Title
The Health Professions Education Pathway: Preparing Students, Residents, and Fellows to Become Future Educators

Permalink
https://escholarship.org/uc/item/1q18566w

Journal
Teaching and Learning in Medicine, 29(2)

ISSN
1040-1334

Authors
Chen, H Carrie
Wamsley, Maria A
Azzam, Amin
et al.

Publication Date
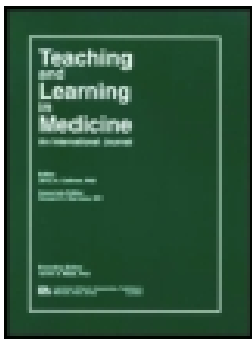2017-04-03

DOI
10.1080/10401334.2016.1230500

Peer reviewed

The Health Professions Education Pathway: Preparing Students, Residents, and Fellows to Become Future Educators

H. Carrie Chen, Maria A. Wamsley, Amin Azzam, Katherine Julian, David M. Irby & Patricia S. O'Sullivan

Published online: 04 Nov 2016.

Submit your article to this journal

View related articles

View Crossmark data

Routledge
Taylor & Francis Group

EDUCATIONAL CASE REPORT

The Health Professions Education Pathway: Preparing Students, Residents, and Fellows to Become Future Educators

H. Carrie Chen[a], Maria A. Wamsley[b], Amin Azzam[c], Katherine Julian[b], David M. Irby[d], and Patricia S. O'Sullivan[e]

[a]Department of Pediatrics, University of California, San Francisco School of Medicine, San Francisco, California, USA; [b]Division of General Internal Medicine, University of California, San Francisco School of Medicine, San Francisco, California, USA; [c]Department of Psychiatry, University of California, San Francisco School of Medicine, San Francisco, California, USA; [d]Department of Medicine and Center for Faculty Educators, University of California, San Francisco School of Medicine, San Francisco, California, USA; [e]Departments of Medicine and Surgery and the Center for Faculty Educators, University of California, San Francisco School of Medicine, San Francisco, California, USA

ABSTRACT

Problem: Training the next generation of health professionals requires leaders, innovators, and scholars in education. Although many medical schools and residencies offer education electives or tracks focused on developing teaching skills, these programs often omit educational innovation, scholarship, and leadership and are narrowly targeted to one level of learner. Intervention: The University of California San Francisco created the Health Professions Education Pathway for medical students, residents, and fellows as well as learners from other health professional schools. The Pathway applies the theoretical framework of communities of practice in its curricular design to promote learner identity formation as future health professions educators. It employs the strategies of *engagement, imagination*, and *alignment* for identity formation. Context: Through course requirements, learners *engage* and work with members of the educator community of practice to develop the knowledge and skills required to participate in the community. Pathway instructors are faculty members who model a breadth of educator careers to help learners *imagine* personal trajectories. Last, learners complete mentored education projects, adopting scholarly methods and ethics to *align* with the broader educator community of practice. Outcome: From 2009 to 2014, 117 learners participated in the Pathway. Program evaluations, graduate surveys, and web-based searches revealed positive impacts on learner career development. Learners gained knowledge and skills for continued *engagement* with the educator community of practice, confirmed their career aspirations (*imagination*), joined an educator-in-training community (*engagement/imagination*), and disseminated via scholarly meetings and peer-reviewed publications (*alignment*). Lessons Learned: Learners identified *engagement* with the learner community as the most powerful aspect of the Pathway; it provided peer support for *imagining* and navigating the development of their dual identities in the clinician and educator communities of practice. Also important for learner success was *alignment* of their projects with the goals of the local educator community of practice. Our community of practice approach to educator career development has shown promising early outcomes by nurturing learners' passion for teaching; expanding their interest in educational leadership, innovation, and scholarship; and focusing on their identity formation as future educators.

Introduction

Background

Advancing medical education and training the next generation of health professionals require not only teachers but educational leaders, innovators, and scholars. Although there are many programs to enhance *teacher* skills and the core teaching competencies[1–4] of medical students and residents, few programs focus on *educator* skills with expanded competencies[1–3,5,6] for scholarship, leadership, and innovation in health professions education (e.g., curriculum development/evaluation, learner assessment). Also, most existing programs target one level of learner (e.g., student or resident); few programs, if any, provide a curriculum for multiple levels of learners across the continuum and across professions.[7–14]

Furthermore, the career paths for health professions education leaders and scholars are not well developed or understood by learners or even junior faculty members, who often receive little guidance or formal preparation for their actual responsibilities.[15–17] This is in contrast to faculty paths to traditional research careers, which are well defined and contain relatively well-delineated training experiences including master's and doctoral degrees and

preparation through the research grant making process. O'Sullivan and colleagues have shown that visibility of career pathways, interaction with role models and mentors, and early exposure to research are among the key elements related to student interest in academic careers.[18] Their findings, supported by Lave and Wenger's communities of practice (CoP) framework,[19–21] emphasize the importance of learners interacting and identifying with educator role models in their education work.

To prepare students, residents, and fellows for a breadth of scholarly careers in medical education, the University of California San Francisco (UCSF) applied the CoP framework in developing the Health Professions Education (HPE) Pathway as part of a larger scholarly concentrations program.[22] The HPE Pathway aims to invite learners into the health professions education CoP, make *educator* career paths visible through interactions with educator role models and mentors, and provide learners with the skills required to pursue them. The HPE Pathway curriculum emphasizes *educator* abilities to apply theory to education practice, engage in education scholarship, and serve as consultants to others on education issues.[5] The HPE Pathway is also unique among other scholarly concentration programs in that it welcomes medical students, residents, fellows, and learners from other health professional schools on the UCSF campus (dentistry, nursing, pharmacy, and physical therapy).[22,23] In this article, we describe the HPE Pathway program development, curriculum, and initial program outcomes by focusing on the pathway's CoP approach to supporting the professional identity formation and career development of participants as future educators.

