

# Developing an Evaluation Framework for the Primary Care Educators' Hub (PCEH)

Research question: What evaluation framework could assess the feasibility, acceptability and usefulness of PCEH?

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## Why PCEH needs an evaluation framework

### Problem

Digital platforms may help educators access resources, connect with peers and support professional development. However, platform activity alone does not establish successful implementation.

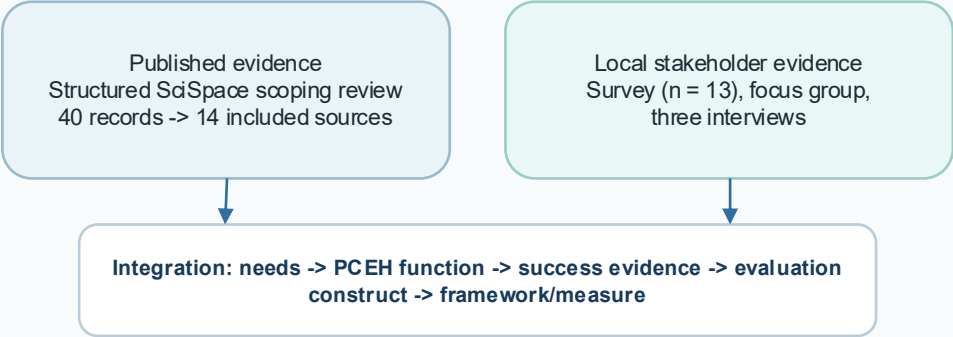
### PCEH in context

PCEH is being developed for primary care educators, initially in London. It is intended to combine educational resources and communication through a shared professional environment.

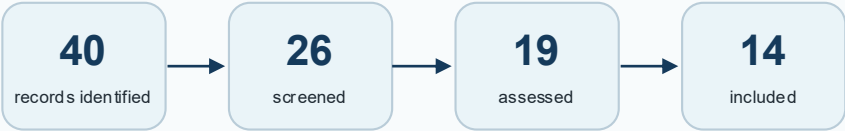
### Aim

To identify and critically examine evaluation approaches relevant to digital professional communities and determine an appropriate framework for PCEH.

## Methods: two evidence streams



## Study selection



Duplicates/alternative versions removed (n=14); title/abstract exclusions (n=7); eligibility exclusions (n=5).

## Results: what should be evaluated?

### Evidence base

The 14 sources represented overlapping literatures: digital professional communities, technology-enhanced learning, digital-health evaluation and implementation frameworks. The evidence did not point to one single model of digital-platform success.

### Five evaluation dimensions emerging from the literature

|   |                      |                                      |
|---|----------------------|--------------------------------------|
| 1 | Access & uptake      | Are intended users reached?          |
| 2 | Engagement           | Do they return and participate?      |
| 3 | User experience      | Is it feasible, acceptable and easy? |
| 4 | Professional benefit | Does it help educators in practice?  |
| 5 | Implementation       | Can use be maintained over time?     |

## What prospective users prioritised

|                                      |                                         |                       |                           |                                    |
|--------------------------------------|-----------------------------------------|-----------------------|---------------------------|------------------------------------|
| 13/13<br>case studies /<br>scenarios | 12/13<br>assessment &<br>feedback tools | 11/13<br>lesson plans | 10/13<br>discussion / Q&A | 10/13<br>messaging /<br>networking |
|--------------------------------------|-----------------------------------------|-----------------------|---------------------------|------------------------------------|

### Qualitative themes

Stakeholders described resource fragmentation, time pressure, limited connection with wider GP educator communities, variable access to mentorship and the need for active platform maintenance.

## From user needs to success criteria

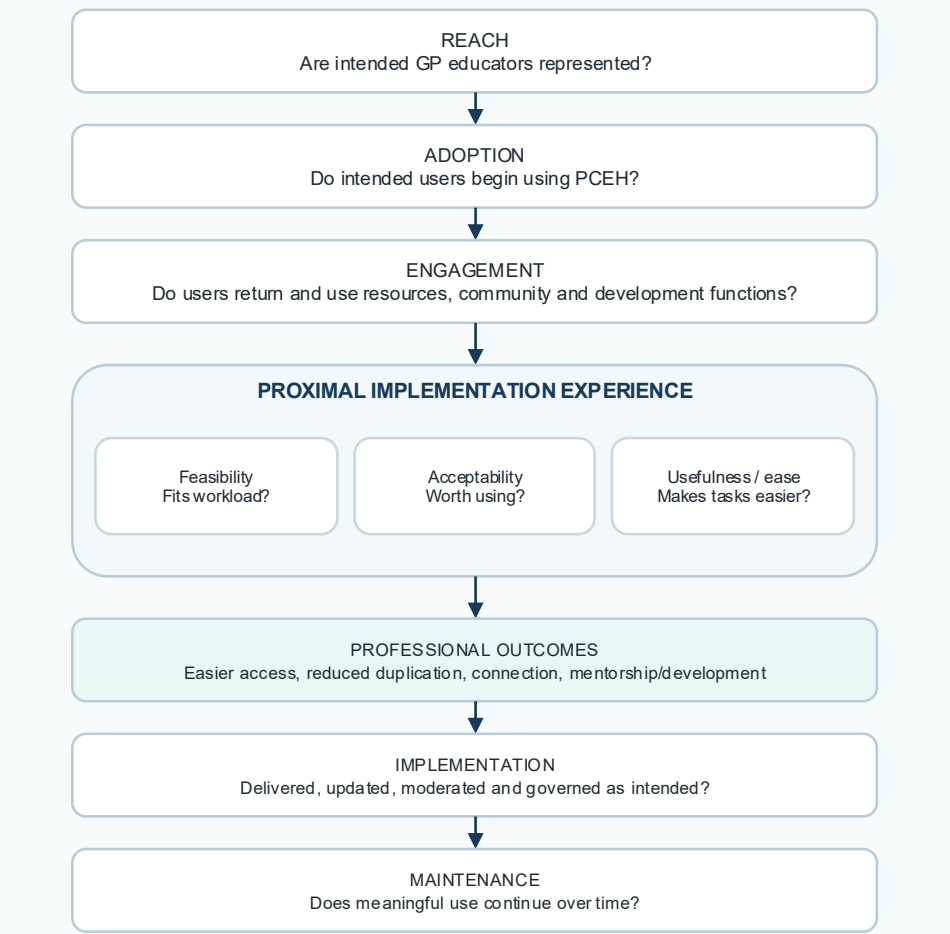
|                                                                                                                          |                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Fragmented resources</b><br>→ centralised repository<br>→ easier/faster resource access<br>→ usefulness + feasibility | <b>Limited educator connection</b><br>→ professional community<br>→ recurrent interaction<br>→ engagement + connectedness |
|--------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|

## Proposed PCEH evaluation framework

### Core decision

Use RE-AIM as the organising backbone, then add explicit assessment of engagement, feasibility, acceptability, usefulness and ease of use.

### Evaluation pathway



## Practical pilot priorities

### Early pilot should focus on:

Task completion, navigation, feasibility, acceptability and usefulness - not premature claims about effectiveness or long-term retention.

|                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Can they use it?</b><br>→ Do they want to use it?<br>→ Do they actually use it?<br>→ Does it help them?<br>→ Does meaningful use continue? |
|-----------------------------------------------------------------------------------------------------------------------------------------------|

Selected references: [7] PCEH needs assessment survey; [8] PCEH focus group/interview notes; [13] PCEH project proposal; [14] Rouleau et al. 2024; [15] Proctor et al. 2011; [32] Glasgow et al. 2019; [34] Davis 1989; [35] Weiner et al. 2017.

