



TRANSFORMING AS INQUIRING TEACHERS AND LEADERS

An Examination of the KSTF PING Program and its Multiple
Contributions to Strengthening the Teaching Profession

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"Undertaking inquiry has to be about making a difference in some way. It is not about trying to understand something for the sake of just understanding. It is understanding for a purpose—and that purpose is about better life chances for kids."

—KSTF Sr. Fellow and PING Participant

I. INTRODUCTION

In the summer of 2011, KSTF launched a pilot program called PING: Practitioner Inquiry for the Next Generation. Conceived as a two-year program, PING ran for three years, concluding in spring 2014. PING involved 10 KSTF teachers—eight Teaching Fellows and two Senior Fellows—who applied for PING as a special opportunity within KSTF. We at Inverness Research have served as critical friends and formative evaluators for KSTF for about a decade. Jodie Galosy, Director of Research and Evaluation (R&E) for KSTF and creator of the PING program, and Nicole Gillespie, KSTF Executive Director, asked us to document the PING pilot. At its conclusion, they asked us to prepare a report about PING for the KSTF community, sharing our perspective as independent but well informed observers of KSTF. This is that report.

Guiding questions for the documentation of PING

In documenting the PING program, the Inverness Research group addressed this guiding question: How does the PING experiment contribute to KSTF's capacity to achieve its mission of strengthening the teaching profession?

Within that broad question, PING had the potential to shed light on multiple specific questions:

- How does the PING experience contribute to the participants' development as teachers and leaders?
- What are the key design principles and features of PING that support the development of teachers' inquiry stance and form an inquiry community?
- How can the PING experiment contribute to the development and strengthening of KSTF?
- How does the PING program and experience position the participants and KSTF as an organization in the ecology of knowledge generation about the improvement of science and mathematics teaching? About teacher leadership?
- What are the implications of PING for the larger field of STEM education? For the development of early career teachers? For the development of leaders in the teaching profession?

This report

This report is an interpretation of PING, focusing on what stands out to us at Inverness Research as important for the KSTF community. Additional pieces on various aspects of PING and its impact could and should be prepared for external audiences.

Section II introduces the PING program and describes the focus of this study.

Section III summarizes the most important takeaways about PING in brief form. The remainder of the report fleshes out the evidence and interpretation behind them.

Section IV examines and reflects upon the many ways that participating in PING impacted the teachers.

Section V looks "under the hood" of the PING program design, offering our interpretation of how a particular set of intellectual traditions, core values, design principles, and program components

functioned to enable the PING participants to grow in multiple and powerful ways. It is our hope that this elucidation of the deep pillars of the PING design will help all in KSTF build their capacity to foster KSTF as a community of inquiry.

Section VI looks at the impact of PING beyond the individuals, focusing first on the contributions that the PING program and the PINGsters individually are making to the re-culturing of KSTF and then on prospects for strengthening the field more broadly.

Section VII offers a final thought about the relationship between learning, teaching, and leading.

II. THE PING PROGRAM: PILOTING TEACHER RESEARCH IN KSTF

KSTF frames its broad mission as contributing to the strengthening of the teaching profession. There are many facets to that mission—strengthening the teachers who comprise the profession, building the knowledge base and authority of the profession, empowering teachers and the profession as a whole to strengthen themselves and their schools, and amplifying the voice of highly talented teachers in efforts to improve teaching at all levels of the system. The PING program was a carefully conceived effort to add to, and in some respects to alter, some of the core processes by which KSTF strived to achieve its mission. By focusing on teachers as researchers—i.e., teachers as systematic inquirers into their professional work—PING deepened and made more explicit “stance of inquiry” as a core value of KSTF and a core component of what it means to be a fully professional teacher. As KSTF shifted away from supporting university professors’ research, PING reflected KSTF’s new commitment to assigning responsibility for generating professional knowledge to Fellows and Senior Fellows as K-12 educators.

PING’s name and its mission, broadly framed, were inspired by the book *Inquiry as Stance: Practitioner Research for the Next Generation* (Cochran-Smith and Lytle, 2009), which posited “four ways forward” as the agenda for the next generation of practitioner researchers in education: “(1) Deepening the work of practitioner inquiry communities and linking across multiple local communities, (2) Reinventing the notion of professionalization and reconsidering what it means to call for the professionalization of practice, (3) Renegotiating the relationship of research, practice, policy and, concurrently, rethinking the relationships of researchers, practitioners, and policymakers, and (4) Connecting the practitioner inquiry movement to other transformative agendas and larger movements for school and social change. (p. 153)” (quoted from the PING Statement of Purpose).

Within this broad frame, PING’s goals as a pilot for KSTF were two: “(1) Begin to develop a learning community working to put the “four ways forward” into practice (and imagining what these ways might mean for the group’s work), and (2) Design steps to begin and sustain the work of PING.” Translated into expectations for participants, achieving PING’s first purpose would involve conducting their own inquiries as members of the PING inquiry community, sharing lessons learned from their inquiries with the broader field through professional forums, and creating and facilitating local inquiry groups in their schools. The question of what sustaining the work of PING would mean at the individual and community levels—Ongoing special PING programs? PING-like practices infused in multiple programs?—remained an open question at the beginning of the pilot, taking more shape toward the end.

PING was funded through and conducted within the auspices of the Research and Evaluation program of KSTF; however, it was guided by a planning committee comprising senior staff from all KSTF programs. Additionally, KSTF brought in two nationally known leaders in the theory, politics, and practice of practitioner inquiry to participate on the planning committee and to help facilitate the work of the PING group. This leadership structure ensured that PING was both informed by, and also would inform, KSTF as an organization as well as key leaders in the broader profession.

PING’s originating theory of action could be summed up as this: KSTF Fellows/Senior Fellows engage in systematic inquiry practices within PING, forming a community of inquiry that is a subset of the KSTF community. Through these experiences the participants generate knowledge about teaching mathematics and science. This knowledge and professional stance are of value to themselves in their professional work in their local schools. This knowledge, made available through various modes of sharing, is also be valuable to KSTF and to the field more broadly. Participants also gain habits and skills of practitioner inquiry and of the facilitation of practitioner inquiry communities. They apply these skills in their schools so as to spread the practices and habits of practitioner inquiry locally. They also apply these skills in other roles within KSTF so as to help spread the habits and practices of inquiry throughout the organization. PING participants sustain

their habits and practices of inquiry and of facilitating inquiry beyond the PING program. Over time, through sustained inquiry activity in multiple contexts, PING participants and KSTF as an organization connect with other networks of teacher researchers and professional communities, helping to reinvigorate and empower teachers and the profession through systematic practices of inquiry and generation of knowledge from practice for practice.

III. TAKE-HOME MESSAGES

The details of this report offer evidence and interpretation related to these major take-aways.