Communities of practice framework

Lave and Wenger first introduced the CoP framework in describing learning in the workplace. In contrast to earlier perspectives of learning as knowledge acquisition, they described learning as participation in activities situated within a CoP and where learning arises from meaningful contributions to the CoP. A CoP is a group, such as health professions educators, who share and work toward a common goal and develop a shared repertoire of common language, knowledge, beliefs, values, stories, and practices to achieve that goal.[19,20] This framework has been applied in education in general to professional development and to the design of learning opportunities.[21,24–26] In health care, it has been used to understand the experiences of medical students, residents, health professionals, and clinical teachers.[27–35]

Wenger has advanced the CoP framework to focus on the concept of learning as identity formation—the production of an identity or the becoming of a certain person.[20,21,36] Here, learning is a journey through multiple CoPs with identification or disidentification with specific CoPs.[36] For instance, a learner may come to identify with surgeons and educators and disidentify with pediatricians and biomedical researchers during her journey through medical training. Wenger further specified that learners identify with a CoP through three modes: engagement, imagination, and alignment. *Engagement* is the direct experience of the activities of the CoP, allowing development of an identity of participation. *Imagination* is the construction of an image of the community and community membership through role models and stories to help learners interpret their participation and understand how or whether they belong. *Alignment* is the identification with and placement within the context of the community. This includes application and adoption of the methods and codes of the community and coordination of activities to contribute to the broader community such as that of an organization or field.[20,21,36] The three modes are distinct and work most effectively in combination.[36]

HPE pathway program

Pathway development

Prior to the creation of the HPE Pathway, UCSF's School of Medicine had a Medical Education Area of Concentration consisting of elective additional training for senior medical students interested in exploring medical education.[22] The Department of Medicine had an entirely separate Medical Education Area of Distinction for residents.[37] Both primarily focused on developing core teaching competencies of learners and required completion of a curricular project.[22,37] A 1-year planning process resulted in a consensus vision for a unified program and learner community across undergraduate and graduate medical education and health professional schools with an increased emphasis on professional identity formation and development not just as clinician teachers but clinician educators.

Admissions

Prior to matriculation into the program, students, residents, and fellows learn about the Pathway via orientation sessions, a website, learner LISTSERVs, and learner newsletters. In addition, HPE leadership informs residency and fellowship program directors about the program. Learners may apply anytime during their training, but typically health professions students apply prior to their final curricular year, residents apply after their 1st year, and fellows apply prior to matriculation. In their

application, learners include a personal statement and proposed project idea(s) and must obtain the support of appropriate program leadership (dean's office or residency/fellowship program director). Because emphasis is on identity formation and entry into the health professions education CoP, participants are selected based on their expressed interest, career plans, and rationale for pursuing the HPE Pathway. We aim to accept all applicants who meet these criteria and have turned down only a handful of learners due to weak interest or rationale. Although not used in selection, we request that learners submit project ideas so that we may ascertain areas of interest, work with them to shape ideas early in the process for improved fit with existing projects or needs, and help identify appropriate mentors.

Curriculum

The goal of the HPE Pathway is to educate and promote the professional identity formation of learners (students, residents, and fellows) as educators who will shape the future of health professions education. Therefore the primary curricular strategy for knowledge and skill attainment is to bring all learners into the health professions education CoP through engaging them in the work of the community. The health professions education CoP comprises members of the UCSF Academy of Medical Educators[38] and educational researchers in the Center for Faculty Educators, as well as other teachers, curriculum developers, educational leaders, and educational scholars from the various health professional schools whose primary identity is as an educator. Learners complete coursework taught by members of this community, undertake a mentored scholarly project in health professions education, and obtain teaching experience within the curriculum.

To accommodate learners' varying interests and career goals/trajectories, the HPE Pathway has two tiers. The core tier, initiated in 2009, is designed for the typical learner who identifies an interest in teaching and wants to explore health professions education. It aims to expand learners' definitions of education beyond teaching and to develop educators who can translate educational theory and instructional strategies to the clinical and classroom learning environments. Curricular focus is on pedagogy, curriculum development, learning theory, technology, and a scholarly approach to education. It includes a core course, a project, a teaching requirement, and participation in works-in-progress sessions.

The advanced tier, introduced 3 years later in 2012, is intended for learners desiring further depth in anticipation of careers as educational leaders and scholars. It aims to develop educators who can advance knowledge in health professions education and lead educational innovations that transform education and practice. The advanced tier includes all requirements of the core tier plus courses on assessment and leadership, and participation in additional educational scholarship sessions. In addition, learners may choose to pursue further training by matriculating into the masters of arts in education program at University of California Berkeley either after completion of or concurrent with their enrollment in the advanced tier, receiving credit toward their master's degree for HPE Pathway coursework. Table 1 summarizes the program content, instructional formats, competencies, sample educational strategies, and learner assessments for the two tiers.

All learners belong to the same learning community and participate in the core curricula and activities, with a small subset engaging in additional advanced tier curricula. Both tiers are available to learners at all training levels. Choice of tier is based on learner interest and previous experience rather than learner level; for instance, a fellow with a newfound interest in education may opt for the core tier, whereas a student who had previously been a schoolteacher may opt for the advanced tier.

