Starting a Network: Why and How[1]

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Introduction

It seems that no matter where we look on the landscape of educational reform, researchers, practitioners, and policy makers are proposing some form of a collective action network to address vexing educational problems. Our goal in this paper is to explore the question of how to get a collective action network off the ground. Collective action networks are known by several names. Among other names, these efforts are often labeled communities of practice (e.g., Lave & Wenger, 1991), professional learning communities (e.g., DuFour & DuFour, 2010; Hord, 1997), and design partnerships (e.g., Penuel, Coburn, & Gallagher, 2013). At the most general level, these arrangements are, with some exceptions, voluntary associations among education professionals who come together to work on some aspect of practice. As is often the case, within broad notions like collective action networks, there is a lot of variation in the details of the organizations that actually form.

The main goal here is to describe one particular network form, Networked Improvement Communities (NIC; Bryk, Gomez, & Grunow, 2011; Bryk, Gomez, Grunow, & LeMahieu, 2015), and discuss their genesis. To nuance our understanding of

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NICs, we place them in the context of the broader range of collective action forms on the scene today. Our aim is to place the foundational agreements on which these collective arrangements are launched into sharper relief.

When we look around us, we see collective action at work in many sectors including large-scale engineering design (e.g. 787 airliner), software engineering (e.g. Linux operating system), and healthcare (e.g. solving the SARS puzzle). There is growing recognition among educators that individuals working in isolation can't adequately address the teaching and learning problems that face us today. Whether it's the individual teacher toiling alone in classroom or the isolated school in a district, the problems of achievement, attainment, and equal opportunity that educators grapple with today were not created by individuals. They were created by systems. And, they will not be addressed through isolated action. We suggest that the growing attention on collective action is an indication that, as a field, education has come to the recognition that we have to find ways to produce effective coordination among the many systems and myriad actors that are part of the achievement equation so that students and vital information are not lost at handoffs among actors, organizations, and systems. This is the hoped-for benefit of networks to addressing today's pressing problems in education.

In a sense, this reliance on networks is not new. Educators have long relied on several mainstay collaborative forms, like communities of practice, to get work done. It makes sense that this would be the case. After all, in education, literally thousands of professionals are doing much the same work all across the United States and the world every day. It is prudent to seek ways to move the field away from individuals acting alone. In the main, what goes under the rubric of collective effort in education is an underdeveloped enterprise. For the most part, in education, our version of collective effort is to help individuals perform individual tasks better — e.g. helping individual teachers to improve their craft. Today, when individuals improve their craft, their insights about how it was accomplished remain locked away in their local settings. Today's zeitgeist that has focused us on networks is about releasing the nascent collective energy in education. The aim of network activity is to solve problems of practice, more quickly, by creating methods for more people to be able to take advantage of local problem-solving progress across contexts.

Key to NICs is the recognition that networks have the potential to leverage and amplify the expertise and intelligence of individuals in the network so that each person can take advantage of the skill, expertise, and knowledge of many others. Moreover, when the network is large, you have the opportunity to tap the creative efforts of many different people, increasing the odds that someone somewhere will figure out something better.

The problem is that all collaborative arrangements are not created equal. Leaders and others who want to take advantage of the multiplying power of networks to solve educational problems have to pick and grow the right kind of network for the goals they seek to advance.

Doing Work Together

The kind of problem that a group of people face determines the kind of network they should build. Broadly speaking, we can divide the world of collective action networks into at least two kinds: sharing networks and execution networks. The tasks of initiating each of these are different. In a community whose overarching goal is sharing information, the coordination bar is set lower than in a community whose purpose is common action and execution to achieve measureable improvements on a specific problem.

Sharing Networks

In the education sector, over the last decade or so, we have developed a great deal of experience in starting and maintaining sharing communities like Communities of Practice. In the main, sharing communities enable their members to understand the nature and contours of some problems. The members may, in turn, engage in activities like gathering and analyzing information about the problem. Individual members in the community may share information on solutions they have generated and offer personal testimony about efficacy. The raison d'etre of sharing networks is to use collective energy to support individual action and agency.