The impact of PING on the participants: Transforming as inquirers

The PING program made an impact on participants far beyond what the participants themselves expected. The experience of inquiry in PING touched the teachers at the level of their identities as learners and as teachers; brought about shifts in perspective about students and colleagues, which shifted their fundamental stance toward improving their teaching and their leadership; and expanded their understanding of what research can be and what professional learning can generate. They have re-positioned themselves as teachers in relation to students, and they have re-defined their reasons for wanting to serve their profession as leaders. In short, they did not just “do” inquiries; they became inquirers. Acquiring the stance of inquiry, as one person described it, “lifted blinders from my eyes,” and they feel there is no going back.

These new insights and shifts will thus have a lasting effect far beyond the acquisition of new technical knowledge about practice, because the PING teachers have altered the professional stance from which they acquire knowledge and examine their effectiveness as teachers and leaders. It is important that the PING teachers continue to model inquiry within KSTF and among their colleagues back home, and to advocate for the multiple ways in which inquiry empowers teachers.

Professional learning and leading for a purpose

The PING participant’s quotation that appears on page one signifies one of the most powerful themes arising from this pilot: “Undertaking inquiry has to be about making a difference.” In year one of PING, the teachers were led to develop the discipline of close study of “puzzles” of teaching or leadership. Many of the puzzles involved failing or disaffected students, or resistant and disaffected colleagues. Probing these puzzles ended up generating highly emotional responses, often because a glimpse of the root cause of these puzzles revealed students and teachers who were failing, resistant, or disaffected because they lacked power—voice and agency—in the education system. When PINGsters¹ met to share their inquiries, they often expressed anger, sadness, shame, and disappointment at what they were seeing. These emotions are very much part of being a human and a teacher, but they are uncomfortable to voice in professional community. The inquiry stance and process gave the teachers the tools to stand aside and gain perspective on these emotions and the conditions that generated them, so that they could explore their questions from a more empowered position.

Additionally, the injustices that their inquiries uncovered ignited a passion in this group to use their empowered stance to “make a difference.” The tagline that PING participants began to use in discussions to reflect this collective mission became “speak truth to power.” These teachers want to make school better for students, they want to make schools better places to work and to learn as professionals, and they want to make teaching a better and stronger profession.

Key design elements of PING

These remarkable results of PING were neither inevitable nor easy to achieve. On the contrary, they emerged as a result of careful design and deliberate process over three years. PING’s design and process were expressions of a convergence of particular and powerful intellectual traditions, core

¹In this report we often use the term PINGsters as shorthand to refer to the PING participants. The term arose early on; no one remembers how. The planning committee soon became dubbed the PONG group.

values about education, the KSTF cultural context, and design components (leadership, conceptual frames, generative structures) that shaped the participants' experiences and opened their minds to new insights. Most of these elements stand in contrast to both the rhetoric and reality that prevail in today's education. They are radical and revolutionary in how they frame the purposes of education, the role of the teacher, and the nature and purpose of educational research.

Some of these key elements were made explicit from the beginning, and some lay further under the surface and remain under-specified within the KSTF community. It seems important going forward that KSTF members strive to examine, and continue to learn about the effects of, the many components that go into the inquiry processes they design for themselves and others, both within and beyond KSTF.

PING as a resource for deepening KSTF's culture of inquiry

KSTF has embarked on a deliberate journey toward becoming a national professional community of inquiry. Importantly, all of the KSTF Program Directors, as well as a Program Officer for Teacher Development, were members of the PING planning committee, engaged with the PING participants in meetings, and closely observed their work over three years. This enabled key leaders across KSTF to gain first-hand understanding of the power and complexity of the experience for the participants, and it also empowered them to make multiple intentional moves toward deepening the culture of inquiry at KSTF. Additionally, PING participants are distributed throughout KSTF, sharing their lessons learned and leading by example as inquirers. Thus, one of PING's most important "products" was human capital development at all levels of the organization—new knowledge, habits, and skills. This knowledge is about the nature of practitioner inquiry within a community of inquiry, and it is also about how that is different from more well-known forms of educational research, more typical forms of teacher professional development, and even the original KSTF Fellowship.

Even so, it is important to keep in mind that PING provided the container for an intense brew of inquiry experience and know-how. Infusing that brew into the larger community could yield a diluted form. One KSTF leader described competing demands that can "pull" on KSTF staff, especially the Teacher Developers (TDs), as they seek to develop habits of inquiry themselves, infuse inquiry into the Fellowship program, and still address content knowledge and pedagogy as foci for professional growth. Even with all that is in place, it will take long-term and consistent effort to develop and support inquiry stance, habits of mind, and tools throughout KSTF.

PING as a contributor to the broader profession

The PING participants, wherever they work as educators, are likely to work in a qualitatively different way after experiencing and adopting a stance of inquiry. The effects of these differences will be intangible perhaps, but will nonetheless be vital to the core mission of KSTF, to strengthen the teaching profession.

KSTF expected the PING participants to make a broader impact in two more observable ways: through sharing their work in professional channels and facilitating local inquiry groups in their schools.

Sharing work. As year three of PING came to a close, the PING group generated five articles, four presentations at large professional meetings, and have two more papers in process. This reflects a considerable amount of output from 10 individuals, demonstrating what teachers can and want to produce for the field when they gain the skills, insights, authority, and voice of the inquiry stance. Further, in their content, these pieces reflect the wide range of ideas and learnings that teachers want to write about when they find their voice. Teachers have knowledge to share, statements to make, and questions to ask of their field that include issues of classroom practice but go far beyond that boundary. The PINGsters are professional educators in the full sense of the word, able to and

insistent upon contributing to dialogue about all aspects of education. In particular, as much as they want to speak with their peers, they are even more strongly moved to speak truth to power.

Given the reality of teachers' work lives, KSTF leaders must remember that these outputs were made possible through two vital investments in PINGsters: time away from work and support during the writing process. There is no limit to what PING teachers (and by extension any KSTF Fellow or Senior Fellow) can contribute to the field, given these investments—but these investments are needed.

Facilitating inquiry in their schools. The PINGsters are motivated to support their colleagues back home in developing an inquiry stance—as one PING leader said, “They are gung-ho to try.” They have worked together and formed plans for doing this. There is no question that these extraordinary teachers can go a long way on the fuel of their desire and the knowledge they have gained to date, for example, a new awareness that leadership begins with relationship.

Several of them, however, question whether they have sufficient know-how, especially about the behind-the-scenes design work and facilitation moves, to replicate what they experienced as the “mystery” and “magic” of inquiry as supported by PING. How will they facilitate their colleagues' embracing of long periods of uncertainty in their inquiries? The emotional effects of insights related to injustice, or of colleagues' inability to probe discomfiting “puzzles”? The making public of unflattering aspects of one's practice on a journey toward insight? The taking comfort in small victories in the face of setbacks? The PINGsters will continue to require guidance and opportunity for ongoing reflection on their local leadership efforts.