Main takeaway: PCEH should be evaluated as a digital professional community, not only as a website. Success requires uptake, meaningful engagement, user experience, professional benefit and sustainability.

# Developing an Evaluation Framework for the Primary Care Educators' Hub (PCEH)

*Consolidated Introduction, Methods and Results - Revised working manuscript*

19 August 2026

Research question: What evaluation framework could be used to assess the feasibility, acceptability and usefulness of PCEH?

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## Abstract

**Background:** Digital platforms may help healthcare educators access resources, connect with peers, and participate in professional development, but platform activity alone does not establish successful implementation. The Primary Care Educators' Hub (PCEH) is being developed to support primary care educators, initially in London. This study aimed to develop an evidence-informed framework for evaluating its feasibility, acceptability, usefulness, implementation, and longer-term value.

**Methods:** A structured scoping review was combined with formative stakeholder needs-assessment data. Four structured literature searches identified 40 records concerning digital professional communities, virtual communities of practice, professional digital platforms, and relevant evaluation approaches. After deduplication and screening, 14 sources were included. Local evidence comprised a survey of 13 medical educators, one focus group, and three stakeholder interviews. Published and local evidence were integrated by mapping user needs to intended PCEH functions, candidate success indicators, evaluation constructs, and suitable frameworks or measures.

**Results:** Five broad evaluation dimensions emerged: access and uptake; engagement and participation; user experience and technology acceptance; professional or educational benefit; and implementation and sustainability. Stakeholders prioritised accessible centralised resources, professional connection, low workload burden, mentorship and development, and sustained platform maintenance. No single framework covered all requirements. RE-AIM provided the broadest organising structure but required supplementation with engagement, feasibility, acceptability, perceived usefulness, and ease of use.

**Conclusions:** PCEH evaluation should progress from reach and adoption to meaningful engagement, user experience, professional benefit, implementation, and maintenance. The proposed hybrid framework provides a staged approach for evaluating PCEH from early pilot testing through longer-term use.

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## 1. Introduction

Health systems worldwide face the challenge of delivering increasingly complex care while maintaining a workforce of sufficient size, capability, and resilience. The World Health Organization (WHO) projects a global shortfall of approximately 11 million health workers by 2030.<sup>[1]</sup> Workforce sustainability, however, depends not only on staff numbers but also on professionals' ability to maintain and develop their knowledge and skills under increasing service pressure. These pressures also affect retention: a systematic review and meta-analysis of 170 studies involving 239,246 physicians found that burnout was associated with lower job satisfaction, greater career regret, and more than threefold higher intention to leave practice.<sup>[2]</sup> Healthcare systems therefore need both to retain professionals and to support their continued development.

These challenges are directly relevant to the National Health Service (NHS) in England and to those responsible for educating current and future professionals. NHS England's Educator Workforce Strategy identifies an ageing educator workforce, difficulty balancing educational and clinical duties, and insufficient protected time as important challenges.<sup>[3]</sup> NHS priorities therefore include protecting educator time and resources, developing clearer career pathways, supporting wellbeing, and introducing new approaches to education. These priorities sit within wider NHS transformation, including the 10 Year Health Plan's shifts from hospital to community, analogue to digital, and sickness to prevention,<sup>[4]</sup> alongside plans to reshape how the workforce is deployed and trained.<sup>[5]</sup> Pressure is particularly visible in general practice:

the General Medical Council reported that approximately six in ten GPs had difficulty providing sufficient patient care at least once a week, while GP trainers reported poorer experiences than non-trainers on several workload measures.<sup>[6]</sup> GP educators therefore sit at a critical intersection between frontline care and workforce development.

Formative work during development of the Primary Care Educators' Hub (PCEH) suggests that these pressures are also reflected locally. In a needs-assessment survey of 13 educators, all 13 selected case studies or scenarios as useful centralised content, 12 selected assessment and feedback tools, and 10 selected each of discussion or question-and-answer forums, messaging or networking, and peer-to-peer resource sharing.<sup>[7]</sup> Survey comments, focus-group findings, and interviews repeatedly identified limited time, difficulty locating resources, inconsistent or outdated materials, and limited connection with the wider GP educator community.<sup>[7,8]</sup> Participants also described unmet needs relating to mentorship, career progression, resource sharing, and learning from colleagues.<sup>[8]</sup> These findings are formative rather than evidence of PCEH effectiveness, but they indicate that resource fragmentation, limited professional connectivity, time pressure, and uneven access to developmental support are meaningful problems for intended users.

Digital technology offers one potential mechanism for addressing these challenges. Online professional communities can provide asynchronous access to educational materials, reduce barriers to interaction, and

support knowledge exchange. A review of general practice training suggested that virtual communities of practice may support knowledge sharing and reduce professional and structural isolation, while emphasising facilitation, trust, usability, and sustained participation.<sup>[9]</sup> More recent work among primary care professionals has similarly shown value from exchanges of knowledge, resources, and professional experience.<sup>[10]</sup> Rural Health Pro, an Australian platform combining professional-development resources, networking, discussion, events, and career support, has been reported to support access to resources and peer connectivity.<sup>[11]</sup> In a subsequent survey of 186 rural health professionals, 60.2% were frequent users and 71% were likely to recommend it; professional-development, community/networking, and career-support content were associated with greater use.<sup>[12]</sup> These findings show how professional learning, information access, and peer connection can be integrated digitally. PCEH has been developed within this context as a shared digital environment for primary care educators, initially in London.<sup>[13]</sup> It is intended to bring together educational resources and enhance communication through a single platform. Rather than functioning only as a resource repository, PCEH is designed to support both the practical needs of educators and their connection with a wider professional community.<sup>[13]</sup>

However, developing a digital platform does not itself demonstrate success. Registrations, log-ins, page views, downloads, or posts can show reach and activity, but not whether users can incorporate the platform into their work, find it acceptable, or gain meaningful professional benefit. Evaluation must therefore distinguish activity from implementation and outcomes. A recent scoping review found substantial diversity in the theories, models, and frameworks used to evaluate digital health interventions and highlighted the value of theory-informed evaluation.<sup>[14]</sup> Implementation

science similarly distinguishes outcomes such as acceptability, adoption, appropriateness, feasibility, fidelity, penetration, cost, and sustainability from downstream service or clinical outcomes.<sup>[15]</sup> For PCEH, defining these dimensions before wider implementation can support iterative development and later evaluation. Accordingly, this study aimed to identify and critically examine evaluation approaches relevant to digital professional communities and to determine an appropriate framework for assessing the feasibility, acceptability, and usefulness of PCEH.

## 2. Methods

### 2.1 Study design

This study used an evidence-informed framework-development design to determine how PCEH should be evaluated. Two sources of evidence were used. First, a structured scoping review examined how digital professional platforms and virtual professional communities have been evaluated in healthcare and identified relevant evaluation concepts, frameworks, and measures. Second, formative data from prospective PCEH users were examined to identify the problems and needs that the platform should address. These two sources of evidence were then combined to develop an evaluation framework tailored to PCEH. An overview of this study design and the integration of the two evidence streams is shown in Figure 1.

