CHARACTERISTIC COLLABORATIVE PROCESSES IN SCHOOL-UNIVERSITY PARTNERSHIPS

This article presents findings from multiple years of evaluation of STEM-focused school-university partnerships. In addition to developing the three empirically grounded models of structural partnership configurations for project effectiveness, the CSEP team used these models to examine partnership projects for their characteristic collaborative implementation processes. This essay specifically applies questions that deal with project viability and sustainability—across the full range of Illinois ITQ projects—revealing which collaborative structures and processes make the projects sustainable and which do not.

In this single-themed issue of *Planning and Changing,* evaluators from the Center for the Study of Education Policy (CSEP) at Illinois State University share an overview of Improving Teacher Quality school-university partnerships. Our evaluation of this program is funded by the Illinois Board of Higher Education (IBHE). Partnerships between schools and universities are a cornerstone of recent federal and state policy for teacher professional learning and development aimed at increasing student achievement (Illinois Board of Higher Education, 2003, 2010). We use the term school to stand for both schools and school districts and the term university to stand for higher education partners after the use of these terms in the IBHE policy documents. Since 2004, we evaluated and provided technical evaluation assistance to 47 distinct grant-funded projects funded under the Improving Teacher Quality (ITQ) state grant program. The bulk of these projects address P–12 teacher professional learning in science, technology, engineering, and mathematics (STEM) because of STEM education's significance to Illinois' future prosperity and as one piece of an effort to create a more coherent P–20 education system, *The Illinois Public Agenda for College and Career Success* (IBHE, 2008). This is an exploratory article for sharing our observations of patterns and themes of collaborative partnership processes.

As statewide evaluators, we have found that the ITQ partnerships have commonalities beyond shared policy features that illuminate the nature of collaborative partnerships. This article provides an initial answer to one of four research questions: How do collaborative implementation processes, past, present, and emerging, assure achievement of ITQ's educational goals? We offer our best thinking to date on the collaborative implementation processes in light of our understanding of partnership structures and evaluation capacity (Baker, 2011; Gardner, 2011; Haeffele, Hood, & Feldmann, 2011).

The idea of forming a partnership to accomplish goals and garner support has great appeal. But partnerships are seldom easy, and once

formed, must adapt all the time as people and circumstances change. Policy makers may promote partnerships with grant funds, but to make these partnerships viable when fully funded and sustainable when funding opportunities shift, we need to look past their appealing qualities into the day-to-day collaborative implementation processes through which partnerships unfold and adapt.

Among common characteristics of school-university partnerships, we have found three basic structural configurations to help us observe partnerships as they function collaboratively (Baker, 2011). We also have a set of policies in the Illinois Improving Teacher Quality grant program that support partnerships to continuously improve and to learn from each other in a statewide consortium (Haeffele et al., 2011). We draw on the professional development scholarship to provide guidance about designing teacher learning experiences. Additionally, scholarship on school-university partnerships allows us to consider them as they unfold. We begin with our conceptual framework and then discuss what we have learned about collaborative implementation processes and their implications.

To understand collaborative partnership processes in the ITQ projects, we use three characteristic configurations as a starting point: single-tier, multi-tier, and complex-brokered partnerships (Baker, 2011). Viable partnerships must develop long-term productive relationships if they are to accomplish the long-term goal of affecting student achievement. In our exploration, we highlight four basic collaborative processes: planning, decision-making, implementation, and making evaluation for improvement integral to the partnership (Gardner, 2011). Each structural configuration must meet the same basic challenges and answer unique situations that emerge. Finally, we offer an overview of collaborative processes in each partnership configuration: Single-tier, Multi-tier, and Complex-brokered (Baker, 2011). Detailed cases representing each configuration appear in this special *Planning and Changing* issue (Leslie, 2011; Prusaczyk & Baker, 2011; Voss, Khazaeli, Eder, & Gardner, 2011). We begin with the conceptual framework that informs our understanding of partnership collaborative implementation processes.

Conceptual Framework

Aspirations for P–12 educational renewal rely heavily on professional development that brings teachers together around problems of practice, authentic work, and consensus about effective mathematics and science professional development (Ball & Cohen, 1999; Bransford, Brown, & Cocking, 1999; Cohen & Hill, 2000, 2001; Garet, Birman, Porter, Desimone, & Herman, 1999; Garet, Porter, Desimone, Birman, & Yoon, 2001; Hawley & Valli, 1999; Loucks-Horsley, Love, Stiles, Mundry, & Hewson, 2003). ITQ partnerships are required to have five features of effective professional development: (a) content-focus; (b) active learning; (c) coher-

ence; (d) duration and intensity; and (e) collective participation (Desimone, 2009). This list comprises key features that viable partnerships must be designed to do and implicates collaboration in several ways.

Yet professional development based on effective practices still has a hard time taking hold (Wei, Darling-Hammond, Andree, Richardson, & Orphanos, 2009). The changes required are not superficial. Some changes are structural, requiring new uses of time, space, and human capital. Other changes concern workplace norms that challenge long-standing patterns of private, isolated practice; and collaborative working arrangements often take years to become embedded in school culture. Winer and Ray (1994) define collaboration as a "mutually beneficial and well-defined relationship entered into by two or more organizations to achieve results they are more likely to achieve together than alone" (p. 33). Collaboration requires developing mutual goals, structural arrangements, and shared commitments (Mattesich, Murray-Close, & Monsey, 2001). Yet the collaborative processes that make partnerships effective are difficult to understand because of their complexity (Thomson & Perry, 2006). Collaborative processes are also distinctively adaptive, requiring ongoing learning from all partners (Heifetz, Linsky, & Grashow, 2009).

