for developing and evaluating action plans focused on feasibility, adherence to national guidelines, integration with other health programs, and capacity for community engagement. The course concluded with a third general assembly to (1) review group progress and action plan development, (2) discuss learning related to the peer-review process, (3) hear SME feedback, and (4) learn about ways to stay connected.

Phase 2: Impact Accelerator

During Phase 2, participants received additional support for implementing their action plans through general assemblies, a remote coffee, and lightning chats. Participants also worked individually to implement their plans and communicated with their peers outside of events. The first two weeks of Phase 2 were considered the Launchpad of the Impact Accelerator. During the two general assemblies of the Launchpad, participants (1) reported on their action plan implementation progress, (2) set a specific goal to accomplish by the end of the two weeks, shared stories of successful and challenging experiences, and (4) reflected on lessons learned. Participants received and shared recommendations and resources from each other and SMEs.

Following the Launchpad, participants were encouraged to participate in a remote coffee during their own time. Two lightning chats followed, featuring specific participants sharing their experiences of implementing their action plans. The successes and challenges they presented facilitated discussion and future planning among all participants.

Theoretical Framework

Connectivism understands learning to be a collaborative process of knowledge creation that links together individuals and information sources (Corbett & Spinello, 2020; Siemens, 2005). On the neural level, biological networks allow us to form memories or concepts and attach meanings to them as we learn. On the conceptual level, we can generate new ideas with others by sharing and connecting information that resonates. On the social/external or systemic level, the networks we are a part of influence the resources we have access to and the connections we can make (Siemens, 2005; UGA Mary Frances Early College of Education, 2021). Connectivism has been particularly influential in shaping online education (Corbett & Spinello, 2020; Dunaway, 2011), and thus offers a valuable lens for evaluating digital tools like TGLF's peer learning-to-action model. In this study, connectivism helps explain how health workers leverage digital technologies to access critical knowledge and collaborate to address complex health challenges related to FGS.

Research Purpose and Questions

This research aims to explore the learning approach, document, and analyze the implementation and outcomes of the 2023 FGS peer-to-peer virtual training program for Francophone Africa. Specifically, it asks: through the lens of connectivism, how did the 2023 FGS virtual peer-to-peer training course (Phase 1) and Impact Accelerator (Phase 2) create value for diverse participants and impact communities?

Quantitative Sub-questions:

1. What factors influenced the likelihood of participants completing either phase?
2. How effective was the training course (Phase 1) in increasing participants' knowledge and capacity to manage female genital schistosomiasis?
3. How did TGLF's peer learning-to-action model affect participants' engagement and knowledge acquisition?

Qualitative Sub-questions:

4. What learning, connections, and resources created value for participants or subgroups of participants?
    a. What technical knowledge and skills did participants report learning?
    b. In what ways did participants share how peer learning and networking with others strengthened their action plans?
    c. How did participants' accounts of diverse connections and resources improve their personal growth and high-level professional impacts?
    d. How did those who completed their action plans and those who did not describe their experiences differently?

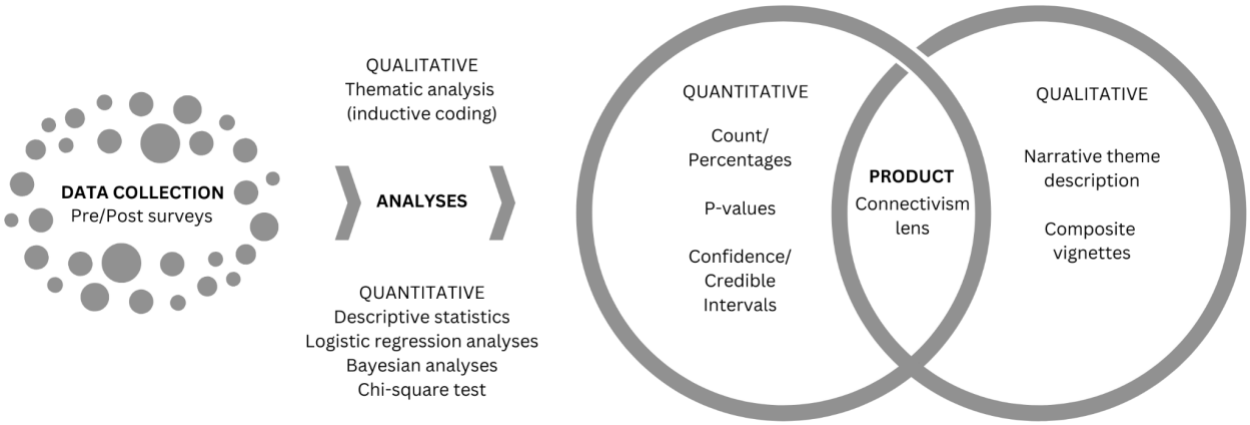
Methods

This research employs a convergent, parallel mixed methods design (Creswell et al., 2011; Creswell & Plano Clark, 2018), giving equal weight to both strands of data (QUAN+QUAL). Quantitative and qualitative secondary data from both phases of the 2023 FGS peer-to-peer virtual training program were collected simultaneously, analyzed separately, and then integrated. To achieve the research aim, quantitative and qualitative research methods were

triangulated to more comprehensively interpret data through the lens of connectivism (see Figure 2).

Figure 2

Procedural Diagram of Research



Ethical Approval

This study is based on secondary data collected by The Geneva Learning Foundation (TGLF) with oversight from its Commission on Research Ethics (CRE). TGLF's CRE abides by the principles of the Cantonal Commission for Research Ethics (CCER), Federal Law on Research on Human Beings (RS 810.30), Swiss Human Research Act (HRA) and Ordinance on Organisational Aspects of the Human Research Act (HRA Organisation Ordinance, OrgO-HRA) for all data collection, management, and its protection, and authorizes proposed research. On June 18, 2024, co-author KE received approval from TGLF's CRE to conduct a research project titled "Enstorying Global Health Landscapes of Learning" on the influence of TGLF's peer-learning model (Appendix C). This study forms part of the TGLF CRE-approved research project. On July 12, 2024, the University of Georgia Institutional Review Board approved and designated the project as non-human subjects research (PROJECT00009825; Appendix B). For authorship information, see Appendix A.

Data Collection

Data collection included pre- and post-course online surveys developed by TGLF for both phases of the 2023 FGS peer-to-peer virtual training program. Participants completing the surveys were French-speaking interprofessionals across all health system levels who participated in the 2023 training events. The pre-course survey established baseline knowledge, competencies, and status. The post-course survey assessed the course's impact and provided participants with an opportunity to reflect on their experiences. Pre-course survey data collected were compiled on June 27, 2023, and post-course survey data on December 12, 2023. Before surveying participants, TGLF informed them in writing of the survey purpose and how their responses may be used (e.g., reports, presentations, research). Within the survey, participants provided written consent for their data to be used for the purpose of research. Participants voluntarily completed surveys and were not compensated for doing so. They could skip any questions they did not wish to answer. Co-authors JJ, NV, RS, and CM had access to respondents' identifying information during and after data collection. Linked videos and texts from participants, including those shared during the lightning chats, are publicly available.

Data Analysis

Anonymized versions of the survey data sets were shared with all co-authors on January 12, 2024, for the purpose of a report to the training funder. Secondary data analysis for the purpose of research began on July 12, 2024. Quantitative and qualitative analysis occurred concurrently.

Quantitative statistical analysis conducted included descriptive statistics, and multiple logistic and Bayesian regressions. Relevant columns were selected from the original dataset to include only variables pertinent to the study. Subsequently, some variables, such as profession

and organization, were transformed to address issues of sparsity in categories and to facilitate meaningful statistical comparisons. The numerical values of certain variables such as that of the impact of participation on social relationships, were recoded into categorical variables to ensure interpretability and consistency.

Descriptive statistics were used to summarize pre- and post-training knowledge scores and self-reported competencies. Changes in these measures provided insight into learning gains attributable to the training. Multiple logistic regression enabled the identification of significant predictors of training completion and to model the probability of improved knowledge based on individual characteristics. A backward stepwise approach was employed using the stats package in R (version 4.4.2). Initially, all candidate variables were included in the model, and variables were systematically removed one at a time based on their p-values and the Akaike information criterion of the models. Variables with unreliable or undefined p-values were excluded during this process to ensure the stability and interpretability of the models. We also assessed multicollinearity using the variance inflation factor (VIF) and excluded variables with high VIF values (> 5) to prevent issues with coefficient instability. For the final models, the threshold of significance was p-value below 0.005.

Given the smaller sample size for Phase 2, Bayesian logistic regression was applied to estimate the effects of peer learning activities on outcomes such as knowledge acquisition. It was performed using the rstanarm package, which employs Hamiltonian Monte Carlo for efficient posterior sampling. The results were summarized using the posterior mean of the coefficients and their 95% credible intervals (CIs). Significant predictors were those whose CIs did not include zero. Bayes factors were calculated to compare model evidence, identifying the best-fitting

models. Trace plots showed smooth mixing and stable chains, confirming convergence and the reliability of posterior estimates.

Qualitative analysis followed the six-phase process of thematic analysis described by Braun and Clarke (2006) and was conducted in Excel. Open-ended survey responses were translated from French to English using a neural machine translation service (DeepL, 2024). Selected responses were reviewed and corrected for accuracy and intent by TGLF and Bridges to Development staff, who are fluent in both French and English.

The first phase involved reading the data several times to clarify and organize responses. In the second phase, data were inductively coded. Preliminary codes were assigned and discussed with the team. In the third phase, codes were combined, described, and categorized through the theoretical lens of connectivism. In the fourth phase, the team discussed possible themes in a review of all the data. Two themes were created in the fifth phase, and responses connected to each theme were identified. In the sixth phase, verbatim quotes were selected representing each level of connectivism, and composite vignettes of healthcare workers' experiences were written to portray the complexity of themes in an accessible way to diverse readers (Fader et al., 2020; Jasinski et al., 2021). Initial drafts of the two composite vignettes were written with assistance from ChatGPT (25 February 2024). The decision to begin with AI-generated initial drafts was made to help populate quotations at random from the selections that may otherwise not have been chosen due to the number and length of participant responses. The initial drafts were heavily revised to present key thematic elements in a focused and holistic way and to ensure the sociodemographic diversity of verbatim quotes. The final vignettes share synthesized narratives of each theme.

Quantitative and qualitative findings were compared and contrasted according to the three levels of connectivism: neural, conceptual, and social/external (UGA Mary Frances Early

College of Education, 2021). Then, they were merged into one comprehensive narrative, achieving integration.

Positionality and Reflexivity

In this study, we share our approach, methods, and findings in a way that demonstrates how a diverse group of healthcare workers found value in the training approach. To achieve this, we employed a mixed-methods approach that not only presents quantifiable data but also amplifies the thoughts and experiences of those most affected by the issue we sought to address (Mertens, 2007). Our focus on centering the experiences and insights of these healthcare workers is part of a broader effort to ensure that public health interventions are shaped by those on the front lines. To foster an inclusive and equitable learning process, we ensured female participation included diverse healthcare workers from across all levels of the health system, and engaged participants from multiple countries. This approach aligns with the commitment of Bridges to Development and TGLF to decolonize public health, as we emphasize local knowledge, diverse representation, and the empowerment of healthcare professionals in their respective contexts.

In keeping with this commitment, we also acknowledged our positionalities in a version of Khan's transparency matrix (2022) that we adapted to fit our work. Our version (Appendix E) shares our positionality, providing context for our role in the research process and how it may influence our findings (Krugman, 2023; Morton et al., 2022; Naidu, 2024; Sharma & Sam-Agudu, 2023). The involved staff from Bridges to Development and TGLF are a diverse group representing different ethnicities, professions, and levels of public health expertise. Our organizations have long been involved with the issue of FGS and have worked directly on the ground in some of the affected countries. To increase credibility of results, we triangulated findings by cross-referencing multiple data sources. We also conducted an audit of the results,

ensuring that colleagues from the Global South, who are integral members of our team and program facilitators, reviewed both its content and presentation.

Results

Table 1 (Appendix F) shows the characteristics of the participants. A total of 1,686 health professionals applied for Phase 1, out of which 786 participants were accepted. Of these, 255 participants completed Phase 1. For Phase 2, 145 participants applied, and 71 participants completed the course. Table 2 (Appendix F) shows the factors that influenced the completion of both phases. Being a woman significantly decreased the odds of completing Phase 1 by 58% compared to men (OR: 0.42, 95% CI: [0.22, 0.79], $p = 0.008$). Those who did not find anything difficult during the course had three times higher odds of completing Phase 1 compared to those who found the concepts or training technology difficult (OR: 3.45, 95% CI: [1.15, 10.34], $p = 0.027$). Those who paid out-of-pocket for their expenses had two times higher odds of completing Phase 1 compared to those who neither they nor their employers incurred any costs (OR = 2.45, CI: [1.26, 4.78], $p = 0.008$). The log-odds of completing Phase 2 decreased by 1.75 for community health workers compared to doctors (coef: -1.75, 95% CI: -3.58, -0.10). In contrast, the log-odds of completing Phase 2 increased by 1.19 for those who had begun implementing their action plans compared to those who had not yet started (coef: -1.19, 95% CI: 0.13, 2.35).

Neural Connections: FGS Technical Knowledge and Skills Learned

Participants entered Phase 1 with varying levels of knowledge regarding FGS diagnosis, treatment, and prevention. Some participants, despite being at the frontlines or involved in policymaking, had no prior knowledge of FGS. As shown in Table 3 (Appendix F), two-thirds of Phase 1 participants reported an increase in their FGS knowledge and diagnosis capacities and

confidence in discussing FGS. Table 4 (Appendix F) presents the factors that influenced the likelihood of gaining more than one level in reported knowledge levels after Phase 1. Community health workers had 83% lower odds of having an increase in their awareness levels after Phase 1 compared to doctors (OR: 0.17, 95% CI: [0.04, 0.67], p = 0.012). Additionally, those who had prior awareness of FGS had 83% lower odds of having an increase in their awareness levels after Phase 1 compared to those who did not (OR: 0.17, 95% CI: [0.04, 0.71], p = 0.015). Table 5 (Appendix F) shows that participants who reported that peer support was useful had significantly increased log-odds of experiencing a change in knowledge levels compared to those who did not find peer support useful (coef: 1.97, 95% CI: 0.80 to 3.30).

Participants also shared that the training helped correct misinformation. They recognized the positive impact this newfound knowledge would have on their clinical practices and the lives of the patients who would benefit from their improved expertise. After Phase 1, 39% diagnosed or managed patients with FGS and saw about 638 cases (Table 3, Appendix F). They also reported sharing what they had learned with their colleagues. After Phase 2, 91% of participants reported training 2,675 of their colleagues (Table 3). Therefore, they extended the reach of the training and enabled even more people to gain knowledge and skills related to FGS.

> "*I have almost ten years of professional experience in the fight against NTDs, and it was only during this training that I learned the concept of FGS. Now, I can direct the differential diagnosis of vaginal bleeding.*" - Participant working in a Ministry of Health

> "*More than 500 people (were) made aware of the disease, 103 healthcare providers trained on the definition and rapid detection of cases in five health facilities including two private (ones)*." - Doctor working with a non-profit

Composite Vignette 1: "Accelerating Connections and Integration." Participating in the training events, I learned that FGS is "a neglected disease." Conversations I had with other scholars in "FGS endemic and non-endemic areas" allowed me to "have a global look at the epidemiology of FGS in the world" to discover how it has been "previously ignored and yet (is) common in our community." I felt compelled to share it with my colleagues and developed "PowerPoint presentations on FGS." After listening to what I had learned, they were "convinced like me that a few things can be done to further protect women and girls against certain diseases." We set to work "sensitizing the zonal medical officer, hospital director, and data manager of the health zone…Despite the challenge of "not hav(ing) enough resources," they suggested leading "advocacy with the partner who supports the fight against NTDs and certainly capitalize on the resources given for other NTDs." Working together, we began training during regular clinical meetings using the "World Health Organization Atlas" as a guide. We also set up a "WhatsApp alert group" for real-time reporting of suspected FGS cases. We organized "communications through radio" and collaborated with community relays, non-governmental organizations "agents of the youth centers, and the medical school." With so many activities going on, support and guidance from experts during the learning cycle were invaluable in "choosing actions" and fellow scholars' advice "strengthened our capacity…to work effectively and efficiently." Through our efforts, we have seen a "change in behavior of the population," and we have now broadened our "differential diagnosis hypotheses." "Bilharzia (FGS) is an important parasitic (infection) endemic in the world," and "the accelerator was like a watchdog, or a rooster who came to encourage us to run ahead of time," helping us to accomplish our plans.

Conceptual Connections: Peer Learning and Networking to Strengthen Action Planning

Action Plan Development

Participants overwhelmingly found peer support to be valuable throughout the training. Some valued the peer interaction as more beneficial than the provided materials. Participants reported that the development of their action plans was improved both by the formal peer review process and through informal networking with peers outside the official channels. 61% of Phase 1 participants learned more than they had anticipated from the peer reviews (Table 5, Appendix F). 86% of Phase 1 participants believed that the peer reviews significantly improved their action plans, and 85% found the peer review of their colleagues' action plans to be beneficial. This peer interaction helped participants clarify expectations and allowed them to learn from each other's successes and challenges. Participants also credited the review process for providing the support and feedback necessary to improve the presentation of their ideas. Additionally, Table 5 (Appendix F) indicates that perceived usefulness of peer reviewing was significantly associated with the odds of completing Phase 1. Even participants who engaged in peer reviewing but perceived it as not useful had increased log-odds of completing Phase 1 compared to those who did not engage in peer reviewing (coef: 7.34, 95% CI: 3.10 to 12.88).

> "*I better understood what I was being asked to do.*" - Community health worker working at the district level

> "*These documents provided me with an intellectual background on all the theory on FGS. Participating in small group discussions allowed me to know what the members of the group understand about FGS and their challenges. I realized that we have almost the*

same challenges and that through the discussions, everyone could learn some useful elements to finalize their action plan." - Doctor at a private hospital/health facility

"*The peer review allowed me to improve my action plan. For example, a peer reminded me that the title of my plan had to start with an action verb. Another suggested that I find a better map of the health districts…because the one I had included in the initial action plan was not too expressive. These two examples, to name just a few, demonstrate the extent to which peer review remains ESSENTIAL.*" - Public health officer at a non-profit

Action Plan Implementation

Many participants reported that continuing to engage with their peers after the end of Phase 1 played a crucial role in the implementation of their action plans. They described learning from the testimonials of others through various platforms, gaining insights into how to effectively integrate their plans with existing programs to facilitate implementation. At the end of Phase 1, 39% of participants had begun implementing their action plans, but only 1% had completed them by the time of the post-course survey. Before Phase 2, there were marginal increases in these numbers among those who participated in Phase 2. However, after Phase 2, which focused on providing support for their action plans, 23% had completed their action plans, and 71% had begun their implementation by the time of the post-course survey (Table 3, Appendix F).

Those who successfully completed their action plans emphasized that integration with existing programs was key to their success, providing them with the necessary materials and data to coordinate responses across different entities. Participants who faced challenges sought advice from their peers. Common obstacles included the unavailability of medication, lack of funding, and the need to secure buy-in from health authorities. They addressed these barriers by

advocating with health officials and community leaders, exchanging advice and solutions with their peers, and consulting with experts and mentors. The peer-driven support networks developed in each country were instrumental in overcoming implementation challenges and achieving their goals.

> "*When I was unable to deploy my action plan due to lack of financial means, I seemed disoriented, until by following live testimonies and reading via Telegram, (I learned) the methods used by other scholars who did not have the financial means like me, to reach populations at risk. This knowledge made me change my approach. It is clear that when we participate in such a launchpad (the Impact Accelerator)...we (are) influenced by new ideas, (and) other scholars from diverse backgrounds.*" - Community health worker working at the district level

Composite Vignette 2: "Connectivistic Connections Despite Complexities." I began "as quickly as possible to roll out" my plan during the Impact Accelerator. However, at every turn, it felt like I hit a wall. I found some "data or usable documents" related to FGS in our community, but they were not enough. My meetings with health and community leaders generated interest, but the proposal was "blocked at the level of authorizations." "This accelerator has helped me a lot, especially in planning activities." By connecting with peers, I had "many other ideas" and strategies. For example, "I carried out surveys to see the proportion of women affected." Then, I made a written "request to the leadership to obtain authorization to implement our plan." The reply asked me "to train staff in the use of this medication and on FGS." I joined "forces with other health professionals," and we presented "on FGS during morning work meetings in health structures." We used these opportunities to help clarify "the confusion between FGS and sexually transmitted infections," and we discussed "FGS widely in the form of a debate, where everyone gives their point of view based on experience and scientific

data." "To learn more from their professional experiences," we made plans for future online training to continue conversations. Health leaders are now beginning "to encourage its popularization and…take ownership of it." We "have requests that are being processed," but for now, we are making "do with what little we could raise." So far, "we have 10 cases of FGS treated and 21 health workers trained and 24 community workers oriented." "Thanks to this participation, I knew nothing about FGS, but today, I have become a great teacher. Thanks to this participation, I am connected to a world of experts who can help me solve a problem on FGS." "We will not finish within the deadline as planned," but "the plan is underway."

