Now We Are Ten: Evaluation of the Association of Pediatric Program Directors Longitudinal Educational Assessment Research Network (APPD LEARN)'s first decade

Alan Schwartz, PhD, Director, APPD LEARN

Beth King, MPP, Program Manager, APPD LEARN

Executive Summary

On the 10-year anniversary of the establishment of the Association of Pediatric Program Directors (APPD) Longitudinal Educational Assessment Research Network (LEARN), a program evaluation was conducted to assess LEARN's progress in achieving the mission of conducting meaningful educational research that advances the training of future Pediatricians.

Overall the evaluation paints a picture of an organization that has made a substantial contribution to medical education research on a national level. There are several potential areas for development and improvement as APPD makes strategic decisions for the future of this program

Key findings include:

➢ Most APPD member programs are members of APPD LEARN (148 of 201 at the time of this report)
➢ There is broad participation of APPD LEARN member programs in LEARN studies – with 114 out of 148 APPD LEARN programs participating in at least one study by 2018
➢ Published papers arising from APPD LEARN studies reflect high levels of scientific rigor, important outcomes, and good visibility, as assessed by validated tools
➢ Members of APPD LEARN have positive perceptions of the impact of the program, and most highly value participation in research that will impact training, access to expertise, and the ability to contribute to the authorship of publications and presentations
➢ APPD LEARN's primary method for professional development of APPD members is through the conduct of the studies themselves – including regular consultation on study design, implementation and analysis
➢ APPD LEARN's scope and influence have grown significantly since inception, including:
  o Reorganization in 2020 to incorporate the Subspecialty Pediatric Investigators' Network (SPIN) as a subnetwork, expanding LEARN's reach through the entire course of graduate medical education. The categorical pediatrics research network was rebranded as a subnetwork called APPD PRIME
  o Time commitment from Degnon staff growing from about half-time to one full-time equivalent
  o Collaborations with external partners (e.g. ABP, NBME, ACGME, COMSEP), enhancing LEARN's reputation outside of APPD and offsetting financial costs
  o Establishment of best practices and templates for multi-site educational research, including model language for Data Use Agreements, IRB protocols, and guidance for study group management and authorship

Areas for development and improvement:

➢ APPD as an organization may wish to consider some more formal research prioritization process to provide guidance to potential applicants and to encourage APPD LEARN to proactively develop studies in priority areas without waiting to react to a submission
➢ APPD LEARN infrastructure is not set up for collection of protected health information – but patient-level outcomes are at the forefront of high-value educational research. If this

becomes an area of interest, APPD LEARN will need to develop new standards and approaches

➢ APPD LEARN's Educational Development Committee (EDC) was formed as a reflection of the program's commitment of continual professional development of its members' knowledge and skills in educational research. However, APPD LEARN has not been able to effectively take advantage of the committee and it may be time to revisit APPD LEARN's strategy for achieving this part of its mission

➢ APPD LEARN's successes and potential as a membership benefit may not be as well-communicated to APPD members outside of presentations at annual meetings. APPD may consider new strategies for keeping members informed and engaged

Addressing the sustainability of the network should be central to planning APPD LEARN's next ten years of growth. This may include:

➢ Outreach to additional organizations that may be interested in partnering on studies relevant to medical training, or in learning how to establish their own educational research networks

➢ Exploring opportunities for expanding APPD LEARN's research portfolio and operational revenue through subnetworks or other enduring partnerships – as exemplified by the incorporation of APPD SPIN

➢ Naming a third individual as APPD PRIME Director

Through APPD LEARN, Pediatrics faculty with a passion for evidence-based education have been supported in working together on shared projects. They have, through this practice, improved the research process; they have, through this research, improved the education process. APPD LEARN has an important role to play in fostering this community into its second decade.

Background

History

In 2005-2006, the Association of Pediatric Program Directors (APPD) began a series of initiatives that would encourage collaboration, member career development, and educational research by APPD members, including Share Warehouse, Special Projects grants, and a mentoring program.[1] These initiatives inspired both substantive research questions (e.g. about the utility of shared materials) and methodological aspirations for collaborative educational research. Through strategic planning activities beginning in 2006 and incorporated into successive strategic plans, APPD began to define the idea of APPD LEARN as an educational (residency program-based) research network.[2]. During the same period, American Board of Pediatrics (ABP)'s four-year self-study of residency education, the Residency Review and Redesign Project (R^3P),[3] led the ABP to begin the Initiative for Innovation in Pediatric Education (IIPE) to foster and disseminate educational innovations in Pediatrics, with support from the ABP Foundation. IIPE governance included several APPD members, and matching funds from APPD's annual operating budget and the ABP Foundation were directed to support APPD LEARN from 2009-2012.[4]

APPD LEARN's first Director was Hilary Haftel, MD, MHPE, then-Program Director of the Pediatrics Residency Program at University of Michigan. By 2011, however, it had become clear that managing APPD LEARN required greater effort than was available from the director of a busy residency program, and Alan Schwartz, PhD, Professor in the Departments of Medical Education and Pediatrics at the University of Illinois at Chicago, who had served as a consultant to IIPE and APPD LEARN, became (and has remained) Director of the network, devoting 40% of his professional time to APPD. Since its inception, APPD LEARN has also been supported by a full-time project manager (originally Robin Young, MPH, currently Beth King, MPP), and more recently an additional part-time research assistant (Dennis West), all based at APPD's association management company, Degnon Associates.

In 2013-2014, APPD LEARN assisted the APPD Fellowship Directors' Executive Committee, Council of Pediatric Subspecialties, and ABP in the formation of the Subspecialty Pediatrics Investigator Network (SPIN), an educational (fellowship program-based) research network.[5] APPD LEARN provided research and data infrastructure to SPIN to support its projects studying Pediatric Subspecialty Entrustable Professional Activities. In 2020, SPIN (now APPD SPIN) became a subnetwork of APPD LEARN, with APPD LEARN's original residency program network rechristened as the APPD PRIME (Pediatric Residency Investigators in Medical Education) subnetwork. APPD SPIN is directed by Richard Mink, MD, Professor of Pediatrics and Pediatric Critical Care Fellowship Program Director at UCLA.

Mission, Vision, and Goals

APPD LEARN's mission, adopted in 2011, is to conduct meaningful educational research that advances the training of future Pediatricians by developing and promoting participation and collaboration in research by program directors for the purpose of improving the health and well-being of children. Its vision is to advance exemplary pediatric education through collaborative educational research by Pediatric program directors.

At the time the mission was adopted, APPD LEARN defined a set of six interconnected strategic activities that serve as goals for the program, and form the basis for this evaluation:

1. Managing collaborative research networks of Pediatric Programs working together to conduct multi-site studies of educational methods and instruments
2. Maintaining an online repository of educational research study materials, raw data, and findings for dissemination to APPD members and collaborators
3. Promoting learning opportunities to enhance educational research participation and scholarship by Program Directors
4. Providing expert consultation for research conducted within APPD LEARN
5. Communicating regularly with the APPD membership and the larger medical education community about activities, opportunities, and outcomes
6. Exploring, conducting, and coordinating research with other organizations and initiatives across a continuum of medical and non-medical education

Methods

Evaluation Model

APPD LEARN's Director adopted a mission-based logic model to guide future program evaluation in May 2016 (see Table, next page). For each of APPD LEARN's strategic activities, the logic model outlines anticipated inputs (necessary resources), output (measureable products of the activity), outcomes to be achieved, and aspirational impacts of the program.

Stakeholders

A variety of stakeholders have an interest in APPD LEARN's activities or are served directly or indirectly by APPD LEARN. The Network's primary constituency is Pediatrics residency (and, since 2020, fellowship) program directors. All U.S. Pediatrics residency programs are eligible to be members of APPD, and most programs elect membership levels that also provide access by their fellowship programs. APPD membership dues are a primary source of funding for APPD LEARN. Faculty at these programs, with the endorsement of their program director and department chair, are eligible to propose studies to be conducted using the APPD LEARN networks, and findings from APPD LEARN studies are regularly presented at the APPD Spring and Fall meetings.

The ABP has also been highly engaged in support of the training of Pediatrics residents and fellows and has provided support to APPD LEARN and specific APPD LEARN projects several times in the program's history. A representative from ABP has historically been a non-voting member of APPD LEARN's advisory committee in order to facilitate coordinated planning and further alignment between the organizations.

Other stakeholders include medical education researchers who might wish to analyze data collected in APPD LEARN studies, Pediatrics faculty, fellows, and residents who may be involved proposing APPD LEARN studies or participate in APPD LEARN studies, other medical education organizations and projects that collaborate or contract with APPD LEARN, and the field of graduate medical education in general.

Data Sources

This evaluation considers data from the time of APPD LEARN's founding in 2009 until 2019.