Partnerships have been assigned a significant role in systemic changes as visions of "seamless" P–20 systems emerge under a vision of simultaneous renewal and ongoing learning (Fullan, 2010; Goodlad, 1993). Partnership as a policy strategy has been questioned as a "third wave" approach to educational renewal requiring that we see partnerships in all their complexity (Hargreaves & Shirley, 2009). There is little empirical evidence that presents a coherent and useful definition of educational partnerships, and the scholarship is heavily weighted towards single case studies (Clifford & Millar, 2008; Kingsley & Washak, 2005; P–12 Project Ohio State University, 2007; Peel, Peel, & Baker, 2002). The bulk of this research focuses, as we do here, on changes to the P–12 partner, although effects of the partnership on the university are developing and warrant further attention (Zhang et al., 2009). We focus on the changes to P–12, because we see so few ITQ projects designed for renewal of the university. Indeed the policy is one that envisions universities taking the lead (Illinois Board of Higher Education, 2003, 2010). The IBHE policy originally listed potential members but now defines partnership by including requirements for collaboration and evaluation. Another strand of scholarship focuses partnership features like the trust that must develop among partners that only comes about as a result of reliable commitments kept over time and the mutuality of goals and benefits (Bryk & Schneider, 2002). In our work, we have chosen to assume that these ineffable partnership features are critically important, but we focus on describing the partnerships as structures and processes to establish some foundational understandings.

To understand how partnerships' structural configurations could be used to design and implement ITQ projects, we turned to the classic work

of Henry Mintzberg (Baker, 2011; Mintzberg, 1983). For Mintzberg, professional bureaucracies, like schools and universities, share five essential functions (Mintzberg, 1983). The CSEP team found these five functions useful for characterizing the structures in partner organizations and partnerships. The five functions are realized structurally as: (a) a strategic apex of executive leaders; (b) a middle line of leaders; (c) an operating core of workers; (d) a technostructure that supports the operating core with expertise; and (e) a support staff that enables the operating core. With these five functional structures as guides, we investigated how variations in partnerships realized different ways to structure and then implement collaborative partnerships. Our goal was to elaborate our understanding of professional development collaborations enabled by the ITQ partnerships.

Each of the five Mintzberg functions requires appropriate configurations in each organization and the partnership; partners must work out the details. In addition, each function will contribute the same five qualities as effective professional development: (a) a content focus; (b) active learning; (c) coherence; (d) duration and intensity; and (e) collective participation. To make a viable, sustainable STEM professional learning partnership, the partners must implement four collaborative processes: (a) planning; (b) decision-making; (c) implementation; and (d) evaluating practices and outcomes, using evaluation results for adaptation. We developed this focused list of processes from scholarship about educational renewal and change processes (Bryk, Sebring, Allensworth, Luppescu, Easton, 2010; Bryk. Sebring, Kerbow, Rollow, Easton, 1998; Elmore, 2009; Fullan, 2007, 2010; Newmann, King, & Youngs, 2000; Newmann, Smith, Allensworth, & Bryk, 2001; Payne, 2008) and evaluation capacity building (Stockdill, Baizerman, & Compton, 2002; Preskill & Boyle, 2008). Just as the five functions and effective professional learning features must be present in each organization and the partnership, these processes must develop into self-renewing commitments to the authentic work of improving student educational outcomes.

Of course, the collaborative implementation processes look different in context, where authority and partnership assume specific forms. The four collaborative implementation processes listed above are designed to include ongoing improvement based on evidence. We derive these processes from the familiar the Plan-Do-Study-Act cycle of self-renewing enterprises associated with the Total Quality Management movement (Deming, 2002). In planning, the designers or partners convene for goal setting, stocktaking, assessing needs, planning evaluation, identifying opportunities, establishing interventions, making preparations, and reaching out to possible collaborators. At the executive level, the planning convenes the College of Education and College of Arts and Sciences deans and local superintendents. This kind of planning is essential for all the reasons above, and to explore shared interests, glean commitments to ongoing partnership, provide policy coherence, and negotiate shared resources. At the mid-level, project directors work with

school partners to establish collaborative work arrangements such as school-based teams. At the operative level, planning is facilitated by the partnership when teachers are provided expertise and support from coaches and each other (Loucks-Horsley et al., 2003).

After partners convene to "Plan," the second and third collaborative processes comprise the "Do" stage in the cycle: decision-making is the collaborative process that complements implementation. The fourth collaborative process is realized when partners make mid-course corrections using the findings from ongoing evaluation, "Study" and "Act" respectively.

Effective partnership planning, decision-making, implementation, and evaluation incorporate all five functions and professional development features, making sure that both technical expertise and supports are present as needed. Once intentions are shared by partners through planning and decision-making, taking action or implementation follows. Coherence plays a special role here as partners communicate intentions they must then translate into the set of complex, challenging commitments that become their shared focus (Hatch, 1998; Newmann, et. al., 2000; Newmann, et. al., 2001). Executive leaders cast the vision, but project directors and principals must maintain the focus in day-to-day interactions and patterns of commitment. Project directors and school liaisons hold the partnership together as they span organizational boundaries, and we have seen that this role is challenging and requires support from executives. The boundary-spanners have the responsibility to make instructional practice a space of collaboration among teachers. They have to open classroom doors and cultivate the trust of teachers. A professional teaching staff will have discretion and not be expected to slavishly implement something with "fidelity," and no one should be deceived into thinking this is easy. The best examples of ITQ project cases encourage teacher professionalism in a partnership arrangement where the university directors and coaches learn collaboratively from what works in classrooms.