Application of the CoP framework

We further describe curricular elements of the program by highlighting how they are structured for *engagement, imagination*, and *alignment* to promote the formation of learner identities as future educators.

Engagement. The core course emphasizes the key knowledge, methods, and procedures learners need to engage in the work of the health professions education CoP. Table 2 provides course content areas and contact hours. The annual 1-month course is full-time, such that all learners engage with one another and develop their community of future educators. All course sessions include activities where learners work with one another and faculty members from the educator CoP to develop competencies and create education artifacts. For instance, learners acquire skills in curriculum development by helping a CoP member address a real curricular need. They work in teams, partnered with a faculty member, to generate needed products (e.g., curricular objectives, assessment tool, etc.) that are then adopted/ implemented by the educator CoP. After the course, learners are required to apply learned teaching strategies by assuming the CoP role of direct teacher. Teaching activities include one or more of the following: large- and small-group classroom teaching, skills teaching in the skills and simulation centers, and clinical precepting/

Table 1. Description of HPE pathway curriculum.

Program Content	Format	Competencies	Sample Educational Strategies	Learner Assessment
Core Tier				
Pedagogy	• Didactics • Workshops	• Deliver a teaching session that incorporates an evidence-based and learner-centered approach, and demonstrates flexibility in the use of teaching strategies appropriate to the learning objectives and context.	• Seminars on classroom and clinical teaching strategies with active practice (e.g. giving lectures, using the one-minute preceptor, giving feedback) • Sessions on group dynamics with hands-on exercises (e.g. working in teams, managing challenging small groups) • Required teaching in a course in any UCSF health professions education program	• End of course exam • Demonstration of each type of teaching – large group, small group, and procedural – with faculty and peer evaluation and feedback
Curriculum Development	• Didactics • Experiential	• Develop instructional modules that address an identified problem, meet the needs of learners, have clearly articulated goals and objectives, use teaching strategies which match those goals and objectives, and can be successfully implemented.	• Sessions with sample exercises drawn from learner projects or actual curriculum and hands-on practice (e.g. developing a plan for needs assessment or course evaluation, writing objectives, game matching educational strategies to objectives) • Team consultations for actual curricular projects	• End of course exam • Completed needs assessment, goals/objectives and/or evaluation of actual curricular project • Team consultation project product and presentation with faculty and peer evaluation and feedback
Learning Theory	• Didactics • Applications and reflections	• Utilize learning theory as a conceptual framework for the design of curriculum, instruction and for educational evaluation and research.	• Field observations and written reflections of learning activities (e.g. observation of different levels of learners on bedside rounds) • Written reflections of personal learning experiences, critical incidents • Class discussion and debate	• End of course exam • Completed written reports, in class discussions and critical reflections
Scholarship	• Monthly works in progress • Mentored project	• Disseminate best practices, curricular products, and/or original research findings employing ethical scholarship principles.	• Case-based discussion of scholarship/ dissemination rules and etiquette • Interactive sessions with skills practice (e.g. submitting IRBs, designing project proposals, writing abstracts, designing posters) • Individual mentored projects	• Project product that contributes to curriculum or to knowledge • Dissemination of scholarly project (abstract submission and poster/oral presentation) at local symposium and/or regional or national conferences, and/or publication of article
Advanced Tier (includes Core Tier elements above and additional elements below)				
Assessment	• Workshops • Independent study	• Develop and/or advocate for the use of learner assessment tools that are: grounded in educational measurement theory; designed according to assessment principles; takes into account feasibility and consequences of assessment; and are appropriate for the knowledge, skills, or attitudes being assessed.	• Interactive workshops (e.g. writing multiple choice questions, developing standardized patient format exam, designing rating scale) • Required independent readings and written assignments • Evaluation of learner assessment tool and current controversies in assessment • Interview of course director regarding assessment tool • Review and reflection on peer assignments	• Development and peer evaluation of an standardized patient format exam • Development and validity checking of a performance rating scale • Written reports evaluating assessment tools and addressing current controversies in assessment • Final written reflection of lessons learned and plans for future application

Domain	Methods	Objectives	Learning activities	Assessment
Leadership	• Seminars • Independent study	• Demonstrate leadership skills and advocate for quality health professions education via participation and/or leadership on committees and other venues.	• Required independent readings and written assignments • Interview of educational leader • Observation of educational committee • Review and critique of peer assignments	• Written analytical reflections on readings addressing organizational structure and curricular change • Written reflective reports of interview with educational leader and observation of educational committee • Critique of peer assignments and summary report of learning • Attendance and participation
Research	• Monthly medical education journal club; weekly educational scholarship conference	• Review articles related to research and best practices in education, so as to translate educational theory and strategies to health professions education environments. • Critique scholarly work of others	• Systematic approach to reviewing current medical education literature with application to local educational context • Review and critique of faculty scholarly education projects and research	

Table 2. Core course on teaching strategies and curriculum development.

Topics	Number of Hours
Teaching strategies: classroom and clinical	29 hours (including 6 hours of procedural and large group teaching practice)
Curriculum development	10 hours plus curriculum development project in learner teams
Learning Theories	8 hours
Scholarly project	11.5 hours
Identity formation and career development	4.5 hours
Introduction to assessment	3 hours
Introduction to educational leadership	4 hours

bedside teaching for the range of educational programs within the UCSF health professional schools.