Activities	Inputs	Outputs	Outcomes	Impacts
Manage collaborative research network of Pediatric Programs to conduct multi-site studies	Programs APPD LEARN Director APPD LEARN PM APPD LEARN PA Limesurvey Listserv De-identification system Policies Grant support	Completed studies Presentations Papers	Adoption of new assessments, curricula, etc.	More effective and efficient training
Manage an online repository of educational research study materials, data, and findings for dissemination	Study materials and data APPD LEARN Director APPD LEARN PM Degnon IT Dataverse server	Studies archived Data shared	Secondary data analyses	
Promote learning opportunities to enhance educational research participation and scholarship by program directors	Program Directors APPD LEARN EDC APPD LEAD	Learning opportunities identified and promoted PDs obtaining additional training in scholarship	Greater research skills in APPD LEARN members More sites engaged in APPD LEARN studies New PDs proposing APPD LEARN studies	PDs conducting other local/national studies
Provide expert consultation for research conducted within APPD LEARN	APPD LEARN Director APPD LEARN PRC	Study proposals revised and reviewed, feedback provided	New APPD LEARN studies successfully proposed	PDs develop skills at study design, proposal writing
Communicate regularly with APPD membership and medical education community	APPD LEARN Director APPD LEARN PM APPD LEARN PA APPD LEARN Adv Comm	APPD newsletter communications APPD meeting communications APPD LEARN website Presentations/papers about APPD LEARN	Awareness/visibility of APPD LEARN within APPD Awareness/visibility of APPD LEARN among other Peds and non-Peds medical education bodies	Help start new networks in other specialties Seat at the table for new data initiatives in Pediatrics and GME
Explore and coordinate research with other organizations and initiatives	APPD LEARN Director APPD LEARN Adv Comm	Collaborative studies initiated Data stewardship	Unique investigations and results.	Seat at the table for new data initiatives in Pediatrics and GME

Results

Inputs

Participating sites

By 2018, 114 of 148 member programs had participated in at least one APPD LEARN study, and most had participated in multiple studies.
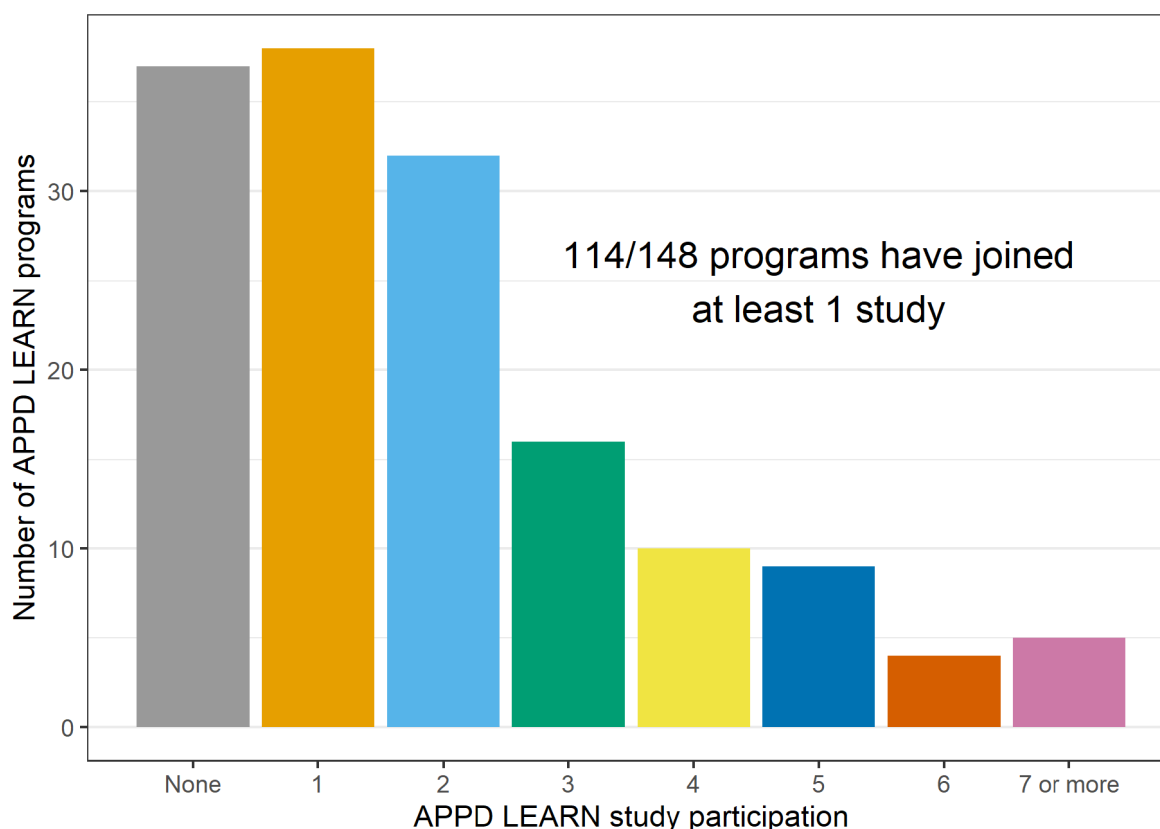
Human resources

From 2009-2011, APPD LEARN's Director was an MD program director and education researcher, devoting 20% of her time to the network. Since 2011, APPD LEARN's Director has been a PhD medical education researcher devoting 40% of his time to the network.

Since 2012, APPD LEARN has employed a Project Manager based at Degnon Associates, APPD's management company. More recently, a part-time research assistant, reporting to the Project Manager, now provides support for APPD LEARN, making the total staff effort approximately one full-time equivalent between the roles. Historically, the Project Manager focused on meeting coordination, development of site study IRB kits, assistance with site questions, building and fielding online survey instruments, data cleaning, and data archiving. In the past two years, the Director has been working to expand the capabilities of the Project Manager in initial data analyses, enabling him to focus more time on study design and advanced analyses and visualization.

With the reorganization of APPD LEARN in 2020 to incorporate APPD SPIN (and to distinguish APPD PRIME, the resident network, from the overall APPD LEARN network infrastructure), APPD SPIN's Director, an MD fellowship program director and education researcher, has been integrated into APPD LEARN operations, and APPD LEARN's Director is also serving as APPD PRIME's Director. As planned, the Director of each subnetwork is expected to devote 10% effort to the subnetwork, and the APPD LEARN Director to devote 30% effort to APPD LEARN itself, exclusive of APPD PRIME. Financial support for the APPD SPIN Director has not, however, been formalized.

Since inception, APPD LEARN has had three major standing committees:

- The Advisory Committee provides guidance to the APPD LEARN Director, sets policies for APPD LEARN activities and resources, and develops calls for proposals in specific research areas. It includes voting members, with staggered 2-year terms, including the current APPD President; non-voting representatives selected by the Director, such as a representative of the American Board of Pediatrics, of the SPIN network before it was integrated into APPD LEARN, and of the APPD Research and Scholarship Learning Community; and ex officio members, including the APPD Executive Director, APPD LEARN Director, APPD LEARN Project Manager, and, since the integration of APPD SPIN, the APPD SPIN Director. As planned, the APPD LEARN Advisory Committee was to conduct annual formative and summative evaluation of the performance of the APPD LEARN Director, but this function has been supplanted by semiannual reporting of the APPD LEARN Director to the APPD Board.
- The Proposal Review Committee reviews member-initiated study proposals and makes recommendations to the APPD LEARN Director on whether proposals should be accepted, declined, or asked for modifications. Prior to 2020, proposals were reviewed by several committee members and then discussed by the full committee. Since 2020, recognizing the need for wider expertise, proposals are reviewed by at least one committee member and additional ad hoc reviewers outside the committee, and then each proposal is discussed, together with its reviews, by the full committee.
- The Educational Development Committee has been charged with identifying and developing educational opportunities for APPD LEARN members and conducting annual member survey for needs assessment and evaluation purposes. However, APPD LEARN has directed more energy into network studies themselves, and as a result has only fielded member surveys in 2012, 2016, and 2019.

With the integration of APPD SPIN, APPD SPIN's Steering Committee, which includes representatives from each of the accredited Pediatric subspecialties, is now a fourth standing committee. It promulgates policies for the APPD SPIN subnetwork, reviews proposals that engage multiple subspecialties, and actively assists in study recruitment of fellowship programs by subspecialty. The APPD LEARN Advisory Committee has served similar functions for APPD PRIME, which does not have a separate Steering Committee.

IT resources

APPD LEARN's IT resources include an instance of the Dataverse data repository system for maintaining study records and data, a contract with Limesurvey Gmbh to provide the

online survey platform for studies, a set of scripts supporting the online APPD LEARN id assignment system maintained by the Director and hosted at the Director's institution, electronic mailing lists for communicating with members, a membership database maintained by the Project Manager, and a section of the APPD web site for providing information and guidance from APPD LEARN.