One very powerful example of a sharing community is the Math Forum (Herrick, 2009). In 1992, a visionary math educator named Gene Klotz recognized that math pedagogy was changing. The research and practice community was learning that effective math pedagogy should be much more problem and project centered rather than involving a steady diet of worksheets, lectures and drills. Yet teachers had few sources to access this pedagogy and materials that supported them. Klotz also saw that the (then new) Internet and World Wide Web could be a boon to helping teachers share and obtain information and insights about this new pedagogy. With these inspirations, and with support from the National Science Foundation, Gene Klotz and his colleagues created the Geometry Forum, now known throughout the math teaching and learning community as the Math Forum (Renninger & Shumar, 2002; Renninger, Shumar, Barab, Kling, & Gray, 2004). These innovators saw that there was great benefit to building a place where mathematics educators could talk about and share math ideas. The Math Forum's vision at its inception, as it is today, was to offer teachers and others interested in math a place to "creat[e] discussion opportunities".

In many ways, sharing networks face what Nelson and Stolterman refer to as *tame* problems (Nelson & Stolterman, 2003). Tame problems may be complicated in that they may have lots of steps, take a long time to work through, and may even require some technical innovation along the way. However, these tasks tend to require less cooperation and coordination than execution networks. When sharing communities address them, they might be guided by a set of principles and an ideology that guides the work of individuals. An example of the Math Forum's efforts to bring discipline to the task of sharing within a community is the Problem of the Week (PoW). PoWs are math activities that are meant to be engaging challenges designed to get students thinking, talking, and doing mathematics. The Forum publishes PoWs as a service to the mathematics teaching and learning community. Each PoW offers structured student and enhanced teacher materials plus specific strategic pedagogical assistance as well as an opportunity for teachers to discuss the PoWs and their outcomes with one another.

To be clear, we characterize problems like teachers' lack of access to rich math problems,, as tame, not because they are "easy". The task of effectively sharing math materials and math innovations is hard work, requiring a rich reservoir of creativity and genuine diligence. We refer to them as tame because the nature of the solution is known at the start. A tame problem is one that can be solved by selecting and appropriately applying the correct algorithm. In the case of the Math Forum, the task was to identify a sharing medium and to provide and structure the materials in a manner that community member could use. We also characterize them as tame because social commitment among members in the networks centers around shared experience with a problem.

The Math Forum is a marvelous example of a very effective and sustainable sharing community of practice. The conditions and commitments of the Math Forum's founding are straightforward. There was a visionary leader with a compelling idea — problem based instruction — coupled to a persuasive information need and a ready access to an audience. These are the primary ingredients necessary for a sharing network to emerge.

Execution Networks

In *execution networks* on the other hand, members' essential commitments are to common outcomes on a commonly agreed upon problem. In execution networks, members collectively agree to accomplish some aim together (e.g. raising achievement for some group by some specific amount by specific time). The raison d'etre is to use collective energy to enable collective agency. Execution networks like Networked Improvement Communities are specifically designed to tackle *wicked* problems (Mishra & Koehler, 2006). Wicked problems don't lend themselves to straightforward procedures and simple social arrangements. Nelson and Stolterman comment that "… these [wicked] problems can lead to paralysis" (Nelson & Stolterman, 2003, p. 16). This paralysis has often led educators to recast wicked problems as tame problems. For example, when faced with widespread failure of economically disadvantaged students to effectively use ambitious curricula, school districts have, on more than one occasion,