Additional courses for the advanced tier (assessment and leadership) are longitudinal, spanning the academic year, and use asynchronous and synchronous teaching/learning strategies to accommodate the patient care responsibilities and schedules of the learners. Asynchronous self-study assignments require independent engagement with the CoP through activities such as faculty educator interviews and participation in curriculum committee meetings. Synchronous activities promote continued learner engagement with one another and include participation in existing faculty development workshops to foster engagement with the larger community of faculty educators. In addition, the advanced tier invites deeper learner engagement with the educator CoP through their regular participation in a monthly faculty health professions education journal club and a weekly faculty education scholarship conference.

Imagination. With attention to the importance of imagination for identity formation, we purposefully involve diverse faculty educators to provide a variety of role models. Instructors include clinician-educators, faculty members with advanced degrees in basic sciences and education, and leaders in educational administration. Our learners interact with educators representing a breadth of education career trajectories from a variety of disciplines and professions. Most sessions include instructor pairs so that learners view a range of perspectives and teaching styles. Pairs often include junior faculty members, many of whom are HPE Pathway alumni. This offers learners access to proximal role models while providing a career development opportunity for the junior faculty members.

The core course includes specific sessions devoted to career development of health professions educators. Clinician educators from within and outside the institution, representing academic and nonacademic careers, share stories to make visible and help learners imagine future identities in health professions education. We hold open discussions to address planning of next steps in clinical training, additional training in education, evaluation of job opportunities, and types of clinician-educator careers. Specific consideration is given to the challenges, approaches/strategies, and successful examples of integrating one's educator and clinician identities. Senior learners serve as role models for the junior learners, sharing how they have integrated being an educator into their clinical identity.

As noted in the engagement activities just described, the advanced curriculum brings learners into further contact with educators who have careers prominently defined by educational leadership and scholarship. For instance, learners query course/program directors about assessment choices, observe committee chairs in curriculum meetings, and interview leaders such as associate deans about their career paths. During required educational scholarship sessions, they sit alongside faculty scholars and researchers to participate in scholarly discourse including critiques of the literature and faculty projects.

Alignment. Through their projects, learners align with the larger health professions education community by applying skills and scholarship etiquette/ethics learned in the core course to advance education. Learners may self-identify a project or choose from a list of projects submitted by UCSF educators. Projects include formal needs assessments, curriculum development, tools for learner assessment, program evaluation, and educational research. Table 3 lists sample projects. The scope of the project varies depending on learner availability, but projects are expected to entail a minimum of 3 months of work, demonstrate robust scholarly approach (e.g., grounded in the literature, appropriate conceptual framework), and be finished by spring of their program completion year. The product from the project should meet a curricular need or add to the knowledge of the field. Learners work with a primary project mentor from the health professions education CoP and are assigned a comentor from the HPE Pathway to provide further educational expertise as needed. Each learner also has access to an educational research faculty member for advanced consultation.

Monthly evening Works-in-Progress (WIP) seminars bring together learners in both the core and advanced tiers for collective problem solving. In these group meetings with core HPE faculty members, learners discuss the progress of their projects and receive feedback from faculty and peer members of the education CoP. These sessions also address relevant topics such as project funding, Institutional Review Board approval, and project dissemination. Advanced tier learners are encouraged

Table 3. Sample of completed scholarly projects.

Project Title	Project Type	Learner Level
Targeted needs assessment of pediatric critical care fellows in bedside ultrasound application	needs assessment	resident
Improving emergency medicine resident efficiency: is this a skill that can be taught?	needs assessment	fellow
An interactive mobile curriculum for teaching the hypothesis driven neurological examination	curriculum development	student
Geriward falls: an interprofessional team-based curriculum on falls assessment and prevention in the hospitalized older adult	curriculum development	resident
Developing an interprofessional team-based observed structured clinical exam (ITOSCE) to evaluate patient-centeredness	learner assessment tool	student
Feasibility of patient-initiated feedback to inform resident performance on ED wound closure	learner assessment tool	resident
Adding students adds value: first-year students as health coaches	program evaluation	student
Use of racial and ethnic identifiers in the clinical clerkship curriculum	program evaluation	student
Emotional state during active versus observational roles in simulation learning	educational research	resident
Resident physician perceptions of interprofessional feedback	educational research	fellow

to further align with and apply their WIP skills to the weekly educational scholarship conferences, which are WIP sessions for the institution's educational scholars.

All learners are expected to present their projects in oral or poster format at a local annual symposium. To promote alignment with the broader health professions education CoP, learners are encouraged to disseminate their projects in additional venues such as regional or national meetings, peer-reviewed journals, and/or curriculum repositories (e.g., MedEdPortal).

HPE program outcomes

All data gathered, analyzed, and reported for program evaluation were approved by the UCSF Institutional Review Board.

Enrollment and completion

From its inception in fall 2009 to the end of the 2013–2014 academic year, the HPE Pathway grew 44.4% and enrolled 117 learners. Of the 117 learners, 10 (8.5%) are still in progress, and 71 of the remaining 107 (66.4%) have completed the Pathway with completion rates in recent years rising above 80%. Of the 71 who completed the Pathway, five (7.0%) completed the advanced tier and two (2.8%) have obtained a master's degree in education. Learners who completed the advanced tier include medical students and fellows; the limited number reflects the additional time commitment required and the tier's availability only since fall 2012. Both of the learners who completed master's degrees were fellows who incorporated the master's into their fellowship training. Table 4 provides additional enrollment information by categories of learner.

Program evaluation and learner feedback

Fifty-one of the 71 (71.8%) participants who completed the pathway responded to the end-of-program evaluation administered by the UCSF Pathways to Discovery Program. They rated their satisfaction with different aspects of the Pathway using a scale of 1 to 5 (1 = poor/strongly disagree, 5 = excellent/strongly agree) and provided optional comments in an open text box. We report mean overall satisfaction ratings in aggregate for the five years of the program and representative comments from a thematic review of all submitted comments.

