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*Published in:*  
Palliative and Supportive Care

*DOI:*  
[10.1017/S1478951524000762](https://doi.org/10.1017/S1478951524000762)

*Publication date:*  
2024

*Licence:*  
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*Document Version*  
Publisher's PDF, also known as Version of record

[Link to publication in Discovery Research Portal](#)

### *Citation for published version (APA):*

Doherty, M., & Abdullah, Q. K. (2024). Using Project ECHO to deliver a tele-mentoring and teaching program on palliative care in South Asia: Interpretive description of participants' experiences with a community of practice for learning. *Palliative and Supportive Care*. Advance online publication. <https://doi.org/10.1017/S1478951524000762>

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Original Article

**Cite this article:** Doherty M, Abdullah QK (2024) Using Project ECHO to deliver a tele-mentoring and teaching program on palliative care in South Asia: Interpretive description of participants' experiences with a community of practice for learning. *Palliative and Supportive Care*, 1–9. <https://doi.org/10.1017/S1478951524000762>

Received: 10 January 2024

Revised: 4 April 2024

Accepted: 18 April 2024


**Keywords:**

Palliative care; distance learning; medical education; Project ECHO; continuing professional development

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# Using Project ECHO to deliver a tele-mentoring and teaching program on palliative care in South Asia: Interpretive description of participants' experiences with a community of practice for learning

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## Abstract

**Objectives.** To explore the learning experiences of participants (learners and teachers), in a yearlong tele-teaching and mentoring program on pediatric palliative care, which was conducted using the Project ECHO (Extension for Community Healthcare Outcomes) model and consisted of 27 teaching and clinical case discussion sessions for palliative medicine residents in India and Bangladesh. The goal of the study is to explore how participation and learning is motivated and sustained for both residents and teachers, including the motivators and challenges to participation and learning in a novel online format.

**Methods.** Qualitative interviews with ECHO participants, including learners and teachers were conducted. Interviews were recorded and transcribed. Thematic analysis of interview data was conducted within an interpretive description approach.

**Results.** Eleven physicians (6 residents, 5 teachers) participated in interviews. Key elements of the ECHO program which participants identified as supporting learning and participation include small group discussions, a flipped classroom, and asynchronous interactions through social media. Individual learner characteristics including effective self-reflection and personal circumstances impact learning. Providing opportunities for a diverse group of learners and teachers, to interact in communities of practice (COP) enhances learning. Three major themes and 6 subthemes describing learning processes were identified. Themes included (1) ECHO program structure, (2) learner characteristics, and (3) COP. Subthemes included flipped classroom, breakout rooms, learning resources, personal circumstances, self-awareness of learning needs, and community interactions.

**Significance of results.** Project ECHO suggests a novel model to train health providers, which is effective in low- and middle-income countries. Online learning programs can lead to learning through community of practice when learners and teachers are able to interact and engage in peer support and reflective practice. Educators should consider incorporating small group discussions, a flipped classroom design, and opportunities for asynchronous interactions to enhance learning for participants in online learning programs.

## Background

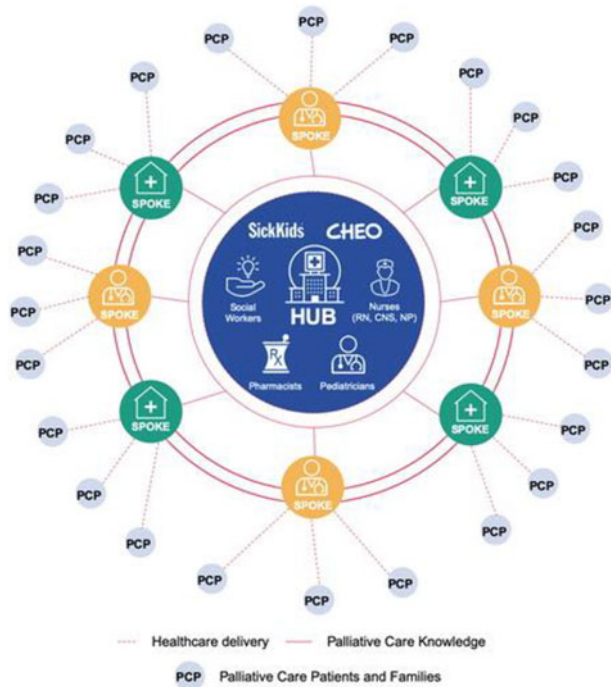
Pediatric palliative care (PPC) focuses on the needs of seriously ill children and their families (World Health Organization 2016). Globally there is a vast need for palliative care (PC), with more than 56 million people needing PC annually and 80% of these individuals residing in low- and middle-income countries (LMIC), such as India (Knaul et al. 2018). Despite the documented need for PC, more than 86% of individuals who need PC cannot access this type of care. In India, the largest and most populous South Asian country, PC is accessible to less than 1% of children who need these services (Mathews and Kumar 2012).