A scoping-review approach was chosen because the aim was to identify and compare a broad range of evaluation approaches rather than to determine the effectiveness of a single intervention. Scoping reviews are suited to questions involving diverse study designs, interventions, concepts, and theoretical approaches.<sup>[16–19]</sup> The reporting of the literature identification and selection process was informed by the PRISMA extension for Scoping Reviews (PRISMA-ScR).<sup>[20]</sup>

### Study design and framework-development process

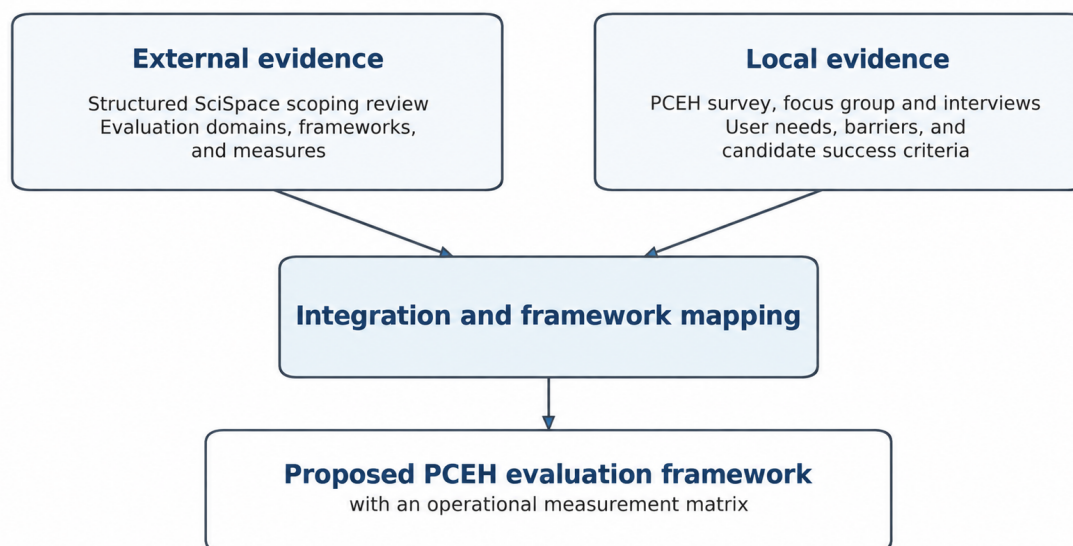


Figure 1. Overall study design. External published evidence and local stakeholder evidence were synthesised to develop the proposed PCEH evaluation framework.

## 2.2 Structured scoping review

### 2.2.1 Review aim

The scoping review aimed to identify how digital professional platforms or communities relevant to healthcare professionals have been evaluated. In particular, the study sought to identify the evaluation domains, frameworks, measures, indicators of success, and implementation concepts used in previous studies. The purpose was not to determine whether these interventions were effective overall, but to identify approaches that could inform the future evaluation of PCEH.

### 2.2.2 Information source and search strategy

Four structured searches were conducted using SciSpace on 19 August 2026. Each search addressed a different aspect of the review question. The first search focused broadly on evaluations of digital professional platforms, online professional communities, and virtual communities of practice used by healthcare professionals or health-professions educators. The second focused more specifically on virtual communities of practice involving physicians, GPs, primary care professionals, and health-professions educators. The

*Table 1. Eligibility criteria for the structured scoping review*

| Component     | Included                                                                                                                                                                                                                                                                      | Excluded                                                                                                                                                                    |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Population    | Healthcare professionals, physicians, GP/primary care professionals, medical or health professions educators; methodological framework sources where population was not applicable                                                                                            | Patient/general-public-only platforms without transferable professional evaluation relevance                                                                                |
| Concept       | Digital professional platform, online/virtual professional community, virtual community of practice, professional learning/support platform, or evaluation framework/measure relevant to feasibility, acceptability, usefulness, engagement, implementation or sustainability | Purely technical performance studies or clinical-efficacy-only evaluations without relevant user/implementation constructs                                                  |
| Context       | Healthcare delivery, primary care, professional education, continuing professional development, professional networking or workforce support                                                                                                                                  | Consumer social networking without a healthcare-professional purpose                                                                                                        |
| Evidence type | Peer-reviewed empirical studies, reviews, methodological/framework papers, and substantive conference proceedings                                                                                                                                                             | Protocols without completed evaluation data; duplicate/preprint versions when a final publication was available; supplementary files without independent evaluative content |
| Language      | English                                                                                                                                                                                                                                                                       | Non-English sources where reliable assessment was not possible                                                                                                              |

### 2.2.4 Deduplication, screening and selection

The 40 search records were reconciled manually by title, DOI, author group, and publication status. Repository copies, preprints, and supplementary records were treated as duplicate publication versions when a final journal article represented the same work. Fourteen duplicate or alternative-version records were removed, leaving 26 unique records. Titles and abstracts were then screened against the eligibility criteria. Records whose relevance could not be determined from the abstract were retained for eligibility assessment. Seven records were excluded at title/abstract screening and 19 reports were assessed for eligibility. Five were excluded at this stage: one protocol without completed evaluation data, two sources insufficiently focused on a professional digital platform/community, one non-peer-reviewed preprint, and one source with insufficient evaluative detail. Fourteen sources were retained in the final evidence synthesis. The selection process is reported in a PRISMA-style flow diagram in the Results section.

### 2.2.5 Data charting and synthesis

For each included source, information was recorded on what was being evaluated and how the evaluation had been conducted. Any framework or model used in the study was

third targeted evaluations of digital learning hubs, professional support platforms, online discussion networks, and other web-based professional communities. The fourth focused on evaluation frameworks and measures relevant to feasibility, acceptability, usefulness, engagement, implementation, and sustainability.

The searches were designed to capture literature across professional learning, networking, community support, and implementation rather than being restricted to one type of digital platform or one evaluation framework. This broader approach was used to reduce the risk of selecting only frameworks identified in advance and to allow other relevant evaluation approaches to emerge. The first 10 ranked records from each of the four searches were retained, producing 40 records for initial review. The exact search questions are provided in Appendix 1.

### 2.2.3 Eligibility criteria

Eligibility criteria were defined in advance using a Population–Concept–Context structure, together with evidence-type and language criteria. Detailed inclusion and exclusion criteria are presented in Table 1.

also noted, together with the aspects of platform use or implementation that were assessed.

The findings were then compared across studies to identify recurring evaluation themes relevant to PCEH. These themes included whether users were reached, whether they engaged with the platform, whether the platform was feasible and acceptable to use, whether it was useful in practice, and whether use could be sustained over time.

Relevant frameworks were then compared according to how well they addressed these needs and how practical they would be for evaluating PCEH. Where a single framework did not cover an important area, complementary concepts or measures were considered.

## 2.3 PCEH stakeholder needs assessment

Formative stakeholder data were examined to identify the needs and problems that PCEH should address. This local evidence was used alongside the scoping review so that the proposed evaluation framework reflected both published evidence and the priorities of intended PCEH users.

### 2.3.1 Needs-Assessment Survey

A needs-assessment survey was completed by 13 medical educators involved in primary care education.<sup>[7]</sup> The survey

explored participants' current use of teaching resources and the difficulties they experienced in accessing or creating them. It also asked what functions they would value in a centralised educator hub and whether they would be willing to contribute to such a platform.

Closed-response questions were analysed descriptively using counts and percentages. Free-text responses were reviewed to provide additional context for the priorities and difficulties identified in the survey.