A key component of APPD LEARN is the APPD LEARN research id algorithm, which enables program directors, learners, and others with access to learner birthdates and social security numbers to generate a consistent and secure data collection id on demand. The same learner will always have the same data collection id, but the id cannot be reversed to recover birthdates or social security numbers. Data submitted to APPD LEARN is only identified by this data collection id, so APPD LEARN personnel are unable to identify learners. Prior to data being archived or shared outside of APPD LEARN, the data collection id is combined with a secret key to produce a data sharing id. Without the secret key, data sharing ids cannot be used to reidentify learners even by those who have access to their birthdates and social security numbers. The secret key is known only to the APPD LEARN Network Director, but a physical copy of the key in a sealed envelope is kept at Degnon Associates in the event of the incapacity of the Network Director.
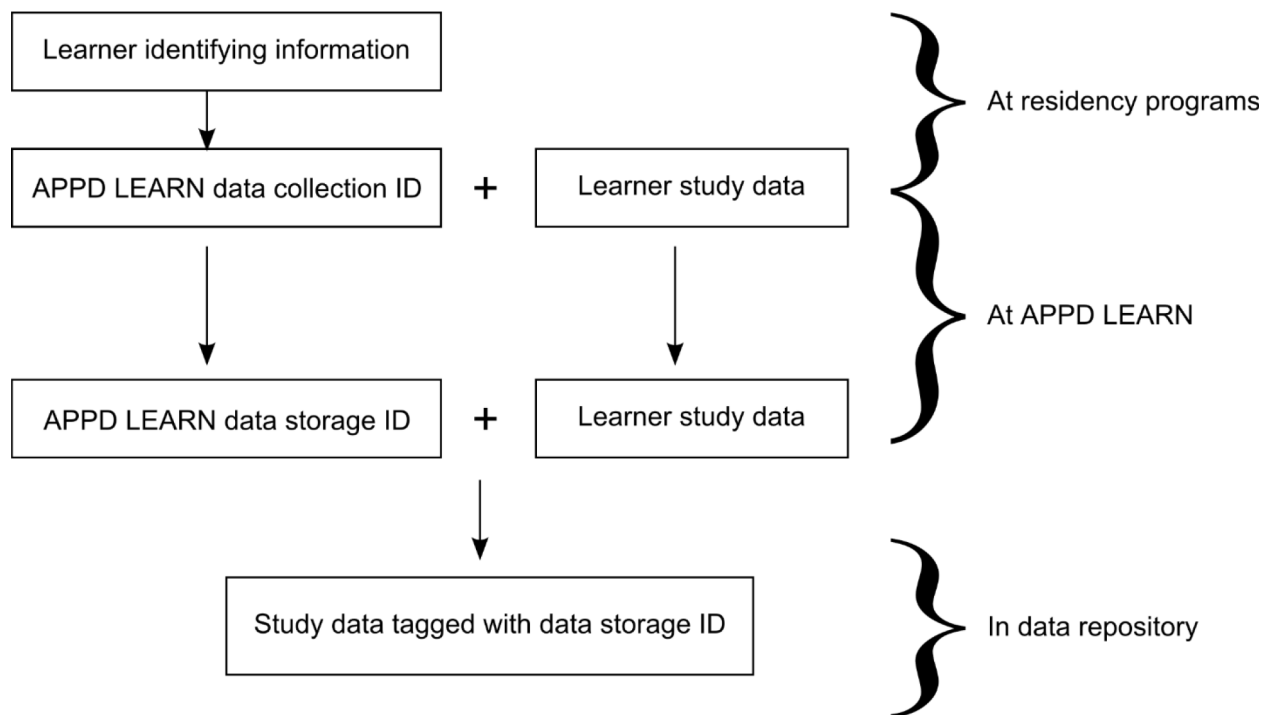

Activities

Review and implementation of network studies

APPD LEARN has reviewed 27 member-initiated studies, and approved 19 of them for the network; at the same time, it has engaged in 14 collaborative studies (discussed below). The

table lists proposals approved since the inception of the network; the figure shows the cumulative rate of member-initiated proposals approved and declined as well as collaborations.

Review cycle	Proposals approved (PI names in parentheses)
8/2012	Social media professionalism (Kesselheim) Self-assessment of milestones (Li and Gifford; two proposals coordinated/combined into a single study)
12/2013	Balance of service and education (Boyer)
8/2014	CCC processes (Schumacher) Research during residency (Abramson)
4/2015	General EPAs (Schumacher, Carraccio)
8/2015	Resilience and Burnout (Mahan, Batra)
8/2016	Academic Half-Days (Shutak, Borman-Shoap)
8/2018	COMLEX Scores and Certification (Rodriguez, Lien, Hairfield) Parenthood in residency (Dundon)
4/2019	SUPERPOWER (Halbach, Mahan) ERAS filters and residency success (DeBord) PROMISE (Marbin)
8/2019	SMS interventions for self-regulated learning (Gifford)
4/2020	Insulin management education (Laves, Schulmeister) Well-being concept mapping (Babel) EPA/Milestone Crosswalk (Schumacher)
8/2020	CVC insertion checklist (Boyer) Virtual Recruitment Experiences (Winthrop, McCullagh)
Total	19
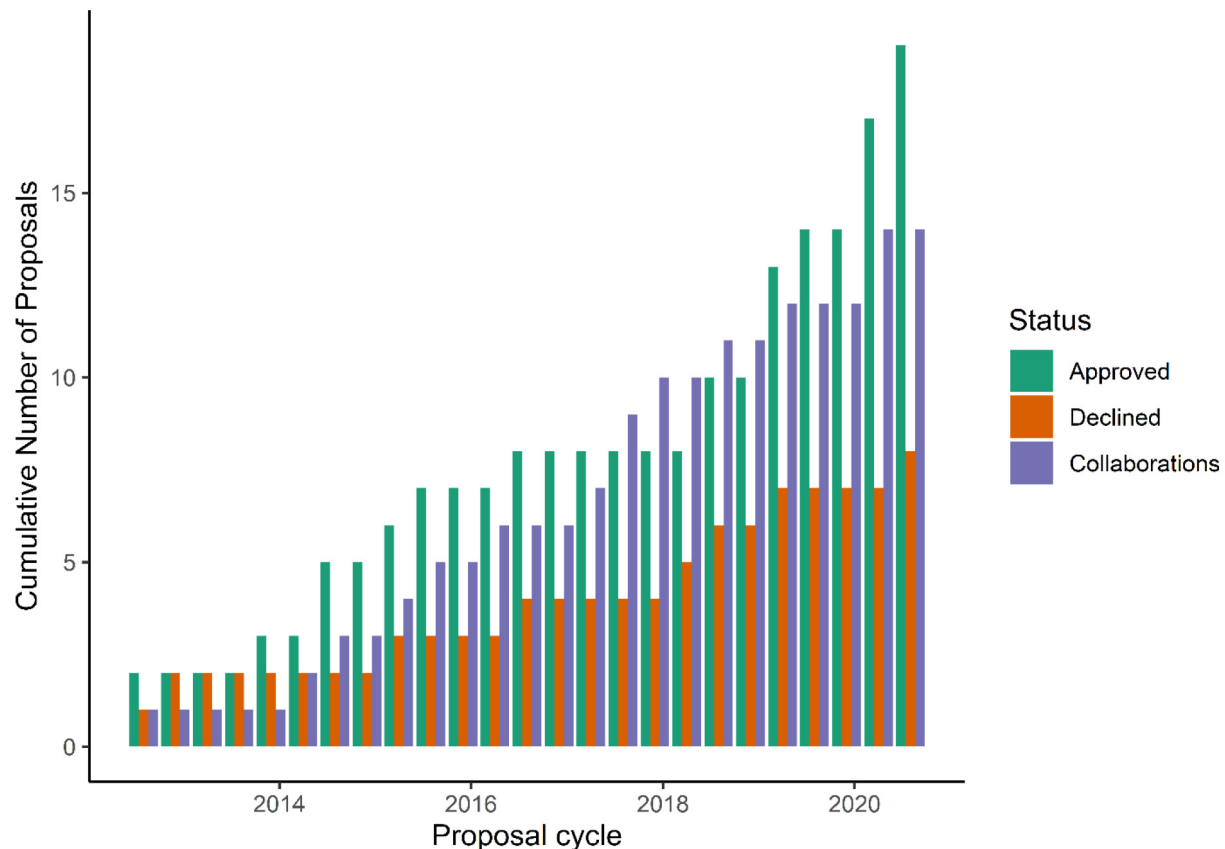
Data sharing

APPD LEARN maintains a Dataverse server and has archived shareable data from its studies (along with codebooks, site kits, IRB approvals, and manuscripts). Although there is a process for requesting existing data for secondary analyses, its use has been limited. In part, this is because APPD LEARN has not widely promoted this process so as to provide study investigators with time to publish from their data before other investigators reanalyze it. However, less formal data sharing among APPD LEARN projects has taken place. Several studies have adopted processes for investigators (not necessarily those involved in initial study design) to affiliate, suggest secondary questions, and receive subsets of study data to investigate these questions. Studies have also collaborated with one another by using one study's programs as a recruitment population for another or by linking data to answer new questions involving different variables collected in each study.

Member development

Member development activities, other than study participation, have included opportunities to serve on APPD LEARN committees and a small number of educational sessions held at APPD annual Fall and Spring meetings. As the meeting format has changed, opportunities for such sessions have been fewer and more competitive; most recently, APPD LEARN has primarily participated as a "Table to Able" session.