IV. THE POWER OF INQUIRY FOR PROFESSIONAL GROWTH: THE IMPACT OF PING ON THE PARTICIPANTS

This section examines the impacts that participation in PING made on the participants. These impacts go far beyond the initially imagined building of knowledge about teaching mathematics and science, and they have implications for KSTF and for teacher development generally. This section is rich with the voices of the PING participants. This is intentional. Near the end of the PING program, the planning committee reflected on the challenge of conveying—to Harry Knowles, to the Board, to the TDs, to the Teaching Fellows and pool of Senior Fellows—what practitioner inquiry is, how powerful it can be, what the investment in PING will return to KSTF. One person said, “The PINGsters might be the only ones who can tell this story.” In this section we want their experiences heard through their own words.

A. PROFESSIONAL GROWTH IS PERSONAL

The lasting effect of learning through inquiry

The typical expectation for effective professional development is that teachers will add to what they know and change something about what they do. However, PING compelled teachers to examine and re-formulate who they are as teachers and what it means for them to be teachers. This is a level of shift that can generate personal professional growth in a lasting way that adds to but goes far beyond the levels of professional knowledge and practice. It is a reminder that professional growth, whether shallow or deep, is always personal.

For the PING group, the inquiry process ignited a lasting desire to study their practice and to share their insights broadly—that is, a lasting desire for continued professional growth and leadership. Understanding how and why inquiry has this lasting effect is a key to recognizing why it is important to support teacher inquiry communities.

Inquiry in PING generated growth at the level of personal identity

Inquiry inherently personalizes professional growth because teachers are examining problems they themselves (not a university professor, not their principal) deem important and making meaning for themselves. This simple fact of authentic ownership, all by itself, can mean that inquiry has greater resonance for teachers than many other forms of professional development.

However, this personalization factor ran much deeper than that for PING teachers. They discovered that the inquiry process tapped into their personal experiences as learners and their personal philosophies of teaching in ways that touched their very identities. The comment below reflects what many PINGsters described about probing problems of teaching and learning at a level of personal depth that was new for them:

The work that we do really pushes deeply into our own stance for how to teach and our own philosophy of what we do in our classrooms and our own personalities. Our thinking can go really deep and it is very personal.

Another teacher gave a particularly illuminating example about how getting to the “root cause” of students’ struggles in the science classroom was very personal and motivating for him:

The descriptive review protocol², being an observer of that, it became very emotional... I think that was the moment where I started to realize that this work that I am doing really is personal

²Descriptive Review is described in section IV.

to me, and it is more than just observing something that is happening in my classroom. This is actually something that really connects closely to who I am as a person, as a science learner, and as a teacher, and really verifies for me that this is work that I want to continue to pursue and something that I think that I really want to keep pushing at and trying to find out. Not an answer, but like what are some things that I can pursue to try and help get to the root cause of these things.

He goes on to describe how this powerful personal connection to what he is learning through inquiry moves him to share his inquiries broadly:

The part that really kind of hit me hard, though, is that real personal connection that I had with that desire to get my story out there, because it relates to me as a person, even my own journeys and struggles and just trying to get that message out there that process is as important, if not more than the actual content that is being delivered.

In these comments we can see how inquiry greatly strengthens teachers' intrinsic desire to learn about their teaching, to understand the causes of problems their students have, and to contribute their insights to the field. Becoming an inquiring teacher strengthened the teachers' sense of agency, and urgency, to continue improving as a teacher and to continue striving to strengthen the profession through their leadership. It did this because the experience touched them at the "who am I as a learner and a teacher" level, not the level of technique.

Engagement in professional inquiry does not guarantee this depth of experience. Rather, this depth of impact can happen when the inquiry process is designed and facilitated in ways that allow that depth of identity work to take place. (Section IV examines what about PING created the context for this identity work.)

B. DEVELOPING AN INQUIRY STANCE

Learning through inquiry brought about deep shifts in perspective

The inquiry process prompted the Fellows to make much deeper shifts in their teaching than any prior experience had, including the many high quality activities of the Fellowship program. Through the inquiry process, they brought into sharper focus their purposes for being teachers. More profoundly, they fundamentally redefined their relationships with their students and in some cases with their colleagues by developing the habit of probing for the "root causes" of problems and challenges in their teaching. This generated a whole new perspective on teaching and learning, on schooling, on leadership, and on their personal values and mission as teachers. Here we begin to see what developing a "stance of inquiry" really means.

Here a teacher comments on a new habit of "thinking more deeply about situations" both professional and personally:

Through my participation in PING I am thinking about myself and the role that I play in whatever area it is that I am thinking about or sharing. So I think that I have sustained that learning and kind of taking an inquiry stance for everything in my work, and even in my personal life...just thinking more deeply about situations that I am involved in, and yeah, and being more intentional about my reflections, I think. I don't see myself losing the kind of things that I have gained and I think that inquiry is now part of my life.

This teacher explains the difference between learning a new teaching technique and gaining a whole new mindset as a teacher:

It is almost hard to think what I can't attribute to PING. I have a very different mindset towards my own growth as a teacher and I feel less of a pressure or a need to think about my growth in

terms of like okay, there is this thing called POGIL and I am going to master this technique in my classroom and I am going to implement it to perfection. It's more of I am learning every day from my room, and by doing inquiry, I can be more receptive to more kinds of information and be more aware of my own assumptions and be more aware of the fact that I have blind spots and I need other people to help me see in those blind spots and those blind spots are the place where I am actually going to learn. So that I think has been really different. I feel different every day in my classroom, just there is more meta things going on in my mind now than there were before...I feel like I see my students more as, and this is always true, but I feel like they are a much more rich source for my learning than I thought of them before...that is a really, really big shift.

The inquiry stance promoted understanding, and relieved suffering, about challenges of teaching and leadership

At the same time that the process of inquiry touched the teachers at the level of identity and personal mission, the inquiry stance gave them the perspectives and tools to stand apart from their teaching so as not to drown in and be blinded by the emotional impact of the challenges they face as teachers and leaders. In PING they developed the habit of mind to stand aside, observe, and ask “what is going on here?” instead of succumbing to the emotions of “I am a bad person/bad teacher” or “my colleagues are inadequate and make me angry.”

Here, one teacher describes how silently listening to her fellow PINGsters' reflections on her inquiry enabled her to gain the observer perspective. Note that the experience of inquiry in community—and specifically the responsive listening skills that are part of the descriptive review process—helps produce this shift:

Two years ago when I was teaching that class it was just killing me. I was waking up at 4 in the morning and I was staying up late, and I was really trying so hard, it was just terrible ... PING gave me the space to sort of look at it critically for how I could have learned from it and not feel really bad about the whole experience...I was too emotionally ravaged by the experience to be able to step away and to do that, but then my fellow PINGsters sort of did that for me, and did a thing where I was a silent observer and they sort of talked through the problem, and I don't know, I just felt like that was a moment where I felt like I could look critically at the situation and I could make it better...[that experience is] putting me in a place this year where in the summer when I learned that I was going to be teaching this class, instead of just freaking out and thinking like oh my God, this is going to be a train wreck, I was like, well what can I do to make this work this time, to make it different?