2.3.2 Focus group and interviews

The qualitative material comprised one focus group involving two participants and three individual stakeholder interviews concerning primary care education and the proposed PCEH.<sup>[8]</sup> These discussions were used to explore the practical difficulties experienced by educators and to understand what they would value from a platform such as PCEH.

The material was reviewed using a directed qualitative content-analysis approach.<sup>[21]</sup> An initial coding structure was based on the main topics covered in the interview guide, such as access to educational resources, professional connection, educator support and development, and platform use. Additional recurring ideas were retained when they did not fit clearly within these initial categories. The analysis aimed to identify barriers, factors that might support use of PCEH, expected benefits, and possible indicators of success. It was not intended to demonstrate thematic saturation or to suggest that the findings were representative of all GP educators in London.

2.4 Integration and development of the PCEH evaluation framework

The final stage integrated the findings from the structured scoping review with the PCEH stakeholder needs assessment. The literature review identified how comparable digital professional platforms had been evaluated and which theoretical or implementation approaches were available. The stakeholder evidence identified what PCEH would need to achieve from the perspective of prospective users.

Integration followed a structured mapping process. Each identified stakeholder need was first linked to an intended PCEH function. The type of evidence that would indicate successful delivery of that function was then considered. This was subsequently linked to an appropriate evaluation construct and to a framework or measure capable of assessing it. This process ensured that the proposed evaluation approach was informed both by published evidence and by the needs of prospective PCEH users.

Framework selection followed a principle of parsimony. A single framework was preferred where it provided sufficient

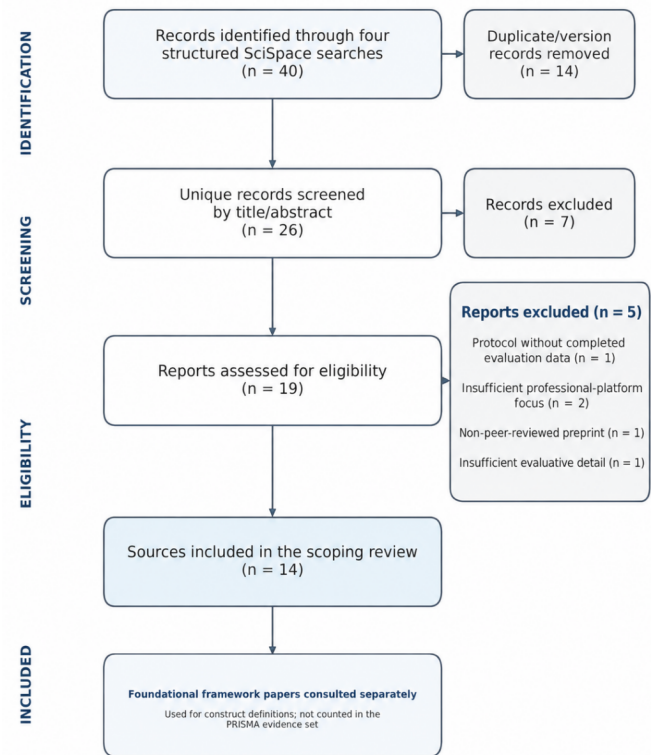
coverage of the evaluation requirements. Where important aspects of PCEH were not adequately captured, the primary framework was supplemented only with clearly defined constructs or measures addressing those specific gaps. The resulting conceptual framework and operational evaluation matrix are presented in the Results section.

3. Results

3.1 Search results and source selection

The four structured searches identified 40 records. After 14 duplicate or alternative-version records were removed, 26 records were screened and 19 were assessed for eligibility. Fourteen sources were included in the final synthesis. The study-selection process is shown in the PRISMA flow diagram (Figure 2).

PRISMA-style flow diagram of source identification and selection



The included sources covered both evaluations of digital professional communities and methodological work on how such interventions can be assessed. Their designfocus and their principal relevance to the development of the PCEH evaluation framework are summarised in Table 2. This evidence base was then synthesised to identify the evaluation dimensions most relevant to PCEH.

Figure 2. PRISMA-style flow diagram of source identification and selection for the structured SciSpace review.

3.2 Characteristics of included evidence

The 14 included sources were published between 2012 and 2024 and represented several overlapping bodies of literature. Nine primarily examined virtual professional communities, social networks, or digitally mediated professional learning and interaction among healthcare professionals; three addressed broader evaluation of technology-enhanced learning or digital-health interventions;

and two focused primarily on implementation-framework evaluation or integration.

Most included sources were evidence syntheses: 11 were scoping, systematic, integrative, or other literature reviews. One was a mixed-method empirical evaluation of a virtual community for GP training, and two were methodological papers concerned with implementation and evaluation frameworks. This distribution reflected the developmental purpose of the present study: identifying how digital

professional communities have been evaluated rather than estimating the effect size of a single intervention.

Table 2. Included sources and principal contribution to development of the PCEH evaluation framework

| Source                 | Design/focus                                                            | Principal relevance to PCEH                                                                             |
|------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| Barnett et al, 2012    | Review of VCoPs in general practice training                            | Isolation, facilitation, ease of technology, supportive environments, measurement and feedback          |
| Hamm et al, 2013       | Scoping review of social media use by healthcare professionals/trainees | Professional digital communication, education and evaluation patterns                                   |
| Barnett et al, 2014    | Mixed-method evaluation of a GP-training VCoP                           | Facilitation, leadership, goals, technology, time, knowledge sharing and connectedness                  |
| Rolls et al, 2016      | Integrative review of healthcare professional virtual communities       | Knowledge sharing, passive versus active participation, accessibility and technology acceptance         |
| Chan and Leung, 2018   | Systematic review of professional social-network use                    | Communication/networking benefits and technical, privacy and professionalism barriers                   |
| McLoughlin et al, 2018 | Integrated review of healthcare VCoPs                                   | Professional development, reduced isolation, trust, participation and technology barriers               |
| Nicoll et al, 2018     | Systematic review of technology-enhanced learning evaluation            | Variation in evaluation quality; frequent reliance on satisfaction and learning measures                |
| Guillaume et al, 2022  | Integrative review of mobile-social CPD                                 | Acceptability, peer/mentor interaction, learning outcomes, social support and implementation barriers   |
| Shaw et al, 2022       | Scoping review of healthcare VCoP implementation                        | Inconsistent framework use; need for structured implementation and evaluation                           |
| Lardier et al, 2024    | Scoping review of VCoP measurement                                      | Validated measurement approaches and limited measurement literature                                     |
| Rouleau et al, 2024    | Scoping review of digital-health evaluation frameworks                  | Breadth of theories/models/frameworks and their roles in evaluation                                     |
| Appel, 2014            | Review of usability, feasibility and adoption evaluation                | Inconsistent terminology and limited explicit success criteria                                          |
| Glasgow et al, 2019    | RE-AIM methodological review                                            | Pragmatic multilevel structure for reach, effectiveness, adoption, implementation and maintenance       |
| Reilly et al, 2020     | Comparison/integration of RE-AIM and implementation outcomes            | Conceptual complementarity between RE-AIM and feasibility/acceptability-related implementation outcomes |

The evidence base was therefore not dominated by one model of digital-platform success. Instead, it contained distinct perspectives addressing professional community formation, technological usability and acceptance, implementation, educational outcomes, and sustained use. Nicoll et al found that healthcare professional technology-enhanced learning evaluations commonly relied on learner satisfaction or combinations of knowledge testing and satisfaction, while also concluding that more consistent evaluation approaches were required.<sup>[27]</sup> Guillaume et al similarly found high acceptability of mobile-social professional learning, with peer and mentor interaction contributing to knowledge sharing, learning outcomes and social support, while implementation remained constrained by access and scheduling barriers.<sup>[28]</sup>

### 3.3 Evaluation concepts emerging from the evidence

Five broad and recurrent dimensions of digital professional-platform evaluation emerged from the evidence synthesis: (1) access and initial uptake; (2) engagement and participation; (3) user experience and technology acceptance; (4) professional or educational benefit; and (5) implementation and sustainability. These dimensions were related but not interchangeable.