Social/External Connections: Diverse Connections and Resources for Growth and Impacts

Personal Growth

Peer interactions fostered participants' confidence, enabling them to believe in their capacity to effect change within their communities and spheres of influence. These interactions not only deepened their desire to expand their knowledge of FGS but also motivated them to share this knowledge with broader communities through case documentation. Additionally, participants reported improved listening skills when engaging with colleagues and highlighted personal growth in their critical thinking, particularly regarding the importance of cross-border collaboration at scale.

> "*This training allowed me to understand that I am now a citizen of the world and that my single advice to a colleague can be useful to them in addressing a public health problem or saving a life on the other side of the world.*" - Public health officer working at a non-profit

> "*...the spirit of listening, tolerance and…how to synthesize ideas in a few words when time is limited.*" - Doctor working in a private hospital/health facility

High-level Professional Impact

Participants shared that certification from the program led to opportunities for role expansion, promotion, and increased responsibilities. Table 3 (Appendix F) indicates that 85% of Phase 1 participants reported significant changes in their professional practice. Due to their increased knowledge and skills, some participants were entrusted with higher responsibilities. Since they began implementing FGS awareness and treatment initiatives, some have seen an increase in patients seeking their expertise. Others reported growing trust and confidence from their communities. As shown in Table 3, 82% of Phase 1 participants engaged and taught 49,088 community members about FGS.

Participants also noted that the program made them more proactive in their professional roles, improving their work performance. The networks formed within and across countries have provided participants with valuable support systems, allowing them to consult with colleagues when encountering FGS cases and collaborate on initiatives. 61% of Phase 1 participants maintained contact with peers after the program (Table 3). This collective voice has enabled them to advocate more effectively to health authorities, resulting in meaningful changes in their respective contexts.

> "(I am now responsible for)...*monitoring any case of FGS in the district because…I became an expert of FGS.*" - Nurse practitioner working in a public hospital/health facility

> "*People listen when I talk about FGS and women want to be 'screened' for FGS.*" - Doctor working in a public hospital/health facility

"I have been able to influence health policy and practice by providing accurate information and advocating the importance of access to testing, treatment, and support services for affected women" - Laboratory technician working at an NGO

Discussion

Participants plans encompassed a range of initiatives that were culturally relevant, locally applicable, and sustainable (see Figures 3 and 4, Appendix F). Like previous studies, which found that interventions embedded into broader health services increased health coverage and efficiency (Jacobson et al., 2022; Lamberti et al., 2024; Preston et al., 2023; Umbelino-Walker et al., 2023), their plans, completed or not, improved health outreach and outcomes. Although statistics alone like action plan completion can be used to demonstrate program impact, our findings encourage deeper reflection on how program outcomes should be reported.

By building and exchanging capacity across all health system levels, participants were active contributors in the decolonization of FGS campaigns. Moreover, their leadership of health transformation initiatives challenged an assumption that many healthcare workers in low- and middle-income countries are incapable of solving their own problems. Thus, our findings support global health literature advocating for the suspension of epistemological authority and respect for participant sovereignty (Afzal et al., 2021; Bua & Sahi, 2022; Eller, 2024a; Eller, 2024b; Engelbert Bain et al., 2024; Hudib et al., 2016; Kwete et al., 2022; Pant et al., 2022; Robertson et al., 2004).

Despite efforts to promote diversity, women and community health workers were less likely to apply for and complete the program. One possible reason could be time constraints due to added responsibilities (Ahmed et al., 2022; El-Sayed & Kamel, 2020; O'Donovan et al., 2018; Raukar & Mishkin, 2020). Furthering our understanding of their experiences could improve learning supports to strengthen their participation and address network needs.

Limitations

We acknowledge several limitations to our study. First, our research used self-reported measures, which could introduce a response bias. While a response rate of 31% was sufficient for these analyses, and we had response rates of 42% for Phase 1 and 49% for Phase 2, higher rates of response may have provided a more complete picture. Additionally, while the context of this study is representative of diverse global health landscapes in Francophone Africa, findings may not be generalizable to other areas. However, we expect the insights gained from this research to have transferable value in other contexts and peer learning programs.

Recommendations

Based on insights gained from this research, specific recommendations for infectious disease training programs include: (1) harnessing the potential of participatory methodologies and digital technologies to dismantle historical power imbalances in global health and foster truly sustainable changes within local communities, (2) funding extended training support beyond technical knowledge and action plan development to benefit participants facing unanticipated, evolving contextual challenges to implementation, (3) supporting participants in creating effective strategies and communications to advocate for the integration of their action plans into current existing services and programs, and (4) increasing collaborative research with participants in ways they are interested and able to identify learning barriers to full engagement and promising supports.

Contextual factors and rapidly evolving threats to global health, like climate change, challenge the ability of global health practitioners and systems to prevent, treat, and mitigate infectious diseases (El-Sayed & Kamel, 2020). Therefore, we further recommend adopting TGLF's peer learning-to-action approach using digital technologies (Watkins et al., 2022) at higher health system levels. Doing so will bring new perspectives, knowledge, and lived

experiences into global dialogue and accelerate problem-solving processes (Eller, 2024a; Eller, 2024b). Such participatory processes also encourage needed mutuality and accountability to restore relationships and improve outreach and outcomes (Call-Cummings et al., 2023; Dazzo, 2024; Robertson et al., 2004). For neglected diseases like FGS, our research indicates that using this approach fosters more inclusive and equitable partnerships, scales improvements in community health outcomes, and strengthens the capacity of our global systems to respond.

Conclusion

Peer learning programs, like the 2023 FGS virtual training, strengthen medical education partnerships by connecting health professionals across geographic and professional boundaries. By decentering expert knowledge, fostering peer-to-peer connections, and prioritizing the sharing of localized knowledge, this training program addressed immediate educational needs while contributing to a broader, more equitable framework for global health education. For Bridges to Development and TGLF, this is a significant step toward decolonizing global health. The goal is to empower local practitioners, value their contributions, and promote sustainable, context-specific solutions that can improve health and healthcare outcomes. This study demonstrates that peer learning programs using digital technologies foster collaboration in community and establish global support networks and partnerships where professionals can exchange advice, share experiences, and collectively address common challenges. These connections promote innovation and capacity building through interdisciplinary and interprofessional exchange in healthcare. As aptly put by a participant in this study, "*(When we) bring together more than twenty nationalities in an interactive way on a virtual platform…we can influence the world.*"

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Appendix A: Additional Author Work Summary

Article Title: Decolonizing Female Genital Schistosomiasis Health Initiative Advancements In Francophone Africa: A Mixed Methods Exploration Of Health Professionals' Continuing Development Through A Peer Learning-to-Action Model

Co-Author	Contribution	Co-Author Affirmation	Co-Author Signature
Kari Eller Doctoral student, University of Georgia https://orcid.org/0000-0002-2463-7896	Conceptualization, Formal Analysis, Investigation, Methodology, Project Administration, Resources, Validation, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing	I agree with this assessment of my contribution to the manuscript. As a graduate student, I am aware that this work must not be used again in another dissertation.	Signed by: Kari Eller 8899D9C9C9EF494... 3/31/2025
Amy Nwoku Intern, Bridges to Development https://orcid.org/0009-0003-6812-2522	Conceptualization, Formal Analysis, Investigation, Methodology, Resources, Software, Validation, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing	I agree with this assessment of my contribution to the manuscript. As a graduate student, I am aware that this work must not be used again in another dissertation.	DocuSigned by: 3C46F1E93FD84C2... 3/31/2025
Julie Jacobson Managing Partner, Bridges to Development https://orcid.org/0000-0002-8243-6427	Conceptualization, Formal Analysis, Funding Acquisition, Investigation, Supervision, Validation, Visualization, Writing – Review & Editing	I agree with this assessment of my contribution to the manuscript.	Signed by: Julie Jacobson 6C2271BCE86E494... 4/1/2025
Nicole Vecchio Consultant Project Coordinator, Bridges to Development	Data Curation, Investigation, Project Administration, Validation, Writing – Review & Editing	I agree with this assessment of my contribution to the manuscript.	Signed by: Nicole Vecchio 4/1/2025
Caroline Pensotti Reproductive and Women's Health Advocate, Bridges to Development	Conceptualization, Validation, Writing – Review & Editing	I agree with this assessment of my contribution to the manuscript.	Signed by: CFD45CAC57584C0... 4/1/2025
Charlotte Njua Mbuh Deputy Director, The Geneva Learning Foundation https://orcid.org/0000-0002-8609-5471	Data Curation, Investigation, Methodology, Project Administration, Resources, Supervision, Validation, Writing – Review & Editing	I agree with this assessment of my contribution to the manuscript.	Signed by: Charlotte Njua Mbuh C956AFBA7B9E4AA... 4/12/2025
Reda Sadki President, The Geneva Learning Foundation https://orcid.org/0000-0003-4051-0606	Conceptualization, Data Curation, Funding Acquisition, Investigation, Methodology, Resources, Software, Supervision, Visualization, Writing – Review & Editing	I agree with this assessment of my contribution to the manuscript.	DocuSigned by: Reda Sadki 5DE8C70E57984FD... 4/11/2025

1Reda Sadki developed and implemented the digital peer learning program framework examined in this study.

Appendix B: IRB Approval

UNIVERSITY OF GEORGIA

Tucker Hall, Room 212
310 E. Campus Rd.
Athens, Georgia 30602
TEL 706-542-3199 | FAX 706-542-5638
IRB@uga.edu
http://research.uga.edu/hso/irb/

Human Research Protection Program

NOT HUMAN RESEARCH DETERMINATION

July 12, 2024

Dear Karen Watkins:

On 7/12/2024, the Human Subjects Office reviewed the following submission:

Title of Study:	ENSTORYING GLOBAL HEALTH LANDSCAPES OF LEARNING
Investigator:	Karen Watkins
Co-Investigator:	Kari Eller
IRB ID:	PROJECT00009825
Funding:	Geneva Foundation
FP ID:	FP00016477

We have determined that the proposed activity is not research involving human subjects as defined by DHHS and FDA regulations. The activity is designed to evaluate the influence of The Geneva Learning Foundation's digital peer-learning model.

University of Georgia (UGA) IRB review and approval is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities are research involving human subjects, please submit a new request to the IRB for a determination.

Sincerely,

Jessica Lasebikan, HRPP Assistant Director
Human Subjects Office, University of Georgia

Appendix C: TLGF CRE Approval

June 18, 2024

University of Georgia
Office of Research
150 Paul D. Coverdell Center
500 D.W. Brooks Drive
Athens, Georgia 30602

Dear UGA Institutional Review Board,

This letter is in support of the research project under review, "Enstorying global health landscapes of learning," with Principal Investigator, Dr. Karen Watkins, and Co-Investigator, Kari Eller. The current research will explore the influence of The Geneva Learning Foundation's (TGLF) digital-peer learning model across different health domains (e.g., immunization, Female Genital Schistosomiasis, climate change) and TGLF-facilitated events (e.g., Teach to Reach, Impact Accelerator).

TGLF's Commission on Research Ethics, provides oversight of all proposed research, data collection, management, and protection according to the principles of the Cantonal Commission for Research Ethics (CCER), the Federal Law on Research on Human Beings (RS 810.30), Swiss Human Research Act (HRA) and the Ordinance on Organisational Aspects of the Human Research Act (HRA Organisation Ordinance, OrgO-HRA). Following best practice guidelines for open-research, TGLF makes some data sets and other publications (i.e., reports, case studies) available to the general public via its Zenodo community pages for publications and open data (https://zenodo.org/communities/tglf-data/).

The PI and Co-Investigator are trained on TGLF data confidentiality procedures, and specific data sets and/or publications not yet available on TGLF's Zenodo community page will be granted to the investigators upon request. All data to be used by the PI and Co-Investigator were collected by TGLF and with CRE oversight. Any questions or concerns on TGLF's support of the proposed research may be directed to Reda Sadki (reda@learning.foundation) or +41225754110.

Sincerely,
S.Mendis
Dr. Shanthi Mendis
Chair, TGLF Commission on Research Ethics
The Geneva Learning Foundation
18 Avenue Louis Casaï
Geneva, Switzerland

Appendix D: Additional Training Information
2023 FGS Peer-to-Peer Virtual Training Events

All events were facilitated by TGLF with support from Bridges to Development staff. Subject matter experts (SMEs) presented the core FGS concepts and served as guides. Events maximized opportunities for participants to learn from and with one another. Participants' offline work on their action plans and direct peer-to-peer communications complemented the events.

Phase 1: Virtual Training Course

**Note: An optional 30-minute "remote coffee" was provided before and after all general assemblies using the same link for participants to socialize, ask questions, and network.*

General Assembly One (Required) | May 4, 2023 (~3 hours)
(*Remote coffee*)→Welcome and introduction→Remote coffee [1:1]→FGS presentation and Q&A→Peer-learning exercise: Scenario-based group discussions→Reflections and Announcements→(*Remote coffee)*

The first general assembly began with a ~10-minute welcome and an introduction by event facilitators, during which SMEs shared how they first learned about FGS and why it is of concern to them. The assembly then continued with a ~5-minute "remote coffee" for participants to meet with one other participant in breakout rooms, following which SMEs presented on FGS and answered participants' questions posed aloud or in the chat for ~30 minutes. A brief overview of scenario-based group discussion was then provided to all participants by event facilitators, and over the next two hours, small-group discussions were held to review two scenarios. Each small-group discussion began with participants reviewing together scenario details and how best to address them in breakout rooms for ~30 minutes, and then returning to discuss their thoughts as a whole group for another ~30 minutes. During whole group discussions, SMEs contributed by making FGS core competency connections to small-group work reports and posing additional questions or ideas for consideration. The first assembly concluded with ~5 minutes of reflection and announcements by event facilitators and SMEs.

General Assembly Two (Required) | May 9, 2023 (~3 hours)
(*Remote coffee*)→Welcome and Review→FGS action plan information→Peer-learning exercise: Group discussions on real-life FGS challenges→Reflections and Announcements→(*Remote coffee)*

The second general assembly began with a ~15-minute welcome and review of the schedule by event facilitators and SMEs, after which they dedicated ~20 minutes to share about the FGS action plan development process and criteria. Following the first general assembly format for collaborative brainstorming, participants then held small and whole-group discussions for two

hours on the real-life FGS challenges submitted by participants who agreed to have their cases reviewed for additional support. The assembly concluded with ~15 minutes of reflection and announcements by event facilitators and SMEs.

Peer-Support Sessions (Optional) | 5 sessions, May 10-16, 2023 (~1 hour)
Welcome→Review of information→Discussion and Q&A

Peer support sessions began with a brief welcome and review of information on the selected topic by event facilitators. Selected topics for the first three sessions were about action planning (how to draw up, complete, submit, and get started), and the last two sessions were about the peer review process (how to get started and submit to journals). After reviewing the information presented on the selected topic, an open group discussion was held where participants could discuss their connections to the topic and ask questions. The sessions then focused on listening to one participant share their FGS challenge and the actions they were going to take to solve it, with feedback and comments from peers and SMEs. During some sessions, participants also discussed what they were learning from the process of peer review and how they would use that knowledge to improve upon their action plans. During all sessions, technical support was provided to participants who had difficulties using the peer review platform.

General Assembly Three (Required) | May 17, 2023 (~2 hours)
(*Remote coffee*)→Welcome, group progress review, & recap→Participant presentations and feedback from SMEs→Closing ceremony and Announcements→(*Remote coffee)*

The third general assembly began with a ~20-minute welcome, a review of the whole group's action plan development, and a recap of important points from the second general assembly by SMEs and event facilitators. Then, over the next ~80 minutes, participants presented their action plans and discussed what they learned from the peer-review process with the whole group. SMEs provided feedback to participants to further strengthen action plans. The assembly concluded with a ~20-minute closing ceremony and final announcements. During the closing ceremony, participants, SMEs, and event facilitators celebrated the group's progress over Phase 1. Final announcements included an invitation to join Phase 2, the Impact Accelerator, and other FGS, Bridges to Development, and TGLF groups and programs like the Genital Schisto Community of Practice, 24 country-based communities of TGLF scholars, and Teach to Reach: Connect events.

**Peergrade, an online platform, was used to submit and review action plans. On May 11, 2023, participants submitted their draft action plans for peer review. On May 16, 2023, participants submitted their reviews of three peers' action plans. On May 19, 2023, participants submitted their own revised and improved action plans.*

Phase 2: Impact Accelerator

Launchpad: General Assembly One (Required) | November 6, 2023 (~1 hour)
Welcome & overview→Peer-sharing & Goal setting→SME feedback→Closing announcements

The first general assembly began with a ~15-minute welcome to participants and an overview of Phase 2 by event facilitators. The overview included information on the Impact Accelerator schedule, group demographics, and concluded by asking participants for their commitment. Participants pledged to form an active part of the human knowledge-sharing network, working with others, sharing information, and regularly reporting on progress to transform knowledge into action and improve global health outcomes, particularly those related to FGS. Then, facilitators briefly shared statistics of group progress made to date. For the following ~15 minutes, participants shared their stories of successful implementation, lessons learned through challenges presented, and existing barriers to implementation. Over the next ~30 minutes, participants set goals they could accomplish in two weeks' time and discussed them, after which event facilitators provided instructions/tips on how to report their goals online. Continuing on, SMEs provided feedback on what was shared for ~15 minutes and advice on goal setting. The assembly concluded with facilitators reminding participants of the next steps.

Launchpad: General Assembly Two <u>(Required)</u> | November 13, 2023 (~1 hour)
Welcome & review→Peer-sharing→SME feedback→Goal setting→SME feedback→Closing announcements

The second general assembly began with ~10 minutes of a welcome, a reintroduction of the pledge made by all participants, a brief overview of the Phase 2 schedule, and a review of the first week's progress by event facilitators. For the next ~30 minutes, participants spoke about their first week–how it went for them, what they learned, what hindered their progress, what surprised them, and what their next steps would be. Over the next ~10 minutes, SMEs were asked to follow-up directly to participants' questions and then provide more generalized feedback to the whole group on how to advance despite the challenging situations raised. Next, event facilitators invited participants to consider what they would like to achieve by the end of the week as well as by December 15th. Participants shared for ~10 minutes what their upcoming goals were and the actions they would take to achieve them. The general assembly concluded with ~10 minutes of final SME feedback and reminders of upcoming events.

Independent Remote Coffee <u>(Encouraged)</u> | Two conversations (~15 to 30 minutes each)
For this remote coffee, participants were randomly matched with another participant they were to contact within a week via their preferred communication methods (e.g., Zoom, Whatsapp, Messenger). This meant participants had the possibility of speaking with two scholars, one that contacted them and one that they contacted. Although participants' conversations were not restricted during the remote coffee, they were encouraged to keep conversations social and limited to ~15 to 30 minutes.

Lightning Sessions <u>(Optional)</u> | November 15, 2023 & November 22, 2023 (~1 hour each)
Welcome & review→Speaker testimony

Both lightning sessions followed a similar format. They began with a ~5-minute welcome, review (i.e., of the reality of FGS, information on training event sponsorship and structure), and an introduction to the selected participant speaker by an event facilitator. Then, the speakers spoke for ~5 minutes about FGS in their communities and described how they had

worked during the Launchpad to accomplish the goals they set. For the next ~35 minutes, the speakers answered mostly participants' questions, with some feedback and questions posed by SMEs. The lightning chats concluded with a ~5-minute wrap-up, thank you to everyone involved in the fight against FGS, and announcements about future events.