Another teacher, commenting below, explains how the descriptive review process helped produced a shift in perspective away from “drowning in my own frustration” and toward “understanding it better”:

Part of [the descriptive review] was the experience of preparing for it [the teacher describes being coached and doing writing] so going through all of that work ahead of time, and really having to reflect on my classroom that way, but also getting some external feedback and hearing how other people perceive things, that was a big moment for me in thinking like, there are a lot of times when I am so wrapped up in my own drama, that it is hard for me to think about things in a new way or hard to think about things in a way that is just not drowning in my own frustration, and so, that was a big turning point for me, and it really made me like think about how I might be perceiving my own practice and how I might go about understanding it better.

Similarly for another PINGster struggling with challenges of leadership, the inquiry process created a perspective that distanced the teacher from overwhelming emotion and cleared a way forward:

Leadership was just this big ugly mess, and two years ago I didn't know where I was going and I didn't know if I was being successful...PING really helped me get a grasp, and that grasp is still evolving and so it is not that I figured it out, it is just that PING has given me a way to move forward ... I was just so hypersensitive to the criticism and that just took over my whole worldview there for awhile. So that was just another way that PING has helped me, giving me those structures to be able to do that.

C. RE-DEFINING THE TEACHER-STUDENT RELATIONSHIP

As a preface to this section, we offer a simple conceptual framework about effective teaching that will help to underscore the importance of the new insights gained by the PING participants through the inquiry process. At Inverness Research, we often define the core components of an effective classroom as a “relationship triangle.”³

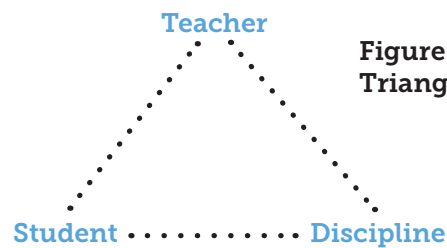


Figure 1. The Relationship Triangle

This framework represents teaching as the following, with the arrows representing relationships:

- A teacher has, and is always developing, a relationship with the discipline she is teaching
- A teacher has, and is always developing, a relationship with the students she is teaching
- The aim of teaching—the teacher’s work at the core of the education system—is to develop a strong relationship between the students and the discipline

The quality of the relationship the teacher has with the discipline, and the quality of relationship she has with the students, exerts a strong influence on the quality of the relationship the students develop with the discipline. For example, in the very best classrooms it is evident to the observer that the teacher knows and loves her discipline and loves to learn it, that she knows, respects and enjoys her students, and that her purpose (and pleasure) is to bring the students and discipline together so that students develop love and knowledge of the discipline. More generally, how a teacher construes the purpose for her teaching—*what kind of relationships she believes she has and wants to develop along all these dimensions*—governs the process and experience of teaching and learning in the classroom.

In the KSTF Fellowship, there has been great emphasis on the teachers’ relationship with the discipline: teachers with strong discipline backgrounds are recruited in, and much of the Fellowship work has focused on continuing to build the pedagogical knowledge that contributes to effective teaching. KSTF has also worked in various ways to build a cultural ethic related to respecting students. Inquiry turns out to be an especially generative way to strengthen teacher knowledge of and respect for students. In fact, perhaps the strongest impact of the inquiry process on the participants was to transform their stance toward students and, as a result, to dramatically strengthen the teacher-student leg of the triangle.

Inquiry compels teachers to re-see students and colleagues in new and constructive ways

The PING teachers began the inquiry process with a grasp on the truism that teaching is fundamentally a relational enterprise. They came into PING knowing they want to form positive

³This stems from David Hawkins’ essay “I, Thou, and It” (1974). Many others have used this triangle to portray the basic relationships at the core of teaching and learning.

relationships with their students, and knowing they want to help their students develop positive relationships with school and with the subjects they are studying. Then, through the inquiry process, the PINGsters discovered and adopted a whole new stance toward their students and their colleagues—in particular, toward their “problem” students and colleagues.

We know from research on teaching and learning (Jussim and Eccle, 1992, just one example) that teachers “construct” students, that is, make assumptions about them based on the files that are accumulated over time, on students’ surface behaviors, and on the stories that adults in schools tell about students; it is practically inevitable that teachers will have strong pre-formed ideas about their students. Furthermore, students respond and fulfill teacher expectations. Thus, if inquiry enables a teacher to re-see a student, to dig below surface behavior and understand what motivates students and what they need, this is a profoundly powerful effect.

Learning from students

First, the PING experience enabled the teachers to develop new means of learning from and with students. Thus the teachers became able to shift their teaching to be student-centered in ways that they had never really grasped before, even in an “inquiry approach to science” kind of way. Also, the principle of “social justice” manifested in a range of ways, often unexpectedly.

In the comment below, a teacher describes learning how to ask what really works for one’s students and making changes when one discovers that well-intentioned strategies for dealing with problem students can backfire:

[I’m] sort of really shifting everything that I do for my students’ perspectives, and so like how am I setting up a student for success? What is the experience of being in my classroom like each day? How much of it is a culture of compliance, and how much of it is fun, and how much of it is intimidating, and just really thinking through like what are kids experiencing, and then actually reaching out and getting feedback from students more frequently about where you are experiencing how the class is going ... and I know like [another PINGster]’s work ... his big take-away, that we have these structures that are meant to help students, but they are not really helping them... I think we are delving deeper into a reflective student-teacher relationship and how to leverage that relationship to make the classroom better for everyone.

Below, another teacher talks about why it is so important to try to inquire into the students’ perspective rather than make assumptions:

One of the things that PING has really helped me think about is not all students come into a classroom with the same mindset or the same set of social skills or the same approach to being a student. As a teacher, one of the things that I need to be thinking about and recognizing and learn more about is how to understand students and their approach to the classroom so that I am not unintentionally just misreading their cues, and helping them grow into scientists rather than discouraging their behavior accidentally by us assuming that they don’t care just because they do certain things. That has been a big thing for me.

Re-seeing students, or “blinders have been lifted from my eyes”

One of the most profound lessons the PINGsters learned through the inquiry process was to deeply respect the personhood of students and of colleagues, to be able to recognize complex or difficult-to-manage behaviors as signs that there is something below the surface of behavior to be learned, so as to become able to form constructive relationships. The inquiry process created a new awareness that part of forming constructive teaching/learning/leadership relationships is to acknowledge, respect, and strive to “see” and understand “the other,” whether student or colleague.