#### Access and initial uptake

Several studies treated membership, registration, initial access, or population uptake as indicators of whether a virtual community reached its intended users. However, access alone provided limited information about subsequent participation or benefit. Rolls et al reported that virtual healthcare communities frequently contained substantially more individuals who read or accessed information than those who actively posted.<sup>[24]</sup> This indicated that platform adoption should not be operationalised exclusively through visible contributions.

#### Engagement and participation

Engagement emerged as a distinct concept from registration. Relevant indicators included frequency of access, reading behaviour, posting, replying, knowledge exchange, interaction with peers, participation in discussions, and repeated platform use. Barnett et al's empirical evaluation of ConnectGPR demonstrated that an online GP-training community could support knowledge sharing and perceived connectedness, but also identified time as an important barrier to participation.<sup>[23]</sup> The literature therefore suggested that apparently low posting rates do not necessarily equate to lack of value, because users may derive benefit through observation, reading, or resource access. Nevertheless, a professional community with high registration but little repeated activity represents a different implementation state from one characterised by recurrent interaction.

#### User experience, feasibility and acceptance

Usability, accessibility, satisfaction, acceptability, feasibility and usefulness were frequently discussed, but terminology and measurement were inconsistent. Appel's review found that usability was more consistently operationalised than feasibility or adoption and that criteria defining successful evaluation were frequently absent or inconsistent.<sup>[31]</sup> Technology-acceptance concepts were particularly relevant in the virtual-community literature. Rolls et al identified applications of the Technology Acceptance Model and related approaches and reported that positive attitudes toward the technology, accessibility and credible peer participation could influence professional use.<sup>[24]</sup> The foundational Technology Acceptance Model distinguishes perceived usefulness - whether a system is believed to improve performance - from perceived ease of use - whether use is perceived as requiring limited effort.<sup>[34]</sup> These constructs were considered particularly relevant to PCEH because a professionally valuable resource could remain unsuccessful if locating information or interacting with the system demanded excessive effort.

### Professional and educational benefit

The professional-community literature extended evaluation beyond technological satisfaction. Reported outcomes included knowledge sharing, professional learning, improved access to expertise, connectedness, reduced professional isolation, mentorship, collaboration and social support. Guillaume et al found that virtual peer and mentor interaction was associated across the included literature with knowledge sharing, knowledge gains and social support, while also identifying practical implementation barriers.<sup>[28]</sup> This suggested that evaluation of PCEH should distinguish whether the platform was usable from whether using it provided something professionally valuable.

### Implementation and sustainability

The final group of constructs concerned whether a platform could be implemented, maintained and embedded beyond initial launch. Shaw et al found relatively limited and inconsistent use of formal frameworks in healthcare VCoP implementation studies and concluded that more standardised approaches to establishment, implementation and evaluation were needed.<sup>[29]</sup> At the broader digital-health level, Rouleau et al identified 68 distinct theories, models and frameworks across 156 studies, with CFIR, RE-AIM, TAM,

Table 3. Educational resources requested by prospective PCEH users (N=13)

| Resource                   | n/N   | %     |
|----------------------------|-------|-------|
| Case studies/scenarios     | 13/13 | 100.0 |
| Assessment/feedback tools  | 12/13 | 92.3  |
| Lesson plans               | 11/13 | 84.6  |
| Curriculum guidelines      | 11/13 | 84.6  |
| Recorded lectures/webinars | 9/13  | 69.2  |

Professional interaction was similarly prominent. Discussion/Q&A, messaging/networking, and peer-to-peer resource sharing were each selected by 10/13 respondents (76.9%). Event calendar/registration was selected by 6/13 (46.2%) and mentorship pairing by 5/13 (38.5%). Peer-support groups were selected by 8/13 (61.5%). Eleven of 13 respondents stated either that they would contribute to PCEH (6/13) or might do so (5/13).<sup>[7]</sup> These data suggested that prospective users envisaged PCEH not solely as a repository but as a combination of resource access and professional interaction.

#### 3.4.2 Focus-group and interview findings

The available focus-group and interview material generated five recurrent categories relevant to future evaluation: resource accessibility and efficiency; professional connection and community; workload/accessibility/usability; mentorship and professional development; and platform maintenance/governance.<sup>[8]</sup>

#### Resource accessibility and efficiency

The principal difficulty was not an absolute absence of educational material. Participants described resources as existing but being fragmented, difficult to locate, sometimes inaccessible outside institutional systems, or variably current. A centralised platform was perceived as potentially reducing duplicated preparation and simplifying access to curricula, teaching materials, updates and other educational information.<sup>[8]</sup>

#### Professional connection and community

Several participants described limited connection outside their immediate educational teams and referred to education being conducted within professional 'silos.' They expressed

UTAUT, Diffusion of Innovations and NPT representing the most frequently reported approaches.<sup>[14]</sup> Taken together, the evidence suggested that no single construct such as satisfaction, usability, or website traffic adequately represented digital professional-platform success.

### 3.4 PCEH stakeholder needs and candidate success outcomes

#### 3.4.1 Survey findings

Thirteen educators completed the PCEH formative needs-assessment survey. Respondents represented several educational roles, including undergraduate GP tutors and clinical or educational supervisors, and varied in duration of involvement in medical education.<sup>[7]</sup> Demand for centralised educational resources was substantial. All respondents selected case studies/scenarios as potentially useful content (13/13, 100%); 12/13 (92.3%) selected assessment and feedback tools; 11/13 (84.6%) selected lesson plans; 11/13 (84.6%) selected curriculum guidelines; and 9/13 (69.2%) selected recorded lectures or webinars. Free-text responses identified time constraints, multiple locations or systems, and difficulties locating specific resources.<sup>[7]</sup>

interest in forums, professional networking and resource-sharing functions through which educators could become more aware of colleagues and exchange teaching experience.<sup>[8]</sup>

#### Workload, accessibility and usability

Time was the most consistent practical barrier. Participants emphasised competing clinical and educational commitments. Some specifically indicated that they did not want another cumbersome application and instead valued an intuitive website, straightforward navigation, remote accessibility and reminders that would encourage return engagement.<sup>[8]</sup>

#### Mentorship and professional development

Participants described variable access to mentorship and particularly identified gaps in career-development guidance and progression within medical education. Structured mentorship, educator training, career opportunities, educational leadership and visibility of ongoing professional activity were perceived as potentially useful PCEH functions.<sup>[8]</sup>

#### Maintenance and governance

Participants also implicitly identified maintenance as part of usefulness. A platform containing outdated resources, lacking ownership, or containing a community in which few other educators participated would have reduced value regardless of technical functionality.<sup>[8]</sup> By contrast, dedicated wellbeing resources were not as consistently prioritised as resource access, peer support, professional connection or career development. This suggested that wellbeing should remain a possible outcome or support function without necessarily serving as the principal early success criterion for PCEH.