The overall HPE Pathway program ratings are high, having improved over the years as a result of an ongoing and intensive quality improvement strategy. Important to note, of all evaluation questions, learners rated most highly (4.30, $SD = 0.72$) the statement "Pathway participation had a positive impact on my career development." See Table 5. This is supported by learner comments that identified three areas of strength. The most frequent comments pertained to professional development, including "It was extremely valuable for my career, it has positively affected my opportunities in medicine, and

Table 4. HPE pathway enrollment and completion.

	Enrolled[1]	In Progress	Completed[2]
Medical Students	51	0	45 (88.2%)
Medical Residents[3]	49	9	22 (55.0%)
Medical Fellows[3]	11	1	8 (80.0%)
Other HPE Learners[4]	6	0	4 (66.7%)
Total	117	10	71 (66.4%)

[1] Some (occasional UME and most GME) learners take 2 or more years to complete the Pathway, so may be enrolled for multiple years. Only new enrollees are counted.

[2] Completion rates/percents calculated using denominator of number of enrolled minus those still in progress

[3] From eight different departments in the School of Medicine: anesthesia, emergency medicine, family and community medicine, medicine, neurology, obstetrics and gynecology, pediatrics, and psychiatry

[4] Students and residents from the Schools of Dentistry and Pharmacy

Table 5. HPE pathway ratings from a pathways-wide survey.

QUESTION	Total N	Range of Yearly Mean Ratings[1]	Mean (SD) Ratings Across 5 Years
Overall quality of experience with pathway	51	3.43 – 4.45	4.18 (0.74)
I disseminated my work outside UCSF[2]	49	3.29 – 4.45	4.02 (1.39)
I would recommend the pathway to future students/residents	51	3.43 – 4.91	4.29 (0.97)
Pathway participation had a positive impact on my career development	40	4.00 – 4.91	4.30 (0.72)

[1] Items rated from 1 (poor/strongly disagree) to 5 (excellent/strongly agree)
[2] While arguably a dichotomous item, it was administered by the institution using the 5-point scale, so data is only available in this format.

has allowed me to explore my interest in medical education research" and "I intend on implementing techniques learned throughout residency and beyond." Learners also often pointed out their interactions with program faculty members and mentors as one of the most positive aspects of their Pathway experience, declaring "my mentors were exceptional." Finally, many highlighted interactions with peers, citing "peer feedback at the WIP sessions" and "face-to-face sessions" as best practices. Constructive comments focused on suggested improvements to logistics and curricular content, increasing interactions with fellow learners, and expanding career focus beyond academic medicine. We addressed each of these concerns as the program evolved over time, including the development of our two-tiered program model.

Early learner outcomes

We used two approaches to assess the contribution of the HPE Pathway to learner career development. First, to capture evidence of impact on identity formation through *engagement* and *imagination*, we queried by e-mail, a sample of program graduates in the spring of 2014 using a three-item free response survey. Second, looking for specific evidence related to *alignment* with the broader health professions education CoP, we conducted a web-based search to determine if graduates disseminated their project.

We conducted the e-mail survey using a qualitative approach to complement the available quantitative evaluation data. We aimed for a narrative survey of a sample of learners to elicit more in-depth responses and allow for better understanding of the program impact on learners. We used maximum variability purposive sampling from our base population of 71 graduates to ensure that we included learners with diverse roles at the time of enrollment (medical students, residents, fellows, or

dental and pharmacy students/residents), from both the core and advanced tiers, and who participated at different times (completion years ranged from 2010 to 2013). Learners were invited to respond to three items: (a) Did your participation in the HPE Pathway program influence your career choice? (b) Did any specific aspect of being in the HPE Pathway influence your decision to pursue your current position the most? (c) Looking back now, how valuable was your participation in the HPE Pathway to your overall career development? Eleven of the 12 graduates invited, completed the survey. One author (AA) analyzed the responses for key themes using conventional content analysis[39] and organized the data by themes, which were then reviewed and endorsed by the remaining authors. We reached saturation within our sample, suggesting that our sample was sufficient.

Graduates of the program described positive impacts on their career development related to the modes of identity formation (*engagement, imagination*, and *alignment*). Three key themes arose from the participant responses to our e-mail survey. First, participants described how the HPE Pathway exposed them to different aspects of education and confirmed their interest in pursuing a career as an educator (*imagination*). Second, they emphasized the importance of opportunities to build community with educators at various career stages, ranging from educators-in-training to experienced members of the institution's educator CoP (*engagement* and *imagination*). Finally, learners spoke of the knowledge and skills they acquired that will allow for continued participation in the educator CoP (*engagement*). Table 6 shows these themes and representative quotes from the survey.

Of the 71 participants who completed the HPE Pathway, all presented at a local conference. In addition, 22 (31.0%) participants presented at a regional meeting, 16 (22.5%) at a national meeting, and three (4.2%) at an international meeting; 13 (18.3%) had peer-reviewed publications from their projects (*alignment*). Because not all conference abstracts would be captured by our web-based search and publications may be time delayed, it is possible that our numbers may be an underestimation.

Community of practice involvement

Approximately 30 faculty members from the health professions education CoP teach in the courses each year and, depending on the year, between one half and two thirds are returning instructors. Since the program's inception, 61 faculty members have served as project mentors, and 21 of these faculty mentors have mentored more than one project. The pathway director and one codirector are educational leaders with active clinical

Table 6. Themes from email survey of HPE pathway graduates.