Consultation

The APPD LEARN Network Director and the Project Manager regularly consult with study proposers and investigators throughout all stages of study design, conduct, analysis, and dissemination. Consultation areas regularly include: development of study designs, selection or creation of instruments, and calculations of sample size for proposals; opportunities for collaboration with ongoing studies; human subjects protections and IRB applications; budget development for external funding; program and respondent recruiting strategies; data collection operations; data analysis and visualization; presentation and manuscript development and review; and authorship.

Member communications

APPD LEARN's primary member communication vehicles are its web site, a listserv of APPD LEARN member program representatives (most often the program director, although the program director can name a liaison in their place, who is usually an associate program director), and platform updates and personal contacts at the APPD Fall and Spring meetings. The listserv's primary use has been announcing new studies seeking to recruit programs. APPD LEARN does not have a social media presence.

Collaboration practices

APPD LEARN has engaged in many successful collaborations with other medical education organizations to conduct joint research or to provide infrastructure to assist education research. Collaborations have involved the National Board of Medical Examiners, the American Board of Pediatrics, the Accreditation Council for Graduate Medical Education, the Association of American Medical Colleges, the Council on Medical Student Education in Pediatrics, the Subspecialty Pediatrics Investigators Network (which has since become integrated into APPD LEARN), and the American Board of Surgery. Many of these collaborations include financial contributions from the collaborating partner that helps defray APPD LEARN's costs and support the network; the large majority provide a perpetual license for APPD LEARN to reuse the de-identified data developed in the study. Working with the APPD Executive Director and Board, APPD LEARN has developed a standard costing procedure for determining financial support necessary.

The table shows collaborative studies and APPD LEARN's roles in each.

Collaborative studies

Roles: S=study design, D=data collection/management, A=data analyses, *=received financial support

| Start	Project	Partners	APPD LEARN roles
5/2012	PMAP (Pediatric Milestones Assessment Pilot, forerunner of PMAC)	NBME	S, D, A, *
5/2014	Subspecialty EPAs cross-sectional study	SPIN, ABP	S, D, A, *

| 7/2014	PMAC (Pediatric Milestones Assessment Collaborative) Module 1	NBME, ABP	S, D, A, *
3/2015	EPAC	AAMC	D
6/2015	General Pediatric EPAs study	ABP	S, D, A, *
4/2016	PMAC Module 2	NBME, ABP	S, D, A, *
1/2017	Fellowship program director survey on EPAs	SPIN, ABP	S, D, A, *
7/2017	Subspecialty EPAs longitudinal	SPIN, ABP	S, D, A, *
8/2017	PMAC Module 3	NBME, ABP	S, D, A, *
11/2017	Surgical EPAs	ABS	D, A, *
5/2018	Milestones and ITEs	ACGME, ABP	S, D, A
1/2019	Impact of Pediatric Boot Camps	COMSEP	D, A, *
1/2020	Predictors of Success: from Medical Student to Pediatric Resident	COMSEP	D, A, *
4/2020	EPA/Milestone Crosswalk study	ABP	S, D, A, *

Outputs

Stakeholder opinions

A survey of APPD LEARN members was fielded in November 2019. A total of 43 responses were received, representing about 29% of the member programs. The figure below illustrates respondents' perceptions of APPD LEARN's success in conducting its primary activities. Members are most familiar with the research activities themselves, and most believe that APPD LEARN has been mostly or completely successful in all activities. There is less knowledge about outside collaborations and expert consultation than other activities, but those familiar with the consultation activity were very likely to feel it was completely successful (that is, this is an activity that is performed well when it reaches members but does not always reach members).
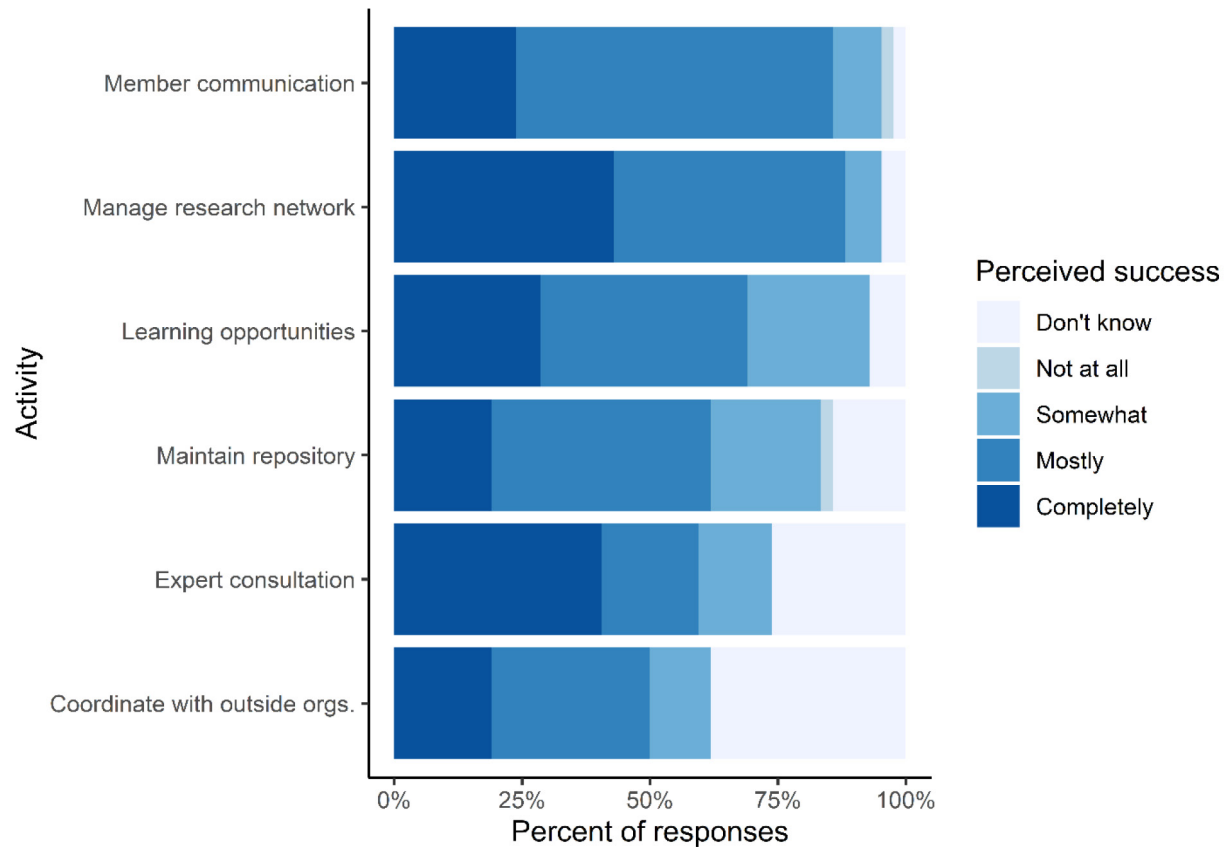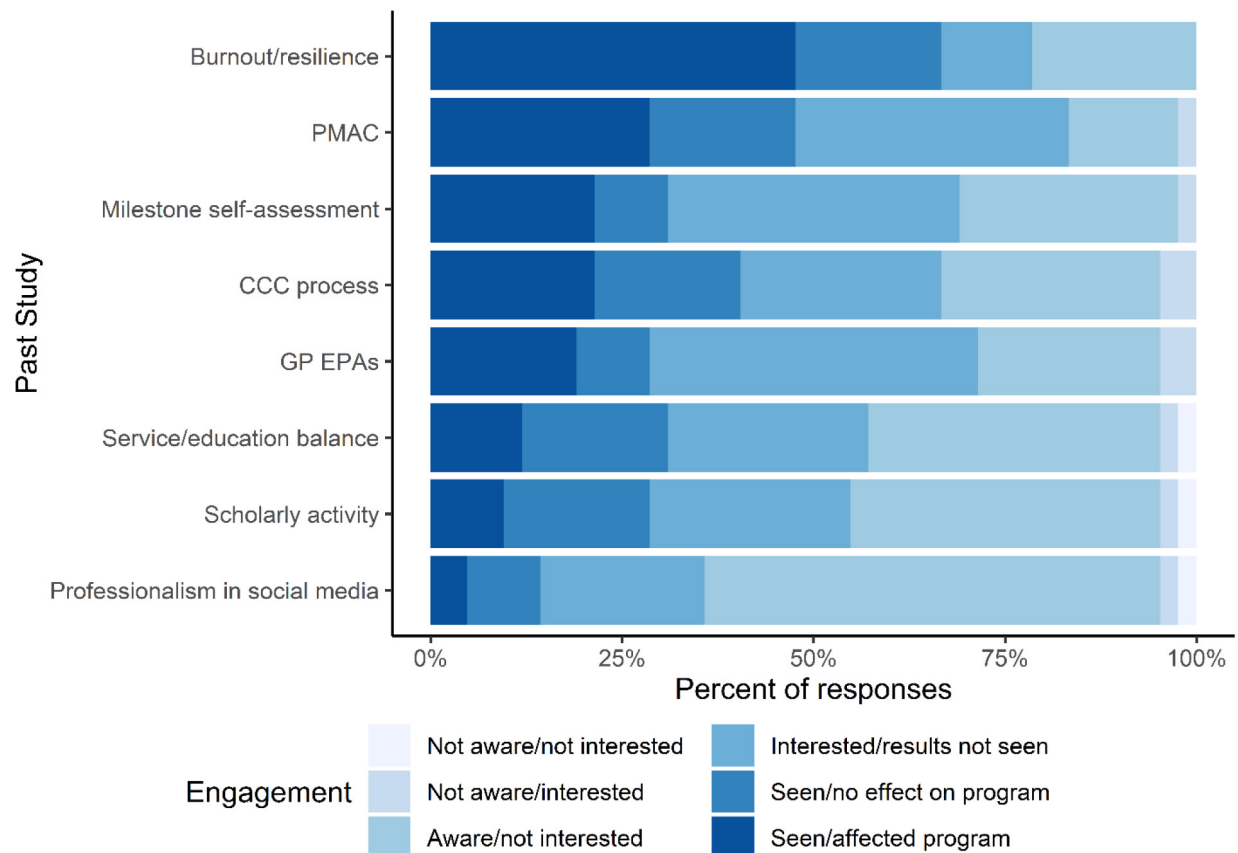
Member engagement