## Palliative care education

Limited PC knowledge and skills among health-care providers (HCP) are significant barriers to increasing access to PC in LMIC (Sasaki et al. 2017). Without adequate PC education, HCP lack knowledge and skills of how to assess and treat pain and other physical symptoms (Sasaki et al. 2017).

There is very little PC training provided during medical and nursing training in India and most other LMIC; thus, most HCP are mostly unaware of the benefits of

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**Figure 1.** Illustrative example of hub-and-spoke design of project ECHO. Lalloo et al. (2020). Reprinted with permission.

PC or how to provide basic PC (Salins 2020). Among postgraduate (PG) medical trainees at a tertiary hospital in southern India, only 44% had received any PC training (Patel et al. 2019). Opportunities for continuing professional development (CPD) in PC are similarly limited (Hannon et al. 2016; Yennurajalingam et al. 2019). Any PC training is typically delivered in urban areas, making it difficult for HCP in rural or remote areas to attend, since widespread staff shortages make it difficult to take time away from clinical duties to attend training (Saini and Bhatnagar 2016). Travel requirements introduce financial burdens, placing additional strain on already limited health budgets in LMIC (Hannon et al. 2016).

### Online learning

Online learning suggests a solution to address the vast shortage in skilled PC providers, facilitating access to PC knowledge and skills for HCP in LMIC (Frehywot et al. 2013; Salins 2020). Project ECHO (Extension for Community Healthcare Outcomes) is a specific model of online learning, which was originally developed to improve the knowledge and skills of community-level HCP (Arora et al. 2017). ECHO uses a “hub-and-spoke” design, where internet-based videoconferencing allows experts at a “hub” facility to connect with learners (“spokes”) for regularly scheduled teaching and mentoring as shown in Fig. 1. The “hub” team generally consists of a group of specialist clinicians located at an academic medical or tertiary care center. Participants at “spoke” sites are generally HCP working outside of a tertiary center, who join an ECHO program to learn and share best practices in providing care to a particular patient population (Usher et al. 2022).

ECHO suggests an innovative solution to address the PC needs in LMIC, by connecting HCP in lesser-resourced settings with PC specialists who need not be in the same region or country (Arora et al. 2017). Furthermore, because ECHO encourages

active learning through discussion and sharing of ideas and experiences, participants are able to test and apply their knowledge, thereby encouraging them to adopt new practices in their daily work (Varon et al. 2021).

CPD ECHO programs on a variety of subjects, including PC, have been reported in the literature; however no undergraduate (UG) or PG ECHO programs have been reported (McBain et al. 2019; Zhou et al. 2016). A small number of PC ECHO programs have reported HCP-level outcomes, including self-reported improvements in knowledge, skills, and attitudes (Doherty et al. 2021b; Lynch-Godrei et al. 2021; Usher et al. 2022). Several programs have reported qualitative outcomes for learners and teachers (Doherty et al. 2021a; Kwok et al. 2022; Manson et al. 2021). Studying health outcomes in PC can be particularly challenging because of the burden of serious illness for PC patients and their relatives, and these outcomes have not been reported for PC ECHO programs (Barclay et al. 2019; Feudtner et al. 2019).

### Communities of practice through ECHO

In communities of practice (COP), learning occurs when individuals with a shared interest meet regularly and learn how to improve care (Wenger 1999). By enabling learners and teachers to interact and share experiences and knowledge, ECHO supports the development of COP (Laloo et al. 2020). Only 1 previous study has explored the learning experiences of HCP in a PC ECHO program in South Asia, where study participants identified that the supportive learning environment and opportunities to exchange ideas with a diverse group of faculty experts and other learners were key benefits of the program (Doherty et al. 2021a).