Key Themes	Exemplar Quotes
Confirmation of career aspirations/trajectory	• This program was also an influence in my choosing UCSF as a residency because I knew I was interested in having a role in education in my future and I thought that this program was a great way to get the introductory training necessary to succeed. (*core tier learner*) • …it did influence my decision to pursue medical education as a strong component of my career - it pushed me to pursue additional training in Med Ed (Masters in Education at Berkeley) and sparked an interested in educational research that I did not know I had! (*advanced tier learner*)
Community/Networking with other educators and educators-in-training	• I think that the most beneficial part of the pathway was meeting like-minded people, hearing about other projects that are going on in medical education, and developing mentorship relationships. These have been invaluable and my mentors have really helped me grow and develop professionally - both in terms of career guidance as well as skills/project guidance. (*core tier learner*) • The most significant impact of HPE would probably be the interactions with HPE course leadership. Their mentorship and guidance has continued to be a significant force in my professional life. (*advanced tier learner*)
New knowledge and skills as an educator	• The Pathway has not only given me the tools to become a clinical educator, but also opened my eyes to education research and development. (*core tier learner*) • I think that if a person has an interest in becoming an educator there are certain fundamental concepts in learning that one should be familiar with. Without the HPE pathway, I would have never been formally exposed to those concepts and had a chance to think about them critically and practice their use. I think that for sure I am a far more well-rounded individual in regards to being an asset to a future academic program having had this training. (*core tier learner*)

practices. Two additional codirectors are educational researchers. All teach in the courses and mentor projects.

Lessons learned

One of the biggest challenges we faced was with learner scheduling and time constraints, particularly with residents. Students and fellows were typically able to complete the core tier over the course of an academic year and the advanced tier over 1–2 years. In contrast, due to their busier and less flexible clinical schedules, all but three residents have taken 2–3 years to complete the core tier, and none have completed the advanced tier. The vast majority of noncompleters encountered logistical constraints that prevented them from engaging to the depth necessary to finish the required coursework or project. Noncompletion was more pronounced during the early years of the program when there was only one tier that included coursework spread throughout the academic year. In response to resident scheduling challenges, we consolidated coursework, merging curricula such as learning theory into the core course so residents needed to take only 1 elective month from their clinical schedules and use evening/weekend time for project work and WIP attendance. We moved most of the assessment and leadership coursework from the core tier and increased activities in educational scholarship to create an advanced tier for learners with interest and time flexibility. Finally, we added preapplication meetings to clarify program expectations and ensure appropriate motivation, provided suggested interim deadlines to help pace learners, increased project oversight with regular check-ins with learners and mentors, and strengthened project mentorship. This has resulted in improved completion rates in recent

years. Of note, there were a handful of learners who voluntarily withdrew after identity exploration during the core course led them to determine that although they enjoyed teaching, they did not wish to become clinician educators. At the same time, some noncompleters identified as educators despite inability to finish the pathway.

Including learners from outside the School of Medicine has been more difficult than anticipated due to the different academic calendars used by the individual professional schools. Institutions where professional schools are on a shared quarter/semester schedule may be more successful. In all instances where we successfully incorporated other health professional learners, the learners themselves took the initiative to work with the mentors and educational leaders in their schools to solve the scheduling challenges.

We highlight additional lessons learned through the lens of engagement, imagination, and alignment with the health professions education CoP.

Engagement

Although we built the HPE Pathway with primary attention to engaging learners in the educator CoP, both learners and faculty members identified the most powerful aspect of the HPE Pathway as learner involvement with one another to create a learning community. A similar effect was described by Cantillon et al. in their study of clinician teachers, where entry-level members of the CoP bond to form a less threatening peer group within the larger clinician teacher CoP.[27] Learners consistently comment that one of the greatest benefits of the HPE pathway is that it allows them to engage with and belong to a learning community representing a broad array of

colleagues who are developing and practicing their skills in health professions education. Due to the hierarchical relationship among students, residents, and fellows in the clinical environment, concerns were raised about safety in discussing topics such as feedback. Although we have considered creating subgroups by learner level for certain portions of the curriculum, the majority of learners advocated for maintaining the diversity of the learning community throughout all curricular activities. Students remark on the positive impact of learning from students from other professional schools, as well as residents and fellows. Residents and fellows are able to share experiences from their own training at diverse medical schools and appreciate the ability to compare and contrast their graduate medical education experiences across the different specialties. As faculty members, we observe with delight the development of this community and the learning that occurs from peer-to-peer and near-peer interactions across levels of learners and across disciplines and professions.

With this diversity of learners, we purposefully built flexibility into course structures to accommodate learners with clinical rotations, in particular residents and fellows. The longitudinal assessment and leadership courses blend online learning with face-to-face sessions, using technology to connect learners at remote locations. We learned to maximize learner interaction with the material and with each other by creating assignments that require (a) learners to connect content and theory to their own personal experiences, as well as those posted by their peers, and (b) commentary and reflection on how work submitted by peers influences their understanding of the material. For instance, all assignments in the leadership course are reviewed with peer feedback, and learners in the assessment course are required to read peer assignments on topics different than their own and summarize what they have learned from both their own work and the work of others.