In the survey, members also indicated the perceived value of rewards that they could obtain from participating in APPD LEARN. Results are summarized in the figure. Members highly value participation in research that will impact training, access to expertise, and the ability to contribute to the authorship of publications and presentations.
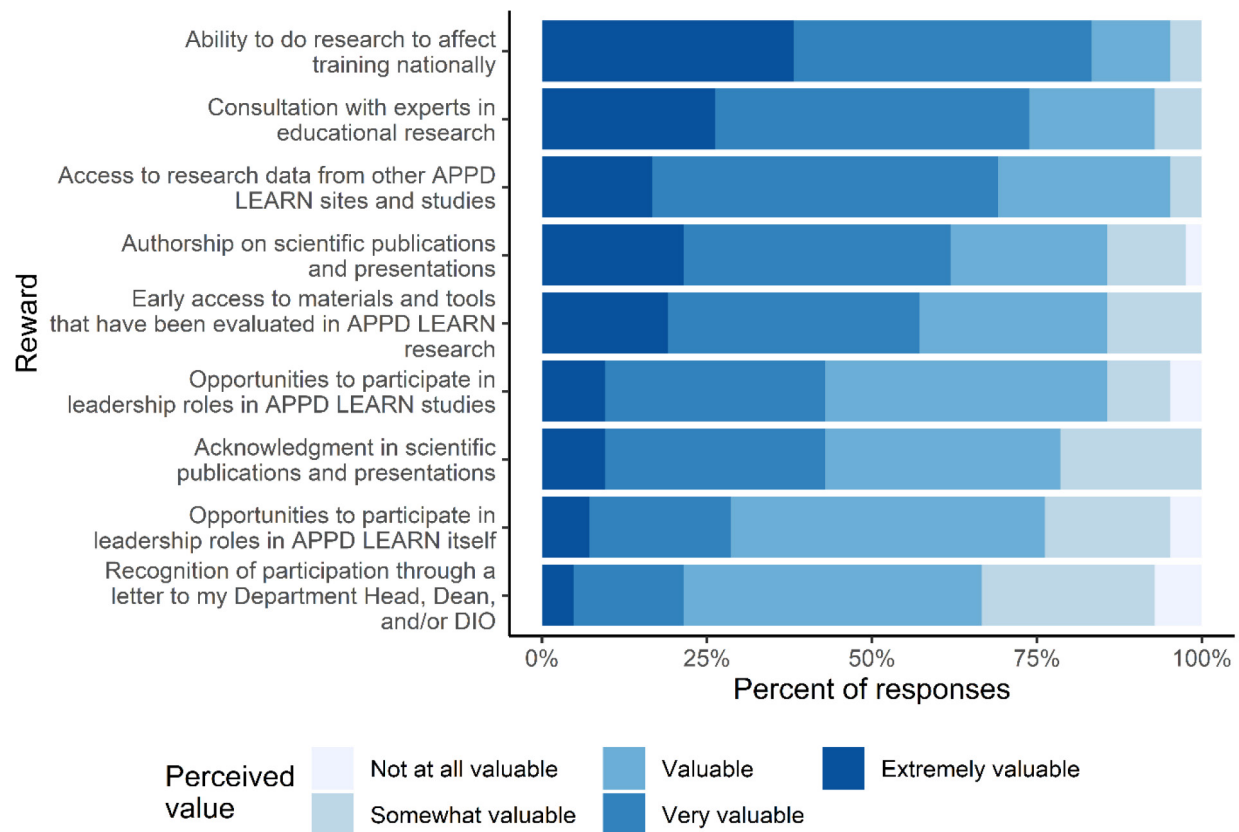
Members were also asked about the visibility of several completed APPD LEARN studies. Responses, summarized in the figure below, show considerable variability in both study visibility and member interest. Perhaps unsurprisingly, members were mostly likely to be aware of studies involving larger numbers of programs and longer periods of time.

Past Study (y-axis): Burnout/resilience, PMAC, Milestone self-assessment, CCC process, GP EPAs, Service/education balance, Scholarly activity, Professionalism in social media

Percent of responses (x-axis): 0%, 25%, 50%, 75%, 100%

Engagement:
- Not aware/not interested
- Not aware/interested
- Aware/not interested
- Interested/results not seen
- Seen/no effect on program
- Seen/affected program

Collaborative Relationships

APPD LEARN has ongoing and effective collaborations with the ABP, ACGME, ABS, and AAMC. As described earlier, SPIN was integrated into APPD LEARN. APPD LEARN worked with COMSEP on a joint grant program for two years, and the organizations are in the process of revising this program to better define its goals and processes.

Research guidance

In the course of conducting studies, APPD LEARN has developed and published guidance on its web site for study investigators on best practices for study group management and for authorship in studies with large numbers of investigators.

APPD LEARN has also developed a set of documents to facilitate institutional review and approval of studies. These include model language for IRB protocols, a letter describing data security provisions of the network, and a model Data Use Agreement for institutions that require such an agreement in order to provide data in APPD LEARN studies (typically to assert ownership and to provide assurance that no protected health information is transferred and that respondents cannot be re-identified). Institutions' own forms are typically not suitable for APPD LEARN's purposes, because they do not anticipate perpetual data storage and reuse. However, APPD LEARN has had considerable success in proposing its model agreement to institutions in these conditions.

Data sets

The APPD LEARN Dataverse currently contains materials related to 13 completed studies. All 13 include the IRB kits used to secure approval at participating programs (if applicable), copies of the IRB approval letters from local participants, and data collection instruments. There are 7 complete and de-identified datasets, with corresponding codebooks and data documentation.

Presentations and Publications

At the time of this evaluation, APPD LEARN investigators had published 23 papers, given 31 oral or platform presentations, and presented 35 scientific posters. In each year since 2015, an APPD LEARN-supported study has been in either the APPD or PAS annual meeting "Top Oral Presentation" sessions.
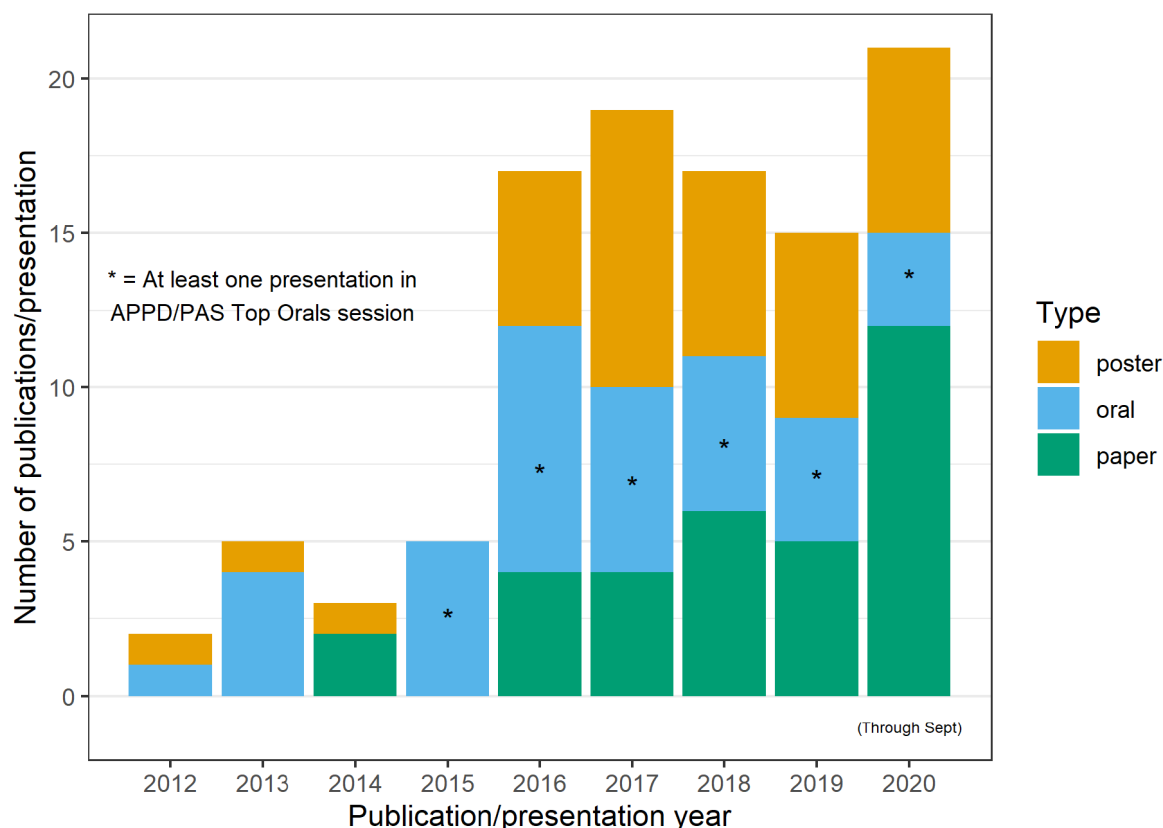
Published papers arising from APPD LEARN studies reflect high levels of scientific rigor, important outcomes, and good visibility. The figure below illustrates the distribution of APPD LEARN papers based on Cook et al.'s definition of study types (description, justification, and clarification, in order of increasing sophistication, with clarification typically <15%),[6] scores on the Medical Education Research Study Quality Instrument (MERSQI; range 4-18, typical median 11, higher more rigorous),[7] and Kirkpatrick's classification of study outcomes (higher