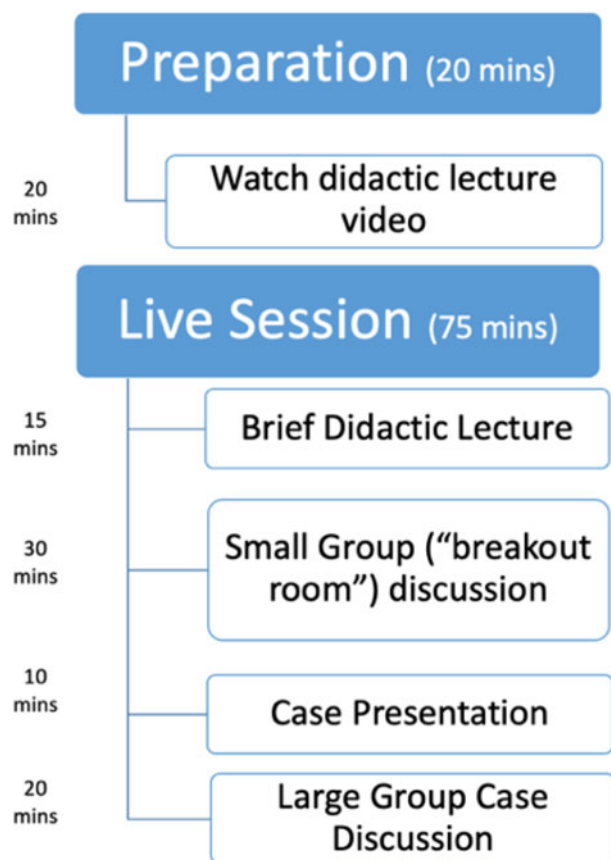
There is a significant need for PC education in LMIC, and ECHO suggests a novel model to address this need. However, there is limited evidence describing how learning occurs and which program and participant features are particularly beneficial for learning and sustained program participation in this setting.

The current study will explore the learning experiences of a PC ECHO program for residents with a flipped classroom design. The aims of this study are to identify the program features which are critical to its success and challenges. The study will explore how participation and learning is motivated and sustained for both residents and teachers.

### Methods

The educational intervention consisted of 27 biweekly online learning sessions (each 75 minutes in duration). The program structure incorporated a flipped classroom design with a didactic lecture video (20 minutes) to be watched prior to each “live” session. Live sessions included of virtual small group discussions (“breakout rooms”) with 6–8 learners and a teacher (Fig. 2). A more detailed description of the learning program design and teaching topics is found in Supplement 1. The curriculum development process included selection of topics, standardization of teaching presentation format, and development of learning objectives. The process included a review of the literature, discussion with experts, and feedback from stakeholders, including both residents in palliative medicine and the program directors for palliative medicine training programs. Expert and stakeholder input was done through 2 online curriculum development sessions and subsequent feedback by email.

To ensure standardization of the small group discussions, facilitators were provided with the discussion questions and model



**Figure 2.** Structure of the ECHO PPC program.

answers ahead of each small group session. All facilitators attended an online training session (duration 1 hour) prior to conducting small group discussions and were provided with a handbook of facilitator guidelines to ensure adherence to key facilitation practices. New facilitators were paired with a facilitator trainer for mentoring during at least 2 small group sessions. The trainer supervised facilitation during at least 2 small group sessions, providing coaching to the new facilitator, and conducted debriefing with them after the sessions. New facilitators were permitted to conduct facilitation independently once they were observed to be competent by a trainer.

Interpretive description (ID) methodology was used, which allowed integration of the study team member's experiences, while permitting identification and analysis of strategies to improve the learning program and to understand factors influencing participation in the program (Hunt 2009; Thorne 2016). Interviews allowed detailed exploration of participants' experiences, probing the factors influencing participants' learning. Further details of the ID steps followed, are detailed in Supplement 3 (Thompson Burdine et al. 2021).

### Study population and setting

The study population consists of ECHO PPC participants during the 2021–2022 program, including teachers and residents. The residents were those in 4 PC PG training programs in India and Bangladesh. The teachers were PC specialist physicians who provided didactic lectures and lead group discussions.

**Table 1.** Subgroups considered in stratified purposeful sampling

Category	Groups
Country	India, Bangladesh
Role	Faculty, learner
Experience in PPC	Limited (<5 years), extensive (>5 years)
Focus of patient population	Pediatric, adult
Residency position (for residents)	Junior resident, senior Resident
Type of health facility	Government, charity/trust/NGO
Role in residency training at your health facility (for faculty)	Program director, teacher
Duration of PC activities at participant's health center	New (<5 years), established (>5 years)
Number of sessions attended	Few (2–5), many (5+)

### Sampling and recruitment

Purposeful sampling was used to explore the breadth and heterogeneity of the population (Maxwell 2012). Participants were selected from particular subgroups to facilitate maximum variation sampling, from the widest range of perspectives (Given 2008). Subgroups considered in sampling are shown in Table 1. Sampling was iterative, incorporating new characteristics as the data collection progressed (Rubin and Rubin 2005). Potential participants were recruited via email and social media.