### 3.5 Mapping PCEH needs to candidate success criteria

Combining stakeholder evidence with the scoping-review findings allowed identified needs to be translated into measurable definitions of success.

Table 4. Mapping stakeholder needs to candidate PCEH success criteria

| Identified problem                     | Intended PCEH response               | Evidence that would indicate success                | Evaluation construct         |
|----------------------------------------|--------------------------------------|-----------------------------------------------------|------------------------------|
| Fragmented educational resources       | Centralised repository               | Relevant material is easier/faster to locate        | Usefulness; feasibility      |
| Duplicate preparation                  | Resource sharing                     | Reduced perceived duplication or preparation burden | Usefulness; efficiency       |
| Limited educator connection            | Professional community               | Increased awareness of and connection with peers    | Connectedness; effectiveness |
| Limited professional interaction       | Forum/networking                     | Repeated reading, posting, replying or sharing      | Engagement                   |
| Clinical and educational time pressure | Asynchronous digital access          | Platform use does not create unacceptable burden    | Feasibility                  |
| Difficult existing systems             | Simple accessible interface          | Core tasks can be completed readily                 | Ease of use; feasibility     |
| Mentorship/development gaps            | Mentorship and development functions | Improved access to relevant opportunities/support   | Usefulness; effectiveness    |
| Out-of-date information                | Content governance                   | Resources remain current and trusted                | Implementation; maintenance  |
| Risk of inactive community             | Facilitation and communication       | Recurrent community participation                   | Engagement; maintenance      |

This mapping revealed a hierarchy of indicators. For example, the number of resource views represents activity or output, whereas educators' ability to find the right resource more easily represents usefulness or outcome. Similarly, registration represents reach/adoption, repeated interaction represents engagement, and greater professional connectedness represents a professional outcome.

### 3.6 Outputs, outcomes and impact

The resulting PCEH logic model contained four progressively distal levels: outputs (registrations, account activation, log-ins, resource views, posts/replies, event registrations, mentorship participation); early implementation outcomes (ease of use, feasibility, acceptability, perceived usefulness, technical reliability); intermediate professional outcomes (easier resource access, reduced duplication of work, greater educator connectedness, improved access to mentorship/professional development, and stronger perceived professional support); and longer-term impact (a sustained professional community, continued professional-development activity, and possible contributions to educator development, educational quality, or retention).

The evidence synthesis therefore supported the distinction proposed during initial project discussions between outputs, outcomes and impact.<sup>[13]</sup> The longer-term tier should not be attributed directly to PCEH without further study because educator retention, wellbeing, and educational quality are influenced by multiple factors external to the platform.

### 3.7 Comparison of candidate evaluation frameworks

The evidence did not identify a single framework that directly addressed every PCEH requirement. RE-AIM offered the broadest overall evaluation architecture by examining Reach, Effectiveness, Adoption, Implementation and Maintenance.<sup>[32]</sup> Its principal advantage was its ability to prevent evaluation from stopping at individual user satisfaction and to include

participation, outcomes, implementation and sustainability; however, feasibility, acceptability and perceived usefulness are not explicit independent RE-AIM domains.

TAM directly addressed perceived usefulness and perceived ease of use, two constructs strongly aligned with both the literature and local stakeholder concerns.<sup>[34]</sup> Its limitation was its narrower focus on individual technology acceptance and correspondingly weaker coverage of population reach, organisational implementation and longer-term sustainability.

Proctor's Implementation Outcomes Framework distinguished outcomes including acceptability, adoption, appropriateness, feasibility, fidelity, cost, penetration and sustainability.<sup>[15]</sup> This was particularly relevant because two of the present study's three central research constructs - acceptability and feasibility - are explicitly represented. Reilly et al demonstrated that implementation outcomes can be conceptually integrated with RE-AIM rather than necessarily used as a competing framework.<sup>[33]</sup>

NPT and CFIR were prominent in the broader digital-health implementation literature identified by Rouleau et al.<sup>[14]</sup> Their principal value for PCEH would be explanatory: understanding how and why the platform becomes embedded - or fails to become embedded - within organisational and professional routines. They were therefore considered particularly useful for later implementation analysis rather than as the principal early evaluation architecture.<sup>[38,39]</sup>

Educational models such as Kirkpatrick or Guskey remain potentially valuable for evaluating specific educational programmes delivered within PCEH, for example webinars, courses or mentorship programmes.<sup>[36,37]</sup> However, PCEH itself is broader than a discrete educational intervention; these models would not adequately capture platform reach, technology acceptance, community engagement and sustainability as a whole.

Table 5. Comparative fit of principal evaluation approaches to PCEH

| Framework / approach              | Reach / adoption | Feasibility | Acceptability         | Usefulness | Engagement | Outcomes               | Sustainability | Overall role                  |
|-----------------------------------|------------------|-------------|-----------------------|------------|------------|------------------------|----------------|-------------------------------|
| RE-AIM                            | Strong           | Partial     | Partial               | Partial    | Partial    | Strong                 | Strong         | Primary organising framework  |
| TAM                               | Partial          | Indirect    | Strong                | Strong     | Partial    | Limited                | Limited        | User/technology experience    |
| Implementation Outcomes Framework | Strong           | Strong      | Strong                | Partial    | Limited    | Limited                | Strong         | Implementation outcomes       |
| NPT                               | Partial          | Strong      | Partial               | Partial    | Partial    | Limited                | Strong         | Routine embedding             |
| CFIR                              | Partial          | Strong      | Partial               | Partial    | Limited    | Limited                | Strong         | Context/barriers/facilitators |
| Kirkpatrick/Guskey                | Limited          | Limited     | Reaction/satisfaction | Partial    | Limited    | Strong for educational | Limited        | Subprogramme evaluation       |

| Framework / approach | Reach / adoption | Feasibility | Acceptability | Usefulness | Engagement | Outcomes | Sustainability | Overall role |
|----------------------|------------------|-------------|---------------|------------|------------|----------|----------------|--------------|
|                      |                  |             |               |            |            | activity |                |              |

No framework alone provided complete and economical coverage.

### 3.8 Proposed PCEH evaluation framework

The synthesis therefore supported a hybrid but parsimonious model. RE-AIM was selected as the overarching structure because it links population reach with adoption, outcomes, implementation and maintenance.<sup>[32]</sup> Three explicit additions were required: engagement, feasibility/acceptability, and usefulness/ease of use.

Engagement was retained separately from adoption because the professional-community literature repeatedly showed that joining, returning, participating and benefiting are different states. Engagement should therefore include both active and

less visible behaviour, such as recurrent log-ins, resource access, return frequency, discussion views, posts/replies, resource contributions, event participation and mentorship interaction.

