Harnessing the Power of Research + Practice: Aggregating Knowledge About Implementation to Better Support Equity Outcomes in Systems

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Abstract: In this conceptual paper, we ask: How can we harness the power of research-practice collaborations and, in particular, how can we aggregate knowledge about educational systems in order to support implementation of new practices? With the goal of increasing teacher and student access to high-quality educational experiences and resources, we argue that there continues to be a need to systematically examine and learn across research-practice research and design efforts. To do so as a field necessitates the development of methodologies and infrastructure aimed at aggregating knowledge across partnerships. We aim to initiate conversation among learning scientists about the potential to systematically aggregate insights about how characteristics and dynamics of systems of practice interact with implementation efforts. In the long term, we hope this effort increases the prevalence and power of research-practice collaborations to better support equity outcomes across educational systems.

Grand challenge

In this short-form conceptual paper, we ask: How can we harness the power of research-practice (R+P) collaborations? Specifically, How can we aggregate knowledge about educational systems in order to support implementation of new practices? With the goal of increasing teacher and student access to high-quality educational experiences and resources, we have spent our careers in collaborative design efforts, research practice partnerships (RPPs), and participatory research; we argue that there is a need to systematically examine and learn across these efforts. Development of methodologies and infrastructure will be required to undertake and disseminate work aimed at aggregating knowledge across partnerships. Our immediate goal is to begin a conversation about this potential, including ways to gather and share methods and practices, and to systematically aggregate insights from RPPs. We point to the value of aggregating knowledge about how characteristics and dynamics of particular educational systems interact with implementation of efforts to impact outcomes of interest. In the long-term, we hope this effort increases the prevalence of R+P collaborations and harnesses their power to better support equity outcomes across educational systems.

Since the 1990s, collaborative efforts between researchers and practitioners have developed and tested designs for teaching and learning (Penuel, Fishman, Cheng, & Sabelli, 2011). Using various related research methodologies, efforts focus not only on the design for learning but also on the contextual variables that affect their implementation and outcomes. Now recognized as R+P initiatives, these efforts that take up the goals of implementation science have become more widespread in learning sciences. Examples of these genres of research include Design-Based Research with Co-design, Design-Based Implementation Research, RPPs, and Networked Improvement Communities (NICs) among others. Across these genres (and more) there is a translational, action-oriented, participatory lens. They share a methodological approach of unearthing characteristics and dynamics that define local contexts as they interact with implementation – all with the aim of ensuring that the innovation and outcomes of research will be useful and meaningful to those for whom it is designed.

Because RPPs are designed to attend to the local context and purposefully structure design to address the needs and conditions of the practitioner partners (Bryk, Gomez, & Grunow, 2011), outcomes from RPPs designs have great potential to improve learning and practice (Coburn & Penuel, 2016). Researchers have created and sustained mutually beneficial partnerships with practitioners, resulting in successful learning outcomes in local school districts and communities. *However, findings from these efforts are specific to and sometimes even unique to their settings. They are, on the whole, not developed to generalize across settings.* The MIST project, for example, is an ongoing partnership between university researchers and several large urban school districts in the United States focused on improving ambitious and equitable instructional practices in mathematics. MIST researchers have begun to identify key elements of a coherent system for instructional improvement; however, they call for additional studies that focus on large-scale instructional improvement in order to fully realize improvements in mathematics instruction *at scale* (Cobb, Jackson, Smith, & Henrick, 2017).

We echo and extend this call. Specifically, we reiterate the need for systematic inquiry of interventions across settings that attends to interactions of local context and patterns of implementation. We further argue that

a) the financial and human resources to conduct such studies are not commonly available, b) the methods to systematically gather and synthesize evidence across such a large-scale study of implementation have not been formally developed, and c) our field does not currently provide opportunities to disseminate large-scale, responsive research studies, including educative cases of partnership or implementation failures.

An opportunity: Aggregating knowledge to support scaling and equity

Despite the challenges we list above, we point to two imperatives that provide warrants for the work we suggest needs to be done. First is the continued failure in our field to produce interventions that scale (Lynch, Pyke, & Grafton, 2012). Second is the continued presence of equity disparities in learning settings, even as the field continues to expand participatory research efforts to address educational justice (Bang & Vossoughi, 2016).