### Sample size

There were 50 potential participants and 11 were included in the study, balancing the scope of the research and study feasibility. The sample size was not predetermined, and was derived from the iterative process of data collection and analysis (Watling and Lingard 2012). Since this study is exploratory in nature, data saturation was not an endpoint and findings are applicable without saturation (Braun and Clarke 2021).

### Data collection

Key demographic data were obtained verbally during interviews. Semi-structured individual interviews were conducted using open-ended questioning based on an interview guide, probing question allowed the interviewer to explore responses in greater detail (Supplement 2). The interview guide focused on learning processes in online learning, ensuring content and construct validity, and incorporated the researcher's previous experiences interviewing ECHO learners in South Asia (Sireci 1998). The guide was piloted with a resident and teacher, and modifications were made to improve the clarity of the questions and probes. Interviews were audio-recorded and transcribed, and data were collected via interviewer note-taking and audio recordings.

Interviews were conducted via Zoom, the same online platform used for ECHO PPC. Interviews were transcribed automatically in Zoom, and then reviewed to ensure accuracy. One study team member (MD), a Canadian-trained PC physician, closely involved in implementing ECHO PPC, conducted all interviews. As an "insider," the researcher brought a well-developed understanding of ECHO program to the research, which supported the

development of research questions grounded in a rich understanding of the context.

The audio transcripts were de-identified, with each participant identified by a numerical code (1–11) and role (resident (R) or teacher (T)). After de-identification, analysis was conducted using NVivo-12 software (QSR International Inc., Cambridge, MA).

### Data analysis

Data analysis used thematic analysis, following the framework described by Braun and Clarke (2022), with analysis proceeding in an iterative manner from specific codes and categories to more general ideas and themes which emerged from the data.

### Researcher bias and reflexivity

The research design was developed from the literature review with critical review of the design based on the research questions. During data collection and analysis, investigators critically reflected on potential themes and ideas, including their own professional experiences and perspectives were affecting interpretation of results.

## Results

### Demographic data

Eleven ECHO PPC residents and teachers were interviewed. All study participants were physicians with wide range of professional experience (1–17 years). Five teachers and 6 residents participated which includes 3 junior residents (first year of training), and 3 senior residents or fellows (second year of training or higher). Table 2 presents a summary of participants' demographic data.

### Interview findings

Three major themes and 6 subthemes were identified. Major themes included the ECHO program features, individual learner characteristics, and learning through COP. The themes and subthemes are shown in Fig. 3.

### ECHO program features

Participants consistently described the ECHO program components and structure and linked these to their learning processes. The ECHO program components included 3 distinct subthemes: flipped classroom, breakout rooms, and learning resources.

**Flipped classroom.** Participants noted that the flipped classroom approach provided more discussion time, since the length of the didactic lecture was reduced. This structure led to enhanced learning for participants, with 1 teacher noting “because people were asked to go and watch the video ... and we had a small summary of it, so there was quite a lot of time for discussion, ... so that was one thing which I felt was very good in [this] ECHO series” (T2).

**Breakout rooms.** Participants appreciated the use of breakout rooms which provided more opportunities for structured discussion and led to more direct interactions with teachers, who were able to share their knowledge and experience. Teachers also noted that residents were able to participate more actively during breakout rooms and that this enhanced their learning, “being a smaller

**Table 2.** Demographic data of interview participants ( $n = 11$ , unless otherwise specified)

Gender	<i>n</i>	%
Female	9	81.8
Male	2	18.2
<b>Professional role</b>		
Faculty	5	45.5
Junior resident	3	27.3
Senior resident or fellow	3	27.3
<b>Years of professional experience</b>		
<5	6	54.5
5–10	3	27.3
>10	2	18.2
<b>Type of health facility for clinical work</b>		
Government	5	45.5
Trust	5	45.5
Non-governmental organization	1	9.1
<b>Main focus of clinical work</b>		
Adults	8	72.7
Children	3	27.3
<b>Country of residence</b>		
India	9	81.8
Bangladesh	1	9.1
Philippines	1	9.1
<b>Teachers' roles in residency training (<math>n = 5</math>)</b>		
Clinical teacher	3	60.0
Program director	2	40.0
<b>Duration of PC at the health facility</b>		
<5 years	4	36.4
5–10 years	1	9.1
>10 years	6	54.5
<b>Number of sessions attended</b>		
<5	1	9.1
5–10	4	36.4
>10	6	54.5
<b>Attend the previous iteration of ECHO PPC</b>		
Yes	6	54.5
No	5	45.5