*****Links to additional information on the training and learner resources are provided below.***

2023 FGS Training Event Resources and Recordings	
2023 FGS training event webpage	https://www.learning.foundation/fgs-fr
FGS Telegram group	https://t.me/+Y43li8lyAdNlN2Q0
Session recordings	https://youtube.com/playlist?list=PLti7k0eaN3gRvrPdYVA1gEoyyX10Xkn6c&feature=shared
FGS core competencies	https://reproductive-health-journal.biomedcentral.com/articles/10.1186/s12978-021-01252-2
Learner resources	https://www.dropbox.com/sh/0oze7fv4u6vifpo/AAAPKr5ihUJaM4Bi_0oo-peea?e=1&dl=0
PeerGrade (online platform used for peer and SME review)	https://www.peergrade.io/
FGS FAQ document	https://zenodo.org/records/8415126
Minimum service package (MSP) for FGS integration *Note*: During the training, participants informally discussed stigma related to their contexts. It was not an official program topic but led to additional work. After the training, Bridges to Development partnered with other organizations to develop and pilot the MSP for FGS integration into SRHR services in Kenya, which has now been published. The MSP has service delivery points across all levels and incorporates training on stigma, especially at the community level, as part of its health literacy, social inclusion and equity components.	https://www.eliminateschisto.org/sites/gsa/files/content/attachments/2024-07-08/2023-09-05%20FINAL%20MSP%20-%20Appendix%20A%20ENG%20-clean%2026.6.pdf

Appendix E: The FGS Transparency Matrix

*Note: This version of the Transparency Matrix (Khan, 2022) was modified to fit the context of our collective work on FGS. Reflections on the matrix dimensions were enhanced by answering questions posed by Morton et al. (2022).

GROUP REFLECTION			
Dimension		**Identity Vector**	**Reflection**
Pose Epistemic positionality employed for rationale and causal relationships	X X X X X	Privileged (elite) foreign academic institution Global public health agency (WHO, UN etc) Privileged (elite) institution from the same country Local institution or research entity Local/Indigenous knowledge	Our work represents the facilitative collaboration of two international non-profits, The Geneva Learning Foundation (TGLF) and Bridges to Development, that support digital learning networks connecting local to internationally positioned health workers.
Position Position within the power structure of the research	X X	Funding agency/NGO Privileged foreign academic institution Global public health agency Privileged (elite) institution from the same country Local institution or research entity Indigenous population representative	We occupy positions ranging from interns/graduate assistants to program coordinators and founding members of the two collaborating international non-profits. This research and its products (i.e., composite vignettes) will be shared with current and potential health stakeholders supporting training events and local needs to eliminate FGS.
Voice Primacy in the design of the research	X X X X X X X	Funders/donors Foreign academics Global policy-makers Academics from privileged local institution(s) Local policy-makers Local academics Community participants	This work is funded by the END fund, which collaborates closely with stakeholders across the global neglected tropical disease community. Action plan designs and implementation reported in this research were based on community needs, observations, and priorities. Health worker contributions informed the research questions and design we developed as co-authors. Participants were acknowledged for participation, survey responses, and action plan development/implementation during and after the training events. Although participants did not meet the qualifications for authorship in this manuscript, they are recognized in the acknowledgment section of the manuscript.

GROUP REFLECTION			
Dimension		**Identity Vector**	**Reflection**
Gaze Communication primarily addressed to	X X X X X	International academics Global policy makers Local policy-makers Local academics Community	The target audience for this publication is health stakeholders (practitioners, researchers, policymakers, funders) supporting FGS endemic areas. Insights on cumulative responses were shared with participants during Phase 1 and 2. The data set is anonymized and published on Bridges to Development's Zenodo page for anyone, including community members, who is interested in learning more (https://zenodo.org/communities/bridgestodevelopment/).
Lens Primary analytical lens used to draw conclusions	 X X	Statistics Qualitative/ethnographic Mixed methods Local/Indigenous ways of sensemaking All of the above (almost) equally	This research relies equally on mixed-methods insight. The data stemmed from local health worker contributions, predominantly reporting direct observations and experiences through first-person narration. These experiences were inductively coded first according to terms used by participants and later refined into categories and themes. Analysis of these data through the lens of connectivism was grounded in verbatim quotes.
Taste (Reality check) User centeredness of research findings/ User experience resulting from the project/policy implementation	 X	User input not required or sought for this research/user--experience not an important consideration of policy/project Minimal consideration of end--user priorities/unpleasant user-experience resulting from policy/project implementation Moderate consideration of end-user priorities/neutral user-experience Significant end-user involvement in different phase of research/good user--experience resulting from policy/project implementation End-user initiated research/excellent user--experience resulting from policy/project implementation	By participating in the training events, health workers agreed to support each other as well as research for future participants and the global community. The training events and this research is informed by their contributions. Additionally, through the training events, participants honed their research and writing skills relevant to their context. In Phases 1 and 2, they practiced using data analysis to inform their action plan development and implementation. They shared their results with peers, SMEs, and event facilitators to receive additional feedback and ideas. They also gained experience giving advice aloud in and in writing to their peers.

GROUP REFLECTION			
Dimension		**Identity Vector**	**Reflection**
Slice Intersectional identities relevant to research	X	Socio-economic Status, age, skin color, gender, virtual training, length of time in global health (practice or research), French proficiency, current country of residence, formal education (obtained or actively pursuing)	We are an interdisciplinary group of co-authors with diverse, intersectional identities relevant to this research (see the second tab, individual positionality, and the third tab, authorship). Collectively, we are united in our desire to empower and equip healthcare workers in the communities they serve. Our experiences in virtual training using TGLF's digital peer-learning methodology have been positive, and we value the type of engagement and outcomes reported by participants. This is a view we recognized could skew our analysis of the data. All stages of our research process were participatory to address this reality and ensure our analysis and interpretation of the data from different cultural, contextual, personal, and professional lenses. During our regular meetings, we shared and listened reciprocally. In our process, we realized the many ways we are similar to and different from the participants. By collaborating with each other over time, we developed a sense of trust that allowed us to challenge each others' perspectives, and we sought out external reviews for additional insight on other potential biases (i.e., gender, age).

INDIVIDUAL REFLECTION								
Dimension	**Identity Vector**		**KE**	**CM**	**RS**	**JJ**	**NV**	**KAN**	**CP**
Slice Intersectional identities relevant to research	Socio-economic Status	Low-income		X				X	
		Middle-income	X		X	X	X		X
		High-income							
		Other/Prefer to not answer							
	Age	<35 years old						X	
		36 to 64 years old	X	X	X	X	X		X
		>65 years old							
		Other/Prefer to not answer							
	Skin color	Light	X			X	X		X
		Medium			X				
		Dark		X				X	
		Other / Prefer to not answer							
	Gender	Man			X				
		Woman	X	X		X	X	X	X
		Non-binary / Gender-fluid							
		Other/Prefer to not answer							
	Virtual training	Little experience (1-3 events)					X		
		Some experience (4-6 events)							
		High experience (7+ events)	X	X	X	X		X	X
		Other/Prefer to not answer							
	Length of time in global health (practice or research)	0-5 years	X					X	
		6-10 years		X			X		X
		11+ years			X	X			
		Other/Prefer to not answer							
	French proficiency	Non-speaker	X			X		X	
		Beginner to intermediate					X		

INDIVIDUAL REFLECTION								
Dimension	**Identity Vector**		**KE**	**CM**	**RS**	**JJ**	**NV**	**KAN**	**CP**
		Advanced to fluent		X	X				X
		Other/Prefer to not answer							
	Current country of residence	Low-income		X					
		Middle-income							
		High-income	X		X	X	X	X	X
		Other / Prefer to not answer							
	Formal education (obtained or actively pursuing)	Bachelor's			X		X		
		Master's		X				X	X
		Doctoral	X			X			
		Other/Prefer to not answer							

Appendix F: Additional Figures and Tables

Figure 3: Action Plan Program Integration

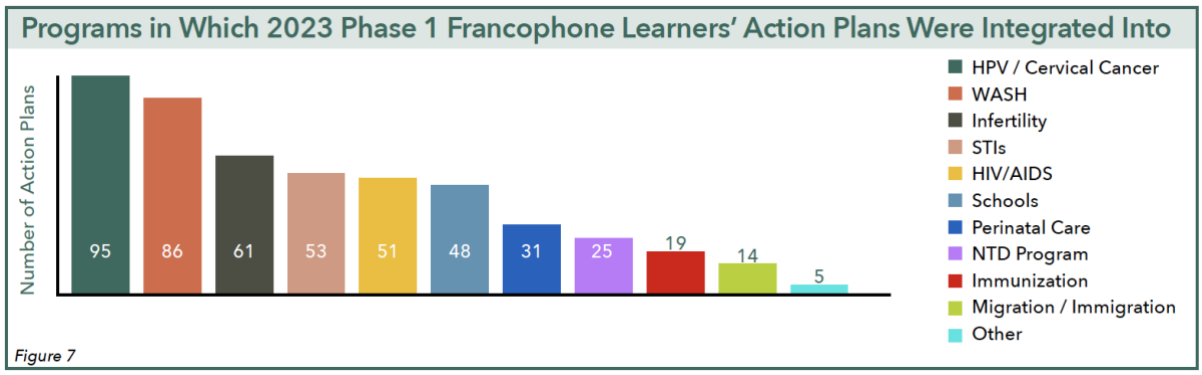

Figure 4: Action Plan Objectives

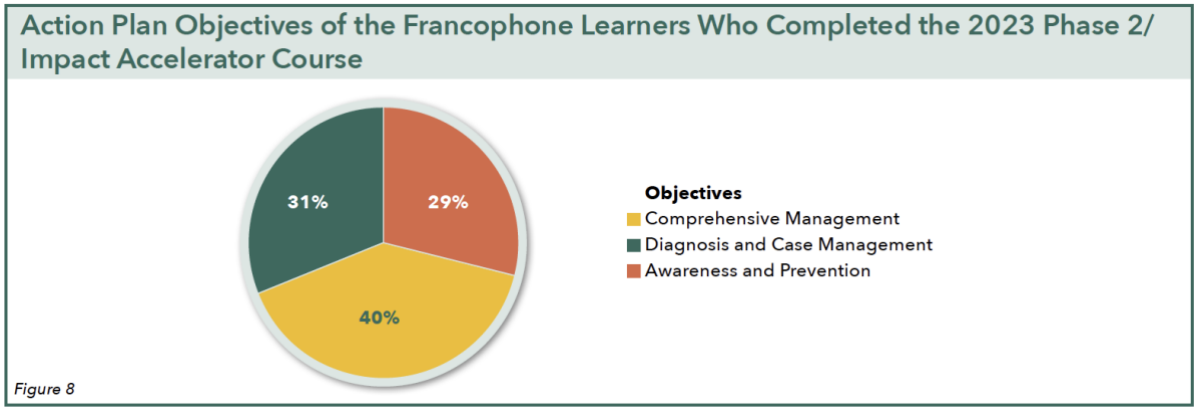

Table 1: Healthcare Workers Socio-demographic Characteristics

Category	Demographic	Phase 1 %	Phase 2 %
Gender	Women	49.3	35.4
	Men	50.7	64.6
Age Range	18–25	36.4	51.9
	35 and above	63.6	48.1
Country of Residence	Central/Middle Africa	51.7	46.9
	Northern Africa	0.5	0
	Western Africa	41	46.2
	Southern Africa	0.3	0.7
	Eastern Africa	5.5	6.2
	Others	1.1	0

Profession	Doctor/Obstetrician-gynaecologist	43.4	47.9
	Public Health Officer	21.8	16
	Nurse/Midwife/Nurse practitioner	21.2	19.4
	Community health worker	8	9.7
	Laboratory technician	5.6	6.9
Organization	Public hospital/health facility	23.1	21.4
	Ministry of Health staff at national level	20.3	22.9
	Private organization	20.8	17.9
	Ministry of Health staff at subnational level	15.5	14.3
	University/academic institution	12	14.3
	Private hospital/health facility	8.4	9.3

Table 2: Regression Analysis of Factors Influencing Course Completion

	Phase 1		**Phase 2**	
Parameters	**Odds Ratio (Confidence Interval)**	**P-value**	**Coefficient**	**Credible Interval (2.5%, 97.5%)**
Gender				
Male	1		1	
Female	0.42 (0.22, 0.79)	0.008*	-0.11	-0.99, 0.75
Profession				
Doctor	1		1	
Nurse	2.86 (0.69, 11.91)	0.149	0.80	-0.27, 1.92
Laboratory technician	1.84 (0.35, 9.77)	0.472	-0.94	-2.76, 0.62
Public health officer	1.32 (0.35, 4.96)	0.679	-0.29	-1.52, 0.97
Community health worker	0.57 (0.16, 2.06)	0.390	-1.75	-3.58, -0.10*
Organization				
Public hospital/health facility	1		1	
Private hospital/health facility	1.58 (0.52, 4.79)	0.422	0.93	-0.65, 2.62
University/academic institution	2.03 (0.62, 6.62)	0.243	-1.02	-2.59, 0.42
Ministry of Health staff at national level	1.03 (0.43, 2.47)	0.955	-0.48	-1.71, 0.74
Ministry of Health staff at subnational level	0.96 (0.34, 2.69)	0.938	-0.23	-1.69, 1.24
Private organization	1.37 (0.49, 3.84)	0.552	0.17	-1.31, 1.72

Perform pelvic exams as part of routine work responsibilities				
False	1		1	
True	0.63 (0.3, 1.33)	0.226	-0.63	-1.63, 0.37
Coverage of costs incurred				
Neither I nor my employer covered any cost incurred.	1		-	-
I paid out of pocket for my expenses.	2.45 (1.26, 4.78)	0.008*	-	-
My employer covered all my expenses.	1.08 (0.07, 16.3)	0.956	-	-
My employer and I covered part of the costs.	3.99 (0.44, 36.51)	0.220	-	-
Had prior experience with the management of female genital schistosomiasis				
False	1		-	-
True	0.78 (0.42, 1.46)	0.439	-	-
Difficulties encountered during the workshop				
Had difficulties with concepts or training materials.	1		-	-
I didn't find anything difficult for me.	3.45 (1.15, 10.34)	0.027*	-	-
Training technology was difficult.	2.35 (0.72, 7.72)	0.158	-	-
Workshop certificate will be recognized by my employer				
False	1		-	-
True	1.61 (0.58, 4.43)	0.359	-	-
Prior online learning experience				
False	1		-	-
True	1.96 (0.69, 5.54)	0.204	-	-
First peer-to-peer learning experience				
False	1		-	-
True	1.56 (0.8, 3.05)	0.196	-	-
Action plan implementation status before impact accelerator				
I have not started the implementation of my action plan.	-	-	1	-
The implementation of my action plan is in progress.	-	-	1.19	0.13, 2.35*
The implementation of my action plan is already complete.	-	-	0.64	-1.29, 2.66
The objectives of my action plan are part of my job responsibilities				
False	-	-	-	-
True	-	-	-0.15	-1.17, 0.85

The objectives of my action plan have been integrated into an existing program or initiative				
False	-	-	-	-
True	-	-	0.03	-0.96, 1.03
Confidence level for implementing action plan before impact accelerator				
Confident	-	-	-	-
Not confident	-	-	0.65	-0.34, 1.71
Very confident	-	-	0.80	-0.33, 1.97
Chi-square test (those who applied for Phase 2)				
Gender				
X-squared = 14.318, df = 2, p-value = 0.0007779				
Difficulties encountered during the workshop				
X-squared = 6.5812, df = 2, p-value = 0.03723				

Table 3: Descriptive Statistics of Training Outcomes

Parameter	Distribution (n=)	Frequency (%)
Phase 1 Learning Gains		
Had a change in knowledge/diagnosis levels	196	66
Had a change in confidence in discussing FGS	197	66
Reach (After Phase 2)		
Healthcare workers trained by participants	2675	91 (of participants had trained someone)
Patients diagnosed/managed	638	39 (of participants had diagnosed/managed)
Community members taught about FGS	49,088	82 (of participants had taught someone)
Begun Action Plan Implementation		
After Phase 1	89	39
Before Phase 2	89	62
After Phase 2	52	71
Completed Action Plan Implementation		
After Phase 1	4	1
Before Phase 2	9	6
After Phase 2	16	23

Table 4: Logistics Regression of Factors Influencing Learning Gains

Parameter	Odds ratio (Confidence Interval)	P-value
Gender		
Male	1	
Female	1.18 (0.6, 2.34)	0.628
Profession		
Doctor	1	

Nurse	1.11 (0.45, 2.77)	0.819
Laboratory technician	0.64 (0.19, 2.22)	0.486
Public health officer	0.54 (0.22, 1.36)	0.193
Community health worker	0.17 (0.04, 0.67)	0.012*
Perform pelvic exams as part of routine work responsibilities		
False	1	
True	0.81 (0.37, 1.77)	0.598
Organization		
Public hospital/health facility	1	
Private hospital/health facility	1.18 (0.29, 4.8)	0.816
University/academic institution	0.32 (0.1, 1.06)	0.061
Ministry of Health staff at national level	0.35 (0.12, 1.02)	0.055
Ministry of Health staff at subnational level	0.39 (0.12, 1.25)	0.114
Private organization	0.67 (0.2, 2.21)	0.506
Had prior experience with the management of female genital schistosomiasis		
False	1	
True	0.17 (0.04, 0.71)	0.015*
Difficulties encountered during the workshop		
Had difficulties with concepts or training materials.	1	
I didn't find anything difficult for me.	0.6 (0.14, 2.6)	0.494
Training technology was difficult.	0.77 (0.15, 3.83)	0.748
Workshop certificate will be recognized by my employer		
False	1	
True	0.16 (0.02, 1.38)	0.097
Work Environment		
Rural	1	
Urban	1.2 (0.63, 2.29)	0.576

Table 5: Peer-to-peer Learning Model Regression

Parameters	**Coefficient**	**Credible Interval (2.5%, 97.5%)**
Influence of model on engagement (Course completion)		
First peer-to-peer learning experience		
False	1	
True	0.10	-0.82, 1.03
Impact of peer review		
I did not learn	1	
I learned more than I expected	0.17	-2.76, 2.57
I learned less than I expected	-0.09	-3.20, 2.83
I learned what I expected	1.65	-1.29, 4.25

Peer support was useful		
False	1	
True	0.81	-1.49, 2.79
Impact of peer reviewing the work of colleagues		
I did not do it	1	
Not useful	7.34	3.10, 12.88*
Useful	6.36	3.70, 10.83*
Very useful	8.70	6.01, 13.24*
Impact of participation on social relationships		
Minimal change		
Moderate change	-0.42	-2.09, 1.14
Substantial change	-1.01	-2.70, 0.43
Influence of model on knowledge acquisition (Change in knowledge/diagnosis levels)		
First peer-to-peer learning experience		
False		
True	-0.10	-0.65, 0.43
Impact of peer review		
I did not learn.		
I learned more than I expected	-0.45	-1.83, 0.83
I learned less than I expected	-0.48	-2.09, 0.98
I learned what I expected	-0.77	-2.20, 0.61
Peer support was useful		
False		
True	1.97	0.80, 3.30*
Impact of peer reviewing the work of colleagues		
I did not do it		
Not useful	1.65	-1.12, 5.32
Useful	0.03	-1.04, 1.08
Very useful	0.16	-0.86, 1.14

Appendix G: Partner Media Connections

Bridges to Development	Partner Media Connections	TGLF Connections
https://bridgestodevelopment.org/		https://www.learning.foundation/
https://x.com/bridges2develop		https://x.com/DigitalScholarX
https://www.instagram.com/bridgestodevelopment/		https://www.instagram.com/thegenevalearningfoundation/
https://www.linkedin.com/company/bridgestodevelopment/		https://www.linkedin.com/company/geneva-learning-foundation/mycompany/
		https://www.facebook.com/DigitalScholar
		https://t.me/GenevaLearning
		https://www.learning.foundation/podcast
		https://www.youtube.com/@TheGenevaLearningFoundation
https://zenodo.org/communities/bridgestodevelopment/		https://zenodo.org/communities/tglf/records?q=&l=list&p=1&s=10&sort=newest

CHAPTER 4: ARTICLE THREE

BRACKISH CONNECTIONS: (DIGITAL) LEARNING NETWORKS, (VIRTUAL) COMMUNITIES OF PRACTICE, AND THE RICH LEARNING-TO-ACTION PATHWAYS OF THEIR COMBINED AND INTERSECTING EXISTENCE[1]

[1] Eller, K. 2024. *Advances in Developing Human Resources*. 27(1): 27-36.
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Abstract

The Problem. Virtual communities of practice (VCoPs) share many features of digital learning networks (DLNs). Their work is ecosystemically connected, and they operate on overlapping continuums. This makes understanding how they function and decisions about which term to use difficult. **The Solution.** This article outlines points of convergence and divergence between VCoPs and DLNs. It explains how the term, complexly coevolving, clarifies their brackish connections, and the proposed term, glocal peer-learning practice networks (GPPNs), is needed to describe their intersecting existence. **The Stakeholders.** Organizations and networks that seek to quickly and comprehensively describe the scale and scope of their work. Researchers who seek to unify terminology for better evaluation and advancement of the field across societal sectors. Practitioners and funders who aim to develop or strengthen work against issues of global concern using combined features of VCoPs and DLNs.