Designs, Methods, and Data Sources

ITQ projects share a common set of design features that are mandated by policy makers. Under a common set of policy guidelines, ITQ projects are a comparable set of interventions or treatments that can be evaluated or studied and used to make policy refinements (Stake, 2005; Vogt, Gardner, Haeffele, & Baker, 2010). We designed our study of ITQ projects as comparative cases, and we have described our designs, methods, and processes for coding, analysis, and reporting (Vogt et al., 2010); shared our research protocol; and linked our evaluation methods and findings to policy changes (Gardner, 2011).

ITQ projects begin with proposals, and we rely on documents from IBHE and the projects. Each project is funded for a three-year cycle but prepares annual renewal applications with interim evaluations. We follow-

up the annual proposals or renewal applications with site visits. We visit two to six times annually to observe project partnership events, professional development activities, and make school site visits to see how projects change teaching and learning opportunities for teachers and students. We interview key partners from all constituencies. We convene the project partners twice annually for focus groups based on our most recent findings. We use what we learn from the partners to improve the CSEP white papers, frameworks, and models in a member-checking approach. Coding and analysis of case evidence is a collaborative process shared among CSEP evaluators. As a result, we have several iterations of ITQ finding, implications, and policy changes that have been developed in a statewide evaluation partnership. This special single-themed issue of *Planning and Changing* provides a snapshot of what the statewide network has learned.

Collaborative Implementation Processes in ITQ

We began our evaluation of professional development partnerships by looking at the intersection of professional development and partnership research. We followed up in the field to see how the complex set of roles, responsibilities, and relationships that comprise the ITQ partnerships were enacted by partners. In 2004, our first efforts to develop a framework generated the Structures of Training and Processes of Implementation (STPI) model (Sappington, Baker, Gardner, & Pacha, 2010). We looked at two variables: the length of training and its design for collaboration. We characterized four pure types: (a) short-term professional development for single educators; (b) short-term professional development for collaborating educators; (c) long-term professional development for single educators; and (d) long-term professional development for collaborating educators. From what we knew about effective professional development at the time, we would only expect long-term professional development designed for collaboration to be the basis for a viable and sustainable professional development partnership (Elmore, 2009).

Yet we learned from our case studies that some short-term but collaborative professional development arrangements showed viability and sustainability as partnerships. This short-term professional development established teacher collaboration at short-term workshops for content and content-pedagogy updates. These teachers then committed to follow-up sessions and also continued their own associations based on their common disciplinary interest, collaborating for resource exchanges of expertise and support (Sarason &, Lorentz, 1998). For STEM teachers, this model was viable because it united science teachers around a disciplinary focus. As teachers connected through the project, they kept in touch personally and professionally. In one example, teachers formed a regional network of support for chemistry education as a grass roots enterprise. This network provided support among chemistry teachers who were just an email or phone call away.

In 2004, this network had been in place for almost 20 years and had shown that it was viable and sustainable by its popularity and ongoing support by engaged regional chemistry teachers. We had been committed to exploring the model in this promising variation which seemed to have special promise for STEM professional learning. Collaborations with colleagues could follow discipline lines, much as professors form networks of scholarly interest. These observations presented the possibility of seeing professional development anew, leading us to develop a model that more accurately describes ITQ partnership structures and to more deeply consider collaboration.

How Single-, Multi-Tier, and Complex-Brokered Partnerships Collaborate

In 2005, we sought to further distinguish partnership structures and processes, developing three models to distinguish partnership structural configurations to apply as lenses to collaborative implementation processes (Baker, 2011). Each model includes all of Mintzberg's five functional structures. The first model is the Single-Tier partnership which is a straightforward partnership between university faculty and P–12 teachers. In this model the technostructure (i.e., the internal technical expertise required by the organization), support, and leadership functions are missing. The second model is the Multi-Tier partnership which includes all five functions to one degree or another by design. The best of these projects are comprehensive but require sophisticated collaboration and implementation strategies that attend to the technostructure and supports. Finally, the Complex-Brokered model gets its technostructure or expertise from outside the partnership, so that the issue of support functions and structures may not be adequately addressed in project design and implementation. We share our exploratory findings on collaborative implementation for each configuration below.

Table 1

Partnership Configurations for ITQ projects in Years With New Requests for Proposals: 2004, 2007, and 2010.

Projects Funded	2004		2007		2010	
	STEM	Total	STEM	Total	STEM	Total
Single-tier	3	16	3	3	2	2
Multi-tier	12	6	2	3	3	6
Complex-brokered	1	3	2	3	1	2
Total	16	25(26)	7	9	6	10

Note. In 2004 there were 26 total projects funded, but 25 were in-service professional development projects.

Table 1 provides the breakdown for the three partnership configurations by type in the three years when new request for proposals (RFP) were written: 2004, 2007, and 2010. An IBHE RFP is a policy document that includes changes made to project criteria and increasing requirements for evaluation. All of the cases in this special issue have been funded for two or more cycles.