Imagination

Beyond the ability to engage with one another around the work of the educator CoP, the learning community creates opportunities for learners to help one another navigate their participation in the CoP and their identity formation as future clinician educators. The identity of a clinician educator involves negotiating memberships in both the clinician and educator CoPs, and crossing boundaries between what may be seen as noncomplementary communities. This can lead to tensions[24,36,40–43] and be particularly challenging for learners from, or aspiring to, clinical specialties with few local clinician educator role models. Authors have argued for explicit attention to and support of learners in their identity

negotiations at these boundaries.[41,42] Although we deliberately provide models of faculty members who successfully inhabit these two communities, Cantillon et al.'s study and others suggest that learners may need continuing access to and support from peers and near peers who are all actively navigating the development of their dual identities.[36,41] This may in part explain the importance of the learning community and learners' request for ongoing in-person meetings with one another.

One challenge has been to identify and involve clinician educators from the other health professions to serve as role models and mentors. The other heath professional schools at UCSF have significantly fewer faculty members, and most do not interact with those from the medical school. Fortunately, with increasing attention to interprofessional collaboration, the medical school's faculty development programs and the Academy of Medical Educators have become interprofessional, allowing easier identification of educators from the other health professions. Regardless of the faculty members' affiliations, we have had to work with all teachers in the courses on how to deliver the curriculum and provide examples from the other professions.

Alignment

Learners often want freedom to choose projects, and sometimes the chosen projects may not align with or contribute to the work of the local health professions education CoP. This can result in learners having more peripheral participation in the CoP and often less viable projects. Over time, we have found that the most successful projects involve connecting learners with mentors who are strongly identified with the health professions education CoP, have education expertise, and either offer established projects or are able to align the learner projects with the goals and needs of the local education CoP and institution.

Conclusion

The UCSF HPE Pathway provides a robust example of employing a CoP framework to developing health professions educators. It nurtures learners' early passions for teaching, evolves their interest as educators, and focuses on identity formation and career development to provide a vision and path for them as future educators. All learner experiences are situated within the health professions education CoP, and the program addresses important elements required for identity formation and professional development, including opportunities for engagement, imagination, and alignment. Wenger argued that learning is not just the transactional acquisition of knowledge or skills, it is becoming a certain person, and that exposure to

paradigmatic role models may be the most influential factor in shaping the learning and identity formation of learners.[20,21] The HPE Pathway makes visible the educator CoP, from its members to its varying opportunities, and emphasizes educator roles beyond direct teaching. It invites learners to try on the identities of this CoP[44] and enables their identity formation as clinician educators who are prepared to be the future educational leaders, innovators, and scholars needed to train the next generation of health professionals.

Acknowledgments

References

1. Collins J. Teacher or educational scholar? They aren't the same. *Journal of the American College of Radiology* 2004;1:135–9.
2. Molenaar WM, Zanting A, van Beukelen P, de Grave W, Baane JA, Bustraan JA, et al. A framework of teaching competencies across the medical education continuum. *Medical Teacher* 2009;31:390–6.
3. Sachdeva AK, Cohen R, Dayton MT, Herbert JC, Jamieson C, Neumayer LA, et al. A new model for recognizing and rewarding the educational accomplishments of surgery faculty. *Academic Medicine* 1999;74:1278–87.
4. Srinivasan M, Li ST, Meyers FJ, Pratt DD, Collins JB, Braddock C, et al. "Teaching as a competency": competencies for medical educators. *Academic Medicine* 2011;86:1211–20.
5. Sherbino J, Frank JR, Snell L. Defining the key roles and competencies of the clinician–educator of the 21st Century: a national mixed-methods study. *Academic Medicine* 2014;89:783–9.
6. Simpson D, Fincher R-ME, Hafler JP, Irby DM, Richards BF, Rosenfeld GC, et al. Advancing educators and education by defining the components and evidence associated with educational scholarship. *Medical Education* 2007;41:1002–9.
7. Blanco MA, Maderer A, Oriel A, Epstein SK. How we launched a developmental student-as-teacher (SAT) program for all medical students. *Medical Teacher* 2014;36:385–9.
8. Blatt B, Plack M, Suzuki M, Arepalli S, Schroth S, Stagnaro-Green A. Introducing Medical Students to Careers in Medical Education: The Student Track at an Annual Medical Education Conference. *Academic Medicine* 2013;88:1095–8.
9. Heflin MT, Pinheiro S, Kaminetzky C p, Mcneill D. "So you want to be a clinician-educator…": Designing a clinician-educator curriculum for internal medicine residents. *Medical Teacher* 2009;31:e233–40.
10. Hill AG, Yu T-C, Barrow M, Hattie J. A systematic review of resident-as-teacher programmes. *Medical Education* 2009;43:1129–40.
11. Reamy BV, Williams PM, Wilson C, Goodie JL, Stephens MB. Who will be the faculty of the future? Results of a 5-year study growing educators using an immersive third postgraduate year (PGY-3) faculty development mini-fellowship. *Medical Teacher* 2012;34:e459–63.
12. Smith CC, McCormick I, Huang GC. The Clinician–Educator Track: Training Internal Medicine Residents as Clinician–Educators. *Academic Medicine* 2014;89:888–91.
13. Song C, Davis BJ, Lambert DR. The Medical Education Pathway: Description and Early Outcomes of a Student-as-Teacher Program. *Academic Medicine* 2015;90:458–61.
14. Soriano RP, Blatt B, Coplit L, CichoskiKelly E, Kosowicz L, Newman L, et al. Teaching medical students how to teach: a national survey of students-as-teachers programs in US medical schools. *Academic Medicine* 2010;85:1725–31.
15. Bartle E, Thistlethwaite J. Becoming a medical educator: motivation, socialisation and navigation. *BMC Medical Education* 2014;14:110.
16. Hu WCY, McColl GJ, Thistlethwaite JE, Schuwirth LWT, Wilkinson T. Where is the next generation of medical educators? *The Medical Journal of Australia* 2013;198:8–9.
17. Hu WCY, Thistlethwaite JE, Weller J, Gallego G, Monteith J, McColl GJ. "It was serendipity": a qualitative study of academic careers in medical education. *Medical Education* 2015;49:1124–36.
18. O'Sullivan PS, Niehaus B, Lockspeiser TM, Irby DM. Becoming an academic doctor: perceptions of scholarly careers. *Medical Education* 2009;43:335–41.
19. Lave J, Wenger E. *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge university press, 1991.
20. Wenger E. *Communities of practice: Learning, meaning, and identity*. Cambridge: Cambridge university press, 1999.
21. Wenger E. Communities of practice and social learning systems: the career of a concept. In C Blackmore (Ed.), *Social learning systems and communities of practice* (pp. 179–98). London: Springer, 2010.
22. Green EP, Borkan JM, Pross SH, Adler SR, Nothnagle M, Parsonnet J, et al. Encouraging scholarship: medical school programs to promote student inquiry beyond the traditional medical curriculum. *Academic Medicine* 2010;85:409–18.
23. Bierer SB, Chen HC. How to measure success: the impact of scholarly concentrations on students—a literature review. *Academic Medicine* 2010;85:438–52.
24. Andrew N, Ferguson D, Wilkie G, Corcoran T, Simpson L. Developing professional identity in nursing academics: the role of communities of practice. *Nurse Education Today* 2009;29:607–11.
25. Plack MM. The development of communication skills, interpersonal skills, and a professional identity within a community of practice. *Journal of Physical Therapy Education* 2006;20:37.
26. Sim C. Preparing for professional experiences – incorporating pre-service teachers as "communities of practice." *Teaching and Teacher Education* 2006;22:77–83.
27. Cantillon P, D'Eath M, de Grave W, Dornan T. How do clinicians become teachers? A communities of practice perspective. *Advances in Health Sciences Education* 2016;1–18.
28. Daly M, Roberts C, Kumar K, Perkins D. Longitudinal integrated rural placements: a social learning systems perspective. *Medical Education* 2013;47:352–61.