Keywords: virtual communities of practice (VCoPs), digital learning networks (DLNs), complexly coevolving, glocal peer-learning practice networks (GPPNs), learning-to-action pathways

Introduction

Connectivism shares that to make sense of the challenges we face, we must learn and act with others through digital networks to solve them (Siemens, 2005, 2006; UGA Mary Frances Early College of Education, 2021a). By sharing unique ideas and knowledge gained from formal, informal, and incidental learning experiences (Watkins et al., 2018), digital networks develop collective intelligence (Hogan et al., 2023) with which to "poke at the corners of a problem" (UGA Mary Frances Early College of Education, 2021b, p. 32:23). Though not all information shared or actions taken through digital network collaboration will resolve a challenge, the collective intelligence generated can accelerate adaptive problem-solving processes (Heifetz et al., 2009; Hogan et al., 2023). Moreover, through "combinatorial creativity" (USC, 2014, p. 0:49), collective intelligence can lead to more effective and efficient responses (Hogan et al., 2023). Thus, knowledge flow in digital networks "can be likened to a river that meanders through the ecology of an organization" (Siemens, 2005, Connectivism section, para. 4). Therefore, to stay rich in actionable knowledge and scale impact amid complexity, we must stay connected to and engaged in digital networks (Siemens, 2005, 2006; UGA Mary Frances Early College of Education, 2021a).

Although if knowledge flow through digital networks is akin to rivers, it is like the ocean in communities of practice (CoPs). The ocean is the largest reservoir, but its waters are not stagnant; they are constantly in motion, and CoPs help members discover needed skills, both new and old, to ride out the tidal waves of change. Virtual communities of practice (VCoPs) that coevolve in complex ways exhibit elements of both (Eller, 2024). They are the brackish waters, where the freshwater of the river meets the salty water of the ocean, transforming the environment around it into an estuary of rich existence.

To explain this assertion, I begin by comparing organizations and networks. Then, I outline the dimensions of learning organizations (Watkins & Marsick, 1993) as compared to those of (digital) learning networks (Downes, 2009; Ehrlichman & Sawyer) and (virtual) communities of practice (Wenger-Trayner & Wenger-Trayner, 2015). Finally, I conclude with how VCoPs, which coevolve in complex ways (Eller, 2024), demonstrate elements of both and propose new terminology to reference the interdisciplinary gathering and collaboration of such VCoPs.

Organizations and Networks

Formal organizations are entities that traditionally have more hierarchical structures and defined boundaries (Harmon, 2019). Yet, in more adaptive organizations, structures can be decentralized, and boundaries made permeable through global digital platforms (Snow & Fjeldstad, 2023). Comparatively, "networks are not associated with entities. Networks are agile, they can reform in a moment. Networks are available to all regardless of place in society. Networks are not hierarchical. They belong to complex systems. They evolve" (TEDx Talks, 2012, p. 2:47). However, networks often require coordination (Ehrlichman & Sawyer, 2018). Furthermore, there are many organizations that operate on a scale larger than some networks. The lines between the two are blurred, and maybe that is the point; they should be considered along continuums of operation and interdependency (Siemens, 2006).

Learning Organizations, Learning Networks, and Communities of Practice (CoPs)

Learning organizations "create continuous learning opportunities, promote inquiry and dialogue, encourage collaboration and team learning, establish systems to capture and share learning, empower people toward a collective vision, connect the organization to its environment and capacity building for change" (Watkins & O'Neil, 2013, p. 135). They are different from

organizational learning, which is more aligned with knowledge management or organizational memory (Watkins & Marsick, 1993; Watkins & O'Neil, 2013).

Similarly, it could be said that networked learning is simply passing information along digital channels while learning networks enable "participants to share information and learn from one another" (Ehrlichman & Sawyer, 2018, para. 1). According to Downes (2009), effective network learning is decentralized, distributed, disintermediated, disaggregated, dis-integrated, democratic, dynamic, and desegregated. However, learning networks are often facilitated by organizations with coordinators who are responsible for everything from communications and outreach efforts to design and operations (Ehrlichman & Sawyer, 2018).

Communities of practice (CoPs) build relationships and communal knowledge among a group of people with a shared interest in practice related to a particular domain. In a CoP, this resembles developing repositories of resources and a collective voice, brainstorming new ideas, collaborating on joint efforts, innovating and solving challenges, giving and receiving feedback, and working to create connections across geographical, professional, and other boundaries.

While not all communities fit this definition, CoPs exist across societal sectors, from (non)profit organizations and governmental agencies to businesses and civic groups. CoPs can be organized more informally or formally. They can emerge through self-organization or be more formally structured, and they can connect as part of or through (learning) organizations and (learning) networks (Wenger-Trayner & Wenger-Trayner, 2015).

Therefore, the existence of learning organizations, learning networks, and CoPs is ecosystemically intertwined. Yet, CoPs occupy their own unique space (Wenger-Trayner & Wenger-Trayner, 2015). In literature, CoPs are often referred to as mechanisms used by learning organizations (Jagasia et al., 2015; Marsick et al., 2000; Smith, 2003). However,

literature has shown interchangeable use of the terms CoPs and LNs, especially those utilizing primarily digital platforms to connect (Allee, 2000; Cummings & Van Zee, 2005; Murillo, 2011), as demonstrated by the following two passages:

> There are countless examples of learning networks around the globe, though many use different terms to describe themselves, including communities of practice or associations (Ehrlichman & Sawyer, 2018, How Learning Networks Work section, para. 1).

> Communities of practice are not called that in all organizations. They are known under various names, such as learning networks, thematic groups…While they all have the three elements of a domain, a community, and a practice, they come in a variety of forms. Some are quite small; some are very large, often with a core group and many peripheral members. Some are local and some cover the globe. Some meet mainly face-to-face, some mostly online. Some are within an organization and some include members from various organizations. Some are formally recognized, often supported with a budget; and some are completely informal and even invisible. Wenger-Trayner & Wenger-Trayner, 2015, What do Communities of Practice Look Like? section, para. 1).

Despite their interchangeability, there are differences between learning networks and virtual communities of practice. Virtual communities of practice (VCoPs) utilize digital platforms and networks to offer primarily asynchronous and synchronous informal and formal learning opportunities. Each VCoP functions and evolves differently (Eller, 2024) and may or may not lean as heavily on effective learning network principles (Downes, 2009) but has a focus on practice. Whereas "collaborative action is not the primary goal of a learning network, action is

often a byproduct of the deeper connections and shared learning that result" (Ehrlichman & Sawyer, 2018, para. 1). VCoPs that coevolve in complex ways offer the most structured flexibility (Eller, 2024) and align best with the principles of effective network learning (Downes, 2009). These VCoPs coevolve their design with members to best meet their needs and interests, offer a variety of connection points, and encourage members to collaborate throughout the network.

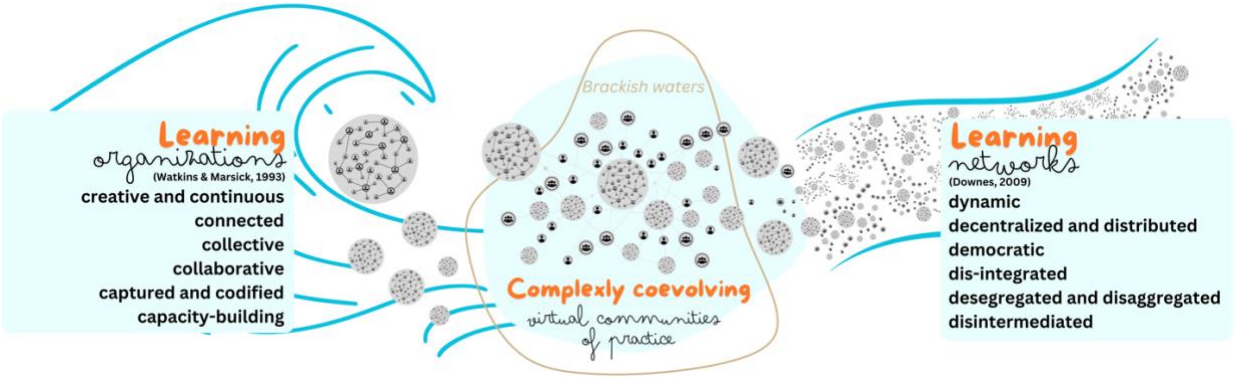
While communities of practice (CoPs) are the "social fabric of a learning organization" (Wenger, 1996, p. 20), complexly coevolving VCoPs (Eller, 2024) that network both diverse individuals and communities of practice together could be said to be the social fabric of learning networks. In a learning network, the focus is on connection for information flow that leads to strategic intervention and innovation. Relationships form and are strengthened through interaction and may lead to collaboration (Ehrlichman & Sawyer, 2018; Wenger-Trayner & Wenger-Trayner, 2015).

In a (V)CoP, the focus is on "the development of a shared identity around a topic that represents a collective intention—however tacit and distributed—to steward a domain of knowledge and to sustain learning about it" (Wenger-Trayner, n.d, para. 1). Diversity of members and thought through continued interaction leads to information flow, collaboration, and innovation (Wenger-Trayner & Wenger-Trayner, 2015). VCoPs that coevolve in complex ways hold onto a shared sense of identity and develop the knowledge base and practice of a given domain while expanding (network) connections to strengthen the flow of information, strategic intervention, and innovation (Eller, 2024; Wenger-Trayner & Wenger-Trayner, 2015). These VCoPs build global capacity to respond to wicked challenges (Rittel & Webber, 1973) by serving as a mechanism to connect the micro-narratives of members to meta-narratives of a shared vision (TEDx Talks, 2012). It can be said that complexly coevolving VCoPs (Eller, 2024) are:

- Expressive and evolving: Members express support for one another personally and professionally, creatively addressing ideas and building resources across a variety of digital platforms, and its facilitators/leaders are constantly modifying or evolving their design with the community to meet members' needs and interests (e.g., self-organizing);
- Expansive: This type of VCoP is continually expanding membership through personal invitations and seeking out new partnerships across boundaries;
- Equity-minded: The community is focused on critical, shared concerns and discusses, plans, and/or takes action to address inequalities;
- Engaging: Facilitators/Leaders promote interdisciplinary and interprofessional communication, interaction, and collaboration;
- Embodied and embedded: Members represent and value diverse constituencies within and across societal sectors;
- Empowering: The purpose of programming and networking is to strengthen members' capacities and authority to improve outcomes through advancements in practice and advocacy.

Figure 1

Learning organizations to learning networks continuum



An example of an organization, as depicted in Figure 1, is The Geneva Learning Foundation (TGLF) https://www.learning.foundation/, a Swiss non-profit with the mission to "research, develop, and scale up new ways to learn and lead against critical threats to our societies" (TGLF, 2024a, para. 1). Their members represent all tiers of the healthcare system from both the public and private spheres, and they partner with local governmental organizations, civil society organizations, and global health alliances, among others. For example, TGLF's work in immunization is tied to the Movement for Immunization Agenda 2030, which "emerged in response to the Director-General's call for a 'groundswell of support' for immunization and combines a network, platform, and community of action" (Sadki, 2022, What is the Movement for IA 2030? Section, para. 2). However, TGLF supports global health practitioners across multiple other domains as well, such as female genital schistosomiasis, psychological first aid, and climate change (TGLF, 2023, 2024a). Each of these domains could be said to be similar to a complexly coevolving VCoP although they are also more than that.

Referencing Complexly Coevolving and Interdisciplinary Practice

Members from a VCoP focused on one domain that coevolves in complex ways (Eller, 2024) often join and engage in others, serving as boundary spanners (Keszey, 2018; Williams, 2002). Additionally, members from these VCoPs may also join interdisciplinary events and collaborate across domains. Such events and collaboration "hold potential for unexpected learning. The meetings of perspectives can be rich in new insights, radical innovations, and great progress" (Wenger-Trayner et al., 2014, p. 17). This cross-pollinating potential can be evidenced in the gatherings and work like that of TGLF's special interest groups, such as "women inspiring women," (TGLF, 2024c), their country-based scholar groups/associations, and their signature Teach to Reach: Connect events (TGLF, 2024b).

However, to my knowledge, there is not a term that comprehensively captures the work of organizations like TGLF, which operate multiple communities that coevolve in complex ways (Eller, 2024) and encourage members to gather and collaborate across disciplinary borders for shared concerns both in formally and informally organized ways. To distinguish this work in practice and scholarship that is so much more than a VCOP, I propose the term Glocal Peer-learning Practice Network (GPPN). This term takes into consideration [1] the scale at which such organizations operate, [2] the primary method used to engage members, and [3] members' embeddedness within and across co-evolving communities of practice networked together in a broader landscape of practice (Wenger et al., 2014). These elements are reflected in my working definition of GPPNs:

> organizations that facilitate and intersect multiple glocal (global + local), peer-learning-based, interdisciplinary, and complexly coevolving VCoPs across a shared, broader landscape of networks to drive innovation and scale outcomes, especially against critical threats. GPPNS connect primarily through virtual (synchronous) gatherings, either formally or informally, and collaborate online (asynchronously) using digital platforms.

New Insights for HRD Education

Original conceptions of a learning organization (Watkins & Marsick, 1993) and communities of practice (Wenger, 1996, 1998) were developed before the digital technologies we use today. Complexly coevolving VCoPs (Eller, 2024) and GPPNs, which utilize the latest technological advancements, challenge HRD to consider how education in our 21st century can be more expressive, evolving, expansive, equity-minded, engaging, embodied, embedded, and empowering. They offer HRD training developers insights into the use of newer informal and incidental learning variations (Watkins et al., 2018). Additionally, they provide examples of how

more accessible program designs and interdisciplinary partnerships may better meet the needs of employees, organizations, and societies at large. For HRD researchers, the clarification of their terminology means being able to more easily identify and reference them in literature, an act that can also bring new insight through existing and future studies of their empirical impact.

Conclusion

The work of learning organizations is tied to that of learning networks, and the terms (digital) learning networks and (virtual) communities of practice have been used interchangeably (Cummings & Van Zee, 2005; Ehrlichman & Sawyer, 2018; Murillo, 2011; Wenger-Trayner & Wenger-Trayner, 2015). Although they operate along continuums (Cummings & Van Zee, 2005; Siemens, 2006), VCoPs that coevolve in complex ways (Eller, 2024) occupy their own space on the learning organizations to learning networks continuum (Figure 1). They maintain a collective identity and continue developing expertise in a domain while diversifying and strengthening connections to improve the exchange of information. GPPNs that facilitate such interdisciplinary community gatherings and collaboration within and across broader landscapes of practice further amplify our global capacity to respond to the wicked challenges (Rittel & Webber, 1973) of our 21st century. The brackish connections of complexly coevolving VCoPs (Eller, 2024) and the intersecting potential facilitated by GPPNs forge powerful learning-to-action pathways and critical spaces for future HRD study.

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CHAPTER 5: ARTICLE FOUR

MIXED METHODS FINDINGS OF A PSYCHOLOGICAL FIRST AID DIGITAL PEER LEARNING PROGRAM FOR CHILD-SUPPORTING PROFESSIONALS[1]

[1] Eller, K., Dhakwa, M., Marsick, V., Sadki, R., Jones, I., Jacomy-Vité, S., Yushchenko, Y., Mbuh, C.N., Steed, I., Saaristo, P., and Watkins, K. E. Submitted to the *International Journal of First Aid Education*, 04/13/25.

Abstract

Background: The need to provide children affected by the armed conflict between Russia and Ukraine with mental health and psychosocial support (MHPSS) services outweighs available support. In 2024, a certificate peer learning program on Psychological First Aid (PFA) was designed to fill that need.

Methods: Sequential mixed methods explored the program's impact through the lens of organizational learning theory. Correlation examined organizational learning culture, knowledge, and mission performance. Mean learning culture scores were compared to similar studies. Logistic regression assessed program completion variables and developed a predictive model. Content analysis revealed contextual needs and participant-valued program features. Constant comparison between MHPSS outcomes related to the past provision of PFA led to the development of an evaluative tool.

Results: Significant correlations were found between learning culture and performance. Mean learning culture scores were significantly higher than in similar quantitative studies. Peer review and gender analysis showed significant associations with program completion. Findings revealed common learning patterns and ways the program improved continuous learning opportunities. Participants found peer learning activities to be inclusive and motivational. MHPSS outcomes included improvements in functioning, subjective well-being, coping, social behavior, social connectedness, and severe reactions.

Conclusion: Results support large-scale programming using digital peer learning strategies to fill network gaps and promote continuous learning. Future PFA learning activities should incorporate more group discussions and use the PFA-evaluation tool to document MHPSS

outcomes systematically. Strong learning systems like the one in this study can strengthen learning culture, which is correlated with higher performance.

Keywords: psychological first aid, learning organizations, continuing professional development, humanitarian crisis, mixed methods

Background

The conflict in Ukraine has displaced over 10 million people. Approximately 6.8 million Ukrainians have sought protection as refugees and asylum-seekers, and an estimated 3.5 million are internally displaced (UNHCR, 2024). Whether displaced internally or abroad, Ukrainians face challenges associated with resettlement, like becoming familiar with other languages and cultures, finding employment, securing affordable housing, material well-being, and connecting with essential services. Additionally, they may also experience other issues like unresolved legal concerns and loss of or separation from family and friends (IFRC, 2024b; Rizzi et al., 2023).

In a recent survey on the mental health needs of displaced Ukrainians (IFRC, 2024a), 83% of respondents shared that they or their family members had faced stressful or traumatic events (Centrone et al., 2023). According to Save the Children (2025), two-thirds of Ukrainian children have fled their homes since 2022, and 85% of families surveyed reported needing psychosocial support. Roughly 92% of externally displaced Ukrainians have moved to other European countries. However, the scale of mental health impacts is great, and organizations are partnering to provide multi-sectoral services (UNHCR, 2024).

Though mental health care is a specialist function, psychological first aid (PFA) can be provided by non-specialists. In the same way that conventional first aid supports initial care for those physically harmed or ill, PFA providers follow four core processes–prepare, look, listen, and link- to ensure initial care for those experiencing distress reactions (TGLF, 2024). “The specific circumstances of armed conflict, disasters and remote settings will require the first aid educators and first aiders to adapt the scientific evidence of the first aid guidelines to their realities” (Wilp & El Gehani, 2022). In 2024, the International Federation of Red Cross and Red Crescent Societies (IFRC) and The Geneva Learning Foundation (TGLF) developed the first

certificate peer learning program on PFA in support of children affected by the humanitarian crisis in Ukraine (see Appendix G). The training was designed to supplement existing technical training with a range of peer learning activities, as well as a didactic self-guided module to provide basic information for practitioners unfamiliar with PFA for children in the Ukrainian context.