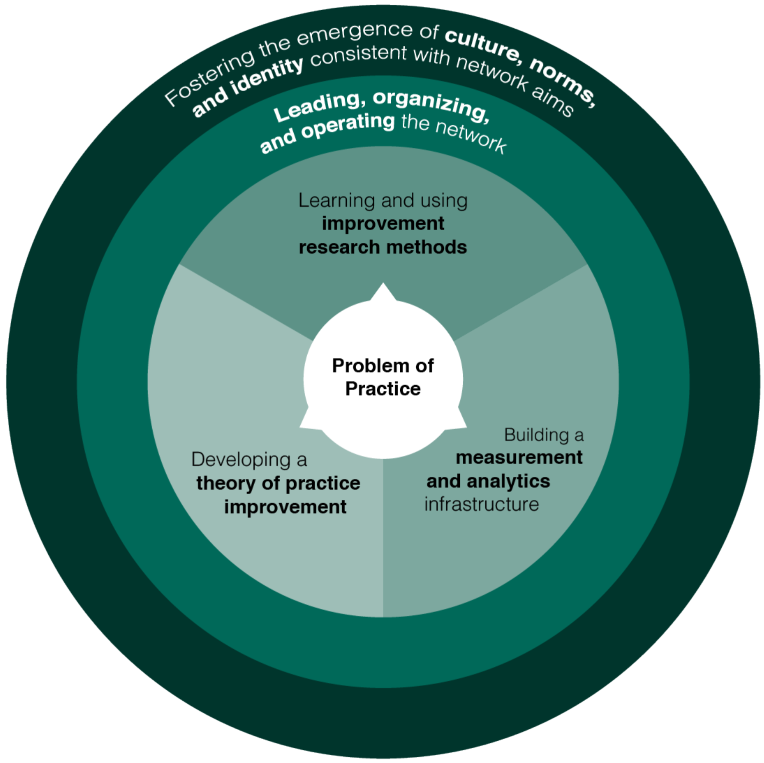
”dumbed-down” these curricula, scripted them and made them one-size-fits-all. In essence, this action takes a complex multi-causal wicked problem and recasts it as a straightforward one-dimensional implementation issue. Reframing in this way avoids confronting the genuine complexity embedded in the problem. There are many reasons for the failure of modern curricula to meet the needs of disadvantaged children. When teachers are told to treat it as a tame problem, they are encouraged to ignore the multi-causal nature of the observed failure. Predictably, proceeding in this fashion leads, at best, to limited short-term progress for some and little long-term sustained improvement. For genuinely wicked problems, we suggest that what is necessary are social arrangements that encourage teachers and others to appreciate the complexity they face and work toward cooperation and coordination that sharing networks do not typically afford.

NICs provide a social infrastructure that allows people to address wicked problems in a concerted manner. To achieve a common purpose, NICs enable members to achieve high levels of cooperation and coordination so that members can engage in shared and concerted action. In sharing networks, improvement is a matter of individuals learning to improve their craft. Execution networks, on the other hand, are organized more akin to professional scientific communities. Four defining characteristics of execution networks enable more effective common action to occur (Bryk et al., 2015). First, they rely on members adopting a well-specified common aim. Second, the community is guided by a common working theory of the problem and, in contrast to the sharing community whose members often have very different theories and system views, NIC members have a shared view of the system that produces it. Third, NIC members use a common set of improvement methods to test and refine interventions and innovations. Taken together, these first three features create a common language for coordinating more effective collective efforts. It also affords members with a social mechanism for warranting what the network currently conceives of as best research-based professional knowledge. In addition and fourth, NICs are organized to help diffusion of innovations to be orderly and to promote ongoing learning about how interventions and changes to them are effectively adapted to the context.

NICs are an attractive arrangement to address wicked problems, in part because the pact among members is deeper and more binding than in sharing communities. The social arrangements in NICs allow people to do systems work where many parts have to work relatively seamlessly together. In practice, this is a huge difference between the task of individual teachers implementing a new problem-based unit of instruction and a goal of advancing quality problem-based instruction to occur in every class every day. The former is a discrete change, perhaps best supported by a sharing network. The latter is a wicked problem that should place an entire system under a microscope and might be well suited to a NIC. To make progress in cases like these means placing a premium on close cooperation and purposeful coordination across an entire system.

The Making of a NIC

Based on extensive qualitative research, Jennifer Russell and colleagues (Russell, Bryk, Dolle, Gomez, LeMahieu, and Gruow, 2015) document the several explicit domains of activity that need attention in order to initiate a NIC. They capture the key elements of NIC formation in the five-element framework shown in Figure 1. The framework divides the initiation activity into two broad domains, the technical underpinning of which is the heart of improvement work and social arrangements that enable people to work together.



The inner technical core of the framework specifies the skills that ought to be present among NIC members in order to accomplish the NIC's goals. At the center of the technical core is a problem of practice that is articulated, documented, and explored through a theory of practice improvement that members understand and share. Members also share a common set of research tools and methods that allow them to explore the problem of practice. The work of the NIC on the problem of practice is further buttressed by a measurement system and analytics infrastructure. In essence, this aspect of the framework specifies the technical capabilities that must be in place for NIC members to cooperate and collaborate toward effective common-problem solving.