18

more important).[8] These distributions are exceptional relative to typical publications in medical education research.
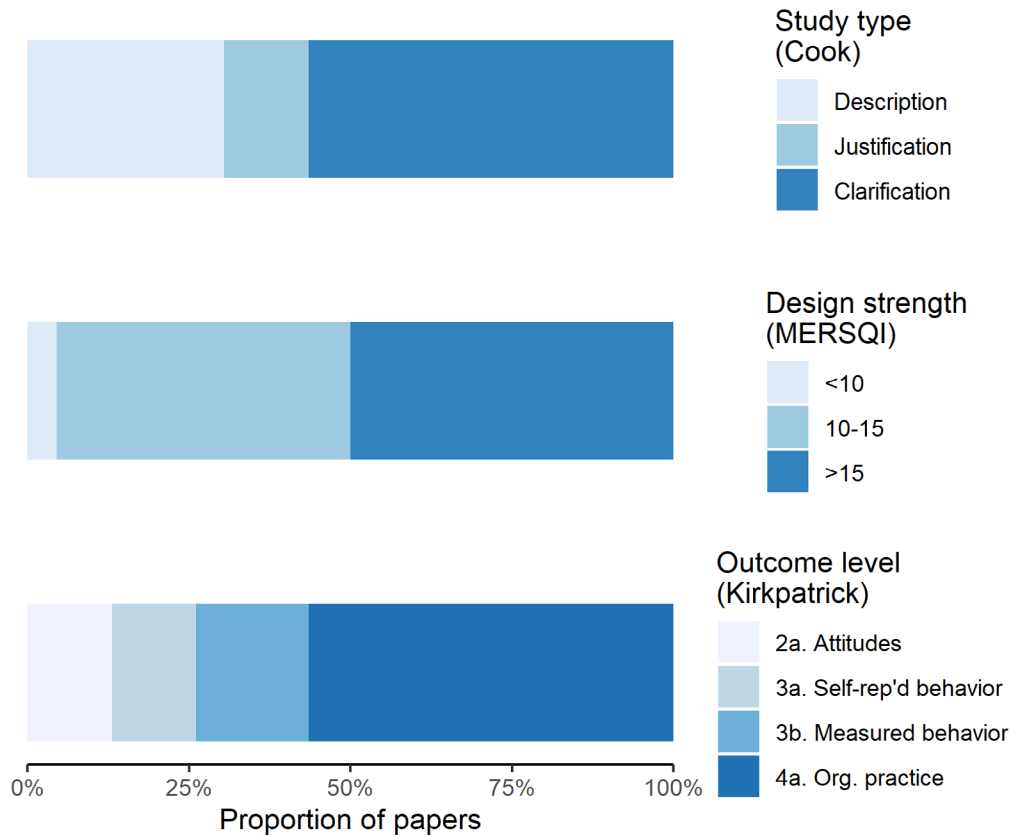
The citation rate for APPD LEARN papers is also promising. Most papers have already been cited at least once. Considered as a group, the network publications currently have an h-index of 8 using citation data from Google scholar. That is, there are at least eight publications with at least eight citations each.
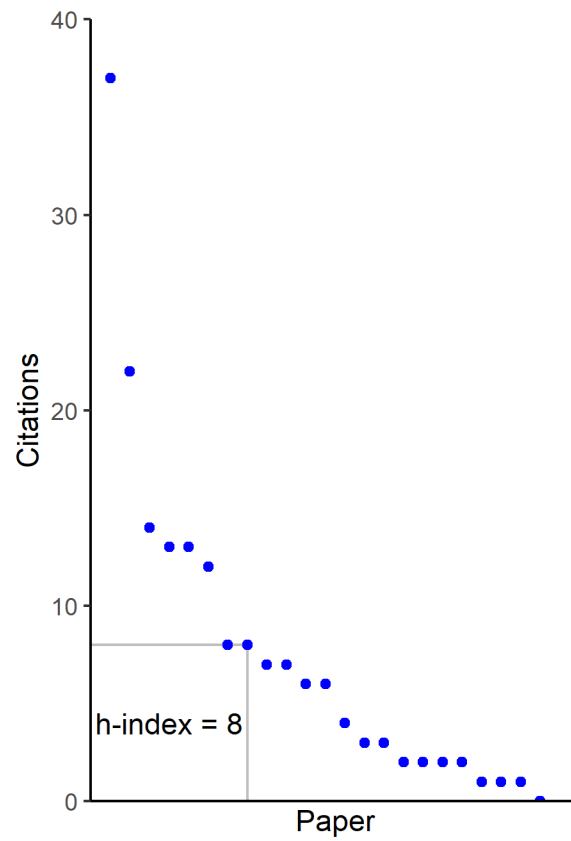
A complete list of the 19 papers appears in the table following.

#	Citation	Originating Study	Publication Year	Cook study type	Kirkpatrick Level of Educational Outcomes	Total MERSQI Score (scaled out of 18)	Web of Science Citations	Google Search Citations
1	Schumacher DJ, West DC, Schwartz A, et al. Longitudinal Assessment of Resident Performance Using Entrustable Professional Activities. *JAMA Netw Open.* 2020;3(1):e1919316. doi:10.1001/jamanetworkopen.2019.19316	General Peds EPAs	2020	D	3b	15.8	1	1
2	Schumacher DJ, Schwartz A, Zenel JA, Jr., Paradise Black N, Ponitz K, Blair R, et al. Narrative Performance Level Assignments at Initial Entrustment and Graduation: Integrating EPAs and Milestones to Improve Learner Assessment. Acad Med. 2020;95(11):1736-44.	General Peds EPAs	2020	D	4a	15.8	0	0
3	Schumacher DJ, Poynter S, Burman N, Elliott SP, Barnes M, Gellin C, et al. Justifications for Discrepancies Between Competency Committee and Program Director Recommended Resident Supervisory Roles. Acad Pediatr. 2018.	General Peds EPAs	2018	C	4a	15.8	1	2
4	Kemper KJ, Wilson PM, Schwartz A, Mahan JD, Batra M, Staples BB, et al. Burnout in Pediatric Residents: Comparing Brief Screening Questions to the Maslach Burnout Inventory. Acad Pediatr. 2018.	Resilience and Burnout	2018	D	4a	12.5	3	8
5	Reed S, Kemper KJ, Schwartz A, Batra M, Staples BB, Serwint JR, et al. Variability of Burnout and Stress Measures in Pediatric Residents: An Exploratory Single-Center Study From the Pediatric Resident Burnout-Resilience Study Consortium. J Evid Based Integr Med. 2018; 23:2515690X18804779.	Resilience and Burnout	2018	C	4a	11.5	2	2