Feasibility and acceptability should be evaluated explicitly rather than inferred from use. The Implementation Outcomes Framework provides the conceptual basis, while brief validated measures such as the Feasibility of Intervention Measure (FIM) and Acceptability of Intervention Measure (AIM) can operationalise these constructs.<sup>[35]</sup> TAM-derived constructs provide a direct way to test whether PCEH helps educators perform valued professional tasks and whether the platform is sufficiently easy to use to justify continued engagement.<sup>[34]</sup>

## Proposed PCEH evaluation pathway

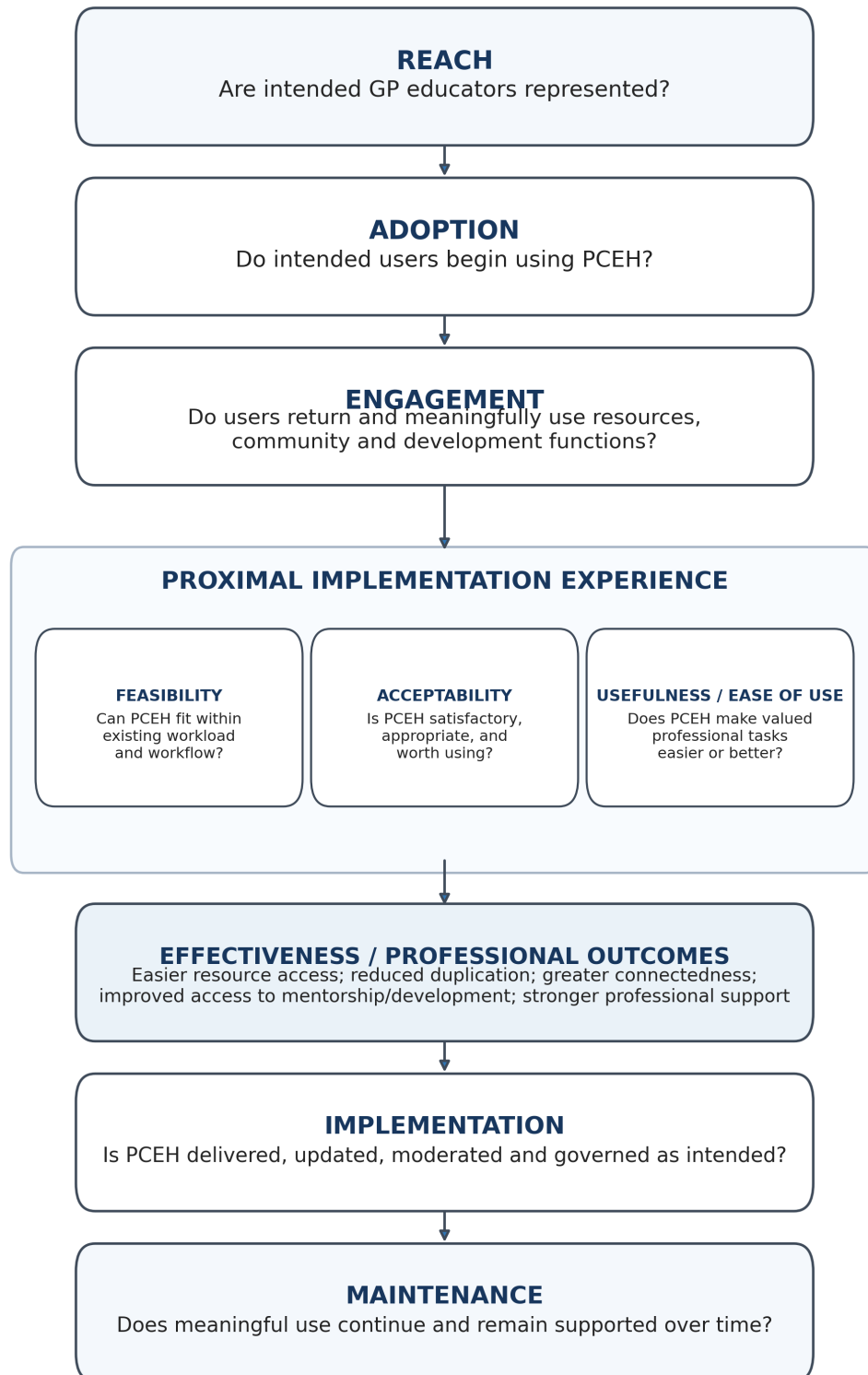


Figure 3. Proposed PCEH evaluation pathway. RE-AIM provides the overarching architecture, supplemented by explicit assessment of engagement, feasibility, acceptability, and usefulness/ease of use.

### 3.9 Operational evaluation matrix

The conceptual framework was translated into a staged measurement strategy suitable for PCEH's current early-development phase.

Table 6. Proposed measures for future PCEH evaluation

| Domain         | Main question                                 | Candidate measures                                                                              | Data source                         | Timing                      |
|----------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------|-----------------------------|
| Reach          | Who does PCEH reach?                          | Registration proportion; educator role/site/career stage                                        | Registration data                   | Launch onward               |
| Adoption       | Who starts using it?                          | Activation; first meaningful session; active-user proportion                                    | Analytics                           | 1-3 months                  |
| Engagement     | Is use recurrent and meaningful?              | Return visits; active days; resources accessed; forum activity; contributions                   | Analytics                           | Continuous                  |
| Feasibility    | Can PCEH fit into professional work?          | FIM; task completion; technical failures; time burden                                           | Survey/usability testing/interviews | Pilot and 1-3 months        |
| Acceptability  | Do educators value the intervention?          | AIM; satisfaction; intention to continue; willingness to recommend                              | Survey/interviews                   | Pilot, 3 and 6 months       |
| Usefulness     | Does it help educators?                       | Perceived usefulness; easier resource access; reduced duplication; networking/development value | TAM-derived items; interviews       | Pilot and 3-6 months        |
| Effectiveness  | Are intended professional outcomes occurring? | Connectedness; access to support; teaching confidence; development opportunities                | Repeated survey/interviews          | Baseline, 3-6 and 12 months |
| Implementation | Is PCEH delivered as intended?                | Content currency; feature availability; moderation; reliability; governance                     | Audit/admin data                    | Quarterly                   |
| Maintenance    | Does use persist?                             | Active users at 6/12 months; recurrent contributions; continued organisational support          | Analytics/interviews                | 6 and 12 months             |

For the immediate pilot involving a small number of senior academics, priority should therefore be placed on task completion, navigation, feasibility, acceptability and usefulness rather than attempting prematurely to demonstrate

effectiveness. The full evaluation sequence can be expressed as: Can they use it? -> Do they want to use it? -> Do they actually use it? -> Does it help them? -> Does meaningful use continue?