The CSEP Support and Evaluation team developed an empirically grounded model with three structural partnership configurations that allow us to examine and typify projects for characteristic collaborative implementation processes. These are intended as pure types, useful for their heuristic qualities and not as absolute categories (McKinney, 1966). We consider both professional development and partnership collaborations through these lenses. This framework guides deliberations with the IBHE staff on appropriate changes in policies and procedures to support viable and sustainable projects.

Partnership Viability and Sustainability

In addition to using the three configurations to study collaborative arrangements, we apply three questions about viability and sustainability that we answer summatively for each partnership at the end of a three-year cycle. First, we ask "is the project viable as a set of collaborative implementation processes supporting professional development and partnership building?" For simplicity's sake, we offer the first three of our four collaborative processes (i.e., planning, decision-making, and implementation) as primarily viability factors. Second, we ask, "is the project sustainable with routinized and mutually supportive collaborative processes?" Ideally, we would see that collaborative processes are in place, routinized, and reliant on ongoing evaluation. Planning, decision-making, and implementation are ongoing processes that are renewed in a developing and maturing partnership. If ITQ projects are going to be sustainable, then professional learning and partnership processes must be strong enough to continue when funding is decreased, new opportunities for support are recognized and seized, and in-kind resources are developed. Finally, we ask, "(how) has the project enhanced evaluation capacity through collaborative implementation processes?" From planning on, evaluation supports the viability and sustainability of projects, starting with a thorough needs assessment and developing formative and summative evaluation capacity within and among the partners.

We realize that these concepts are not neat or categorical in practice. We take each collaborative implementation process below as a feature of viability and sustainability. Partners must plan professional learning for teachers and administrators, develop ways to make decisions that keep all partners engaged and addressing common and particular interest, and take action through partnership activities. If the partnership is viable and matures through a set of ongoing, institutionalized structures, collab-

orative processes continue to unfold, answering the professional learning needs of educators in the locale or region. We briefly reconsider the role of evaluation in viable, sustainable partnerships as well.

Single-Tier Collaborations

When the CSEP Support and Evaluation team began in 2004, most ITQ projects conformed to the single-tier model and focused theories of change on individual teachers operating as independent agents in their own classrooms (Baker, 2011). Of the 26 original projects, 23 were designed with this model. Teachers typically take individual opportunities for professional development, usually a summer institute or set of workshops. Follow-ups are generally one or two meetings for sharing among the solo teachers during the academic year. Planning and decision-making are the domains of university designers and facilitators of the summer institutes. Executive leaders at schools and universities may be almost completely unaware of the project's existence. The single-tier projects have no steering committee or planning group, and if there are partnership meetings, they are ad hoc and use existing personal and professional relationships. For example, a professor knows former students in the area and goes to them for recruitment and entry into the schools.

As professional development, these single-tier projects were frequently designed around active learning, collective participation within the parameters of summer workshops. In ITQ they generally have a content-focus. They lack active, collective participation at the school or district level, sufficient duration and intensity, and the coherence we associate with effective professional development (Desimone, 2009).

Because teachers were making their own choices, partnership collaborative processes are simple and straightforward: Recruit teachers for professional development. The volunteer solo teacher practitioner then chooses from a menu of opportunities. Implementation is piecemeal, a matter of private choice, without thought to affecting collaboration for a school, district, or network. Evaluation typically does not include assessment of implementation or student learning, although a select few ITQ single-tier projects assessed teacher learning. A solo faculty member or a small team maintains ties with teachers for purposes of recruitment. Over time, single-tier partnerships may develop into networks that draw former students back to their alma maters for content updates and that recruit others by word of mouth.

The IBHE now requires that projects statewide develop evaluation that links activities and interventions to results (Haeffele et al., 2011; Weiss, 1997). Through evaluation of project results, some single-tier partnerships understood their evolution into networks with local or regional influence. In this way, evaluation encouraged changes in the core collaborative processes that comprise partnership viability and sustainability. Sustainable projects are those that have developed routinized changes in schools resulting from

project activities and mutual commitments to ongoing renewal, even under changes of leadership and funding. We discuss each of these below.

Viability in Single-Tier Partnerships.

For viable partnerships, collaborative planning and decision-making are essential. In the case of single-tier partnerships, planning and decision-making are rarely collaborative. Because the partnerships originated in faculty entrepreneurship, planning and decision-making is the domain of faculty working independently. In STEM disciplines, content updates are popular with teachers, so planning in this way is sufficiently responsive. If collaborative teams are formed, they are not school-based but project-based, making it difficult to affect student learning in a coherent way. They are simply not designed to situate implementation processes in schools. This divorces planning and decision-making from the technical expertise and on-the-ground support necessary to change practice, whether the practice affects the classroom or the reorganization of teacher work to be more collaborative.

In another challenge to collaborative implementation, with teachers coming as independent agents from different schools, project participants did not share curricula. This meant that even where the professional development was method and tool-oriented, without the "large tool" of a common curriculum, chances to collaborate are lost (Leslie, 2011, p. 123), although learning standards in some cases serve the same unifying role. Such partnerships typically lack evaluation mechanisms that make informed planning and decision-making possible, including the capacity to identify needs, evaluate for outcomes, and feed results back to the partners. Until 2009 when the IBHE first required needs assessments in planning, partnership needs assessments were simply listing the participating teachers' schools and indicating which met the federal criteria as "high need."