2024 Psychological First Aid Digital Peer Learning Program

The program, using TGLF's peer learning-to-action model (Eller et al., 2024; Umbelino-Walker et al., 2024; Watkins et al., 2022), created a digital, networked learning system for educators, social workers, and health professionals to strengthen support for Ukrainian children through PFA. The two-week program was implemented five times throughout 2024 for two English-speaking and three Ukrainian-speaking cohorts. Activities varied slightly from one cohort to the next based on participants' needs and programmatic insights. The function of synchronous sessions described below was to scaffold asynchronous activities and to strengthen meaningful connections between participants:

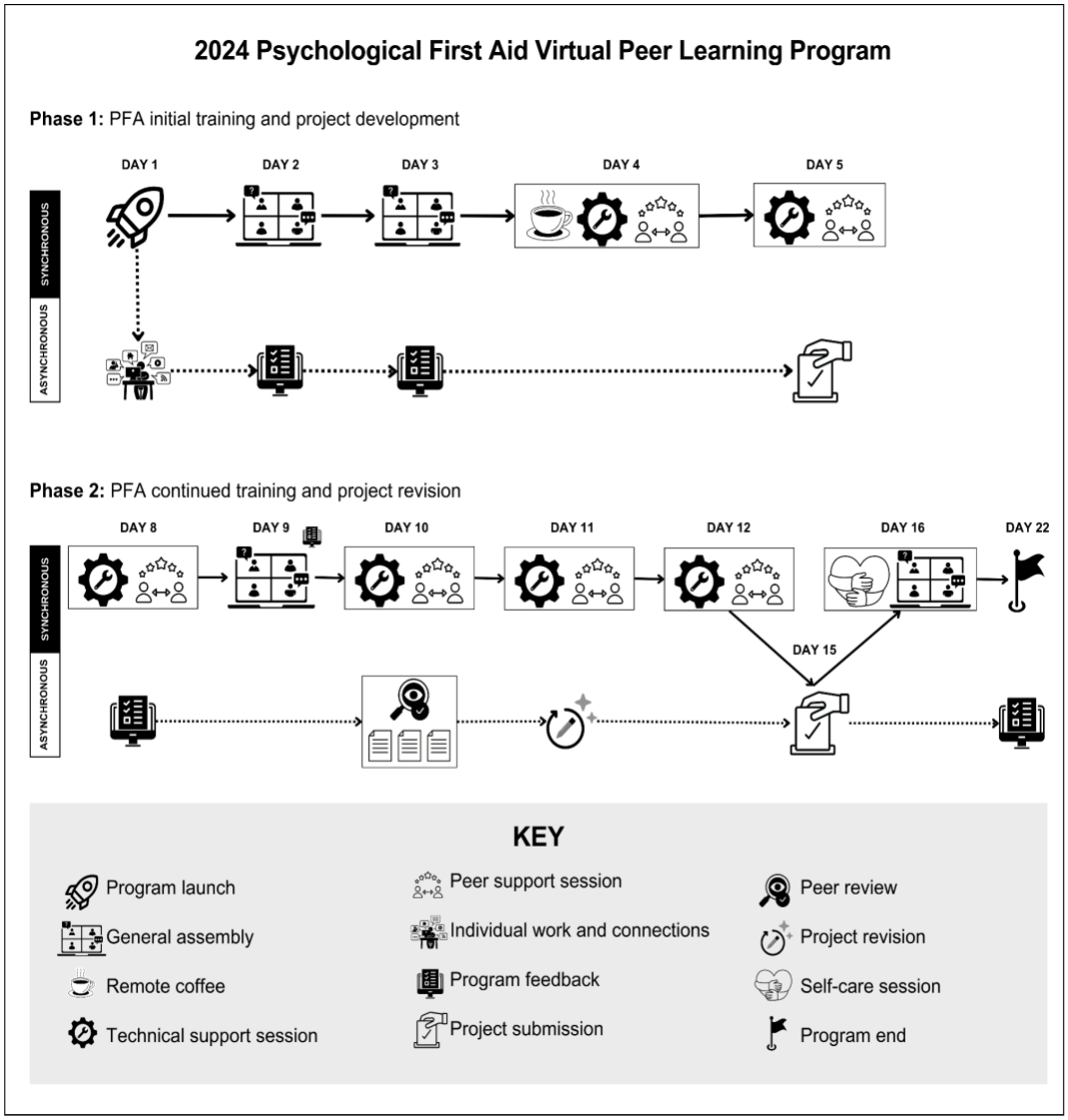
- **Discovery Day**: Intensive small-group discussion, in which participants self-organized into peer learning groups, identified a case from their experience, and analyzed the case using the rubric they also used to develop their individual case studies.
- **Exploration Day**: Small-group discussions followed the same model with feedback from the Discovery Day.
- **Peer Support Sessions**: Synchronized sessions combining technical support (often provided by peers), experience-sharing, and PFA skills development on specific topics. These sessions provided opportunities to practice, problem-solve, and support each step of the case study development process.

- **Plenary Sessions:** Whole group discussions of peer review activities and final project submissions.
- **Remote coffees:** Optional social sessions where participants offered advice, supported one another, and discussed issues of common interest.

The most significant learning during the program happened asynchronously. Outside of sessions, participants wrote and revised a case study using TGLF's rubric in which they described and reflected on a time they provided PFA to children in crisis. As part of the case study, participants also drafted an idea for a project to increase PFA capacity in their context. Three other participants provided feedback on case studies through TGLF's peer review platform using the same rubric. With this feedback, participants made revisions and submitted an improved version. Synchronous activities were recorded and available via YouTube. Certification was provided to participants based on completing the case study, peer review, and revision to improve the case study based on peer feedback and other inputs. Figure 1 depicts the general program structure (see Appendix D).

Figure 1

Learning to Action Pathway



A Theoretical Framework for the Health Services Context

Global health service provision depends on the health workforce's adaptive capacity to evolve as rapidly as the problems we face, an act requiring continuous, interdisciplinary, and interprofessional collaborative learning (Watkins et al., 2022). To frame our findings around this understanding, we use the theoretical foundation of learning organizations. A learning organization "learns continuously and transforms itself" (Watkins & Marsick, 1993, p. 8) along

seven dimensions or action imperatives, including: “create continuous learning, promote inquiry and dialogue, encourage collaboration and team learning, establish systems to capture and share learning, empower people toward a collective vision, connect the organization to its environment, and leaders model and support learning” (Watkins & Marsick, 1997, p.11). When attuned, learning organization culture transforms people and structures across individual, team, organizational, and global levels (Watkins & Marsick, 1993, p. 262), which are measured in the Dimensions of a Learning Organization Questionnaire (DLOQ) (Watkins & Marsick, 1993, 1997, 2003).

The Dimensions of a Learning Organization Questionnaire (DLOQ)

The original 43-item DLOQ (Marsick & Watkins, 2003; Watkins and Marsick, 1997; Watkins & O’Neil, 2013) and subsequent 21- and 7-item evaluative tools (Yang et al., 2004) ask employees to rate their organization’s capacity to learn and transform along the seven dimensions using a six-point Likert scale. Over 100 research studies have further developed and validated the DLOQ and its shortened versions (Ju et al., 2021). Yang and colleagues (2004) reported sufficient statistical reliability of all three DLOQ versions, with all seven dimensions having Cronbach’s alphas of >.80 and acceptable construct validity fitness.

Since 2019, TGLF has adopted the DLOQ to measure capacity for innovation and change in relation to performance. Table 1 reveals mean DLOQ scores and contextual information reported in empirical studies on healthcare organizations from 2000 to 2025. Literature was considered in any language that contained combinations of the search terms: [1] dimensions of learning organization questionnaire or DLOQ and [2] healthcare or health care or health services or health facilities. A total of 18 empirically-based articles were located. For comparison, Table 1 also shares DLOQ scores from a non-profit/network context and DLOQ scores across all health-focused and non-profit or network-focused studies.

Table 1

DLOQ Scores[2]

Health focus	CL	DI	TL	ES	EP	SC	SL	N	Continent	Country	Context	Version
Alonazi (2021)	3.22	2.97	3.27	3.28	3.23	3.29	3.23	1131	Asia	Saudi Arabia	Hospitals	21-items
Alrashidi et al. (2023)	4.70	4.15	4.41	4.28	4.17	4.09	4.50	117	Asia	Saudi Arabia	Hospitals	not shared
Do et al. (2023)	4.67	4.00	4.00	4.00	4.00	4.33	4.67	336	Asia	Vietnam	Hospitals	21-items
Estrada (2009)	4.48	3.96	4.06	4.01	3.88	4.10	4.32	594	North America	U.S.	Acute care hospitals	21-items
Goula et al. (2019)	4.29	4.37	4.39	4.64	4.31	4.48	4.55	100	Europe	Greece	Private hospital	43-items
Goula et al. (2021)	2.60	2.93	2.60	2.45	2.24	2.42	2.75	380	Europe	Greece	Public hospitals	43-items
Khosravi et al. (2016)	3.03	2.95	2.82	2.80	2.43	2.53	3.05	170	Asia	Iran	Governmental healthcare organizations	43-items
Kumar (2016)	2.83	3.60	2.73	3.23	3.24	3.18	3.79	286	Asia	India	Teaching hospital	21-items
Leufvén et al. (2015)	3.24	3.14	3.29	3.17	3.09	3.21	3.75	135	Asia	Nepal	Hospitals	21-items

[2] The learning organization framework encompasses seven dimensions: creating continuous learning opportunities (CL), promoting inquiry and dialogue (DI), encouraging collaboration and team learning (TL), establishing systems to capture and share learning (ES), empowering people toward a collective vision (EP), connecting the organization to its environment (SC), and providing strategic leadership for learning (SL).

Little & Swayze (2015)	4.31	3.85	3.93	4.10	3.72	4.10	4.10	500	North America	Southeastern U.S.	Medical center	21-items	
McClendon-Davis (2022)	4.36	3.75	3.90	4.08	3.63	3.68	4.23	60	North America	Midwestern U.S.	Leadership Association (manufacturing and healthcare organizations)	21-items	
Nurmala (2014)	4.22	3.90	4.10	3.58	3.89	4.38	4.23	172	North America	U.S.	Georgia Public Health Training Center	21-items	
Uğurluoğlu & Uğurluoğlu (2013)	4.09	4.22	4.37	4.31	4.65	4.51	4.93	243	Europe / Asia	Turkey	Public hospitals	43-items	
Watkins et al. (2009)	3.23	3.11	3.12	3.07	2.84	3.13	3.41	675	North America	Midwestern U.S.	Local public health departments	43-items	
Health focus mean	3.81	3.64	3.64	3.64	3.52	3.67	3.89	---	---	---	---	---	---
Other focus (NGO, network)	CL	DI	TL	ES	EP	SC	SL	N	Continent	Country	Context	Version	
Dirani et al. (2021)	3.79	3.69	3.63	3.63	3.63	3.61	3.53	48	Multiple	Multiple	Interdisciplinary networks, environmental change	7-items	
Kortsch et al. (2022)	3.05	3.18	2.93	2.93	2.75	3.10	3.03	310	Europe	Germany	Intersectoral (manufacturing, trade, IT, education)	21-items	
Kortsch et al. (2022)	2.68	2.84	2.69	2.86	2.65	2.86	2.78	348	Europe	Russia	Intersectoral (manufacturing, trade, IT, education)	21-items	

McHargue (2003)	4.16	4.15	4.33	3.78	4.20	4.35	4.73	264	North America	U.S.	Large nonprofit human service organizations	43-items	
Other focus mean	3.42	3.47	3.40	3.30	3.31	3.48	3.52	---	---	---	---	---	
All Studies	CL	DI	TL	ES	EP	SC	SL	N	Continent	Country	Context	Version	
All studies mean (Other focus, health focus)	3.72	3.60	3.59	3.57	3.48	3.63	3.80	---	---	---	---	---	[3]

[3] All means were standardized to a 6-point scale.

Overall, these studies demonstrate that the means are quite similar for each dimension. Not surprisingly, when combining so many different studies, variance is suppressed. Nevertheless, the pattern of responses across these studies of higher average means for continuous learning and providing strategic leadership for learning and lower means for embedded systems for learning and empowering people toward a collective vision holds.

Research Purpose and Questions

This research aims to analyze the learning culture of participants' organizations, PFA-related mental health and psychosocial outcomes, participants' local plans to strengthen PFA, and their learning program experience. Specifically, it asks: through an organizational learning theory lens, how did the 2024 Psychological First Aid (PFA) digital peer learning program enhance network capacity to address the mental health and psychosocial needs of Ukrainian children?

Quantitative Sub-questions:

1. To what extent did participants describe their organizations as learning organizations?
    a. How do their responses compare to previous learning organization studies in similar contexts?
2. What is the relationship between the learning culture of participants' organizations and the extent to which they completed the PFA programming?
3. To what extent is this relationship affected by the role or location of the participant?
4. Is there a model that predicts completion?

Qualitative Sub-questions:

5. How did the program enhance PFA provision in participants' contexts?
6. How did the program benefit the network?

7. What mental health and psychosocial outcomes did participants report from the provision of PFA to Ukrainian children?

Methods

Study Design

This sequential mixed methods analysis (J.W. Creswell & J.D. Creswell, 2018) triangulates secondary data to provide a comprehensive view of impact. Quantitative and qualitative secondary data were collected leading up to, during, and after the 2024 Psychological First Aid (PFA) digital peer learning programs. The quantitative data focused on what impacted participants' completion of the program, while the qualitative data sought to understand the impact beyond the participants to their contexts and to the network itself.

Ethics and Consent

This study is part of a research project titled "Enstorying Global Health Landscapes of Learning" that evaluates the impact of The Geneva Learning Foundation's (TGLF's) peer-learning model (Eller, 2025). It reviews secondary data collected by TGLF with oversight from its Commission on Research Ethics (CRE). The project was approved on June 18, 2024, by TGLF's CRE (Appendix C) and designated on July 12, 2024, by the University of Georgia Institutional Review Board as non-human subjects research (PROJECT00009825; Appendix B). TGLF's CRE adheres to the principles of the Cantonal Commission for Research Ethics (CCER), Federal Law on Research on Human Beings (RS 810.30), Swiss Human Research Act (HRA), and Ordinance on Organisational Aspects of the Human Research Act (HRA Organisation Ordinance, OrgO-HRA). These legal instruments direct all TGLF research procedures, including data collection, data management, and data protection, and are referenced for evaluating and authorizing proposed research. All co-authors with access to participants' identifying information were trained and approved in TGLF data confidentiality procedures. Co-authors RS,

SJV, YY, IJ, CM, and IS had access to this information during the program, and co-authors KE and KEW had access after the program ended. Co-authors MD, VM, and PS did not have access. For authorship information, see Appendix A.

Data Collection

Before collecting data, TGLF provided written information on the research purpose and how information may be used. Participants were not compensated and provided written consent for their data to be used for research. Data was collected from July 2024 to December 2024. Data collection included [1] participants' program applications (n=1,116), [2] peer review feedback and final scores (n=323), [3] self-review reflections and final scores (n=193), [4] post-workshop feedback (n=148), [5] program reflections shared verbally, and [6] case studies (n=119). Program applications revealed practitioners' sociodemographic characteristics, workplace context, and culture (the seven-item form of the *Dimensions of a Learning Organization Questionnaire*, Watkins & Marsick, 1997), prior experience using PFA, and meeting preferences. Peer- and self-review shared assessment according to the case study rubric (see Appendix D). Post-workshop feedback collected data using TGLF's value creation framework on how participants felt the program changed them as professionals, influenced their social connections, helped their professional practice, affected their professional environment, and encouraged them to view the world differently (Wenger & de Laat, 2011). Case studies described a specific situation, analysis and reflection, application of PFA for children principles, analysis of the effects of support provided, and ideas for a local project to strengthen support, building on this experience. Data from each collection were then merged into a single database for analysis.

Data Analysis

Analysis sequentially explained program impact (quan → QUAL) through the lens of organizational learning theory. Correlational analysis examined organizational learning culture, knowledge, and mission performance. Mean learning culture scores were compared to similar studies. Logistic regression assessed program completion variables and developed a predictive model that was evaluated using Akaike information criterion and deviance statistics. Content analysis revealed contextual needs and participant-valued program features. Constant comparative analysis led to the development of a MHPSS evaluative tool.

Table 2

Analysis Plan

Research Question	Associated Data	Analysis Performed
1. To what extent did participants describe their organizations as learning organizations?	•DLOQ scores- current study •Performance metrics (knowledge and mission)-current study	Pearson correlation analysis was conducted between the seven dimensions of the DLOQ metrics and two performance metrics measured on a 6-point scale (n=757). Knowledge performance was based on participants' agreement with the statement, "Where I work, compared to last year, we are better at using what we learn to support children affected by the humanitarian crisis in Ukraine." Mission performance was based on agreement with: "Where I work, compared to last year, the mental health of children affected by the humanitarian crisis in Ukraine has improved due to our support."
1a. How do their responses compare to previous learning organization studies in similar contexts?	•DLOQ scores- current study •DLOQ scores- previous studies (Overall reported means)	Each of the seven DLOQ metrics was compared to the overall mean of corresponding metrics reported in previous studies using a one-sample t-test. To further validate the results, bootstrap confidence intervals were calculated.
2. What is the relationship between the learning culture of participants' organizations and the extent to which they completed the PFA program?	•DLOQ scores (composite calculated as participant response average across seven DLOQ dimensions)- current study •Outcome variable: Participants' program completion status •Predictor variable: DLOQ score composite	Program completion was categorized into two groups: completed and not completed. Logistic regression was used to model program completion status (binary outcome) as a function of the composite mean score of the seven DLOQ items

Research Question	Associated Data	Analysis Performed
3. To what extent is this relationship affected by the role or location of the participant?	•Outcome variable: Participants' program completion status •Predictor variables: DLOQ composite Score, role, and location	Location and participant's role were added to the logistic regression model to examine their influence on the relationship between the PFA program and DLOQ scores
4. Is there a model that predicts completion?	•Outcome variable: Participants' program completion status •Predictor variables: DLOQ Composite Score, role, location, gender, and peer review	Logistic regression was performed to predict program completion using multiple combinations of predictor variables. Model fit was evaluated using AIC and deviance statistics. The model that included DLOQ composite score, location, role, peer review, and gender demonstrated the best fit with notable improvement in both AIC and deviance.
5. How did the program support and enhance PFA provision in participants' contexts? 6. How did the program benefit the network?	•Program reflections shared verbally by participants during the program •Self- and peer-review feedback (open comments) •Post-workshop feedback: -Can you explain how participation in the program has changed you as a professional? -Can you explain how participation has affected your social connections? -Can you explain how participation has helped your professional practice? -Can you explain how your participation has changed your ability to influence your professional environment? -Can you explain how your participation made you look at the world differently? •Case studies (n=24) purposively chosen as they represented a broad range of PFA contexts, techniques, and detailed information	Analysis of PFA-related contextual needs and program features valued by participants was conducted using conventional content analysis (Hsieh & Shannon, 2005). All data were read multiple times and inductively coded. Reflection on the codes and notes led to code refinement, categorization, and the identification of verbatim quotes. Categories and verbatim quotes from the content analysis were then reviewed collectively for network benefit.

Research Question	Associated Data	Analysis Performed
7. What mental health and psychosocial outcomes did participants report from the provision of PFA to Ukrainian children?	•Application Questions -How do you know that PFA has helped a child get better? -Do you have an experience supporting children affected by the humanitarian crisis in Ukraine that you would like to share with colleagues? -*Tell us what happened and how it turned out.* Be specific and detailed so that we can understand your story. -*Reflect* on your story. •Case studies (n=24) purposively chosen as they represented a broad range of PFA provision contexts, techniques, and detailed information	Analysis of MHPSS outcomes related to the past provision of PFA was conducted by comparing and contrasting participants' responses to associated questions in their program applications and the selected subset of case studies. Multiple rounds of inductive coding were first conducted using generative AI (OpenAI, 2024). Outcomes were (re)categorized several times, and a manual round of inductive coding proceeded. All generated code examples without evidence were removed, and additional codes were added, leading to further code synthesis. Codes and categories were then compared to multiple existing MHPSS outcome frameworks. General categorical descriptions were written based on the finalized codes, example verbatim quotes, and referencing existing MHPSS outcome definitions used by the Inter-Agency Standing Committee (IASC, 2021), which aligned with findings.

Positionality and Reflexivity

We are an interdisciplinary group of co-authors with diverse, intersectional identities relevant to this research (see Appendix E). Personally and professionally, we are connected to the work and desire to support helpers in humanitarian contexts and affected children. We regularly engage and participate in digital networks and do not see a way to address critical threats to our global society without them. Our collective stance and experiences have led us to develop expertise in peer learning and familiarity with Ukraine's context. To counteract our biases, we ground analysis in member-checked insights and quotes.