(Continued)

**Table 2.** (Continued.)

Role in previous iteration of ECHO PPC (n = 6)		
Learner/Resident	4	66.7
Faculty	2	33.3

group, [the residents] were more confident to put up their views ... than in a larger group and we also used to... ask them to summarize it, so it gave them confidence” (T2).

The actions of teachers were identified by residents as being particularly important for ensuring successful learning in breakout rooms, as teachers guided and enriched the discussion, providing ample opportunities for maximum contributions among participants. One resident noted,

the facilitator [teacher] kind of set the flow of the discussion that was going on in the group and maybe give pointers, gave their own views, and made sure that every one of the participants actually participated in the whole discussion, so that everyone puts forward their point of view... They [teachers] actually make the whole environment very comfortable. (R7)

**Learning resources.** Participants described the benefits of having access to the learning materials (e.g., presentations, video recordings) from ECHO sessions and additional learning resources (e.g., journal articles, guidelines). Participants used these materials during their daily clinical care, as well as for self-study, and when training to other HCP. Despite being PC experts, teachers also reported that ECHO resources helped them to refresh their knowledge. One teacher described their motivation to review the resources, noting “I felt that I missed a few points during the [ECHO] discussion so...I would rather go back and learn or see the articles which were being shared” (T2).

**Individual learner characteristics**

Individual characteristics of participants influenced their learning experiences with ECHO PPC. Individual characteristics were

divided into 2 distinct subthemes: personal circumstances and self-awareness of learning needs.

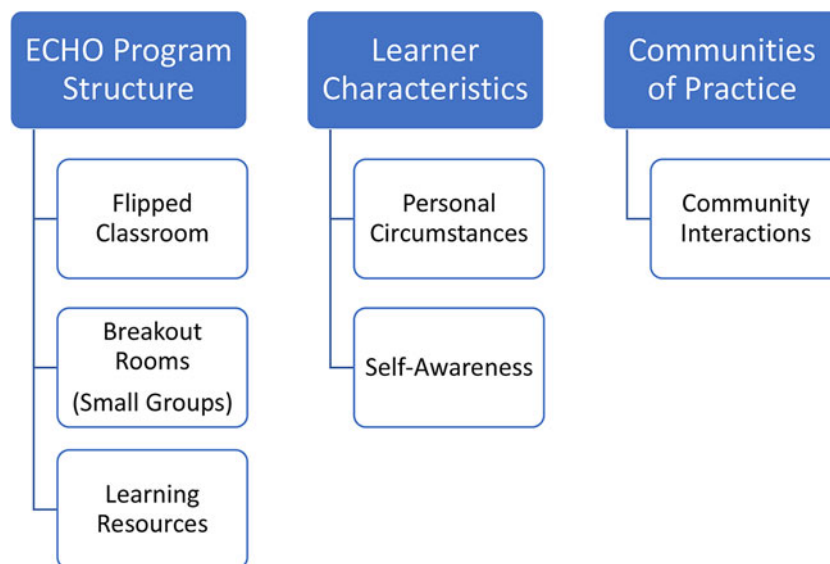
**Personal circumstances.** The personal circumstances of participants, such as personal or family health problems or situations, challenged their ability to join the ECHO sessions. Since the sessions were outside of regular work hours many participants had competing personal demands. One teacher noted, “[the residents] are on ... emergency duty, and then the next day goes, and then sadly they’re in [zoom] calls, and then people also have been having their own health problems, family health problems” (T4). Teachers seemed to experience a sense of anticipation, looking forward to the ECHO session with the residents, and experiencing feelings of disappointment if the residents did not attend.

Time was a frequent barrier to full participation in the program, with participants identifying that finding time to prepare for the sessions and then to participate in the ECHO sessions was particularly challenging due to busy work schedules and overnight call duties. Teachers also highlighted the challenges of finding time to prepare to lead the breakout room discussions. Despite time-related barriers, participants were able and motivated to participate in ECHO PPC, noting that the learning benefits superseded their workload commitments, and they would “make time” to join.