At its base, the NIC provides a setting that allows members to build a common language. The importance of common language to progress should not be underestimated. Recall the biblical story of the tower of Babel where God thwarted common purpose by merely removing common language. Like the biblical story, when participants, in change efforts, don't have an ability to communicate effectively, reform is stymied. In a NIC, the common language emerging from the technical core enables the creation of important social structure.

The outer rings of the framework specify the social substrate that fuels the will and creates the basic operations necessary to sustain members' work together in the NIC. It provides mechanisms to form social participation structures and cultural identity. The very outer ring addresses the idea that NICs require a shared culture among its members. The shared culture enlivens identity and behavioral norms with consistent narratives. Common narratives support a common will. People have the will to stay the course in working towards an aim when they share common narratives for why they do what they do. For example, sports teams stick together in the lean times because they share stories about what makes the team, and its approach to the game, special. In a similar way, the framework suggests that common narratives and a common identity offer NIC members the social resources to sustain collaborative work. Mechanisms like shared narratives serve to remind members about what they value in the NIC, why they elected to become members, and why the NIC is doing its important work in ways different from what others are doing. For example, a common narrative and identity would allow members to say "*our network's*" focus on problem-based math is superior to others' focus on simple math drills.

The social substrate also offers NIC participants the interpersonal resources to master the art of getting diverse actors to develop the will to want to engage in collective action on a commonly defined problem. Great leaders have figured out that it is necessary to get individuals from diverse settings to see that their identities have become bound to the problem that is at the center of the collective action effort. Decades of social science underscore the need to engage intrinsic motivation in order to get people to pay attention in sustained ways. From the perspective of the framework, the alignment of cultural norms, common work routines, and group feelings of identity allow attention to be sustained.

The second-most outer ring in Figure 1 indicates that NICs need leadership resources and formal organization to advance its work. Beyond individual leaders with charisma and convening power, the NIC's leadership has to decide which specific organizations and individuals to recruit at the beginning. They need good strategies to help select the right members who have the right sets of experiences to move the work of the NIC in its early fragile stages. We will shortly describe The Mathematics Teacher Education Partnership (MTEP; LeMahieu, Edwards, & Gomez, 2015). MTEP, as you will see, was exceeding in its attention to this aspect of initiation.

Beyond individual leadership roles, the leading, organizing and operating ring also places in relief that NICs differ from other forms of collective action in that they require specification of formal communication mechanisms, data collection, and sharing agreements among members of the community. Further, NICs create organizational resources that identify the best extant research expertise and they develop a core analytic capacity to learn from the accumulating data and results generated by NIC members themselves. In this way, the NIC develops organizational resources to adjudicate evidence as a scientific social proof network. There are roles, process, and capabilities that underscore what it means for a NIC to focus on execution.