Planning and decision-making in the single-tier design is the domain of faculty content experts. Technical expertise is necessary for the day-to-day decision-making that teachers must make to implement what they learn, but in the single-tier model, this expertise is not strategically developed for teachers' ongoing access. Supporting change is a near impossibility too because partners are isolated teachers. A university faculty partner is challenged to support and provide expertise in schools. In the case of science particularly, missing support included instructional materials and equipped laboratories, support an isolated teacher is in no position to acquire, and the university facilitators may not recognize as a need. Overall, policy makers implied this model when they designed ITQ around university expertise and not school practice, so project directors often did not envision collaboration as engaging the school partners. Yet this left little guidance or incentive to form a viable partnership that could be sustained without developing new forms and processes.

Sustainability of Single-Tier Partnerships.

The goal of the IBHE and the CSEP Support and Evaluation team was to find out what makes partnerships viable and sustainable (Illinois Board of Higher Education, 2003, 2010). Sustainability is more than ongoing funding; sustainability becomes possible when structures and processes accommodate the partnership with commitments to mutual goals. It was clear from the beginning that single-tier partnerships were unsustainable, because they could not be routinized or offer sustained opportunities to reinvent work norms and modes of instruction. They could not be routinized simply because there was no involvement of the executive and middle tiers and no way to focus evaluation. Without a unit of analysis beyond the isolated classroom, we would not expect student learning to be affected in a meaningful way (Marzano, 2003). In addition, the scholarship on professional development, school change, and educational renewal would predict little impact from a model relying on the individual discretion of a solo practitioner who needs both technical expertise and support close at hand to realize new ways of working. In this issue of *Planning and Changing,* we offer a case study of a long-standing single-tier partnership that recognized the emergence of a regional network in a multi-tier configuration, "Improving Science Instruction in Southwestern Illinois and Metro St. Louis through a Sustained Network of Teachers" (Voss et al., 2011).

Multi-Tier Collaborations

We have reviewed the three partnership configurations model drawn from Mintzberg's characterization of five organizational functions (Baker, 2011; Mintzberg, 1983). Each organization must have people tasked with roles and responsibilities that fulfill these functions. The partnership too must have these functions, and the partners must engage in collaborative processes to address them. Critical to our analysis of partnerships are the two functions that must be managed as part of implementing collaborative professional development: technical expertise and support structures. The multi-tier ITQ partnership is simply one that has all five functions and structures developed in, between, and among partners. The viable multi-tier partnership has found ways to engage the critical mid-level functions that span organizational boundaries and connect partners in collaboration. A sustainable multi-tier partnership is one that has demonstrated ongoing development and flow of expertise and support, engaging all levels of authority.

Viability of Multi-Tier Partnerships.

Schools and universities are professional bureaucracies with three levels of influence and authority: executive or strategic level, middle-lev-

el, and operative level (Mintzberg, 1983). The multi-tier ITQ partnership is one that engages partners at the three levels in collaboration. Executive leaders (i.e., university deans and central office school administrators) are engaged in collaborative implementation processes from planning through implementation and ongoing refinement. Middle level leaders, such as university-based project directors and school principals, collaborate to implement key functions: providing technical expertise and support in schools to ensure that professional development results in changed practices. Finally, operatives are the faculty, mentors, trainers, coaches, and school teachers whose collaborative planning, decision-making, and implementation are closest to students and most likely to affect project results.

If project designers intend changes to expectations, roles, relationships, work norms, and instructional practices, then collaborations that engage these groups are crucial to viability. Multi-tier operatives are often university-based coaches with teaching experience, advanced education, and math and/or science expertise. Increasingly professional development relies on coaches in the schools to be the experts and supportive colleagues of teachers changing their practices. The coaches may be teacher leaders in schools too, but the multi-tier projects generally develop rather than discover teacher leaders to fill this function.

Multi-tier partnerships include school partners in collaboration with all five professional development features. Even so, coherence is often challenging in multi-tier projects, because mid-level leaders, school principals in particular, may not recognize ITQ's strategic value, so coherence is lost. This challenges project coordinators to reach out repeatedly, seeking to develop coherence and to make sure teachers have access to, and develop capacity for, expertise and support through collaboration and teacher leadership. Where teacher leadership can be developed in new collaborative roles as coaches, mentors, and team leaders, the possibility of sustainable partnership is enhanced.

Sustainability of Multi-Tier Partnerships.

In multi-tier partnerships, implementation is guided by a vision for the partnership and policy coherence between and within institutions. As such, they are designed as networks. Sustainability becomes possible because the partners engage all five functions and deploy them to make permanent changes that do not have to reply on a single funding source indefinitely. This is a tremendous partnership challenge, but the multi-tier partnership is well-situated to accomplish this because authorities who can develop funding are engaged (Bullough & Kauchak, 1997). If partners can enact collaborative implementation processes for each function, then the partnership can be flexible and continue to develop its ability to respond to educational renewal pressures and to a system of shifting supports. Finally, the multi-tier project is the only configuration that presents the possibility of renewing the

university partner, not just deploying university expertise to "fix" the school partner. This is only possible because now deans or other leaders can use the partnership to influence the university to renew its technical core: curriculum, instruction, and assessment (Baker et al., 2007; Vogel, 2010).