#	Citation	Originating Study	Publication Year	Cook study type	Kirkpatrick Level of Educational Outcomes	Total MERSQI Score (scaled out of 18)	Web of Science Citations	Google Search Citations
6	Schumacher DJ, King BA, Thoreson L, Sklansky DJ, Sharma TS, Scott-Vernaglia SE, et al. Key Factors for Recommending a Resident May Serve as a Supervisor: A National Study of Clinical Competency Committee Members (Research Abstract). Academic Pediatrics. 2017;17(5):e28-e9.	CCC	2017	C	4a	15.5	1	2
7	Schumacher DJ, Bartlett KW, Elliott SP, Michelson C, Sharma T, Garfunkel LC, et al. Milestone Ratings and Supervisory Role Categorizations Swim Together, but Is the Water Muddy? Acad Pediatr. 2018.	General Peds EPAs	2018	C	4a	15.0	1	2
8	Schumacher DJ, King B, Barnes MM, Elliott SP, Gibbs K, McGreevy JF, et al. Influence of Clinical Competency Committee Review Process on Summative Resident Assessment Decisions. J Grad Med Educ. 2018;10(4):429-37.	CCC	2018	C	4a	15.0	3	7
9	Patricia J. Hicks, Melissa J. Margolis, Carol L. Carraccio, Brian E. Clauser, Kathleen Donnelly, H. Barrett Fromme, Kimberly A. Gifford, Sue E. Poynter, Daniel J. Schumacher, Alan Schwartz & the PMAC Module 1 Study Group (2018) A novel workplace-based assessment for competency-based decisions and learner feedback, Medical Teacher, 40:11, 1143-1150, DOI: 10.1080/0142159X.2018.1461204	PMAC	2018	D	4a	15.8	1	4
10	Abramson EL, Naifeh MM, Stevenson MD, et al. Scholarly Activity Training During Residency: Are We Hitting the Mark? A National Assessment of Pediatric Residents. *Acad Pediatr*. 2018;18(5):542-549. doi:10.1016/j.acap.2018.02.002	Scholarly Activity	2018	C	4a	11.5	4	13

#	Citation	Originating Study	Publication Year	Cook study type	Kirkpatrick Level of Educational Outcomes	Total MERSQI Score (scaled out of 18)	Web of Science Citations	Google Search Citations
11	Kemper, Kathi J. MD, MPH; McClafferty, Hilary MD; Wilson, Paria M. MD, MEd; Serwint, Janet R. MD; Batra, Maneesh MD, MPH; Mahan, John D. MD; Schubert, Charles J. MD; Staples, Betty B. MD; Schwartz, Alan PhD; on behalf of the Pediatric Resident Burnout-Resilience Study Consortium Do Mindfulness and Self-Compassion Predict Burnout in Pediatric Residents?, Academic Medicine: June 2019 - Volume 94 - Issue 6 - p 876-884. doi: 10.1097/ACM.0000000000002546	Resilience and Burnout	2019	D	3b	13.0	5	13
12	Park YS, Hicks PJ, Carraccio C, Margolis M, Schwartz A, Group PMS. Does Incorporating a Measure of Clinical Workload Improve Workplace-Based Assessment Scores? Insights for Measurement Precision and Longitudinal Score Growth From Ten Pediatrics Residency Programs. Acad Med. 2018;93(11S):S21-S9.	PMAC	2018	C	3b	15.8	1	3
13	Schumacher DJ, Michelson C, Poynter S, Barnes MM, Li ST, Burman N, et al. Thresholds and interpretations: How clinical competency committees identify pediatric residents with performance concerns. Med Teach. 2018;40(1):70-9.	CCC	2018	C	3a	12.5	4	7
14	Kesselheim JC, Schwartz A, Boyer D, APPD LEARN Education and Service Study Group. Integrating Education and Service in Pediatric Residency Training: Results of a National Survey. Acad Pediatr. 2017;17(8):907-14.	Education and Service	2017	C	2a	11.0	1	1

#	Citation	Originating Study	Publication Year	Cook study type	Kirkpatrick Level of Educational Outcomes	Total MERSQI Score (scaled out of 18)	Web of Science Citations	Google Search Citations
15	Li ST, Tancredi DJ, Schwartz A, Guillot A, Burke A, Trimm RF, et al. Identifying Gaps in the Performance of Pediatric Trainees Who Receive Marginal/Unsatisfactory Ratings. Acad Med. 2018;93(1):119-29.	Milestones	2018	D	2a	15.0	-	1
16	Mink RB, Schwartz A, Herman BE, Turner DA, Curran ML, Myers A, et al. Validity of Level of Supervision Scales for Assessing Pediatric Fellows on the Common Pediatric Subspecialty Entrustable Professional Activities. Acad Med. 2018;93(2):283-91.	Subspecialty EPAs	2018	C	3a	16.0	10	22
17	Turner TL, Bhavaraju VL, Luciw-Dubas UA, Hicks PJ, Multerer S, Osta A, et al. Validity Evidence From Ratings of Pediatric Interns and Subinterns on a Subset of Pediatric Milestones. Acad Med. 2017;92(6):809-19.	PMAC	2017	J	2a	15.8	2	8
18	Li S-TT, Tancredi DJ, Schwartz A, Guillot AP, Burke AE, Trimm RF, et al. Competent for Unsupervised Practice: Use of Pediatric Residency Training Milestones to Assess Readiness. Acad Med. 2017;92(3):385-93.	Milestones	2017	C	3b	15.8	11	12
19	Schwartz A, Margolis MJ, Multerer S, Haftel HM, Schumacher DJ, APPD LEARN. A multi-source feedback tool for measuring a subset of Pediatrics Milestones. Med Teach. 2016;38(10):995-1002.	PMAC	2016	C	4a	15.8	3	6
20	Kesselheim JC, Schwartz A, Belmonte F, Boland KA, Poynter S, Batra M, et al. A National Survey of Pediatric Residents' Professionalism and Social Networking: Implications for Curriculum Development. Acad Pediatr. 2016;16(2):110-4.	Professionalism and Social Networking	2016	J	3a	11.5	5	6

#	Citation	Originating Study	Publication Year	Cook study type	Kirkpatrick Level of Educational Outcomes	Total MERSQI Score (scaled out of 18)	Web of Science Citations	Google Search Citations
21	Hicks PJ, Margolis M, Poynter SE, Chaffinch C, Tenney-Soeiro R, Turner TL, et al. The Pediatrics Milestones Assessment Pilot: Development of Workplace-Based Assessment Content, Instruments, and Processes. Acad Med. 2016;91(5):701-9.	PMAC	2016	C	4a	15.8	6	14
22	Tocco D, Jain AV, Baines H. The Pediatrics Milestone Pilot Project: Perspectives of Current Pediatric Residents. Academic Pediatrics. 2014;14(2):S8-S9.	PMAC	2014	J	4a	7.0	2	3
23	Schwartz A, Young R, Hicks PJ, APPD LEARN. Medical education practice-based research networks: Facilitating collaborative research. Med Teach. 2016;38(1):64-74.	APPD LEARN	2016	D	4a	Non-empirical	16	37

Most common loss of MERSQI points: No studies were randomized controlled trials, no studies measured patient/health care outcomes. As a result, maximum effective normalized MERSQI is 15.8 for studies without sampling or 16 for studies with sampling.

Discussion

Summary

During its first ten years, APPD LEARN has established itself as a productive educational research network in several key areas. Network membership has expanded, and now includes APPD SPIN, a subnetwork of subspecialty fellowship programs. APPD members actively propose and conduct network studies, and the results of these studies, as well as collaborative projects, have been well-received by the community and the field. APPD LEARN has considerable goodwill in APPD itself, as well as with partnering organizations in Pediatric medical education.

Recommendations for Future Development

Despite—or in some cases because of—the success that APPD LEARN has had, there are several outstanding areas that call out for further development through future strategic planning processes and the development of a revised evaluation model to guide the next phase of the network's development. What follow are primarily the reflections and recommendations of the APPD LEARN Director.

Study Activities

APPD LEARN has developed and continues to refine methods for efficiently conducting multi-site educational research. Currently, these studies are either proposed by APPD membership or arise from collaborations initiated either by APPD LEARN or by partnering organizations. The collaborative studies are largely "self-supporting" in that they often include revenue or reimbursement to the network to offset the costs of the research, and their support of common infrastructure helps subsidize the member-initiated studies.

Because the APPD membership is the primary stakeholder in APPD LEARN, it may be valuable to explore methods to direct more of APPD LEARN's bandwidth toward projects that are of high priority to the membership. This has been accomplished in the past by treating member proposals as indicative of the broader interests and concerns of members (e.g., at the advent of the adoption of milestones, members proposed studies on milestones; as concern about burnout in trainees increased nationally, members proposed studies on burnout and wellness). Although it is valuable to have resources to be responsive to immediate member-perceived needs, this process relies on members being comfortable with proposing studies. APPD as an organization may wish to consider some more formal research prioritization process to provide guidance to potential applicants and to encourage APPD LEARN to proactively develop studies in priority areas without waiting to react to a submission. For example, APPD has organizational priorities in the area of diversity, equity, and inclusion; its mission also emphasizes the impact of the training of Pediatricians on child health. These represent two areas of focus that could warrant more proactive organization of studies.

Data Activities

A key element of APPD LEARN is the perpetual archiving and sharing of data. To date, APPD LEARN has done well in preparing and storing data, and has had a few notable successes in linking data across studies. The sharing function of the network, however, has not received as much attention. Although the network has developed terms and conditions for sharing data with

other researchers, no data have yet been shared outside of study investigators. This is in part due to desires to preserve time for principal study investigators to publish papers from their data before making them available to others. In past discussions, there has been some reluctance to apply a "one-size-fits-all" embargo period before making data available. An alternative approach might be to annually query study investigators from studies that have not yet published their data and ask them whether they would be comfortable publishing yet or, if not, to establish tentative triggers for publication.