In the comment below, for example, a teacher narrates an epiphany about making a shift from blaming and labeling students toward asking about the sources of students' behaviors. The teacher grasps that the language she uses to label a student shapes her own assumptions about that student—and that those assumptions obstruct a teaching-learning relationship. In this epiphany, the idea of "expectations for students" takes on a very powerful meaning.

I am a lot more conscious of the power of language...sometimes you will hear about 'good' students or the 'bad' student, just being very aware of the fact that the language that I use, it sort of shapes how I think about an approach to them...as a teacher that has been a huge shift for me because now I feel like I could only possibly operate from a from a place of being completely in love with my students and thinking that everything that they do makes rational sense on some level and maybe I just don't understand. I was with a teacher today who was describing one of the student's behavior. The student was being an 'asshole' because she was eating during class and she wasn't supposed to be eating, and so [the teacher] told her to put the food away, and she [the student] didn't acknowledge what he said and she kept eating and so in his mind, the student was being an asshole. I know this student, and I talk to this student, and this is a really typically high achieving student and can be a really pleasant and wonderful human being, and in my mind right away, it wasn't 'oh this student is an asshole,' it is like 'wow, what is up with that student?' Right away there are a bunch of questions because I am coming from a place of 'this is a good, decent person who operates rationally and something must be up.' I think the year that I struggled so much, I did not have that mindset...

This teacher goes on to explain how inquiry lifted "blinders" from her eyes, enabling her to "see students for the first time."

I didn't always come from a place of being every student's number one fan. I have to be very careful when I speak with students that I am coming from a point of what I am noticing, questions that I have about what they are doing with their class time at that given moment... It is like learning how to respect them as students and also as people...like I just don't understand why they struggle so much with fractions, and not just being like, god, they are so dumb sometimes, and like I would never say that now. It would be like, what is going on there?...it is like, blinders have been lifted from my eyes or something and I really feel like I see students for the first time. Like each student is like a little puzzle that I need to figure out, like what do they need?

D. TRANSFORMING AS LEADERS

Selection into KSTF comes with the expectation of becoming a teacher who leads. Especially for an early career teacher, this expectation can lead to feeling shipwrecked on the rocky shoals of a system that is hierarchical (principals have great positional authority) and a profession that is egalitarian (teachers often "resist" colleagues who strive to be leaders). Being a leading teacher in this complex social system requires a highly specialized set of knowledge and skills. Some participants in PING decided to focus their inquiries not on teaching but instead on leading. The inquiry stance and process brought about dramatic shifts in their perspectives that enabled them to re-position themselves more effectively as leaders.

Re-defining leadership as relationship

The PINGsters' constructions of colleagues coming into PING were different from their constructions of students. While the PINGsters already knew that teaching is about relationship, they seemed less aware that leadership is also about relationship. For example, whereas the PINGsters tended to feel like "bad teachers" when their students did not succeed in their classrooms (in other words they blamed themselves), PINGsters tended to place blame with colleagues who did not measure up to their expectations about professional behavior. In many a PING meeting,

especially in the first year, the participants complained about their departments, colleagues, and workplaces in ways they never complained about their disruptive students. Thus, the transformations regarding leadership that several experienced through the inquiry process seem all the more remarkable.

Here one PINGster describes a dramatic moment of realization that negative assumptions about colleagues were inhibiting leadership effectiveness:

I was at a PING meeting when I realized that the truth of the matter, if I had to really be honest, is that when I said something about, 'I don't think everyone [colleagues] has something to offer me,' and basically, 'can you truly collaborate with someone if you have the perception that they can't help you?'...I hadn't taken the time to try to figure out what people have to offer and I can't make that judgment...I don't know why I had those feelings, and I don't think anybody wanted to say them out loud because that sounds ridiculous to say that. So it was during a PING meeting where I really tried to reflect on that and think about that. I think it may have been [fellow PINGster] or someone said to me, like 'I don't know if you even like these people, even value what they have to say,' and I am like, 'I probably don't.'

This same teacher goes on to explain the new insight gained that leadership, like teaching, is about relationship—an insight that moved this teacher to re-frame her stance and behaviors as a leader:

So that was the thing, and I need to really deal with that—that is not okay! ... I think the biggest thing that I took away from all of this is that teaching is relational. I understood that so much for my classroom, and when I was outside of my classroom I didn't get it, but now I do, and it really does make a difference.

Another PINGster explained how, after processing her own experiences in PING, she was able to clarify her stance and approach as a leader who promotes professional thinking:

I don't want [my colleagues] to feel the way that I felt last year. I don't want to come off as somebody who is there to give answers or be exemplars of something...I have a more fluid understanding of leadership I guess ...I need to plan to have conversations with teachers because I want them to be conversations about exploring their own thinking rather than me telling them my thinking.

One of the KSTF leaders reported that at the beginning of PING, the teachers complained about "how everybody else was a problem," but at the end, they were asking, "How I can be a better inquiry partner?" It is this dramatically different stance—seeing themselves as allies with their colleagues rather than adversaries—that will set PINGsters up for effective teacher leadership.

Developing a new professional voice

All of the PING participants went through stages of questioning whether their inquiries had generated something of value to say or write about for a professional audience. Simultaneously, however, as they re-framed problems of teaching and leadership, they were also discovering a new professional voice.

Here a teacher explains how she sees a need to speak up for, and give voice to, teachers who are committed to working with the most challenging students:

A lot of the teachers that write [for professional journals], it seems like they are into the challenging math and their goal is to decide the next rigorous high level thing to present to their students, and I feel like for a lot of us, we are not seeking out additional challenges! We are confronted every day with the challenges that students are under-prepared and lack basic numeracy skills and yet, the standards keep getting more and more challenging and the assessments keep getting more and more complex...So we are giving voice to teachers in the

math education community who are not like reveling in the elegance and the beauty of math, we are trying to figure out ways for students to jump through these hoops...because there is a conversation of like, as an educator, how can you give them successes? And do so with mathematical integrity, but also in a way that enables them to experience success when they clearly haven't.

Another teacher explains a newfound commitment to speaking out about the greater role that informed teacher judgment should play in education—in particular on the behalf of the student experience. This teacher is a good example of how the inquiry process can empower teachers to evaluate education and want to empower the profession.

Another message...important for people to learn is that teachers can and should be the ones doing that important work in education and determining whether the things that we do in the classroom, the teaching styles that we use and the discipline procedures that we have, the curriculum that we teach, teachers should be more actively involved and coming to evaluate them... I have the ability as a teacher to influence district policies, district processes and things like that, and recognizing that I could, I just need to be an advocate for students.

One teacher spoke about how typical professional development offered in the workplace—in contrast to inquiry—frustrates and inhibits teacher judgment and voice, rather than strengthening teachers:

[inquiry is] different from the way that teacher PD is done now, which is like, someone else has identified a need that you have and they are going to inflict some professional development on you...it is universally frustrating....I think the more that [PD] could actually be like an inquiry process for the teacher, the better, because I think a lot of times that teachers are taught to doubt their own professional judgment because so and so says so, which I think is damaging.