The MTEP case: the making of a NIC

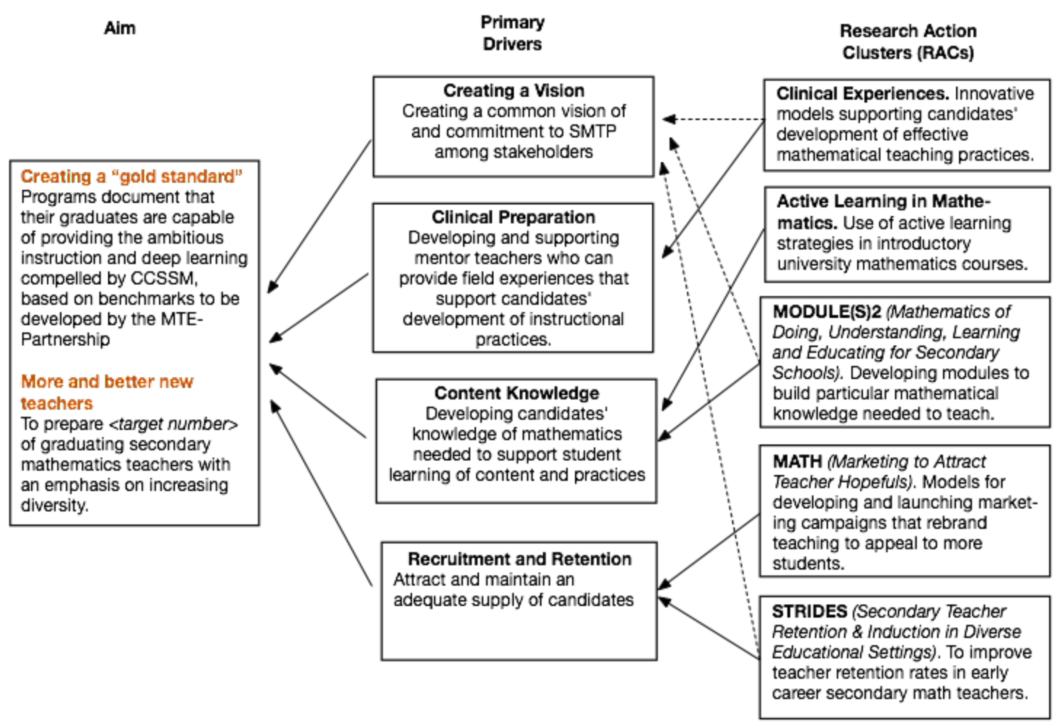
We now look into the work of Gary Martin and Howard Gobstein who spearheaded the formation of a network of mathematics educators called The Mathematics Teacher Education Partnership.

W. Gary Martin, a leader in the mathematics education community, and Howard Gobstein, who is an Executive Vice President at the American Association of Public and Land-Grant Universities, are working to catalyze a NIC focused on the redesign of secondary mathematics teacher preparation programs (Martin & Gobstein, 2015a). Their goal is to bring together university faculty and classroom teachers from participating school districts to meet the challenges of the Common Core State Standards for Mathematics (National Governors Association, 2010). Their aim is to make progress on the mathematics teaching and learning challenges posed by the Common Core. In particular, they seek to develop strategies that help new teachers effectively execute ambitious Common Core learning tasks in their classrooms. The story of the formation of MTEP helps to illustrate how catalyzing a NIC is a different enterprise than forming a sharing community.

MTEP was initially conceived in 2011 at an APLU convening that focused on APLU's aim to improve science and math teaching in secondary schools and at the beginning of college training. That APLU was the original convening agency is consistent with the Framework. Among its 237 members are some of the nation's leading higher education institutions. When APLU draws attention to improving secondary mathematics teaching, people listen. MTEP did not begin as a NIC. At the start of MTEP, it was a sharing network like the Math Forum. It was a loosely confederated collection of higher education institutions that had a shared interest in a set of mathematics education problems. In 2012, Martin and Gobstein encountered the Networked Improvement Community ideas. They realized that their loose confederation might have the social resources to form a NIC. For example, their partnership already had a process to identify and agree on major problem areas in secondary mathematics instruction. Martin and Gobstein realized that they could build on the fact of common interest and pre-existing social relations to ask some of their members to try forming a NIC. These two leaders drew together approximately 10 of their closest colleagues as a semiformal leadership team and began to think about how they could use the convening power of APLU and the extant social capital within their loose confederation to work toward forming a NIC.

They invented the notion of Research Action Clusters (RACs). The entire NIC was made up of 38 higher education institutions and local school districts near them. They conceived of RACs as smaller sub-problem-focused teams within the emerging NIC. Each RAC shared a commitment to developing common theory. Their idea was that each RAC would use the common theory to align itself with the sub-problem that was most deeply felt in their locality. In doing so, each RAC would, in a sense, own a problem that was prominent for its local constituents, and at the same time, their work would be coordinated within the greater NIC by a common theory.

As noted earlier, the innermost ring of the Framework is its technical core. It is where the NIC's theory of practice improvement resides along with the research methods that are shared within the NIC and its' measurement and data analytics infrastructure. Martin, Gobstein, and their colleagues used the idea of Driver Diagrams as a way to visualize the casual cascade of actions that could, if the theory is on target, lead to a desired improvement. In forming their working theory of improvement, Martin and Gobstein encouraged RAC members to focus on thinking through theory and representing their progress in Driver Diagrams. The Driver Diagram that guides MTEP's work is shown in Figure 2 (Martin & Gobstein, 2015).