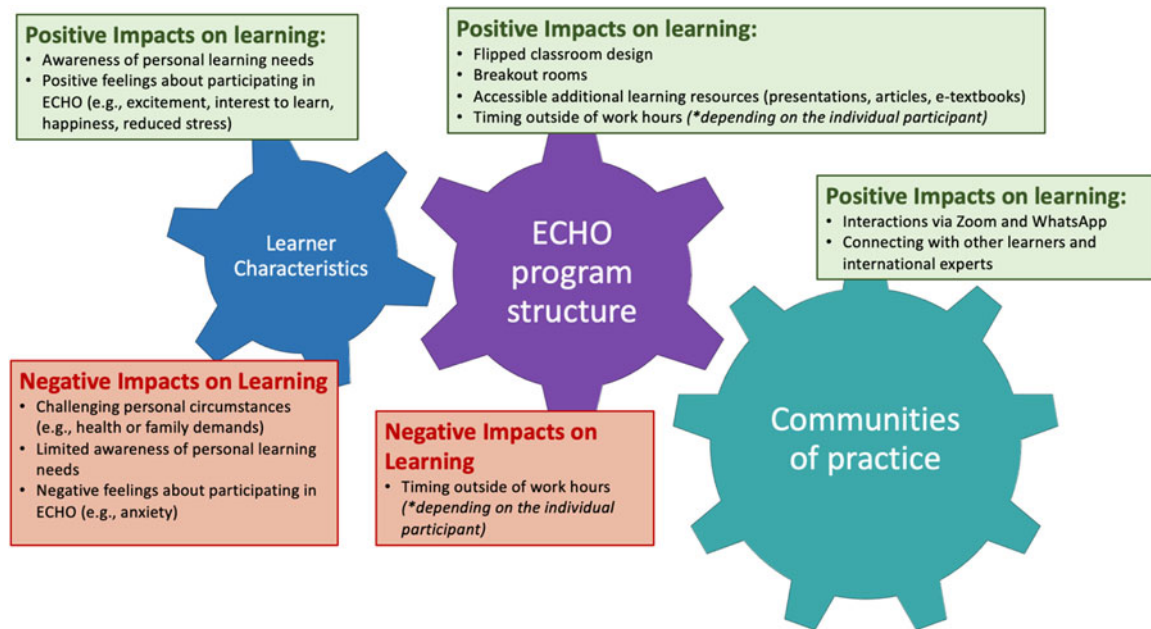
**Self-awareness of learning needs.** Participants identified their own learning gaps in pediatric PC as a key motivator to participate and sustain participation, with statements such as

I don’t [have] much exposure in the paediatric palliative care sessions or palliative care courses. So, prior to starting this course, I was having only 5–10% of knowledge of what is [paediatric palliative care] and that the ECHO program represented a unique opportunity to learn about this topic, which I felt was very important. (R9)

Participants identified the ECHO program as a unique learning opportunity, which motivated them to attend despite their other time commitments and personal challenges, as mentioned in the previous subtheme.



**Figure 3.** Major ECHO PPC themes and subthemes.



**Figure 4.** Interaction of ECHO learning experience themes including factors positively or negatively impacting learning in ECHO PPC model.

### *Communities of practice*

Participants identified their learning as being highly connected to the creation of COP within ECHO PPC. Several key features of the COP which participants particularly valued included reflective practice and peer support. The COP led to reflective practice, as residents described how they critically evaluated their own practice in light of experiences shared by other participants. The residents were conscious “that there are other programs around the country doing the same things” and identified that “that helps” (R8).

The residents are contented on how the COP provided peer support based on the belief that they shared, “similar challenges and knowing how they’re approaching those challenges” (R8). Participants also identified that they received peer support about new treatments which helped them implement the new practices in their clinical work. A resident noted,

I can try to put it into my own practice as well. So sometimes if I have a difficult case, and I heard this experience from Bangladesh, India or Nepal I have the kind of confidence to try, or I had the idea to try what they have also done. (R8)

Residents described sharing of good practices which boosted their confidence to implement similar treatment strategies.

**Community interactions.** Both teachers and residents noted that being in ECHO lead them to feel that they were part of a community where they benefitted from hearing about PC practices at other health centers and could also receive support. One resident noted, “[hearing] what they [other residents and teachers] were doing and the challenges they will be seeing ... that really built up that sense of camaraderie or you know that I can turn to somebody for help if needed” (R10). Participants described how the community interactions continued outside of the live ECHO sessions through social media channels established for the course.