Prior to increasing data sharing activities, APPD LEARN will need to consider how to mitigate the possibility of re-identification of learners through their demographic information. In part, this takes the form of appropriate outgoing data sharing terms and conditions, which have already been developed. This may also take the form of statistical disclosure control,[9] such as limiting the data shared (e.g. excluding potentially unique demographic elements), "blurring" the data, or conducting some analyses "in house". The APPD LEARN Network Director intends to begin a study of suitability and effectiveness of statistical disclosure control methods using existing data sets, which may help inform these considerations.

APPD LEARN's data repository is currently based on the assumption that no protected health information data are collected or maintained. However, the use of patient data in the assessment of trainees is at the cutting edge of medical education research.[10] Although APPD LEARN could collect aggregated (at the learner level, by their program) data on patient care or outcomes, it cannot, currently, conduct research with patients as the unit of analysis. If this becomes an area of interest, APPD LEARN will need to develop new standards and approaches to data collection and storage, and revise its repository IRB protocols.

Educational Activities

As a community of practices, one of APPD LEARN's goals is the continual development of its members' knowledge and skills in educational research. This priority was reflected from the formation of the network in the creation of its educational development committee (EDC), which was to conduct needs assessments of the membership and identify, propose, or develop educational activities to meet those needs. Although the network has certainly contributed to member development through shared activities (e.g., the proposal development and review process, discussions of analytic approaches and findings, manuscript development), it has only rarely identified or conducted formal educational activities. For example, the Network Director has encouraged and supported network staff in developing additional data analysis skills, and APPD LEARN has sometimes participated in workshops at the APPD annual meetings at the behest of the APPD Research and Scholarship Learning Community, but neither of these activities was primarily coordinated through the EDC.

New models for this mission should be considered, and it may be time to revisit the value of the EDC as constituted. One possibility would be to encourage or require study investigators to identify or propose areas of development and to host a webinar or workshop presented by the investigators (with support from network staff) focused on their experiences in designing, proposing, conducting, or disseminating their projects. Another possibility would be to hold an annual workshop (or preconference session) focused on available data sets, providing an introduction to data that other members could use for secondary analysis as well as a tutorial on analytic methods. In the latter case, it may be possible to defray some of the expenses of such a program by charging a workshop fee to non-APPD members who may be interested.

Communication Activities

APPD LEARN's primary communication vehicles for network information have been an update presentation at APPD annual meetings, a mailing list for recruiting member programs to new studies, and informal conversation with APPD LEARN staff. In the past, APPD LEARN has sometimes published short updates in the APPD member newsletter.

Increasing the frequency and regularity of communication would help keep members informed and engaged. However, because APPD LEARN's resources are limited, more effort has been focused on conducting studies than regular member communication. New strategies should be developed, such as templates for quarterly updates through the APPD newsletter that could reduce the effort associated with determining what and when to communicate.

Collaboration Activities

APPD LEARN has developed strong collaborative relationships with national medical education organizations that have resulted in important research and other collaborations. In addition to maintaining these collaborations, APPD LEARN should reach out to additional organizations to explore common interests. These might include the American Board of Medical Specialties, the Association of Medical School Pediatric Department Chairs, the Medicine-Pediatrics Program Directors Association, the American Academy of Pediatrics, the American Medical Association, the National Resident Matching Program, and the Federation of State Medical Boards. In some cases, these organizations may be interested in partnering on studies relevant to the training of Pediatricians; in other cases, these organizations may be interested in learning how to establish their own educational research networks.

Sustainability

APPD LEARN's 10-year anniversary is an important milestone. Looking ahead, several measures should be considered to sustain the network through its next 10 years.

Growth opportunities. With the incorporation of APPD SPIN, APPD LEARN now studies Pediatrics learners through the entire course of graduate medical education. APPD LEARN has also collaborated with both COMSEP and AAMC on projects related to undergraduate medical education in Pediatrics, and has strong ties with ABP, which regulates maintenance of certification for practicing pediatricians. There are clear opportunities for expanding APPD LEARN's research portfolio through subnetworks or other enduring partnerships focusing on these two ends of the educational continuum. Although such expansion would require additional resources, extending the network could also increase its resource base commensurately. An important consideration would be preserving APPD's special role in the governance of the overall network while providing opportunities for subnetworks to pursue their research in ways that fit the particular nature of their training milieus; APPD SPIN may provide a good example of this.

Funding. APPD LEARN's budget represents a large commitment on the part of APPD to collaborative educational research. In many ways, this is an efficient model, which relieves APPD LEARN of devoting resources away from member-initiated studies and toward seeking external funding. It is possible that the incorporation of APPD SPIN will also lead more institutions to increase their APPD membership tier to accommodate their fellowship program directors, or more fellowship program directors to attend APPD annual meetings. Collaborative

studies have often included additional funding on a per-project basis. APPD may also wish to explore ongoing funding commitments from allied organizations.

Diversity, Equity, and Inclusion. As in other units of APPD, APPD LEARN looks to diversify participation in the network and to increase equity and inclusion in medical education and medical education research. This goal includes encouraging and supporting network governance and study development activities led by program directors from historically underrepresented groups, as well as encouraging research studies that invite the active participation and co-production of underrepresented residents and that address questions of concern to advancing equity and inclusion in training. Several ideas for advancing these goals have been discussed by the APPD LEARN advisory committee, and APPD LEARN plans to work actively with APPD's Confronting Racism Action Team on these goals.

Leadership. Since 2011, APPD LEARN has had a stable Network Director, and two long-term Program Managers. With the incorporation of APPD SPIN, APPD SPIN's Director is also a core part of the network leadership team. Currently, the role of APPD PRIME Director is being held concurrently by the APPD LEARN Director, but APPD LEARN should consider naming a third individual as APPD PRIME Director. In addition to providing additional skill and effort (albeit at some additional cost), such an organization would facilitate cross-training among the leadership, the ability to smoothly transition operations in the event of the incapacity of one of the leaders, and eventual succession planning.

Conclusion

In many ways, APPD LEARN has facilitated a new community of practice in Pediatrics medical education research. A community of practice is a group of people "who share a concern or a passion for something they do and learn how to do it better as they interact regularly."[11] Academic Pediatrics as a field has always been at the forefront of collaborative educational research and practice.[4] APPD LEARN has sought to support that collaborative spirit by providing common infrastructure previously available only locally and unevenly. As a result, Pediatrics faculty with a passion for evidence-based education have been able to work together on shared projects. They have, through this practice, improved the research process; they have, through this research, improved the education process. APPD LEARN remains committed to fostering this community into its second decade.

Acknowledgments

References

1.   Roberts KB, Degnon LE and McGregor RS. The Association of Pediatric Program Directors: The First 25 Years. *Academic Pediatrics* 2012; 12: 166.

2.   Burke AE, Guralnick S and Hicks P. The Association of Pediatric Program Directors' Strategic Plan: An Opportunity for Transformational Change. *Academic Pediatrics* 2010; 10: 220-221.

3.   Jones MD, McGuinness GA and Carraccio CA. The residency review and redesign in Pediatrics (R3P) project: Roots and branches. *Pediatrics* 2009; 123: S8-S11.

4.   Schwartz A, Young R, Hicks PJ, et al. Medical education practice-based research networks: Facilitating collaborative research. *Med Teach* 2016; 38: 64-74. DOI: 10.3109/0142159X.2014.970991.

5.   Mink R, Schwartz A, Carraccio C, et al. Creating the Subspecialty Pediatrics Investigator Network. *The Journal of Pediatrics* 2018; 192: 3-4.e2. DOI: 10.1016/j.jpeds.2017.09.079.

6.   Cook DA, Bordage G and Schmidt HG. Description, justification and clarification: a framework for classifying the purposes of research in medical education. *Med Educ* 2008; 42: 128-133. 2008/01/16. DOI: 10.1111/j.1365-2923.2007.02974.x.

7.   Cook DA and Reed DA. Appraising the Quality of Medical Education Research Methods: The Medical Education Research Study Quality Instrument and the Newcastle–Ottawa Scale-Education. *Acad Med* 2015; 90: 1067-1076. DOI: 10.1097/acm.0000000000000786.

8.   Hammick M, Dornan T and Steinert Y. Conducting a best evidence systematic review. Part 1: From idea to data coding. BEME Guide No. 13. *Med Teach* 2010; 32: 3-15. Article. DOI: 10.3109/01421590903414245.

9.   Benschop T, Machingauta C and Welch M. Statistical Disclosure Control for Microdata: Theory. The World Bank, 2020.

10.   Schumacher DJ, Wu DTY, Meganathan K, et al. A Feasibility Study to Attribute Patients to Primary Interns on Inpatient Ward Teams Using Electronic Health Record Data. *Acad Med* 2019; 94: 1376-1383. DOI: 10.1097/acm.0000000000002748.

11.   Wenger-Trayner E and Wenger-Trayner B. Introduction to communities of practice: A brief overview of the concept and its uses, https://wenger-trayner.com/introduction-to-communities-of-practice/ (2015, accessed 2/22/2021).