In this way, they encouraged the NIC members, as a collective, to appreciate and establish the community norms anchored in research evidence and analytic arguments that could discipline theory and guide progress. Their approach was to have RACs each take on some part of the large theory. As such, members are joined together as an affinity group around this subset of common concerns.

Martin and Gobstein also encouraged RACs to use Plan, Do, Study, Act (PDSA) cycles (e.g., Cleghorn & Headrick, 1996). PDSA cycles are another Improvement Science tool and are a disciplined way to engage in an improvement that guides iterative inquiry cycles. Each step in the four-stage process contains a set of actions. For example, in the **Plan** stage where one is testing a small innovation, it is expected that before proceeding to trying to engage in a change at the **Do** stage, a written prediction should be recorded. When RAC members engage in common disciplined activity of this sort, it offers them a communicative infrastructure so their activities can be coordinated and problem focused. Martin and Gobstein were quite intentional using these elements in the core of the Framework to enliven a culture of common and coordinated work. They realized that at the start of the NIC, MTEP members were capable of sharing but needed help to move from sharing to common execution. In describing this organizational convergence, we often say that, "we have to get everyone on the same page". This kind of cultural alignment of aspiration and identity is helped by sharing a common technical core. But it is much easier said than done.

In their book "Switch: How to Change Things When Change is Hard", Chip and Dan Heath recognize the simple but profound truth that it is very hard to get people to start thinking in terms of "our problem" (Heath & Heath, 2010). Collective action starts to take hold and organizations start to form when diverse actors stop viewing a problem as someone else's thing to worry about. Martin and Gobstein realized that the work of the RACs was, necessarily, slow and painstaking at the beginning. Culture and identity are the social glue that holds a collective action together. This social glue enables coordination and cooperation, without which working together is impossible. They knew that powerful collaboratives are not without adjustment. Organizers have to develop what Charles Payne refers to as "a taste for slow and respectful learning". They know how to get diverse actors emotionally engaged when they can develop on the ground skills of change together. Managers and designers must pay careful attention to cultivating an organizational ecology that works for members to learn how balance the complex concerns of collaborative work. In MTEP for example, Martin and Gobstein realized that participants felt an affiliation tension between the specific RAC and its tight problem focus and the broader concerns of the larger MTEP partnership. In response they made sure to spend time at each of their large partnership convenings they revisited history, goals, and vision of MTEP in order to keep to context and overarching purpose of the RACs in full view.

Starting a collective action effort requires the initiators to consider the degree of independence versus interdependence that will be needed to accomplish the community's vision. The levels of independence vs. interdependence surely vary, but keeping ecological balance will determine the structure of the resultant collective action effort and the success of the effort.

Conclusion

Collective action is a big idea. Networks can enable collective action. Networks come in multiple forms. Here we have highlighted two kinds of networks: those that are focused on sharing and execution. Our aim in engaging in this discussion is to encourage more conversation about these ideas and to bring a little more order to the field. Both sharing and execution communities are necessary. With the advent of almost ubiquitous networking enabled by the Internet, school leaders and others can readily mount sharing networks. Indeed, as we saw in the work of the Math Forum, there are many pedagogical and other teaching and learning advances that should be widely disseminated. The "network's products" are discrete materials and shared experiences. Execution networks raise the bar for collaborative and coordinated work. They aim high to make measureable improvements on a "wicked complex systems problem." On the human social infrastructure side, these require more effort, and specifically effort of a particular kind. In the MTEP case, what was needed to make a NIC was genuine coordination and, presumably, a formal infrastructure that supports it. Today, when we are using terms like collective action and networks rather indiscriminately, it is important to reflect on what we need and the reasons we might need a network at any particular moment. Our aim here was to offer some reflections on the contrasts between sharing and execution networks. While networks, and the progress they make possible, are becoming evident, the excitement about them is producing a bit of a cacophony. Everywhere you look, you find allusions to Communities of Practice, NICs, and other ideas. Our hope for this paper was to help spur a discussion that will aid us in discerning what kind of network works well for what problems, given the goals groups have in mind.

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