Quantitative Results

The total sample size was 1,041, though the number of valid responses varied across measures due to missing data (see Appendix F for descriptive statistics). Correlation analysis (Table 3) revealed significant positive relationships between DLOQ metrics and performance outcomes. Five DLOQ metrics exhibited correlations above 0.5 with knowledge performance, while only strategic leadership approached 0.5 for mission performance. Strategic leadership showed the strongest correlation with both knowledge and mission performance. Additionally,

the mean of all DLOQ metrics (Composite DLOQ Score) demonstrated a strong positive correlation with both knowledge performance ($r = 0.639$, $p < 0.01$) and mission performance ($r = 0.515$, $p < 0.01$), further reinforcing the overall relationship between a learning-oriented culture and performance outcomes.

Table 3

Correlation of DLOQ and Performance Scores

	Knowledge Performance	Mission Performance
Continuous Learning	0.375**	0.281**
Dialogue & Inquiry	0.34**	0.327**
Team Learning	0.537**	0.443**
Embedded System	0.517**	0.413**
Empowered People	0.531**	0.415**
System Connection	0.524**	0.411**
Strategic Leadership	0.641**	0.495**
Composite DLOQ Score	0.639**	0.515**

Dimension of a Learning Organization Questionnaire (DLOQ) Scores

The DLOQ is a profile– a pattern of highs and lows that demonstrate the relative strength of each dimension in relation to one another. Table 4 presents DLOQ results of the organizations represented by participants in the current study. Figure 2 visualizes their pattern, showing how continuous learning, dialogue and inquiry, collaboration and team learning, and empowering people are lower than embedded systems, system connections, and strategic leadership. Thus, the organizations represented by participants in this study were stronger on the organizational level and less strong on the individual and group levels.

Table 4

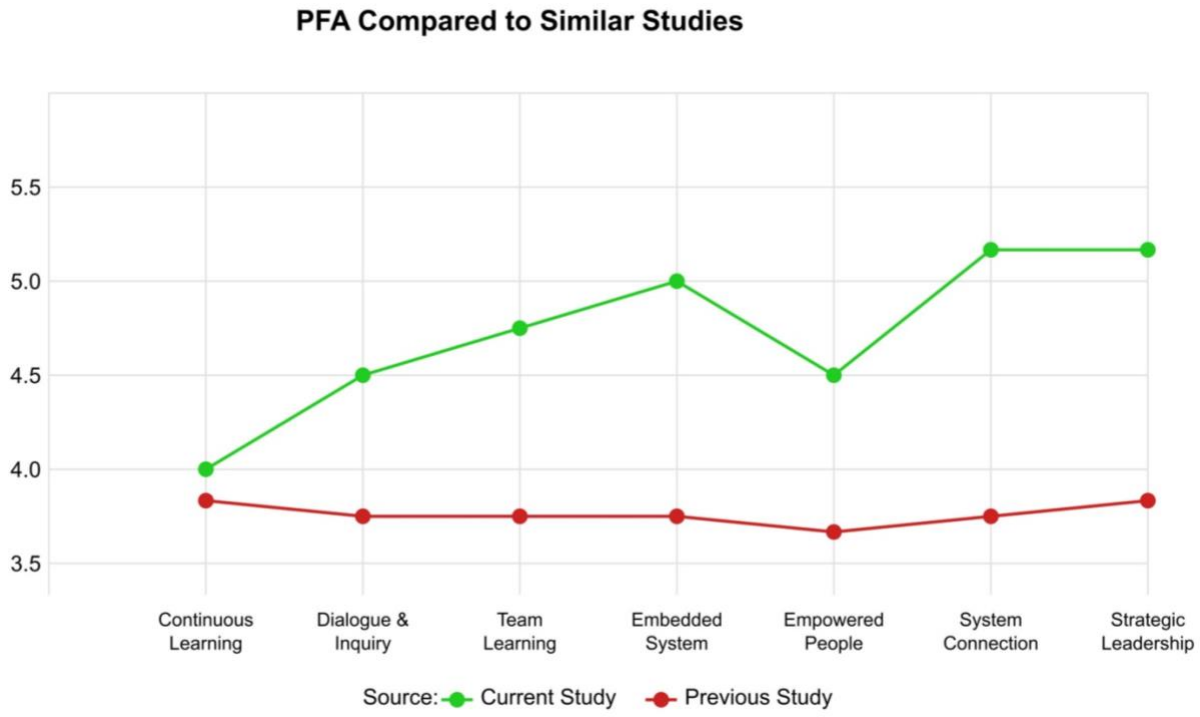
DLOQ Scores, Current Study

Study	CL	DI	TL	ES	EP	SC	SL	N	Continent	Country	Context	Version	
Eller et al., 2025	4.03	4.46	4.75	4.97	4.56	5.13	5.13	757	Europe	Multiple	Educators, social workers, and health professionals for Ukrainian children	7-items	
Mental Health Professional	4.01	4.38	4.73	4.96	4.57	5.13	5.15	413	---	---	---	---	---
Multiple Roles	4.01	4.51	4.75	4.96	4.51	5.10	5.09	344	---	---	---	---	---
Ukrainian	3.97	4.40	4.75	5.00	4.52	5.10	5.15	550	---	---	---	---	---
Non-Ukrainian	4.15	4.57	4.70	4.86	4.60	5.15	5.05	207	---	---	---	---	---

Figure 2 also reveals how our results compare to those of similar studies noted above. While previous studies exhibit a relatively flat trend with small peaks at continuous learning and strategic leadership, the current study demonstrates sharp highs at embedded systems, system connections, and strategic leadership with a sharp low at continuous learning.

Figure 2

PFA Comparison (Line Chart)



We computed a series of one-sample t-tests to compare the mean scores of the seven dimensions of the DLOQ from the current sample (N=757) with reported means from prior studies. All comparisons yielded statistically significant differences (p<0.001), confirming that the current study's means are significantly higher than the respective means of the prior studies. Bootstrap analysis also confirmed these results.

Learning Culture and Participant Factors in PFA Program Completion

Table 5 presents the log of odds ratios predicting program completion. Model 1 includes only the DLOQ composite score, Model 2 adds role and country, and Model 3 further incorporates gender and peer review. The DLOQ composite score shows a weak positive association (0.002–0.128) with program completion across all models and is not statistically significant. Mental health professionals, compared to those in other roles, and Ukrainians,

compared to participants from other countries, have lower odds of completing the program, though these differences are not statistically significant in both Model 2 and Model 3. This implies that the association with completion did not differ significantly for either roles or country.

In Model 3, which includes the additional covariates of gender and peer review, female participants were significantly less likely to complete the program than males (-1.435, $p < 0.01$). This result should be interpreted cautiously due to the small number of male participants compared to female participants. However, peer review (5.864, $p < 0.001$) was strongly positive and significantly associated with a higher likelihood of completion. Comparing Model 1 with other models using different combinations of covariates, Model 3 was the best fit, as indicated by AIC and Deviance tests. This suggests that the predictors of Model 3 explain a meaningful portion of the variance in completion.

Table 5

Logistic regression Odds Ratios of DLOQ scores on Completion

Predictor	**Model 1**	**Model 2**	**Model 3**	
	n=510	*n*=510	*n*=398	
DLOQ Composite Score	-0.002	0.006	0.128	
Role (Mental Health Professionals vs. Other)		-0.045	-0.014	
Country of Participants (Ukraine vs. Others)		-0.295	-0.591	
Gender (Female vs. Male)			-1.435	**
Peer Review			5.864	***

p-values: *** < 0.001, ** < 0.01, * < 0.05, † < 0.1

Although DLOQ scores, country, and role did not predict completion, DLOQ scores were positively correlated with the performance measures and, compared to similar studies, were significantly higher. It is not surprising that a measure of the learning culture in participants' organizations does not correlate with whether or not participants completed the program. We can function independently of the culture within our organizations, and participants indicated fairly supportive learning cultures within their organizations in the first place. Nor is it surprising that peer review predicts completion since their submission is close to the end of the program. What is interesting about these findings is the low scores for continuous learning among participant organizations, justifying the need for learning programs such as this one.

Qualitative Results

Even more interesting are the qualitative findings that demonstrate the power of collaboration and peer networking to create a learning culture among participants. The program's focus on PFA for children, peer exchange, and its inclusive and engaging environment supported participant and network development. A review of participants' narratives showed that PFA led to mental health and psychosocial improvements in six areas.

Peer Exchange

While peer exchange enhanced strategy effectiveness, service comprehensiveness, and broadened participants' MHPSS perspectives, reflection stimulated new ideas.

- "I learned how to create personalized strategies that address both emotional and academic challenges."
- "The continuous exchange of experiences…also inspired me to…consistently evaluate and refine my methods for greater effectiveness."
- "My group came up with…a course…that will help parents to talk and connect with their children, especially teenagers."

Sessions and group discussions exposed participants to varied cultural concerns, making visible network trends, and inspiring advocacy.

- "We had a very interesting discussion about our countries' reaction for the first and second waves of the arrival of the refugees…My groupmates' views and opinions highlighted things I had not thought of myself."
- "...the program… helped me challenge existing practices that may overlook the cultural dimensions of psychological support and promote more inclusive, culturally sensitive approaches in humanitarian operations…within my organization and other platforms."

Peer review strengthened participants' assessments of crisis situations, communication skills, and repertoire of PFA strategies.

- "...when we gave feedback…it put us in the shoes of 'experts,'...to see the situation from the outside..."
- "I was able to look at my own case…(and) write my idea in a comprehensive way."
- "Analyzing the cases of my colleagues, I found many new practices and methods..."
- "Communication with my colleagues inspired me to look for sponsors…I have already received 15 Hibuki (stuffed dog toys)...for the students of my gymnasium."

Mental Health and Psychosocial Outcomes

The MHPSS outcomes below were synthesized from participants' observations of past PFA provision. While these data are not associated with what was learned during the program, they contribute to collective knowledge-building on outcome categories and how impact can be measured. Reported PFA outcomes aligned with six mental health and psychosocial (MHPS) categories (see Table 6), used in the Common Monitoring and Evaluation Framework for Mental Health and Psychosocial Support in Emergency Settings (IASC, 2021). Given the immediacy of

PFA outcomes, the category of “disabling distress/symptoms” was slightly modified to reflect ‘severe reactions’ observed in children.

Table 6

MHPSS Outcomes in Ukrainian Children Following PFA Provision

Category and Description	Outcome	Example
Functioning or the ability to carry out daily activities	Acted independently	"After our interaction, the little girl gradually began to participate in the daily activities of the kindergarten."
	Resumed typical behaviors	"After one day of classes, his mother said: "Now I recognize my son again! What did you do?" The specialists told us to wait, but over time it got worse and worse. Now, after one day, he hugs and kisses me, sings songs, plays and tells me how much he likes food!"
	Improved sleep patterns	"A 17-year-old boy...complained of...thoughts that did not allow him to sleep. After (a) conversation with the young man's mother...his thoughts before bedtime were no longer intrusive, and his sleep improved."
Subjective well-being or happiness and satisfaction in life	Felt confident	"It was noticeable that the child's mood improved, he began to behave more confidently, and at the end of our meeting he came up and said his name in my ear..."
	Expressed their thoughts/feelings	"He became more relaxed, his shoulders visibly easing as we talked. He became more open, sharing his thoughts and feelings more freely. He started smiling more…"
	Managed emotions	"The child began to behave calmly in the shelter, tears and tantrums disappeared, and communication with classmates was established, which was not the case before."
Coping or the ability to address problems	Sought help on their terms	"Since the child refused to communicate, I gave her my business card with my phone number, which she could call me whenever she felt the need. A few days later, I received a call."

Category and Description	Outcome	Example
	Requested help from leaders	"I was also helpful in offering ideas, directions and guidance regarding joining different communities and seeking for help...(His mother) told me that the kids don't bully him as much as they used to since she sought assistance from the school as I suggested her to do so."
	Used techniques for emotional regulation	"I conducted psychoeducational work with the mothers…and taught them techniques...it worked...(they have the) ability to regulate own emotions."
Social behavior or the desire to get along and help others	Demonstrated less aggression	"...the children managed to trust others better …(the child) is no longer engaged in fighting with others."
	Acted prosocially	"He came up and said: 'Now I know it's safe here.' This was a significant progress, and now he not only feels calmer, but also helps other children overcome their fears."
Social connectedness or strengthened relationships	Linked to essential services	"After my intervention, (the) family had better access to the necessary medical and social services..."
	Developed new friendships	"...they have been visiting local center for Ukrainian refugees I recommended…(the child) joined activities for children there and even managed to find a friend there."
	Engaged in new communities	"My support included…introducing them to other people, and sharing insights about Finnish traditions and culture. This assistance positively impacted…their sense of participation in the community."
Severe reactions or extreme behaviors	Reduced self-harming behaviors	"Moving the child to a safe, dimly lit area and providing toys, food, and drinks helped reduce distress. This led to a decrease in self-harming behaviors."

Discussion

In a war zone, there are many reasons why participants might not complete a program (IFRC, 2024a; IFRC, 2024b; Rizzi et al., 2023). As our findings indicate, completion data alone is not an adequate proxy for learning impact, and qualitative data provides a richer

demonstration. Yet in many arenas, including public health, qualitative data is less valued (Stickley et al., 2022).

Compared to other PFA studies, this research found similar mental health outcomes but also provided concrete examples of behaviors that supported the mental health of children and, in some cases, the protective role of their caregivers (Hermosilla et al., 2023). Furthering our ability to capture the extent of impact in these areas can address a network need for robust data on MHPSS outcomes and yield additional proxies for assessing program impact.

Looking beyond program completion to assess impact in the current study, we found the learning approach implemented by TGLF fostered a learning community among a diverse, Europe-wide group of participants that supported and enhanced network capacity to provide PFA to children. Structured peer learning activities laid the groundwork for ongoing networking and collaboration– elements of an enhanced network learning culture (Sadki, 2025). The program also included a strong element of self-care and self-reflection by PFA providers, contributing to their longer-term engagement and efficiency.

Limitations

Our study was limited to professionals mainly supporting children from Ukraine and may not be generalizable to other populations. Statistical analysis had sufficient power to detect differences but could have been stronger with a larger data set. Despite a total sample size of 1,041 participants, many DLOQ metrics, peer review, and completion data were missing, reducing observations in the complete model to 398 and in the DLOQ-only predictors model to 510.

Recommendations

Specific recommendations for strengthening support to children in humanitarian crises include fostering peer learning strategies to enable continuous learning opportunities at scale.

While many face-to-face programs use breakout groups to create opportunities for peer learning, the TGLF approach ecosystemically embeds the knowledge gleaned from peers in a way that makes what is learned widely available across borders and system boundaries. It is a human-centered approach that extends knowledge sharing beyond technology-driven databases to allow for the kind of specific problem-solving and support people can offer one another.

Learning organization theory has generally focused on specific organizations and their culture. In this study, it was clear that while individuals came from many different organizations, there was a common pattern across them that could be affected by the collective learning of multiple participants. Additionally, future studies on MHPSS outcomes using the questionnaire created from these data could help validate the impact of PFA for children and be used as an additional proxy to more rigorously assess the outcomes of PFA-related learning interventions.

Conclusion

Peer learning programs that use digital technologies to strengthen human connections, like those offered by TGLF, address a significant gap for practitioners who often lack ways to connect and share experiences, especially in fragile and crisis contexts. They establish a learning culture that spans informal, incidental, and more formal, goal-directed learning. This culture builds on and extends participants' existing organizational learning culture by building practitioner networks where learning can continue long after the program ends. Combining and evolving large-scale programming and personalized small-scale learning opportunities fosters a unique learning culture that enhances network capacity.

This research quantitatively confirms previous studies on TGLF's peer learning-to-action model (Eller et al., under review; Umbelino-Walker et al., 2024; Watkins et al., 2022). It is significant to note that qualitatively, using a fully inductive analysis, we still arrived at the same

themes found in the joint global guidelines (IASC, 2021). As Wang et al. (2024) argue, it is extremely difficult to conduct controlled trials in disaster contexts of the effectiveness of PFA. Yet, sufficient expert opinion supports PFA, and our study shows the essential elements of safety, calm, and connectedness identified by PFA providers are enhanced through TGLF's peer learning approach. Thus, TGLF's approach to building a learning community around shared knowledge leads to actionable solutions to complex challenges.

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Appendix A: Additional Author Work Summary

Article Title: Mixed Methods Findings of a Psychological First Aid Virtual Peer Learning Program for Child-Supporting Professionals

Co-Author	Contribution	Co-Author Affirmation	Co-Author Signature
Kari Eller, Doctoral student, University of Georgia https://orcid.org/0000-0002-2463-7896	Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Project Administration, Resources, Software, Validation, Visualization, Writing – Original Draft, Writing – Review & Editing	I agree with this assessment of my contribution to the manuscript. As a graduate student, I am aware that this work must not be used again in another dissertation.	Signed by: Kari Eller 4/7/2025
Malika Dhakwa, Alumni, University of Georgia https://orcid.org/0000-0001-8681-6905	Data Curation, Formal analysis, Investigation, Methodology, Resources, Validation, Visualization, Writing – Original Draft, Writing – Review & Editing	I agree with this assessment of my contribution to the manuscript.	Signed by: Malika Dhakwa 4/9/2025
Victoria Marsick, Professor, Columbia University https://orcid.org/0000-0002-8285-694X	Conceptualization, Formal Analysis, Investigation, Methodology, Resources, Validation, Writing – Original Draft, Writing – Review & Editing	I agree with this assessment of my contribution to the manuscript.	Signed by: Victoria Marsick 4/7/2025
Reda Sadki[1] President, The Geneva Learning Foundation https://orcid.org/0000-0003-4051-0606	Conceptualization, Data Curation, Funding Acquisition, Investigation, Methodology, Resources, Software, Supervision, Visualization, Writing – Review & Editing	I agree with this assessment of my contribution to the manuscript.	DocuSigned by: Reda Sadki 4/8/2025
Ian Jones, Research Specialist, The Geneva Learning Foundation	Formal Analysis, Investigation, Methodology, Resources, Validation, Visualization, Writing – Original Draft, Writing – Review & Editing	I agree with this assessment of my contribution to the manuscript.	Signed by: IJ 4/8/2025
Séverine Jacomy-Vité, Project Manager, The Geneva Learning Foundation https://orcid.org/0009-0002-3167-5572	Investigation, Resources, Writing – Review & Editing	I agree with this assessment of my contribution to the manuscript.	Signed by: 4/8/2025

Yuliia Yushchenko, Subject Matter Expert, The Geneva Learning Foundation	Data Curation, Resources, Writing – Review & Editing	I agree with this assessment of my contribution to the manuscript.	Signed by: Yuliia Yushchenko 4/7/2025
Charlotte Njua Mbuh Deputy Director, The Geneva Learning Foundation https://orcid.org/0000-0002-8609-5471	Data Curation, Investigation, Methodology, Project Administration, Resources, Supervision, Validation, Writing – Review & Editing	I agree with this assessment of my contribution to the manuscript.	Signed by: Charlotte Njua Mbuh 4/8/2025
Ian Steed, Learning and Research Specialist, The Geneva Learning Foundation	Investigation, Writing – Review & Editing	I agree with this assessment of my contribution to the manuscript.	Signed by: Ian Steed 4/7/2025
Pann Saaristo, Thematic Lead for Health, International Federation of Red Cross and Red Crescent Societies	Funding Acquisition, Writing – Review & Editing	I agree with this assessment of my contribution to the manuscript.	DocuSigned by: Pann Saaristo 4/14/2025
Karen E. Watkins, Professor, University of Georgia https://orcid.org/0000-0001-6247-7240	Conceptualization, Formal Analysis, Investigation, Methodology, Project Administration, Resources, Supervision, Validation, Visualization, Writing – Original Draft, Writing – Review & Editing	I agree with this assessment of my contribution to the manuscript.	Signed by: Karen Watkins 4/7/2025

IReda Sadki developed and implemented the digital peer learning program framework examined in this study

Appendix B: IRB Approval

UNIVERSITY OF GEORGIA

Tucker Hall, Room 212
310 E. Campus Rd.
Athens, Georgia 30602
TEL 706-542-3199 | FAX 706-542-5638
IRB@uga.edu
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Human Research Protection Program

NOT HUMAN RESEARCH DETERMINATION

July 12, 2024

Dear Karen Watkins:

On 7/12/2024, the Human Subjects Office reviewed the following submission:

Title of Study:	ENSTORYING GLOBAL HEALTH LANDSCAPES OF LEARNING
Investigator:	Karen Watkins
Co-Investigator:	Kari Eller
IRB ID:	PROJECT00009825
Funding:	Geneva Foundation
FP ID:	FP00016477

We have determined that the proposed activity is not research involving human subjects as defined by DHHS and FDA regulations. The activity is designed to evaluate the influence of The Geneva Learning Foundation's digital peer-learning model.