E. UNDERSTANDING INQUIRY

The group of 10 teachers signed up for PING without knowing what “inquiry stance” really meant or even what they were in for, though they had read about it. Trained in math and sciences, and having been good consumers of education research, they certainly carried into PING notions of what counts as research. Only through their personal experience of inquiry were they able to deeply grasp its nature.

Inquiry is much more than reflection

PING participants see practitioner inquiry, as they experienced it in this program, as being qualitatively different from reflective practice, with inquiry process being systematic, i.e., involving discipline, skills, and tools. Thus they have new appreciation for what it means to adopt an “inquiring stance” as a teacher. The teacher commenting below, like others, is pre-disposed to be reflective, but was unable to enact that predisposition without the structured guidance and tools of PING. The implication is important: Reflectivity may be a disposition, but inquiry is a disciplined process.

I always found myself kind of trying to really think about learning and teaching practices and what are some things that kind of puzzle me and what are some things that I am curious about...I found myself not having the knowledge or the direction of how to do it in a structured manner.

This teacher then draws an illuminative distinction by explaining how a teacher could be lulled into thinking that reflectivity equals inquiry:

It is easy to trick yourself that you are doing inquiry, or to lull yourself into feeling you are doing inquiry as stance at a high level, when you are actually doing it at a low level. And if you

are always using your gut reactions and you don't really go back and check yourself with another data source, or another perspective, you can arrive at conclusions, and erroneous isn't quite the right word, but you can kind of go down this path but would never get there, and I am claiming that the more structured one is a better one in my experience... Inquiry as stance is not you are just looking to improve, it is more than that, and it is being systematic, and it is even being systematic about how you are being systematic and that you systematically choose powerful tools to structure your inquiry...Reflective attitude is good and healthy, but it is not inquiry as stance, with a capital I.

Practitioner inquiry re-defines what counts as research

What practitioner inquiry is and what it involves was an unknown to the participants when they started. Even though they had read about inquiry, it took time—several meetings or a year—to grasp it. One said this about STEM teachers:

One of the first big shifts for me as I am sure it was for many people, especially us STEM-y, nerdy science teachers and math teachers, and it is this idea of shifting the idea of what counts as research and I know that that was presented in the first meeting, but it took some of us like a year...as soon as I understood that that is what I was trying to do, it totally blew the lid off what I thought I could do.

One insight that was new to these science- and math-trained teachers was how one “case” of a student could shed light not only on a whole classroom, but also on one’s practice broadly. Forming this recognition for themselves signaled a big shift for these teachers, who were trained in statistical definitions of generalizability:

I didn't expect to be so surprised by some of the depth in which I can examine small pieces of my teaching and how much of an impact that can have on the way in which I look at the profession...for example looking at one student in one of my classes, I feel that experience really was about that student, right, and I learned a lot about that student...But really when I think back on that...getting to know that one student and how much that helped me know better the experience of the students in the class and I think that really affected the work that I was doing with all of my students.

One teacher emphasized the way in which practitioner inquiry broadened his sense of what sources of data he could learn from.

I think another thing that has changed for me is that we are open more to other data sources, as opposed to just looking at numbers or focusing on maybe like a survey result. I am more sensitive to a lot more of that anecdotal stuff and taking what the students say and even just every little experience that I have to try to make connections to what is going on in my classroom and my teaching. I have gotten away from that idea that data has to be numbers.

In sum, the PING program made an impact on participants far beyond what the participants themselves expected. The experience of inquiry in PING touched them at the level of their identities as learners and as teachers; brought about shifts in perspective about students and colleagues, which then shifted their fundamental stance toward improving their teaching and their leadership; and expanded their understanding of what research can be and what professional learning can generate. These new insights and shifts will have a lasting effect far beyond the acquisition of new technical knowledge about practice because they have altered the professional stance from which these teachers acquire knowledge and examine their effectiveness as teachers and leaders. They have acquired the stance of inquiry.

V. KEY FEATURES OF THE PING PROGRAM THAT MADE IT EFFECTIVE

This section begins with a brief overview of the trajectory of the three-year program and the demands it made on the participants. It then examines multiple elements that contributed to the PING program's effectiveness in creating transformative experiences for the participants. These elements begin with the leadership team, called the planning committee, who were the architects and builders of PING. A small set of core values about teaching, learning, and research formed the foundation of the program design. Finally, several key design components facilitated the teachers' work in powerful ways.

A. OVERVIEW OF PING—ADAPTING TO A NEW FORM OF RESEARCH

The first year of PING focused on the formation of questions about “puzzles” of practice (teaching or leadership) and on exploration of the range of types of evidence the teachers could examine related to their questions, with an emphasis on close observation and field notes/journaling of observations. The facilitators placed emphasis on keeping questions open and examining the assumptions behind the questions, and on close observation of selected students through journals and field notes as evidence.

These emphases were challenging at first for the PINGsters, trained in the quantitative tradition; they tended to want to frame a question in narrow terms and then to administer surveys or conduct structured interviews to get data sets that, within the qualitative realm, were more comfortably systematic than the more interpretive field notes/journals. However uncomfortable they were at first, the PINGsters willingly suspended disbelief and engaged in the first year's work with gusto and faith in the process; this was because they had faith in the facilitators and because they had trust with one another. All of this faith and trust had its roots in their prior experience in and trust of the KSTF organization and culture. These same teachers, put into an inquiry group outside of KSTF, could very well have balked at these quite alien forms of professional practice.

The second year involved continuing, ever-deeper explorations of their evolving questions, again with emphasis on observational forms of evidence (and also including some surveys and interviews). The facilitators placed emphasis during the second year on various forms of peer review of evidence and peer response to interpretations of what the evidence might mean. On one occasion, participants were invited to bring colleagues from their workplaces to a meeting for the purpose of beginning to experience sharing their questions, evidence, and thinking with external audiences. These multiple rounds of collaborative inquiry had two major effects. First, they provided multiple analytic perspectives on each person's question and evidence. This is an important feature of inquiry within community: multiple analysts looking at evidence enhance the rigor and quality of interpretation. Second, and in a complementary way, each individual had opportunity to examine evidence from multiple inquiries occurring simultaneously. This afforded insights into the many commonalities they shared. Thus this second year of collaborative work strengthened the PING community's bonds and also strengthened each person's individual project.

The second year of work also brought into sharp relief the truth that practitioner inquiry is not a quick or even a finite process. Rather, it is an ongoing process generated from a stance of continual inquiry—with questions generating more questions and more desire for evidence to gain insight. An inherent challenge is to decide when to pause, capture lessons learned, and formulate ideas to share with others. The planning committee recognized partway through year two that the PINGsters were not ready to end their projects and decide what to write and share. They thus decided to extend the pilot into a third year to enable the participants to hone their studies and devote more time to think through how to share what they were learning.