However, few projects were originally designed for sustainability. The CSEP team learned through our site visits, interviews, and document analyses that a well-written proposal did not translate into a viable partnership. We learned, for example, that a dean's signature on a letter submitted with a grant proposal or renewal application did not mean that the dean had any real knowledge of the ITQ project or any commitment to collaborative planning, decision-making, implementation, or evaluation. Without support from executive leadership, sustainability is impossible. Incomplete realizations of this model were noted in many projects. The ITQ projects together learned through evaluation improvements, symposia, CSEP reports, and conversations to rethink partnerships and learn from results, although some took up the lessons more readily than others. Variations in these projects begin as multi-tier designs but one or more functions (i.e. five functions per Mintzberg) or levels of coordination (i.e., executive/strategic apex; middle level; and operative level) may be missing or less than fully engaged in collaborative implementation. These are target areas for program improvement.

In the most successful multi-tier projects, effective middle level leaders understand the need to link partnership functions and collaborations, enabling technical expertise and support in schools and classrooms where teachers need them. As expertise is established in classrooms and support changes practice, teachers collaborate first with university coaches and then as experts and supports for each other. Even so, the project leadership has worked to make sure that the functions and the people at different levels of authority take their places in the partnership. We offer a brief overview here as an illustration of the kinds of collaboration engendered by this configuration, a multi-tier case from the University of Chicago, "Seeking Symmetry in a School-University Partnership: University of Chicago and Chicago Public Schools—A Collaboration Approach to Developing Models and Tools for Professional Development and Teacher Preparation" (Leslie, 2011).

Complex-Brokered Collaborations

In the case of single- and multi-tier partnerships, university expertise is drawn from the university partner's faculty and professional staff. In the complex-brokered configuration, the university is consulted to identify experts who can offer training or advice on policy. This is a challenging partnership configuration for developing and sustaining collaboration through planning, decision-making, implementation, and evaluation. These partnerships are complex because of two particular challenges: convening the scattered partners and keeping them engaged in collaborative

processes. The challenges are seldom recognized by designers of complex-brokered partnerships, who often operate under a professional development model that is demonstrably ineffective: the one-shot workshop. These projects are brokered because the university serves as matchmaker between consultants and P–12 partners. Typically, the university partner writes a proposal for grant funding, identifying a consultant to come in for short-term workshops. The university then hires or brokers the consultant for professional development, housing the grant administration, sometimes with the project director as the only university representative, although faculty may serve in this role as well as grant managers. There is typically no development of the roles and responsibilities that provide ongoing technical expertise and support to teachers and schools. University faculty may or may not be engaged in local planning, implementation, or evaluation activities essential for systematic school renewal.

Among ITQ projects in this category, well-known educational experts and influential authors were hired for professional development activities. The expertise of the brokered consultants is undeniably desirable and creates buzz for a project, usually around some "best practice." In other cases, the brokered trainers represent particular curricula, such as a science curriculum adopted by schools. Some single- or multi-tier projects are partially brokered. In one such, evaluators with special expertise were hired to train teachers and principals on a complex evaluation process in a multi-tier project.

These projects may yield multi-tier collaborations, and in some cases regional networks develop. Among superintendents and principals in Illinois, for example, regional universities convene an annual round-up that invites policy experts to raise issues and interpret new policies. In one such ITQ project, superintendents were able to convene collaboratively several times annually to address policy initiatives including response to intervention. The university partner identified and contracted appropriate experts to present and facilitate conversations. As with single-tier collaborations, the complex-brokered partnership must develop multi-tier or networked approaches to become viable and sustainable, however. In some cases this occurs as partners come together repeatedly and learn to rely on each other when the brokered consultants are no longer available. Where this has happened, the possibilities of viability and sustainability are enhanced.

Viability of Complex-Brokered Partnerships.

The common challenge for complex-brokered partners is ensuring collaborative implementation processes (i.e., planning, decision-making, implementation, and evaluation) are developed and maintained. The consultants cannot be connected with only the project director or other university representative if meaningful collaboration matters. Nor can the project rely on teachers and schools to use the excitement of inspiring workshops to implement the partnership's design so that teacher and student learning

results. Nothing is clearer in educational research than the failure of this approach to professional development.

As in the single-tier model, collaborative implementation processes tend to be neglected in complex brokered arrangements. Planning and decision-making are placed in the university, and the brokered consultant typically brings a universally presentable program not tailored to the context or to practice in schools. In the prior round up example, the region had many poor rural school districts charged with implementing a new initiative, but the expert trainers were from wealthy suburban districts. While a useful dialogue emerged, the challenge of matching trainer to context was clear. The assumption is that the value of a "best practice" will be self-evident, and administrators and teachers will be inspired to follow-through. If the hired experts travel from a distance and have high fees, this can be an expensive approach to partnership. Project resources are drained away in consultants' fees and do not provide follow-ups for local educators. This configuration lacks both the collaborative implementation processes and the five key features that characterize effective professional development.

Planning and decision-making in the complex-brokered partnership tends to be disjointed. The grant and its goals are developed at the university, often in the Dean's office or in a grant writing center, although some are initiated by faculty entrepreneurs. The professional development workshops are planned and facilitated by the brokered consultant. Evaluation for planning and decision-making is circumscribed by these disconnections as well. The consultant may evaluate but gather satisfaction-oriented data that does not provide partners with evidence of workshop effectiveness, teacher learning, or implementation (Guskey, 2000). Implementation, faithful or otherwise, is unlikely without real-time interventions, and support, and feedback on effectiveness. Changing practice requires changes to school work arrangements to convene teachers around the intended "best practice." The university partner remains untouched by the grant and internal constituencies may not even know about it.