Our proposal addresses two issues related to the challenge of scaling educational interventions. Penuel et al. (2011) argued that RPPs that consider local enablers and barriers to implementation as part of design of innovations could develop insights about what works, for whom, under what conditions. Among other funders, The National Science Foundation (NSF) named RPPs using DBIR and other approaches among those methods it sought to support, in light of the possibility that designing for adaptation to new contexts would increase the likelihood that the designs would continue to be useful and effective across contexts. Implicit in the call by Penuel and colleagues is the notion that individual research-practice teams, engaged in intensive design work, would need to contribute to and draw from the larger field (and adjacent fields like organization science) to build design and implementation knowledge that could account for context. Indeed, using research-practice approaches, the field has developed studies to understand the contexts of the specific RPPs in which the work was conducted. Yet, we still do not have broadly accessible theory, design principles, or best practices to support the field's understanding of interactions between local context and implementation, those that would arise from the study on implementation across multiple settings. Therefore, we repeat and extend the 2011 call; to more effectively provide evidence of what works for whom, under what conditions, we need methods to document 'conditions' and to aggregate knowledge about implementation.

The second issue of scale is the challenge to build capacity among RPP teams, a necessary and productive layer of RPP design and implementation work. Ideally, both researchers and practitioners experience professional development as part of participation on RPP teams; collaboration among experts from different fields and with varied backgrounds can produce innovative research and design (Carlile, 2004). Building capacity for design and implementation of novel interventions is also a key factor in scaling ideas and capabilities, both among individuals and among systems that must 'learn' to accommodate new practices. While there is increased sharing of capacity building practices happening over time (e.g., via publications, conferences, etc.), systematic analysis of these practices as a function of local context and the specific design/implementation work of these teams is still elusive.

We also point to the call to conduct R+P work as a means to ensure that educational experiences and resources are designed and implemented to be equitable for all students, their teachers, and other school system stakeholders. By incorporating the diversity of those whom partnerships serve and by addressing issues of equity as they play out in design and implementation, RPPs conduct the valuable work of surfacing the multiple dimensions through which equity may be addressed. With specific continuous improvement aims to address systemic inequities, RPP teams are well positioned to design innovations that productively alter systems (Bryk, 2017). Unfortunately, this short-form conceptual paper does not allow for a more comprehensive discussion of this issue; we look forward to engaging with others interested or involved with this work in other venues.

Theoretical perspectives

This paper draws from perspectives of participatory research (Reason & Bradbury, 2008) and work that has emerged from that tradition. One advantage of participatory research is that researchers and practitioners work collaboratively to understand local context and design innovations to address context-specific dynamics that influence equitable learning opportunities for youth. This research examines interactions among social, cultural, historical, and institutional aspects of contexts with the aim of improving practice. Taking a sociocultural approach, we look at contexts through the lens that participation is grounded in the individual experiences of people, current and historical, and based on institutionalized practices (Holland & Lave, 2009). We foreground this frame to describe critical aspects of partnerships; designing, implementing, sustaining, and scaling interventions involves coordination of people, policies, and materials, among other layers of practice (e.g., developing and harnessing human capacity from across a system). The sociocultural nature of RPP work implies that 'context' is a dynamic construct. This notion is reflected in research on the scaling of educational innovations which also cites the ever-changing contexts and needs of people, acknowledging the dynamic nature of scale will impact scaling strategies (Morel, Coburn, Catterson, & Higgs, 2019).

Knowledge aggregation exemplar: Enabling Conditions Collaboratory

The complexities of the sociocultural, dynamic nature of implementation contexts and the partnership work that occurs within them illustrate the need to share and aggregate experience and insights. Some synthesis efforts are happening behind the scenes in spaces like RPP consortia and funder-led grantee meetings focused on local problems of practice, but their intellectual work has yet to be broadly shared. We now turn to a discussion of an effort aimed at knowledge aggregation, and discuss the tools, structures, and cultural shifts used to access and aggregate knowledge within that community. That being said, without widely accessible, shared approaches to gather and synthesize this critical information, outside stakeholders and proximal communities will have (at best) limited access to processes and outcomes, let alone strategies to conduct future R+P work.

The Enabling Conditions Collaboratory (ECC) is a multi-project, cross-institution research investment by Lucas Education Research (LER), a division of the George Lucas Educational Foundation. LER's current research portfolio focuses on efforts to define rigorous project-based learning (PBL) in K-12. The ECC is working towards understanding the conditions that support high-quality PBL. Using Coburn's (2003) framework for reconceptualizing "scale", the ECC is examining depth, sustainability, spread, and shift in ownership within their PBL implementation efforts and collectively identifying ways to aggregate learning across projects to further investigate and better attend to these aspects of scale.