### References

1. World Health Organization. Health workforce. Accessed August 19, 2026. <https://www.who.int/health-topics/health-workforce>
2. Hodkinson A, Zhou A, Johnson J, et al. Associations of physician burnout with career engagement and quality of patient care: systematic review and meta-analysis. *BMJ*. 2022;378:e070442. doi:10.1136/bmj-2022-070442
3. NHS England. Educator Workforce Strategy. Published March 1, 2023. Updated May 15, 2026. Accessed August 19, 2026. <https://www.england.nhs.uk/long-read/educator-workforce-strategy/>
4. Department of Health and Social Care. Fit for the Future: 10 Year Health Plan for England. Published July 3, 2025. Updated July 30, 2025. Accessed August 19, 2026.
5. NHS England. Medium Term Planning Framework - Delivering Change Together 2026/27 to 2028/29. 2025. Accessed August 19, 2026.
6. General Medical Council. The state of medical education and practice in the UK: workplace experiences report 2025. 2025. Accessed August 19, 2026.
7. Primary Care Educators' Online Hub and App - Needs Assessment Survey. Microsoft Forms summary. Unpublished project data. August 18, 2026.
8. PCEH Focus Group 1 and Interviews 1-3. Unpublished formative stakeholder interview notes. January-February 2026.
9. Barnett S, Jones SC, Bennett S, Iverson D, Bonney A. General practice training and virtual communities of practice - a review of the literature. *BMC Fam Pract*. 2012;13:87. doi:10.1186/1471-2296-13-87
10. Koatz D, Torres-Castano A, Salrach-Arnau C, et al. Exploring value creation in a virtual community of practice: a framework analysis for knowledge and skills development among primary care professionals. *BMC Med Educ*. 2024;24:121. doi:10.1186/s12909-024-05061-6
11. Ramsden R, Pappas SJ, Rostas J, Islam MI, Martiniuk A, Guisard Y. Rural Health Pro - a digital platform connecting rural people, organisations, and communities. *Aust J Rural Health*. 2025;33(3):e70050. doi:10.1111/ajr.70050
12. Wang Y, Islam MI, Ramsden R, Guisard Y, Rostas J, Martiniuk ALC. Exploring the use and experience of a digital platform to support rural health professionals in Australia. *Rural Remote Health*. 2026;26:9926. doi:10.22605/RRH9926
13. Mostowfi Zadeh D. NHS England London Workforce, Training & Education Innovate-MD Fellowship: Educator Workforce Project Proposal. Unpublished project proposal. March 2025.
14. Rouleau G, Wu KL, Ramamoorthi K, et al. Mapping theories, models, and frameworks to evaluate digital health interventions: scoping review. *J Med Internet Res*. 2024;26:e51098. doi:10.2196/51098
15. Proctor E, Silmere H, Raghavan R, et al. Outcomes for implementation research: conceptual distinctions, measurement challenges, and research agenda. *Adm Policy Ment Health*. 2011;38(2):65-76. doi:10.1007/s10488-010-0319-7
16. Munn Z, Pollock D, Khalil H, et al. What are scoping reviews? Providing a formal definition of scoping reviews as a type of evidence synthesis. *JBIM Evid Synth*. 2022;20(4):950-952. doi:10.11124/JBIES-21-00483
17. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol*. 2005;8(1):19-32. doi:10.1080/1364557032000119616
18. Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. *Implement Sci*. 2010;5:69. doi:10.1186/1748-5908-5-69
19. Peters MDJ, Marnie C, Tricco AC, et al. Updated methodological guidance for the conduct of scoping reviews. *JBIM Evid Synth*. 2020;18(10):2119-2126. doi:10.11124/JBIES-20-00167
20. Tricco AC, Lillie E, Zarin W, et al. PRISMA extension for Scoping Reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med*. 2018;169(7):467-473. doi:10.7326/M18-0850
21. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res*. 2005;15(9):1277-1288. doi:10.1177/1049732305276687
22. Hamm MP, Chisholm A, Shulhan J, et al. Social media use by health care professionals and trainees: a scoping review. *Acad Med*. 2013;88(9):1376-1383. doi:10.1097/ACM.0B013E31829EB91C
23. Barnett S, Jones SC, Caton T, Iverson DC, Bennett S, Robinson L. Implementing a virtual community of practice for family physician training: a mixed-methods case study. *J Med Internet Res*. 2014;16(3):e83. doi:10.2196/jmir.3083

24. Rolls K, Hansen M, Jackson D, Elliott D. How health care professionals use social media to create virtual communities: an integrative review. *J Med Internet Res*. 2016;18(6):e166. doi:10.2196/jmir.5312
25. Chan WSY, Leung AYM. Use of social network sites for communication among health professionals: systematic review. *J Med Internet Res*. 2018;20(3):e117. doi:10.2196/jmir.8382
26. McLoughlin C, Patel KD, O'Callaghan T, Reeves S. The use of virtual communities of practice to improve interprofessional collaboration and education: findings from an integrated review. *J Interprof Care*. 2018;32(2):136-142. doi:10.1080/13561820.2017.1377692
27. Nicoll P, MacRury S, van Woerden HC, Smyth K. Evaluation of technology-enhanced learning programs for health care professionals: systematic review. *J Med Internet Res*. 2018;20(4):e131. doi:10.2196/jmir.9085
28. Guillaume D, Troncoso E, Duroseau B, Bluestone J, Fullerton J. Mobile-social learning for continuing professional development in low- and middle-income countries: integrative review. *JMIR Med Educ*. 2022;8(2):e32614. doi:10.2196/32614
29. Shaw L, Jazayeri D, Kiegaldie D, Morris ME. Implementation of virtual communities of practice in healthcare to improve capability and capacity: a 10-year scoping review. *Int J Environ Res Public Health*. 2022;19(13):7994. doi:10.3390/ijerph19137994
30. Lardier DT Jr, Dickson EL, Hackett JM, Verdezoto CS. A scoping review of existing research between 1990 and 2023: measuring virtual communities of practice across disciplines. *J Community Psychol*. 2024;52(1):198-225. doi:10.1002/jcop.23092
31. Appel E. Systematic literature review of usability and feasibility evaluation studies for mobile healthcare applications. Presented at: Medicine 2.0 Conference; 2014.
32. Glasgow RE, Harden SM, Gaglio B, et al. RE-AIM planning and evaluation framework: adapting to new science and practice with a 20-year review. *Front Public Health*. 2019;7:64. doi:10.3389/fpubh.2019.00064
33. Reilly KL, Kennedy SG, Porter GC, Estabrooks PA. Comparing, contrasting, and integrating dissemination and implementation outcomes included in the RE-AIM and Implementation Outcomes Frameworks. *Front Public Health*. 2020;8:430. doi:10.3389/fpubh.2020.00430
34. Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Q*. 1989;13(3):319-340. doi:10.2307/249008
35. Weiner BJ, Lewis CC, Stanick C, et al. Psychometric assessment of three newly developed implementation outcome measures. *Implement Sci*. 2017;12:108. doi:10.1186/s13012-017-0635-3
36. Guskey TR. Does it make a difference? Evaluating professional development. *Educ Leadersh*. 2002;59(6):45-51.
37. Yardley S, Dornan T. Kirkpatrick's levels and education 'evidence'. *Med Educ*. 2012;46(1):97-106. doi:10.1111/j.1365-2923.2011.04076.x
38. May C, Finch T. Implementing, embedding, and integrating practices: an outline of Normalization Process Theory. *Sociology*. 2009;43(3):535-554. doi:10.1177/0038038509103208
39. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement Sci*. 2009;4:50. doi:10.1186/1748-5908-4-50

## Appendix 1. Structured SciSpace search questions

1. Which peer-reviewed studies have evaluated digital professional platforms, online professional communities, or virtual communities of practice used by healthcare professionals or health professions educators, including outcomes such as feasibility, acceptability, usability, usefulness, engagement, adoption, implementation, professional development, or sustainability?
2. Which empirical peer-reviewed studies evaluated online or virtual communities of practice for physicians, general practitioners, primary care professionals, or health professions educators, and reported usability, usefulness, engagement, professional learning, communication, or implementation outcomes?
3. Which peer-reviewed empirical studies have evaluated digital learning hubs, professional support platforms, online discussion networks, or web-based communities for healthcare professionals or medical educators using measures of feasibility, acceptability, usability, usefulness, satisfaction, recommendation, engagement, or continued use?
4. Which peer-reviewed papers propose, apply, compare, or validate evaluation frameworks or measures relevant to feasibility, acceptability, perceived usefulness, engagement, implementation, and sustainability of digital health or healthcare professional platforms, including RE-AIM, technology acceptance models, implementation outcomes, normalization process theory, CFIR, and value creation frameworks?