In all, complex brokered projects may be partnerships in name only and tend to promote the ineffective professional development practices that demonstrably do not change teaching, collaboration in schools, or student learning. They are "sit and get" affairs developed easily but executed with great difficulty. Typically, some tenets of strong professional development are missing. First, content focus is often missing. A generic school process is introduced such as adopting a "best" practice. Second, each consultant is only engaged in the professional development for a short time, so the duration and intensity standards are not met even though prescribed best practices may be quite complex. Third, although quality consultants plan engaging workshops, the idea of active participation is more than that. The active engagement of teachers and others in the schools is an ongoing professional learning requirement that requires real changes to the nature of teacher work. Fourth, collective participation is not designed

into the process, which focuses on outside expertise. In the other models, single- and multi-tier, the university experts, faculty and coaches, are close at hand geographically even if collaboration is challenging. When the expertise and support come in the form of consultants' materials, no matter how well-executed, they are predictably inadequate to meet the day-to-day requirements of teachers challenged by a new practice or way of working. These problems are not insurmountable and can be addressed by leaders who thoughtfully develop potential roles for outside consultants to strengthen their own coherent policies. But this requires developing leadership, particularly in the middle partnership tier, typically university staff representing the program and school principals.

Finally, the most troublesome problem with the typical complex-brokered partnership is lack of coherence. Of the complex-brokered partnerships we studied, few were designed with input from school partners based on an educational renewal initiative by a school or district. Both of these either began or evolved as networks engaged in school improvement processes or policies that could provide coherence. To design complex-brokered partnerships in a collaborative fashion would engage representatives of schools and universities to prioritize needs and seek appropriate consultants.

Sustainability in Complex-Brokered Collaborations.

Partnership sustainability is a function of ongoing, shared, and deliberative interactions that are challenging for complex-brokered partnerships. First, many of these are not really partnerships that convene local actors to address some mutual purpose, a cornerstone of any partnership. Any value in the brokered arrangement must be rooted in context and based on honest conversations and needs assessments. Second, even where local players participate, the technical expertise is external to the partnership. In addition, these are frequently expensive partnerships, but the resources leave the community, region, and even the state when the consultant leaves. When funding sources change, the reliance on outsiders makes brokered partnerships vulnerable to collapse. Without routinizing collaborative interactions among teachers and renewed approaches to curriculum, instruction, and assessment, we would not expect sustainability. Brokered partnerships that do not include the five organizational functions and effective professional development practices are among the least sustainable unless efforts are made to address the core middle level functions the partnership requires.

The Southern Illinois University at Carbondale (SIUC) case took a different tack, choosing a challenging cognitively-based approach to mathematics. Designers knew the project would require long term expert support to teachers, but the RAMPD project adopted the complex-brokered configuration because no faculty could be recruited to meet an identified local need for improving elementary mathematics instruction. In the ex-

panded case study, we share the other ways in which RAMPD was unique in a case study, "Improving Teacher Quality in Southern Illinois: Rural Access to Mathematics Professional Development (RAMPD)" (Prusaczyk & Baker, 2011).

Conclusion

The Improving Teacher Quality projects began in the No Child Left Behind era. STEM partnerships will likely look very different under new education reform policies that include Race to the Top, applying the Teach for America model for reinventing the profession, renewed efforts to revitalize education with school charters, and more (Darling-Hammond, 2010; Fullan, 2010; Hargreaves & Shirley, 2009). This is a time for stocktaking as the last cycle of three-year projects enters its second year, and we position ourselves to explore what we have learned. We consider two kinds of implications. First are implications for practice when partners come together to collaborate. We also consider grant-funding as a problematic resource, the role of leadership collaborations, and our emerging understanding of networks as partnership configurations (Bryk, Gomez, & Grunow, 2011). The second are the implications for research and evaluation. We address both in the following brief discussion, and now that we understand partnerships better, we will use the next two years of ITQ's final funding to develop the implications more fully.

The ITQ projects developed from 2004 to the present, taking some practical actions that support development of collaborative structures, implementation processes, and use of evaluation. And each partnership must address the issues of partnership and make sure approaches to professional development meet complex criteria that address the authentic learning requirements of teachers and students when funding may be withdrawn in three years or when the project is redesigned for three more years of funding. The first practical feature of stronger partnerships is that they exist or are convened for reasons that make sense in context. Otherwise projects are ad hoc activities stimulated by grant funding or disconnected interest in a new "best practice." These projects do need funding to continue, and the partnership must be developing funding and in-kind resources all the time. Partnership building is hard work, and new projects need special supports and time if they are to establish themselves as viable and sustainable. Second, partnerships are stronger when all five functions and effective professional development features are in place. Our projects seldom have all the functions in place for all partners, but the most viable strive to reinforce these functions and features. Third, the partners must engage on a regular basis and develop strong relationships so that formative assessments and evaluations can keep the partners learning together. The engagement of partners follows three rough stages that are recursive in practice: planning, decision-making, and implementation, all of which have particular evalu-

ation and improvement functions to which partners must attend. Finally, it takes time to form stable partnerships with these characteristics. Only when we observe their presence can we have confidence in the sustainability of the partnership.