29. Dornan T, Boshuizen H, King N, Scherpbier A. Experienced-based learning: a model linking the processes and outcomes of medical students' workplace learning. *Medical Education* 2007;41:84–91.

30. Egan T, Jaye C. Communities of clinical practice: the social organization of clinical learning. *Health* 2009;13:107–25.

31. Gandamihardja TAK. The role of communities of practice in surgical education. *Journal of Surgical Education* 2014;71:645–9.

32. Jaye C, Egan T, Smith-Han K. Communities of clinical practice and normalizing technologies of self: learning to fit in on the surgical ward. *Anthropology and Medicine* 2010;17:59–73.

33. Mazel O, Ewen S. Innovations in indigenous health and medical education: the leaders in indigenous medical education (LIME) network as a community of practice. *Teaching and Learning in Medicine* 2015;27:314–328.

34. Sheehan D. Clinical learning within a community of practice framework. *Focus on Health Professional Education* 2011;12:1–16.

35. Strand P, Edgren G, Borna P, Lindgren S, Wichmann-Hansen G, Stalmeijer RE. Conceptions of how a learning or teaching curriculum, workplace culture and agency of individuals shape medical student learning and supervisory practices in the clinical workplace. *Advances in Health Sciences Education* 2015;20:531–57.

36. Wenger-Trayner E, Wenger-Trayner B. Learning in a landscape of practice: a framework. In E Wenger-Trayner, M Fenton-O'Creevy, S Hutchinson, C Kubiak, B Wenger-Trayner (Eds.), *Learning in landscapes of practice: boundaries, identity, and knowledgeability in practice-based learning.* (pp. 13–29). New York: Routledge, 2015.

37. Kohlwes RJ, Cornett P, Dandu M, Julian K, Vidyarthi A, Minichiello T, et al. Developing educators, investigators, and leaders during internal medicine residency: the area of distinction program. *Journal of Graduate Medical Education* 2011;3:535–40.

38. Cooke M, Irby D, Debas HT. The UCSF academy of medical educators. *Academic Medicine* 2003;78:666–72.

39. Hsieh H, Shannon SE. Three approaches to qualitative content analysis. *Qualitative Health Research* 2005;15:1277–88.

40. Akkerman SF, Bakker A. Boundary crossing and boundary objects. *Review of Educational Research* 2011;81:132–69.

41. Fenton-O'Creevy M, Brigham L, Jones S, Smith A. Students at the academic-workplace boundary: tourists and sojourners in practice-based education. In E Wenger-Trayner, M Fenton-O'Creevy, S Hutchinson, C Kubiak, B Wenger-Trayner (Eds.), *Learning in landscapes of practice: boundaries, identity, and knowledgeability in practice-based learning.* (pp. 43–63). New York: Routledge, 2015.

42. Fenton-O'Creevy M, Dimitriadis Y, Scobie G. Failure and resilience at boundaries: the emotional process of identity work. In E Wenger-Trayner, M Fenton-O'Creevy, S Hutchinson, C Kubiak, B Wenger-Trayner (Eds.), *Learning in landscapes of practice: boundaries, identity, and knowledgeability in practice-based learning.* (pp. 33–42). New York: Routledge, 2015.

43. Handley K, Sturdy A, Fincham R, Clark T. Within and beyond communities of practice: making sense of learning through participation, identity and practice. *Journal of Management Studies* 2006;43:641–53.

44. Ibarra H. Provisional selves: experimenting with image and identity in professional adaptation. *Administrative Science Quarterly* 1999;44:764–91.