Participation in the ECC involves an added layer of project activity, separate but in support of each team's overall research goals. At least one junior research team member and one PI from each of the four projects participate in monthly virtual meetings. These meetings, facilitated by LER research advisors, are intentionally designed to support cross-team discussion and learning. Teams are encouraged to share protocols, nominate topics of common interest, and share findings, challenges, and feedback with one another. The monthly meetings also include opportunities for guest speakers to contribute additional perspectives on the work and build team capacity.

Approaches to support knowledge aggregation

Because the ECC shares a common goal of examining enabling conditions of high-quality PBL, the variation among the project implementation contexts is the object of inquiry, rather than a confound. In other collaboratives not focused on developing knowledge about interactions among local context and implementation, the variation of inquiry context must be examined *in addition* to the variation of intervention/change of interest and therefore requires additional work to unpack those interactions. Specifically, strategic comparisons may need to be coordinated in order to observe relevant dimensions of design and/or implementation. While the common problem of inquiry of the ECC grounds collaboration among the teams, this layer of work contributes to each project; each partnership defines their questions about enabling conditions by leveraging prior or ongoing data collection and extending current analytic strategies. In other words, within the common problem space, teams are still able to examine aspects of practice that are most relevant to their initial research questions. The common, but not limited or identical focus of the ECC teams' research is a key factor in the productivity of the collaboration. In future efforts, systematic examination of the functioning of collaboratives would illustrate tradeoffs of different forms and degrees of structure among teams, including shared research questions and approaches.

An important conceptual tool that can be used to leverage the common research space is *a systems perspective*. In the ECC, this perspective allows the teams to map the aspects of PBL practices that are involved in multiple teams' efforts and which are only studied in a small number of contexts. A shared systems map serves as a concrete representation of the components, interactions, and dynamics of systems of practice (stakeholders, resources, policies, etc.) and helps to ground cross-team conversations. The map has helped to surface opportunities for investigation to address specific questions about variations across systems/contexts.

In particular, the value of focusing on *social dynamics* of systems of practice are well documented (Reeves & Forde, 2004). Ensuring that a collaborative maintains a focus on sociocultural dimensions of practice when synthesizing evidence and insights across projects is paramount, but also introduces layers of complexity. Tracing the interactions between and among the sociocultural threads and technical components of systems of practice (i.e., changing practices of interest and related materials) that enable system or stakeholder change (e.g., increasing capacity) is a critical approach to knowledge building across research endeavors.

Building from a common understanding of the key components and dynamics of a socio-technical systems of practice, teams using design-based research methods can engage in *principled, iterative design* to extend their insights about systems of practice to scaffold ongoing efforts. This could include design of materials but also of institutional or social supports for various stakeholders and their interactions. Collaboratives that engage in design from the outset would be well-positioned to use both a (socio-technical) systems perspective and a principled design approach to structure their individual and shared work.

Finally, the importance of sociocultural aspects of the collaborative itself cannot be understated. A significant thread of the work of a collaborative is the establishment and maintenance of collaborative and

professional norms that equally benefit all participants. In the NIC partnership model, a hub or separate team takes on a facilitation role and in the LERs ECC, research advisors fulfill this role. Facilitators are critical for attending to relationship building, focusing on collaborative norms which sometimes conflict with professional incentives (e.g., authorship and recognized expertise).

Starting a conversation

Our purpose is to begin a conversation among the ISLS community about the potential of efforts to aggregate insights about how characteristics and dynamics of particular systems of practice interact with implementation efforts to impact outcomes of interest, including equitable learning opportunities. It is important to recognize that researchers are often incentivized to limit access to outcomes of their work prior to publication. There is a need to continue to shift the culture of research to more collaborative modes, including sharing research that is in progress or that has negative outcomes (e.g., implementation challenges). A challenge to this shift is institutional barriers including forms of professional advancement. Some funders clearly value the role of collaboratives including NSF whose use of program hubs are intended to produce cross-project collaboration. As research funding is a key element among professional advancement criteria, some shifts in professional norms may be on the horizon. It is also important to be realistic about the time and resources required to undertake the proposed work. It will also be crucial to understand practitioners' incentives to engage in this form of work, as a function of their professional processes, structures, and interests, in light of the time and resources it will require.

Despite these challenges, we are optimistic that the field is poised to take up tools and structures for knowledge aggregation and to address the challenge of harnessing the growing RPP efforts to learn about the role of context and enabling conditions in implementation research across settings in support of scaling. The increasing number of highly skilled and experienced R+P participants is a significant indication of the shifts underway. The number of funders supporting R+P work (and collaboratives) is an indicator that some policy stakeholders value this line of work. We are optimistic that should R+P teams engage in knowledge aggregation practices, we will be more likely to harness their potential and develop more equitable, scalable educational experiences for all.

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