Year three involved a range of activities—both in person and at a distance—designed to help the PINGsters identify a “slice” of their inquiry to share with an audience beyond PING, and to provide them with feedback and help with drafts of written articles and presentations.

B. FOUNDATIONS OF PING

Under the surface of the design of the PING program, perhaps invisible to the participants, were several elements that gave it its shape and contributed to its effectiveness. Again, it is important to note that PING did not occur in a vacuum; rather it was imbued with particular intellectual leadership, core values, and organizational culture. It is important that KSTF leaders and PINGsters alike recognize these because it is not likely these elements will be naturally occurring in the local contexts where PINGsters try to launch inquiry groups. Without explicit knowledge of these—rather than tacit—PINGsters could find themselves on the rocky shoals of resistance once again as they reach out to their colleagues.

Intellectual leadership

Key leaders of PING brought substantial intellectual and experiential history to the program. Jodie Galosy, the R&E Director, came to KSTF with experiential knowledge about inquiry stance as the basis for teacher professionalism and leadership, and about inquiry processes as the source of teacher-generated knowledge for teaching. She gained these in part through her membership on the Network Faculty Development Committee (Bartunek, 2003), a very powerful professional community committed to professionalism and teacher-led improvement in education. Galosy hoped she could recreate the best of the NFDC with the new PING program.

To assist in envisioning and facilitating PING, Jodie involved two university-based teacher educators outside of KSTF, each with extensive background facilitating, studying, and writing about practitioner inquiry. One was Susan Lytle of the University of Pennsylvania (<http://scholar.gse.upenn.edu/lytle>), who has written extensively for over 20 years about the theory and practice of teacher research and teacher-led change in schools, and who has edited volumes of teacher research studies. With her long-time collaborator Marilyn Cochran-Smith, Lytle was the author of the book, *Inquiry as Stance* (2009), one of the core readings for PING and part of its inspiration. The other was Diane Wood of Towson University (<http://www.towson.edu/coe/ilpd/wood.asp>), who on top of many years as a teacher and principal, co-founded the Network Faculty Development Committee. Wood also brought strong theoretical grounding in qualitative research, in particular hermeneutics and narrative as ways of knowing. Both Lytle and Woods could speak about the ways in which their work with teacher research was steeped in the long tradition of action research, with its roots in equity and democratic ideals and its moral humanistic perspective on education and its place in civil society.

As co-architects with Galosy, Lytle and Wood served on the PING planning committee throughout the project, as well as serving as facilitators of PING meetings. Wood, with more time to devote to KSTF through a resident scholar appointment, also served as a mentor to individual participants.

It should be said that an all-KSTF leadership group could very well have created and run PING as a pilot—Galosy, with expertise in practitioner inquiry; similarly the new Senior Fellows Program Director, Dina Portnoy, who had worked and published with Susan Lytle in Philadelphia; as well as Rosanne Rostock, KSTF Teacher Developer who had also worked with Lytle; and then Teaching Fellows Program Director Nicole Gillespie, holding a vision of practitioner inquiry as a core practice of leading teachers. However, inviting these two renowned scholars from outside KSTF to contribute as substantially as they did added depth and “heft” to the PING program, situating it explicitly in a definitive intellectual and progressive education tradition, and connecting the PING participants to other communities of inquiry working for equity and transformative education.

Core values that served as foundation for the design

Proponents of practitioner inquiry in education share a deep set of beliefs and values about the nature and purposes of teaching and learning, and about teachers as knowers, not just applicers of others’ knowledge. PING was built upon a foundation of these guiding assumptions.

The nature of teaching and learning

The PING program and the tradition of practitioner inquiry more generally work from an assumption that teaching is primarily a relational human enterprise. Teaching and learning involve the whole persons of the teacher and the student and the relationships among them. Teaching is complex, nuanced, extremely intellectually and emotionally demanding. Certainly there are techniques, tools, shared knowledge, and discipline practices, but teaching is not basically a technical profession, but rather a humanistic relational one with major intellectual demands as well.

Teachers as agents

A practitioner inquiry project of any kind assumes a basic level of professionalism among teachers: that teachers care about students and want to help them learn, that teachers are capable of making meaning from their experience as educators, that teachers can construct knowledge for teaching by generating knowledge from teaching. One member of the PING planning committee described the progressive philosophy of education upon which practitioner inquiry is based as “practically revolutionary” because it “positions teachers as thinkers and agents whose intentions can be trusted and whose commitment to kids can be trusted...It assumes teachers are thinking creative people who have deep commitments that will make them want to do the right thing.”

These assumptions run counter to the principles upon which much professional development, curriculum implementation, and accountability systems are currently designed, which one person characterized as the belief “that teachers are not doing their job and you need to coerce them into doing it with draconian evaluation plans and merit pay, because they are not going to do it on their own.” Some might say the more progressive philosophy also counters how the teaching profession sometimes positions itself politically. A tag-line that arose through discussion early in the PING program was, “Teachers need to speak truth to power.”

The nature of research that is important for teachers (practitioners) to do

Certainly becoming an inquiry teacher promotes teachers’ professional growth. Additionally, it does generate knowledge available to the field more broadly. Practitioner research is different from traditional scientific research and different from much of research in education. It is not only almost exclusively qualitative in nature, but it is also subjective in the sense that it relies upon the unique perspective of the practitioner for its validity and its value. Practitioner research does not try to “control” or “eliminate” variables, nor does it seek out problems related to phenomena that are easily measured or quantifiable. In contrast, it tries to observe and make meaning about the nuances and complexities inherent in the context-embedded teaching-learning enterprise.

Proponents of practitioner research claim that teachers ask questions and gain insights that are absent from traditional research and that they thus are vitally important contributors to the stores of broadly available knowledge about and for teaching. However, because research (like all other human constructs) is socially stratified, and because practitioner research lies at the bottom of the totem pole, teacher researchers typically struggle to be “heard” alongside the higher status researchers in education. This social reality was not lost on the PING members, some of whom had felt it personally at a meeting of the American Educational Research Association (AERA), the premier academic research society. It gave them further drive to “speak truth to power.”

The KSTF professional culture that served as context for PING

Particular elements of the KSTF context within which PING occurred gave it its shape, which has implications for KSTF and for the field.