One example of an ITQ partnership that has demonstrated its sustainability is the Edwardsville Hands-On Science project. Its loosely coupled network with "weak ties" is a special case that will address specific purposes (Granovetter, 1973; Weick, 1982). We believe different kinds of networks will support different kinds of professional development. The Edwardsville case seems to work because its disciplinary focus is shared by the partners. The Edwardsville partnership (or partnership-as-network) has taken 25 years to form, long beyond the terms of most grant funding streams. The partners in this case have developed new supports as needed and built the in-kind capacity of the network schools and districts to contribute, setting aside space and funds for labs as one example.

The human story behind partnerships is about a set of personal commitments that make partnerships viable, with leadership and the ability to build social capital through networks. Social capital is the capacity of connecting people in harmonized roles and relationships that function to support changes requiring both individual and collective actions (Smylie & Evans, 2006). Social capital in schools operates at deep organizational strata (Elmore, Peterson, & McCarthey, 1996). In practice this means that building capacity requires trust building, communication, reflection and fresh insight, and changing norms, behaviors, rules, roles, and relationships. The work must be focused and coherent. Leadership creates the possibility of coherence that is foundational to trust, communication, insight, and change. Executive leadership can be the source of coherence and commitment. In one ITQ project leadership meant refusing to "sign off" on a grant that did not have partnership support, denying university math and science educators a grant-funding opportunity but likely reflecting a dean's commitment to form viable partnerships and not overextend the grant portfolio. In a time when leadership changes are the norm, the coherence that partnership projects so desperately need is always in peril. Leaders move on, and some leaders are all but completely unaware of the grant projects in their units or districts. Executives are a mixed blessing if they fail to bring coherence to their units or arrive as new hires who do not honor the prior partnership. In some cases, being off the radar is a blessing when leaders change, because the partnership continues.

We also have found repeatedly, whether we are in Chicago or miles away, that partnerships are dependent on extraordinary efforts by a few key individuals. These leaders hold middle-level authority and use it to strengthen leadership among operatives, build technical expertise, and reinforce resource support networks in which operatives are full partners. In examples from our cases, the chemistry professors from Edwardsville; the project director at University of Chicago who meets regularly with ex-

ecutive leaders, principals, coaches, and teachers, and the CGI consultant in Carbondale who commits to regular school visits, are all serving make-or-break partnership functions. In Edwardsville, the project leadership has been "handed off" twice now, from Emil Jason to Sadegh Khazaeli to Eric Voss, but in many other projects, loss of the founder means the project is fragile, and the partnership disappears. The Edwardsville professors now recognize that they have a network organized around science discipline communities with the ability to provide expertise and sustain their own resource network of supports.

In the other two cases, solid classroom credentials as former teachers and a willingness to offer a range of in school and external supports distinguishes the key people who make the elementary math projects function. Debbie Leslie in Chicago and Cheryl Lubinski in Carbondale, with expert coaches extending their reach, are essential to each partnership. In the Chicago case, the Center for Elementary Math and Science Education (CEMSE) supports the project with a commitment from executives in the University of Chicago's Urban Education Institute and its origins in the Everyday Math curriculum. But the RAMPD case in Carbondale, as a complex-brokered arrangement, is more fragile. A network has developed in five rural communities suggesting a rich opportunity for further growing the partnership. Yet the university has few commitments to the partnership which relies on a few committed individuals, and the typical hired consultant would not provide the consistent presence or leadership to make RAMPD viable. RAMPD was fortunate in its brokering, but the big question remains: Will Southern Illinois University-Carbondale seize the opportunity, or will the commitment to CGI and the network of inspired teachers fade away if key people are no longer partners?

Leadership at all levels is essential, and to miss a leadership function is to put the partnership in peril. Without commitments from executives, deans and superintendents, who see long term value, partnerships are vulnerable. Viability is at risk, because they will not be full partnerships guided by a common vision of collaboration. Unless the partnership can acquire the features that predict its viability, then sustainability is impossible. ITQ partnerships seem to run into the same snags with mid-level leadership: not enough attention is given to building the technical and resource support functions and negotiating the collaborations that make these useful. Each school principal is a potential source of coherence and support, but this is all too often not the case. At the operative level where students are affected by the project, the professional responsibilities of teachers must be altered to make collaboration a norm of practice. School and district leaders must commit to this. Where coaching is part of the project design, the coaching fulfills expert and support functions, but in a sustainable project with reduced funding, coaching capacity must be cultivated within the school staff. Shrinking budgets everywhere mean that this will take not only leadership but imagination, and a reconsideration

of leadership as a quality of all organizational functions (Mintzberg, 1983; Ogawa & Bossert, 1995).

This leads us to consider how to complete the statewide evaluation with just two more years of funding, and we must ask new questions that build on our prior work. Three areas come to mind as areas for attention. First is the recognition that networks are essential to partnerships, and that no one network type can be prescribed. We observe that partnerships are comprised of partnering organizations, but a network analysis that could focus on the development of social capital is a clear next step. We understand that systems of expertise and support are only as good as the social capital they build. We also know that this is complex and the challenges are real and make a difference daily.

We took pains to look at some more tangible characteristics of partnerships: structures, collaborative implementation processes, and evaluation capacity building. Now it is clear that we need to look at trust, communication, and other ineffable partnership qualities. These emerging factors that promote and prevent partnership viability and sustainability are not well-understood, but the foundational work of characterization we have done in ITQ projects will be useful in the final two years of funding under current state and federal policies.

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