University of Georgia (UGA) IRB review and approval is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities are research involving human subjects, please submit a new request to the IRB for a determination.

Sincerely,

Jessica Lasebikan, HRPP Assistant Director
Human Subjects Office, University of Georgia

Appendix C: TLGF CRE Approval

June 18, 2024

University of Georgia
Office of Research
150 Paul D. Coverdell Center
500 D.W. Brooks Drive
Athens, Georgia 30602

Dear UGA Institutional Review Board,

This letter is in support of the research project under review, "Enstorying global health landscapes of learning," with Principal Investigator, Dr. Karen Watkins, and Co-Investigator, Kari Eller. The current research will explore the influence of The Geneva Learning Foundation's (TGLF) digital-peer learning model across different health domains (e.g., immunization, Female Genital Schistosomiasis, climate change) and TGLF-facilitated events (e.g., Teach to Reach, Impact Accelerator).

TGLF's Commission on Research Ethics, provides oversight of all proposed research, data collection, management, and protection according to the principles of the Cantonal Commission for Research Ethics (CCER), the Federal Law on Research on Human Beings (RS 810.30), Swiss Human Research Act (HRA) and the Ordinance on Organisational Aspects of the Human Research Act (HRA Organisation Ordinance, OrgO-HRA). Following best practice guidelines for open-research, TGLF makes some data sets and other publications (i.e., reports, case studies) available to the general public via its Zenodo community pages for publications and open data (https://zenodo.org/communities/tglf-data/).

The PI and Co-Investigator are trained on TGLF data confidentiality procedures, and specific data sets and/or publications not yet available on TGLF's Zenodo community page will be granted to the investigators upon request. All data to be used by the PI and Co-Investigator were collected by TGLF and with CRE oversight. Any questions or concerns on TGLF's support of the proposed research may be directed to Reda Sadki (reda@learning.foundation) or +41225754110.

Sincerely,
S.Mendis
Dr. Shanthi Mendis
Chair, TGLF Commission on Research Ethics
The Geneva Learning Foundation
18 Avenue Louis Casaï
Geneva, Switzerland

Appendix D: Additional Training Information
2024Psychological First Aid Virtual Peer Learning Program

Prepare, Look, Listen, Link

Prepare involves gathering information, resources, and materials to share and emotionally readying oneself. It requires providers to know [1] the limits of their expertise and competence, [2] their colleagues and their roles, [3] who to call for immediate help, and [4] referral and reporting procedures.

Look considers how providers can assess for signs of distress, safety concerns, and children's comfort. In all PFA stages, providers consider how situations affect them and their work.

Listen entails providers reflect on authentic engage with children and those accompanying them to create a sense of trust and promote safety, calmness, connectedness, self-efficacy, and hope. In this part, providers use various techniques and tools to discover needs and concerns expressed verbally and non-verbally.

Link refers to resources and gathered information. It reinforces existing strength-based assets, protection from further harm, and connection to additional age-appropriate information, culturally-appropriate services, and needed material resources (TGLF, 2024).

PFA Connections and Recordings

PFA Program Webpage
https://www.learning.foundation/ukraine

PFA Telegram Group
https://t.me/+-Rf4Giq7c0dmMTdk

PFA Session Recordings-English
https://youtube.com/playlist?list=PLti7k0eaN3gShz-LjPN2u7B6qJhHhAJ4p&feature=shared

PFA Session Recordings-Ukrainian
https://youtube.com/playlist?list=PLti7k0eaN3gTdeiSlc3gyyq4MkvRIeLF-&feature=shared

PFA E-learning Course
https://articulateusercontent.com/review/uploads/7fNSItoqXt4WDcjprF_aWBUwK91fPU2f/GxQQ1r04/index.html#/

C3L Lift (online platform for peer review)
TGLF PFA-PL100
https://apps.lift.c3l.ai/

Program Selection Criteria

“You do not need to be a specialist to be selected. We encourage applications from anyone with genuine experience supporting the psychosocial needs of children affected by the Ukraine crisis, regardless of formal qualifications. Your stories, challenges, and commitment to learning are what matter most.

We aim to assemble a diverse, dynamic cohort of participants who can learn from each other's range of experiences and perspectives. The main criteria for selection are:

- Direct experience supporting children affected by the Ukraine humanitarian crisis. This could be in roles such as teachers, social workers, health professionals, or humanitarian staff and volunteers. We value the insights gained from your real-world practice.
- Commitment to actively engaging in peer learning activities, both to seek help for your own challenges and to support fellow participants.
- Successful applicants will demonstrate openness to learning from others and willingness to share their own knowledge.

In addition, we will strive for balanced representation across factors such as:

- Geographic location (both within Ukraine and in other countries)
- Professional role and area of work
- Level of experience with Psychological First Aid and psychosocial support
- Language (to enable meaningful peer exchange)
- Gender

The goal is to create a supportive community where participants with diverse backgrounds can learn together. All applications will be carefully considered, with the aim of selecting a cohort that can generate rich cross-pollination of ideas.”

Reference

The Geneva Learning Foundation/TGLF. (2025). #PeerLearning for education, social work, and health professionals. *Psychological first aid in support of children*. https://www.learning.foundation/ukraine

Example of Program Overview

The Geneva Learning Foundation | Certificate peer learning programme on Psychological First Aid (PFA) in support of children affected by the humanitarian crisis in Ukraine

PFA inaugural exercise schedule (1-16 July 2024)

Day	Learning activity	Date and start time	Est. duration	Certification requirement
Day 1	Official launch event of the exercise	Monday 1 July 2024 13h00 CEST	1 hour	Recommended
Day 1	Start developing your project	Monday 1 July 2024	1-2 hours	**Mandatory**
Day 2	**General Assembly: Discovery**	Tuesday 2 July 2024 16h30 – 19h30 CEST	3 hours	**Mandatory**
Day 2	Discovery session feedback	**Deadline**: 2 July 2024 23h59 (11:59 PM) CEST	15 minutes	**REQUIRED** even if you were unable to attend
Day 3	**General Assembly: Exploration**	Wednesday 3 July 2024 16h30 – 19h30 CEST	3 hours	**Mandatory**
Day 3	Exploration session feedback	**Deadline**: 3 July 2024 23h59 (11:59 PM) CEST	15 minutes	**REQUIRED** even if you were unable to attend
Day 4	Remote coffee launch Receive the invitation to meet two fellow participants for an informal exchange	Thursday 4 July 2024	30 minutes	Recommended
Day 4	Peer support session Join 30 minutes early for technical support. Stay an additional 30 minutes for more dialogue and guidance.	Thursday 4 July 2024 17h00 CEST	30 minutes	Attend if you need support OR want to support your colleagues
Day 5	Peer support session Join 30 minutes early for technical support. Stay an additional 30 minutes for more dialogue and guidance.	Friday 5 July 2024 17h00 CEST	30 minutes	Attend if you need support OR want to support your colleagues
Day 5	Submit your project	**Deadline**: 5 July 2024 23h59 (11:59 PM) CEST	15 minutes	**REQUIRED** to complete the exercise and earn certification.
Day 8	Peer support session Join 30 minutes early for technical support. Stay an additional 30 minutes for more dialogue and guidance.	Monday 8 July 2024 17h00 CEST	30 minutes	Attend if you need support OR want to support your colleagues

The Geneva Learning Foundation | Certificate peer learning programme on Psychological First Aid (PFA) in support of children affected by the humanitarian crisis in Ukraine

Day 8	Share your feedback about the Remote coffee	**Deadline**: 8 July 2024 23h59 (11:59 PM) CEST	5 minutes	Recommended but not mandatory
Day 9	**General Assembly: Share what you are learning from peer review**	Tuesday 9 July 2024 10h00 CEST	1 hour	**Mandatory**. Share what you are learning from peer review
Day 10	Peer support session Join 30 minutes early for technical support. Stay an additional 30 minutes for more dialogue and guidance.	Wednesday 10 July 2024 10h00 CEST	30 minutes	Attend if you need support OR want to support your colleagues
Day 10	Submit three peer reviews	**Deadline**: 10 July 2024 23h59 (11:59 PM) CEST	15 minutes	**REQUIRED** to complete the exercise and earn certification
Day 11	Start revising your project	Thursday 11 July 2024	1-2 hours	**REQUIRED** to complete the exercise and earn certification
Day 11	Peer support session Join 30 minutes early for technical support. Stay an additional 30 minutes for more dialogue and guidance.	Thursday 11 July 2024 10h00 CEST	30 minutes	Attend if you need support OR want to support your colleagues
Day 12	Peer support session Join 30 minutes early for technical support. Stay an additional 30 minutes for more dialogue and guidance.	Friday 12 July 2024 10h00 CEST	30 minutes	Attend if you need support OR want to support your colleagues
Day 15	Submit revised, improved project	**Deadline**: 15 July 2024 23h59 (11:59 PM) CEST	15 minutes	**REQUIRED** to complete the exercise and earn certification
Day 16	Self-care session	Tuesday 16 July 2024 10h30 CEST	1 hour	Attend if you need support OR want to support your colleagues
Day 16	**General Assembly:** **Final project presentations**	Tuesday 16 July 2024 12h00 CEST	1 hour	**REQUIRED** to complete the exercise and earn certification
Day 22	Complete the feedback and evaluation	Friday 2 August 2024	15 minutes	**REQUIRED** to receive certification

Example of Program Detailed Schedule

The Geneva Learning Foundation I Version 2.0 I 2 July 2024

Certificate peer learning programme on Psychological First Aid (PFA) in support of children affected by the humanitarian crisis in Ukraine

Peer learning exercise detailed schedule

Zoom link to join all sessions: https://us02web.zoom.us/j/81482431870

Please block incoming calls during the live sessions.
Otherwise, you will disconnect from Zoom and may not be able to rejoin.

Day 1: Official launch event

When	What	How long	Where
1 July 2024 13.00 CEST	**Official public launch of the exercise** TGLF & IFRC	1 hour	Separate Zoom registration required, as this is a public event.

Day 2: Discovery

2 July 2024 CEST

Day	Session	Date and start time	Est. duration	Attendance
Day 2	General Assembly: Discovery	Tuesday 2 July 2024 16h30 – 19h30 CEST	3 hours	Mandatory

When	What	How long	Where
16h30 – 17h00	**Discuss your case study.** **Tutorial:** everything you need to know about today's session and your case study project	30 minutes	Plenary & Breakout rooms
17h – 17h05	**Opening ceremony: introduction to Discovery Day**	5 minutes	Plenary
17h05 – 17h10	**Session overview** A brief overview of who we are as a group and what we will do together in this peer learning exercise	5 minutes	Plenary
17h10 – 17h15	**Who we are as a group**	5 minutes	Plenary
17h15 – 17h30	**Invitation to share a specific situation in which you had to support to a child or group of children at a time of crisis.** How to use the Rapporteur notes	15 minutes	Plenary
17h30 – 17h35	**Breakout groups 1** Introduce yourself, choose a note-taker and a facilitator	5 minutes	Breakout rooms
17h35 – 17h45	**Breakout groups 2** Select one person's experience (a specific situation or case of a child or children they supported) Summarize in the Rapporteur notes what happened Summarize the group's feedback on the situation	10 minutes	Breakout rooms
17h45 – 17h50	**Q&A on PFA with Guides**	5 minutes	Plenary
17h50 – 18h00	**Breakout groups 3** Respond to the remaining questions in the Rapporteur notes	10 minutes	Breakout rooms
18h00 – 18h10	**Breakout groups present their notes** Guides and peers give feedback	10 minutes	Plenary
18h10 – 18h20	**Breakout groups 4** Work on a new case **OR** review and finalize Rapporteur notes	10 minutes	Breakout rooms
18h20 – 18h30	**Plenary session** Guides: Q&A on LOOK	10 minutes	Plenary
18h30 – 18h45	**Breakout groups 5** Work on a new case **OR** review and finalize Rapporteur notes	10 minutes	Breakout rooms
18h45 – 18h55	**Presentation & feedback from Guides**	10 minutes	Plenary
18h55 – 19h00	**Closing reflections & next steps** Overview of case study project and timeline **Mandatory: Post-session feedback**	5 minutes	Plenary
19h – 19h30	**Detailed presentation of the rubric** **Launch of Remote coffee** Meet the participants	30 minutes	Plenary

This session's schedule may be adjusted in response to learner needs.

Day 3: Exploration

3 July 2024 CEST

Day	Session	Date and start time	Est. duration	Attendance
Day 3	General Assembly: Exploration	Wednesday 3 July 2024 16h30 – 19h30	3 hours	Mandatory

When	What	How long	Where
16h30 – 17h	Meet the participants. 1-2-1 discuss your case study **Tutorial**: everything you need to know about the rubric and how to develop your case study **Tutorial**: How to submit your case study **Tutorial**: How to get the most out of the peer support sessions **Tutorial**: How to get the most out of your Remote coffee	30 minutes	Breakout rooms
17h – 17h05	**Introduction to Exploration Day**	5 minutes	Plenary
17h05 – 17h10	**Feedback on Discovery Day** Your feedback on the first day of group work Feedback from Guides to the breakout groups	15 minutes	Plenary
17h10 – 17h15	**Feedback on feedback** Course team and Guides respond to participant feedback	5 minutes	Plenary
17h15 – 17h30	**Invitation to share a specific situation in which you used PFA to support a child** How to use the Rapporteur notes	15 minutes	Plenary
17h30 – 17h35	**Breakout groups** Introduce yourself, choose a note-taker and a facilitator	5 minutes	Breakout rooms
17h35 – 17h45	**Breakout groups** Select one person's PFA experience (a specific situation or case of a child or children they supported using PFA) Summarize in the Rapporteur notes what happened **IMPORTANT**: Focus on the PFA section in the Rapporteur notes Summarize the group's feedback on the situation	10 minutes	Breakout rooms
17h45 – 17h50	**Q&A on PFA with Guides**	5 minutes	Plenary
17h50 – 18h20	**Breakout groups** Revise and improve the PFA section in the Rapporteur notes. If you can, complete the remaining questions in the Rapporteur notes	30 minutes	Breakout rooms
18h20– 18h45	**Breakout groups present their work** Guides and peers give feedback	25 minutes	Plenary
18h45 – 18h55	**Feedback** from Guides	10 minutes	Plenary
18h55 – 19h00	**Closing reflections & next steps** **Mandatory: Post-session feedback**	5 minutes	Plenary
19h – 19h30	**Announcement of Peer support sessions** Ask your questions about your case study project Feedback on Remote coffee activity Meet the participants	30 minutes	Plenary

This session's schedule may be adjusted in response to learner needs.

Day 9: Share experience

9 July 2024 CEST

Day	Session	Date and start time	Est. duration	Attendance
Day 9	General Assembly: Share Experience	Tuesday 9 July 2024 10.00 CEST	1 hour	Mandatory

Days 4, 5, 8, 11, and 12: Peer support sessions

Attend if you need support **OR** want to support your colleagues.

Each peer support session will:

1. Help participants with technical difficulties.
2. Help participants finish their work before their next deadline.
3. Ask questions and get support from PFA Guides who have expertise on specific themes.
4. Learn more and practice skills for one or more of these themes: psychoeducation, techniques for supporting children (ex: grounding and breathing, triangulation), and age-specific needs.

Join 30 minutes before the session if you have technical difficulties. We will also use the time before the session to meet informally.

Participants may decide to extend each session by an additional 30 minutes (1) to spend more time discussing a specific case and/or (2) to provide opportunities for role-playing and other practice.

The recording will be uploaded after each session.

	When	What	How long	Where
Day 4 Thursday 4 July 2024	17h – 17h30	**Peer support session** **Psychoeducation – how it is done** During this session, most learners will be focused on how to write up their projects. Katarzyna Topolska (HIAS Poland), our guide for psychoeducation, will participate to listen, learn, and provide guidance. Focus: Psychoeducation (role play) Guides: Yuliia & Katarzyna Topolska (HIAS Poland)	30 minutes	Plenary/Group work
Day 5 Friday 5 July 2024	17h – 17h30	**Peer support session** **Special techniques to use with children (breathing, grounding, triangulation, etc)**	30 minutes	Plenary/Group work
Day 8 Monday 8 July 2024	17h – 17h30	**Peer support session** **Age-specific needs: supporting children of different ages**	30 minutes	Plenary/Group work
Day 10 Wednesday 10 July 2024	10h – 10h30	**Peer support session**	30 minutes	Plenary
Day 11 Thursday 11 July 2024	10h – 10h30	**Peer support session**	30 minutes	Plenary
Day 12 Friday 12 July 2024	10h – 10h30	**Peer support session**	30 minutes	Plenary

Day 16: Self- and team-care

16 July 2024 CEST

Day	Session	Date and start time	Est. duration	Attendance
Day 16	Self- and team-care session	Tuesday 16 July 2024 10:30	1 hour	Optional

When	What	How long	Where
10h30 – 10h45	**Introduction and identifying main risks for helpers' wellbeing**	15 minutes	Plenary
10h45 – 11h15	**Group work** Discussion on the most effective strategies to care for yourself and for your peers. Experience exchange.	30 minutes	Breakout rooms
11h15 – 11h30	**Wrap up and closing the session**	15 minutes	Plenary

Day 16: General Assembly

16 July 2024 CEST

Day	Session	Date and start time	Est. duration	Attendance
Day 16	General Assembly: Final project presentations	Tuesday 16 July 2024 12:00	1 hour	Mandatory

When	What	How long	Where
12h00 – 12h45	**Overview of what participants have achieved in a week** Quick overview on action plan development and peer review	45 minutes	Plenary
12h45 – 13h00	**Next steps for the programme & Closing**	15 minutes	Plenary

Case Study Template and Feedback Rubric-English

Your case study title <- **change this!**

1. Write out your story.

You will need to focus most of your time on analysis and reflection. Only spend as much as needed so that others can understand your story.

- **Describe the situation**: Describe relevant details about the child and the situation while maintaining confidentiality.
- **What happened?** Walk through what happened, focusing on your interaction with the child and your own role and reactions. Focus on the specific actions you took to help the child and explain why you chose to do things that way.

2. Analyze and reflect on your story.

- Analyze the situation, initial response, what happened, tools and techniques, and connecting the child to additional services and support.
- Reflect on your own background and relationship to the child's community and environment.

3. Apply Psychological First Aid (PFA) principles.

Analyze your case study through the lens of Psychological First Aid (PFA).

Reflect on how PFA principles, tools, and techniques were or could have been applied in the situation you described.

- If you did not explicitly use PFA, think about how it might have enhanced your ability to support the child.
- If you did use PFA, consider what worked well and what could be improved for future situations.

Remember: If you are not yet familiar with Psychological First Aid (PFA), you need to complete the 20-minute e-learning module before you start writing your case study.

You will not be penalized if you have no prior PFA training or experience. The goal is to demonstrate your understanding of PFA concepts and your ability to apply them to your case study.

4. Analyze the effect of the support you provided.

Explain how you know if your response helped the child/children you described to cope better and improve their well-being.

5. Develop an idea for a project to strengthen support.

Based on your case study's lessons learned and the needs of children in your community, describe an idea for a local project or initiative to better support their mental health and psychosocial well-being.

Guidance for peer reviewers

1. Your story

0	No story.
1	**Very basic description**: The case study provides limited information about the child's background, feelings, or the things the author did to help. Important details about the situation and the author's role are missing, making it difficult to understand what happened.
2	**Some description**: The case study includes some details about the child's background, where the interaction took place, and the main things that happened. However, the description does not go into depth, and many questions are left unanswered. The author's role and reactions are not fully explained, and it is not clear how their actions related to the child's needs.
3	**Good description**: The case study gives a complete picture of the child's background, emotions, and specific needs, while protecting their privacy. The situation and setting are well-described, and the author's role and reactions are thoroughly explained. The specific actions taken to help the child are described, along with the reasons behind them. The child's response and any changes in their behavior are noted.
4	**Excellent description**: The case study creates a detailed, well-rounded picture of the child, the situation, and the interaction, while carefully protecting the child's privacy. The author shows a deep understanding of the child's unique background, stressors, and needs, and how these things influenced their approach. The specific actions taken to help the child are explained in detail, with clear reasons that consider the child's individual qualities and the cultural, religious, or social factors involved. The author's own role, reactions, and thought process are described in depth, providing valuable insights into the complexities of giving support to children in crisis situations.