Both teachers and residents identified the value of learning how PC was practiced at centers in different countries and cultures, particularly healthcare centers with more experience. One teacher,

“it also helped me to know about various opinions and views about how palliative care is done at different parts of the world, because [ECHO PPC] experts were from different parts of the globe and also, from different parts of India” (T2).

### *A model of the relationships between themes and subthemes*

The interview findings suggest that the study themes (learner characteristics, ECHO program structure, COP) are interrelated. Figure 4 illustrates how the theme interacts with each other to generate learning, illustrating how individual learner characteristics influence the ECHO program and the ECHO program in turn influences learning through COP. The factors can influence learning within the themes of individual learner characteristics and ECHO program, and can either positively (green boxes) or negatively impact learning (red boxes).

### **Discussion**

This study identified key components of COP which explain how learning occurs in ECHO, identifying that an ECHO program stimulates reflective practice and peer support through regular interactions among a group of learners. The study also identified key components of the ECHO program and characteristics of the learners which impacted learning. Table 3 suggests key recommendations for educators designing online learning programs based on study findings.

### *Communities of practice*

COP describes how learning occurs when participants with a shared interest interact regularly to learn together (Lave and Wenger 1991). Learners often benefit from sharing experiences which allow them to reflect on their own clinical practice, ultimately leading to new insights (Wenger 1999). In this study, participants were aware of being part of a COP, and described the benefits

**Table 3.** Key recommendations for educators based on study findings

Study theme
<b>Communities of practice</b>
There should be a <b>diversity of practice situations</b> among ECHO participants.
Teachers should include <b>national and international experts</b> .
<b>Teachers should receive training on their role in ECHO</b> , and how to leverage the ECHO program structure to support the creation of COP.
<b>ECHO program structure</b>
Educators should incorporate opportunities for <b>asynchronous interactions</b> between online sessions using social media.
Educators should explore the <b>social media and technology preferences of participants</b> and select platforms which are accessible and familiar.
<b>Small group discussions (“breakout rooms”)</b> should strongly be considered by educators when designing ECHO programs.
<b>A flipped classroom</b> design can be considered for ECHO programs.
Participants should be encouraged to <b>use and modify program learning resources</b> for their own teaching and learning purposes.
Educators should ensure they have resources and processes to <b>ensure that participants can easily access and adapt learning materials</b> for their needs.
<b>Learner characteristics</b>
<b>Planning the timing for ECHO sessions</b> should consider participants’ personal and professional time pressures.
Educators should encourage participants to <b>self-reflect on their learning needs</b> during ECHO programs
Educators should be aware that <b>personal circumstances may have a significant impact</b> on learners’ participation and learning from ECHO

of the community’s peer support. This is similar to findings from PC ECHO programs from a wide range of countries (Doherty et al. 2021a; Kwok et al. 2022; Manson et al. 2021; Usher et al. 2022). This suggests that COP is a consistent feature of ECHO which is experienced by different types of HCP and can occur in diverse locations globally. Educators designing ECHO should be aware that COP is a common and consistent experience within ECHO and should design programs to encourage regular interactions and sharing which will enhance COP learning.

The opportunity to compare and contrast cultural differences and similarities seems to be a particular benefit in PC ECHO programs, since the practice of PC is highly specific to the cultural context, exploring these differences may help learners to better understand PC by critically reflecting on what are the key components of PC and how these can be implemented in their setting (Stoltenberg et al. 2020). This study found that through reflective practice during ECHO sessions, learners explored different experiences of providing PC and gained new understanding. This element of reflective practice was also seen in a previous PC ECHO program in South Asia, where participants highlighted that the opportunity to learn from the experiences of others from different cultures and countries was a specific benefit of the ECHO program (Doherty et al. 2021a). This suggests that future PC ECHO programs should consider how to provide participants with diverse perspectives on PC.

### The role of teachers in COP

In COP, the role of the teacher is to guide learners, by suggesting new behaviors, providing space and support for learners to explore their own solutions, and identifying opportunities for learners to practice skills (Torre et al. 2006). In this study, teachers identified the importance of their actions to promote interactive discussions and reflective practice among participants. Teachers recognized that these actions provided learners with opportunities to explore how the concepts from ECHO PPC could be applied to patient care in learners’ clinical settings. These findings suggest that learning may be enhanced by providing training to ECHO teachers which emphasizes their role as a guide and teaches them key behaviors to guide learners.