2. Analyze and reflect on what you described

0	**No analysis or reflection.**
1	**Minimal analysis and reflection**: The case study provides a very basic analysis of the situation and the author's response. There is little consideration of the child's individual characteristics, cultural factors, or the author's background. Reflection on the author's thoughts, feelings, and lessons learned is superficial or missing.
2	**Some analysis and reflection**: The case study includes some analysis of the situation, the author's response, and their background. The author considers some of the child's individual characteristics and cultural factors, but the analysis lacks depth. There is some reflection on the author's thoughts, feelings, and lessons learned, but it is not well-developed.
3	**Good analysis and reflection**: The case study provides a thorough analysis of the situation, the author's response, and their background. The author considers the child's individual characteristics, cultural factors, and how their own background influenced their response. There is thoughtful reflection on the author's thoughts, feelings, and lessons learned, with some insights into how to improve future practice.
4	**Excellent analysis and reflection**: The case study provides a deep and comprehensive analysis of the situation, the author's response, and their background. The author carefully considers the child's individual characteristics, cultural factors, and how their own background, assumptions, and emotions influenced their response. There is insightful reflection on the author's thoughts, feelings, and lessons learned, with clear insights into how to improve future practice and navigate challenges. The author also considers the bigger picture, such as societal and systemic factors that affected the child's distress and the author's ability to provide support.

3. Apply Psychological First Aid (PFA) principles

0	**No analysis of case using PFA principles.** (Do not penalize a learner for lack of PFA experience.)
1	**Minimal understanding of PFA principles.** Attempts to analyze how they apply to the case study but lacks depth and specific examples.
2	**Basic understanding of PFA principles.** Provides some analysis of how they were or could have been used in the case study, with a few specific examples.
3	**Good understanding of PFA principles.** Offers a thoughtful analysis of how they were or could have been applied in the case study, using several specific examples.
4	**Excellent understanding of PFA principles.** Presents a detailed and insightful analysis of how they were or could have been applied in the case study, using multiple specific examples. Shows an ability to adapt PFA to different situations and individual needs, and provides a clear rationale for how PFA could have enhanced the support provided to the child.

4. Analyze the effect of the support you provided

0	No explanation.
1	**Minimal explanation**: The case study provides a very basic explanation of how the author knows if their response helped the child. The author does not distinguish between support provided at the time of the situation and support provided before or after. Signs of improvement in the child are vague or not mentioned.
2	**Some explanation**: The case study includes some explanation of how the author knows if their response helped the child. The author makes some distinction between support provided at the time of the situation and support provided before or after. Some signs of improvement in the child are mentioned, but they lack specificity. The rationale for attributing positive changes to the author's support is not well-developed.
3	**Good explanation**: The case study provides a clear explanation of how the author knows if their response helped the child. The author clearly distinguishes between support provided at the time of the situation and support provided before or after. Specific signs of improvement in the child are described, such as changes in their emotional state, social interactions, physical health, or performance at school or home. The author provides a reasonable rationale for attributing positive changes to their support. If feedback or assessments were used, the author describes how they were helpful in understanding changes in the child's wellbeing.
4	**Excellent explanation**: The case study provides a detailed and thorough explanation of how the author knows if their response helped the child. The author clearly distinguishes between support provided at the time of the situation, support provided before or after, and support provided by others. Multiple specific signs of improvement in the child are described, covering different aspects of their wellbeing. The author provides a strong, well-reasoned rationale for attributing positive changes to their support, considering other factors that may have contributed. If feedback or assessments were used, the author describes in detail how they were helpful in understanding changes in the child's wellbeing and how they could be used to track progress in future projects.

5. Project ideation

0	No project idea.
1	**Undeveloped project idea**: The case study includes a vague project idea that lacks details and connection to the lessons learned. The idea does not consider the potential role of PFA, goals, target group, resources needed, challenges, or cultural relevance.
2	**Basic project idea**: The case study includes a basic project idea that is somewhat related to the lessons learned. The idea briefly mentions the potential role of PFA but does not fully explain how it fits into the project. The idea addresses some of the questions about goals, target group, resources, and challenges, but lacks depth and feasibility. The connection between the project idea and the community's needs is not well-established.
3	**Well-developed project idea**: The case study includes a well-developed project idea that is clearly based on the lessons learned and the needs of children in the community. The idea explains how PFA could be helpful in strengthening support and how it fits into the project. The idea addresses most of the questions about goals, target group, activities, resources, and challenges. The project idea is feasible and culturally relevant, with a clear explanation of how it could strengthen support for children.
4	**Comprehensive and innovative project idea**: The case study includes a comprehensive and innovative project idea that is strongly grounded in the lessons learned and demonstrates a deep understanding of the community's needs and resources. The idea thoroughly addresses all of the questions, including specific actions to equip others to better support children, a clear explanation of how PFA fits into the project, well-defined goals and activities, a specific target group, necessary resources, potential challenges and solutions, expected impact on children, and cultural relevance. The project idea has a high potential for realistic implementation and meaningful impact based on the case study insights.

Appendix E: The PFA Transparency Matrix

*Note: This version of the Transparency Matrix (Khan, 2022) was modified to fit the context of our collective work on PFA. Reflections on the matrix dimensions were enhanced by answering questions posed by Morton et al. (2022).

GROUP REFLECTION			
Dimension		**Identity Vector**	**Reflection**
Pose Epistemic positionality employed for rationale and causal relationships	X X X X X	Privileged (elite) foreign academic institution Global public health agency (WHO, UN etc) Privileged (elite) institution from the same country Local institution or research entity Local/Indigenous knowledge	The Geneva Learning Foundation (TGLF), an international non-profit, supports and connects local to internationally positioned health workers, educators, social workers, and other professionals using digital networks and peer learning.
Position Position within the power structure of the research	X X	Funding agency/NGO Privileged foreign academic institution Global public health agency Privileged (elite) institution from the same country Local institution or research entity Indigenous population representative	As co-authors, we occupy positions ranging from graduate assistants and professors to founding members and board members.
Voice Primacy in the design of the research	X X X X X X X	Funders/donors Foreign academics Global policy-makers Academics from privileged local institution(s) Local policy-makers Local academics Community participants	Primacy in the research design was based on feedback provided by PFA participants and the project plans they developed. Participants were interdisciplinary and interprofessional, representing all levels indicated. Their contributions were recognized in the acknowledgment section of the manuscript.
Gaze Communication primarily addressed to	X X X	International academics Global policy makers Local policy-makers	The research is primarily addressed to PFA health stakeholders, such as those indicated as well as practitioners and

GROUP REFLECTION			
Dimension		**Identity Vector**	**Reflection**
	X	Local academics	funders supporting (Ukrainian) children in humanitarian contexts.
	X	Community	
Lens Primary analytical lens used to draw conclusions		Statistics	This mixed methods research incorporates descriptive and inferential statistics and qualitative analysis of participants' organizational learning cultures, case studies, and insights into the peer learning process. Results are presented jointly using verbatim quotes representing how participants made sense of their contexts and experiences.
		Qualitative/ethnographic	
	X	Mixed methods	
	X	Local/Indigenous ways of sensemaking	
		All of the above (almost) equally	
Taste **(Reality check)** User-centredness of research findings/ User-experience resulting from the project/policy implementation		User input not required or sought for this research/user-experience not an important consideration of policy/project	PFA program participants shared their experiences and collaborated to refine their project ideas. Throughout the training, they pledged to support each other and the global community. This research was initiated from participants' work and aims to provide them with needed insights for the purpose of PFA training advancement and advocacy.
		Minimal consideration of end-user priorities/unpleasant user-experience resulting from policy/project implementation	
		Moderate consideration of end-user priorities/neutral user-experience	
		Significant end-user involvement in different phase of research/good user--experience resulting from policy/project implementation	
	X	End-user initiated research/excellent user-experience resulting from policy/project implementation	
Slice Intersectional identities relevant to research	X		see "individual reflection"

INDIVIDUAL REFLECTION												
Dimension	**Identity Vector**		**KE**	**KEW**	**MD**	**VM**	**RS**	**IJ**	**SJV**	**YY**	**CNM**	**IS**	**PS**
Slice Intersectional identities relevant to research	Gender	Man					X	X				X	X
		Woman	X	X	X	X			X	X	X		
		Non-binary / Gender-fluid											
		Other/Prefer to not answer											
	Virtual training	No experience											
		Some experience			X	X		X	X			X	X
		Significant experience	X	X			X			X	X		
		Other/Prefer to not answer											
	Ukrainian proficiency	Non-speaker	X	X	X	X	X	X	X		X	X	X
		Beginner to intermediate											
		Advanced to fluent								X			
		Other/Prefer to not answer											
	War zone / Humanitarian crisis experience	No experience	X	X	X	X		X					
		Some experience					X				X	X	
		Significant experience							X	X			X
		Other/Prefer to not answer											
	Experience being a mental health or other healthcare provider	No experience	X	X	X	X	X	X				X	
		Some experience							X	X	X		
		Significant experience											X
		Other/Prefer to not answer											
	Experience being a social worker	No experience		X	X	X	X	X	X		X		
		Some experience								X		X	X
		Significant experience	X										

INDIVIDUAL REFLECTION												
Dimension	**Identity Vector**		**KE**	**KEW**	**MD**	**VM**	**RS**	**IJ**	**SJV**	**YY**	**CNM**	**IS**	**PS**
		Other/Prefer to not answer											
	Experience being a child educator	No experience			X	X	X	X		X			
		Some experience		X							X	X	X
		Significant experience	X						X				
		Other/Prefer to not answer											
	Experience providing Psychological First Aid	No experience		X	X	X	X	X				X	
		Some experience	X						X		X		X
		Significant experience								X			
		Other/Prefer to not answer											

Appendix F: Additional Table

Table 1. Descriptive Statistics

	n	Mean/Percentage
Learning Culture Composite Score	757	4.71
Peer Review (Yes%)	845	31.95%
Program Completed (Yes %)	714	35.43%
Gender (Female %)	1036	92.47%
Role (Mental Health Professionals %)	1037	51.21%
Country (Ukraine %)	1037	68.37%

Appendix G: Partner Media Connections

IFRC	Partner Media Connections	The Geneva Learning Foundation
https://www.ifrc.org/		https://www.learning.foundation/
https://x.com/ifrc		https://x.com/DigitalScholarX
https://www.instagram.com/ifrc/		https://www.instagram.com/thegenevalearningfoundation/
https://www.linkedin.com/company/ifrc/		https://www.linkedin.com/company/geneva-learning-foundation/mycompany/
https://www.facebook.com/IFRC/		https://www.facebook.com/DigitalScholar
https://www.tiktok.com/@ifrc		https://t.me/GenevaLearning
https://www.ifrc.org/podcasts/all		https://www.learning.foundation/podcast
https://www.youtube.com/user/ifrc		https://www.youtube.com/@TheGenevaLearningFoundation
https://mhpsshub.org/		https://zenodo.org/communities/tglf/records?q=&l=list&p=1&s=10&sort=newest

CHAPTER 6: CONCLUSION

This dissertation utilized a four-article approach to advance scholarship and praxis of informal and incidental virtual learning (IIVL). The first article achieved this purpose by providing essential information on the network design and functioning of virtual communities of practice (VCoPs), one variation of IIVL, in the field of global health. This foundation provided information on how IIVL may evolve to meet development needs amid complexity (Eller, 2024b). The second article contributed toward the purpose by documenting and analyzing elements of The Geneva Learning Foundation´s (TGLF's) peer learning-to-action approach used in a global health virtual training program for a neglected tropical disease. The model's connections on neural, conceptual, and social/external levels demonstrated the impact of IIVL on continuing healthcare worker professional development and healthcare outreach and outcomes (Eller, 2025a). The third article met this purpose by exploring the unique intersection of global health VCoPs and digital learning networks (DLNs). Details discussed revealed how IIVL combinations are generating new solutions to critical global concerns across societal sectors that warrant further investigation (Eller, 2024a). The fourth article fulfilled this purpose by explaining and comparing how TGLF's model fills network needs and enhances network capacity to provide mental health and psychosocial support. This article provides a macro-level view of how IIVL can support and enhance the global health learning culture.

Summary and Discussion of Findings

In the first article, conceptual review and thematic analysis of the literature revealed two themes, 'structured flexibility' and a 'hierarchy of learning' (Eller, 2024b). Structured flexibility reflected the diversity of VCoP designs and redevelopment activities. All VCoPs reviewed were

found to have more evolved (a)synchronous practices (e.g., special or ad hoc sessions, discussion boards) and recommended further adaptations to address member and organizational needs. ‘A hierarchy of learning’ referred to learners’ possibilities to interact before, during, and after synchronous sessions based on VCoP design. These opportunities influenced the directional exchange of knowledge and leadership of sessions. This finding echoes the need expressed by Bøje and Ludvigsen (2020) for continuous feedback and self-paced learning. It also strengthens Wee and colleagues (2023) claim about the bidirectional nature of peer learning among fixed teams, or in this case program participants. Yet, the large numbers of participants in some studies reviewed in the first article also contribute to their recommendation for member rotation to increase exposure to variants, build learners’ capacity to address a wider range of situations, and keep motivation to engage high.

The second article applied knowledge gained from the first article to document and analyze TGLF’s peer learning-to-action model during the 2023 virtual training for healthcare professionals combatting a neglected tropical disease (Eller et al., 2025a). Neural connections increased FGS technical knowledge and skills. Conceptual connections strengthened local problem-solving, and diverse social/external connections positively influenced personal growth and high-level professional impacts. Much like the three studies reflecting the learning needs of patients, their carers, and healthcare workers (Lynch et al., 2023; Muijsenberg et al., 2023; Siriviriyanun & Chaiyasat, 2022), multimodal and tailored approaches throughout service provision was found to build up connections for both technical and adaptive learning. An important takeaway from these studies that also speaks to this article’s findings is that no one connection can serve all purposes, and multiple connections can reiterate and recycle learning at different levels. Therefore, as we face emotional rollercoasters of difficult circumstances and

barriers to the provision of care, having multiple IIVL types can more comprehensively address our needs and consistently deliver more distributed learning. With many participants in a massive online open course who lacked energy to continue leading change due to circumstances that left them feeling burned out, having the additional option to engage in one type of IIVL, social media, was found to be renewing and led to unanticipated outcomes (Anderson et al., 2020).

The third article further explored the continuum of learning from learning organizations to learning networks and their brackish interstices. Complexly coevolving practice, continually adapts IIVL strategies, provides examples of how programming in the 21st century can be expressive, evolving, expansive, equity-minded, engaging, embodied, embedded, and empowering. On one hand, Muijsenberg et al. (2023) agreed with this insight, sharing a myriad of examples of how technology has bridged distances and served to support community health, especially during situations like the COVID-19 pandemic when it was unsafe to being physically present. However, the authors also argued that technological shortcomings continue to exclude all from participating in such practices and recommended the incorporation of more low-tech solutions and investment in technological infrastructure to better balance community care.

The fourth article found common learning culture patterns and identified variations of incidental to formal virtual learning valued by participants across multiple organizations. TGLF's unique learning culture, maximized, embedded, extended, and evolved IIVL variations for large numbers of diverse participants, creating ample opportunities for the upbuilding of collective intelligence. This act, amplified network capacity to learn and enhanced participants' adaptive skills to scale health outcomes at the network level. On a smaller scale, Floren et al. (2023), also looked at learning culture preferences, finding residents physicians in the

Netherlands preferred using IIVL embedded online learning systems compared to their U.S. counterparts, who made more use of human interactions for learning systems connections. Despite these differences, designing training opportunities that maximize interactions for interprofessional learning and resource orientation was recommended. Although not explicitly stated, new IIVL variations might be this missing link that meets the preferences of both groups, and as Vaid et al. (2023) found, provide opportunities to share and practice decision-making patterns in emerging uncertainty. As discussed by Curran et al. (2024), regardless of challenging experiences, the incorporation of varied IIVL engagement strategies may also increase ownership of education, lead to new learning, and benefit current and future employee training. Over time, Grehan et al. (2023) reported increases in network IIVL interest and confidence with online learning. Hargreaves et al. (2022) agreed and further recommended training for IIVL facilitators to learn how to equitably "operate in higher virtuality" (p. 80). Evolving training to meet these demands often requires restructuring, and as Udedibia (2020) pointed out, short-term leadership learning can aid organizations to meet objectives and influence outcomes.

Limitations and Research Recommendations

One limitation was the availability of additional studies for comparison. For instance, the literature search for article one was extensive, but only 13 studies from 2018-2023 fit the criteria. To strengthen returns and diversity of findings, one recommendation is to continue searching for additional articles in the field of global health over the next few years. Although a few studies reported empirical observations over time (Grehan et al., 2023; Mbunge et al., 2022), another limitation was a general lack of longitudinal data reporting multi-leveled outcomes connected to training that simultaneously employed multiple IIVL strategies (Bøje & Ludvigsen, 2020). Researching how participants use and make different IIVL connections at later intervals is

recommended to extend understanding of how to evolve for post-training support and to explore its long-term impact on the learning culture of involved organizations and networks. Connected to this recommendation, it is also suggested that participants be included more in the research process (Eller et al., 2025a). Doing so, could deepen accountability (Call-Cummings et al., 2023; Mertens, 2007) and shed more light on how local peer-learning practice networks (GPPNs) operate as complex adaptive systems (Dooley, 1997; Dugan, 2017; Holland, 2006; Obolensky, 2014) through the lens of enactivism (Begg, 1999; Carney et al,. 2020; Fenwick, 2000; Scully-Russ, 2018; Varela et al., 1991). A final recommendation for research is to explore IIVL leadership models and their associated outcomes on inclusive learning practices.

Recommendations for Practice

Recommended changes from the reviewed literature in the first article, included shifting to mid- and long-term planning, focusing on inter-organizational partnerships for logistical support, encouraging a collaborative approach, and customizing materials in online repositories. Additional linguistic and emotional support for participants and promoting non-competitive, respectful relationships in and outside of IIVL programming were also suggested to increase engagement and foster more reciprocal partnerships (Eller, 2024b). The second article recommended key stakeholders harness participatory methodologies, fund more adaptive IIVL trainings, and assist practitioners in developing advocacy strategies (Eller et al., 2025a). The third article recommended forging new IIVL pathways to improve information exchange, build capacity through interdisciplinary collaboration, foster global community, and inspire operation in a broader landscape of practice. To continue advancing network capacity and impact, the fourth article suggested adopting IIVL strategies in large-scale training to enhance global health learning culture and improve health outcomes (Eller, 2024a).

Concluding Thoughts

Developing pathways to advance knowledge and practice in our 21st century requires incorporating new, digitally enhanced combinations of informal and incidental learning to scale network solutions and outcomes (Barefield & Nicolaides, 2023; Eller, 2024a; Eller, 2024b; Eller et al., 2025a, Eller et al., 2025b; Siemens, 2012; Watkins & Marsick, 2021; Watkins et al., 2022). To make them sustainable, participatory, peer-driven, and locally relevant approaches should be supported by key stakeholders to ensure IIVL strategies meet the needs of learners, organizations, and our societies at large (Eller et al., 2025a). Virtual communities of practice demonstrate how IIVL can address members' needs. However, how they function and evolve depends on their design (Eller, 2024b), and their design influences the connections that can be made, and the outcomes that may result (Eller et al., 2025a). IIVL that coevolves in complex ways can fill network training gaps, positively enhancing its capacity and the learning culture of organizations (Eller, 2025b). IIVL interstices, particularly, glocal peer-learning practice networks forge powerful learning-to-action pathways that constantly evolve to meet member needs. Rigorous, valid research of these pathways should reflect the complexity of their design and their desire to restore relationships through increasingly participative and mixed methods (Eller, 2024a). The evidence, examples, and recommendations to strengthen IIVL practice all point to the need to adopt and embed it at higher levels. Given the intensity and speed at which our global concerns are changing, I am convinced our future depends on it.

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