Teachers are also influenced and learn from the COP, by utilizing the community interactions and discussions to engage in reflective practice themselves (Pyrko et al. 2017). In this study, teachers described identifying areas of personal strength and improvement, noting that this approach sustained and motivated their participation. A previous PC ECHO study, described how the program helped teachers to realize that they had overestimated PC knowledge of ECHO learners and thus they were able to adjust their teaching to better match participants’ actual knowledge and skills (Usher et al. 2022). These findings suggest that teachers’ personal commitment and motivation may be encouraged by the personal benefits they derive from participation. These findings should be further explored in future studies, focused on teachers’ learning experiences.

### Synchronous and asynchronous learning opportunities in COP

The present study described how the learning environment was expanded beyond the weekly online sessions, occurring asynchronously through social media messaging between sessions. The unique combination of a social media platform and live ECHO sessions described in this study, seem to provide additional synergies for learning and has not been previously described in the literature. This innovative design is supported by principles from technology-enhanced learning which suggest that providing learners with opportunities for learning when it is personally convenient, such as through asynchronous social media messaging, improves learning (Nielsen 2005). Asynchronous opportunities may be particularly important in addressing the negative impacts of challenging personal circumstances (e.g., family responsibilities, work/duty hours).

The value of “safe spaces” for support and learning have previously been described using in-person peer groups to support medical trainees; however, this has not been widely described in an online format (Chou et al. 2011, 2014). Social media chats, as described in this study, seem to facilitate an online forum for peer support with challenging clinical situations and thereby create “safe spaces” for learning and reflection. This may be particularly beneficial in PC where HCP face the additional challenge of dealing with serious illness and death on a regular basis.

### Flipped classroom

In a flipped classroom approach, learners review video lectures and written materials prior to the live classroom sessions, which allows more time for active learning, discussion, and interaction (Chen et al. 2017). The present study is the first to describe the



enhancement of learning from a flipped classroom approach in Project ECHO. Previous studies of UG medical students in India have described the positive benefits of a flipped classroom on learning, showing improvements in learners' knowledge, as well their enthusiasm for the design (Aristotle et al. 2021; Sreegiri et al. 2018). In this study, PG learners enthusiastically embraced the flipped classroom, suggesting that a flipped classroom is a highly valued learning format for PG learners in this setting.

### Technological considerations

A previous ECHO study described internet access as a barrier to online learning, with 59% of participants citing internet access as a barrier in rural Bangladesh (Doherty et al. 2022). Participants in the current study did not identify internet access as a similar barrier, which may reflect their residence in urban areas, where stronger internet connections are available. Indeed, this study's findings closely match those from a previous study in India which found that 88% of practicing PC physicians did not anticipate that internet access would be a barrier to their participation in online learning (Kiss-Lane et al. 2019). This suggests that internet access is a not always a barrier to online learning in LMIC and some learners may be more affected than others by this barrier.

### Study strengths and limitations

This study provides a detailed picture of learning experiences of residents and teachers in an online learning program in South Asia. The study successfully included a diverse group of participants, which suggests that the study describes a broad range of resident and faculty perspectives on ECHO. The study findings are expected to be relevant and applicable to online learning programs not only in South Asia and in other settings where resources are limited but also globally.

The limited number of study participants is a limitation in this study, and interviews of additional ECHO participants may provide further insights. Some aspects of experiences of participants in this study's ECHO program may be unique to this program since learning is influenced by the interactions between learners and teachers.

### Conclusion

This study describes how an online learning program such as Project ECHO, can lead to learning through COP which provides opportunities for learners and teachers to interact and engage in peer support and reflective practice which stimulates learning. Key elements of the ECHO program which support learning and sustain participation, include small group discussions, a flipped classroom design, and opportunities for asynchronous interactions. Individual learner characteristics including effective self-reflection and personal circumstances impact learning. Educators should consider these elements when implementing online learning, particularly in resource-limited settings.

**Supplementary material.** The supplementary material for this article can be found at <https://doi.org/10.1017/S1478951524000762>.

**Funding.** This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

**Competing interests.** The authors declare that this project and research was carried out in absence of commercial or financial relationships that could be considered a potential conflict of interest.

**Ethical approval.** The study was approved by the research ethics boards of University of Dundee, United Kingdom and the Children's Hospital of Eastern Ontario Research Institute, Canada. Written informed consent was obtained from participants prior to participation, including consent for verbal recording.

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