Characteristics of KSTF Fellows

The KSTF pool from which PING participants came had a number of special characteristics that lent a particular flavor to the design, experience, outcomes, and implications of PING. As early career teachers, they were in a formative stage of teaching where they had mastered the basics but were conscious of having much still to learn. Most were not very experienced at leadership, although many had been thrust into leadership roles in their schools and were expected to develop as leaders as part of KSTF's mission. All were rigorously trained math and science teachers, steeped in the scientific method and quantitative study; they had practically no understanding of nor experience in practitioner inquiry or the primarily qualitative methods at its heart. As KSTF Teaching Fellows or Senior Fellows, they were fully inculcated into the KSTF professional culture, which—very unlike typical workplace culture in schools—promotes mutual trust of one another's commitment to professional values and openness to engagement in critical professional dialogue. Finally, the PING members taught in schools and districts scattered around the nation rather than sharing a workplace. Thus, unlike many local teacher research groups, they were not conducting inquiry to collectively address shared workplace issues, and further, they needed to learn how to form an inquiry community that could function well both face-to-face and at a distance.

Existing KSTF culture

PINGsters shared many past experiences. They had all earned the professional honor of being selected into KSTF; they had been in the trenches of the demands and opportunities of the Fellows program, with its emphasis on striving together to improve teaching, working in dialogue with carefully formed norms and protocols, and gaining critical feedback on their ideas and practices. These foundations made them *immediately* capable of 1) diving into the new experience with trust that whatever the PING leaders gave them to do would be worthwhile, and 2) engaging in critical professional dialogue about teaching and learning in ways that allowed them to be vulnerable enough to examine their professional identities and values.

This was all to their advantage—with one caveat: even as the PING leaders called out the advantage of building on their shared KSTF experience, some PINGsters may not have fully appreciated these cultural norms and values. At times, a certain sense of elitism pervaded the PING group, causing them to contrast the high-intensity PING culture to the cultures of their workplaces.⁴ This led them to judge colleagues a bit negatively for not being as willing or able to dive so readily into in-depth inquiry.

A lesson learned is that developing an inquiry stance and forming professional culture go hand in hand. Neither takes care of itself. So if PINGsters want to foster inquiry communities around them, they will need to have skills of developing some foundational cultural elements in tandem.

C. KEY ELEMENTS OF PING DESIGN AND FACILITATION

There were several design elements of PING that enabled the learning described in Section IV to happen. Even as participants, the PING teachers were quite blind to the elements of design that fostered their powerful experience. A good number of them used the term “magic” and “unique” to describe the dynamics of the experience that enabled such deep and transformational learning to happen. In fact, given the expression of some of the foundational pillars described above, it is highly likely that these same design elements would yield deep and lasting experiences for many more teachers. Thus the discussion is offered in the hope that it contributes to the infusion of the inquiry stance throughout KSTF.

⁴Sometimes the PING participants made elitist comparisons between PING and other KSTF groups they had worked with as well.

Rigorous planning and responsive facilitation

From day one, PING participants knew they were signing on to expectations that they would learn something through their inquiry that they would share in some way with an audience as a kind of “product” of their work and secondly, that they would strive to facilitate inquiry communities in their schools. PING leaders referred to these expectations now and again. However, the design of PING activities could not be called a march toward these objectives. Also from day one, PING participants were exposed to some basic tools of qualitative research: field notes, close observation, and interviewing. However, PING was not a course in qualitative research. Rather, it was a carefully crafted series of experiences that combined strong intent and rigorous planning with responsive facilitation.

Because the teachers came into PING with such intelligence, drive, and ambition to produce, the leaders bent over backwards to de-emphasize the products of inquiry initially, so as to allow PINGsters the time and depth of experience needed to develop the stance of inquiry. From the PINGsters’ perspectives, this intent, while a bit foreign at first, ultimately led to a deep appreciation of the design. One PINGster described the unique design of PING like this:

An opportunity to just sort of explore and not worry about having something to share or like this little nugget of something that would be produced as a result of it. I think that sense was really helpful to just be able to focus on the process, the experience itself.

The planning committee gathered voluminous documentation of every PINGsters’ work throughout the program—the posters, the postings on the wiki, the discussions and Google Docs filled with notes, the Microsoft PowerPoints and Prezis—and reviewed them carefully before planning the next meeting. They also spoke and emailed individual participants in order to stay abreast of their progress. All of this data went into the planning meetings to help answer the question, “What do the PINGsters need to do next—each individual and the group as an evolving community of inquiry—to make progress as inquirers?” Detailed meeting agendas were designed and posted so that PINGsters could prepare.

Then, at the meetings, as PINGsters worked, the leaders kept tabs on how the meeting was going, both by observing the work and also by explicitly checking in with the teachers. At lunch each day and at the end of each day, they reflected together and made adjustments. Some adjustments were small (e.g., lengthening or shortening an activity) and some were large (e.g., scrapping a morning’s plan and substituting something different). Also, PINGsters were asked to form their own plans for what they needed to do between one face-to-face meeting and the next, how much time they needed to do it, and with whom they would work.

One member of the planning committee described this combination of rigorous planning and flexibility to change as “planning the crap out of it” and then “putting it into the hands of the group”; another said they “mapped out the territory and then let them loose in it.” Leaders and PINGsters alike described the result as “magic.”

The PING design thus blended the leaders’ strong guiding vision with the realities of the participants’ experiences. In this sense, it was a model of “teacher-centered professional development.”

Working in community of inquiry

The PING leaders always envisioned PING as a community and wanted the PINGsters to build inquiry communities in their local areas. They are also now working to strengthen KSTF as a national inquiry community. All of PING’s design elements and facilitation moves helped to simultaneously develop each person’s inquiry as well as to form and strengthen inquiry community.

The general pattern in PING meetings involved a back-and-forth of individual and group, with individuals doing some writing (informal or more formal), sharing that writing or presentation with

a small group, listening to the group discussion/interpretation of the ideas, and then taking note of new insights gained from the collective reflection. As PING evolved over time, the teachers realized they were actually becoming dependent upon the group as a setting for deepening their inquiry. They felt the need to share their thinking with group members so they could learn from others' perspectives and get light shed on their own inevitable blind spots.

When the PINGsters were able to pursue their own curiosities, they found new and deep connections between their personal and professional identities. When the individuals then found that they had curiosities in common, they saw greater professional connections among themselves than they had felt before, even as KSTF Fellows. One PINGster described this complex phenomenon of deep personal meaning and deepening professional bonds that began to form when those were shared:

I find that for me personally and I think many others, the reason why it is of interest to you is because it really hits you at the core, and it is underlying what you are and who you are as a person and as a teacher ...many of us were kind of surprised as we were doing this, that there was a lot of similarities, even though we are in different contexts and we had different inquiries ourselves...I think honestly, the reason why, it may have to do with the fact that as we started to get really close to what was at our heart and at the core of us and it started to emerge that way.

Another advantage of learning in community is that feedback from another teacher who is also in the muck of grappling for meaning both expands and clarifies one's own lens and thus expands the insight that is possible. Then when one begins to see common themes across individual inquiries, that magnifies the learning. Comments from two teachers:

When I started getting feedback through a couple of people and I was giving [them] feedback about what I heard from them or things that I am really thinking about it in my own situation, I think that is when it kind of like hit me, wow, they might be coming about things in a different direction, but really I feel connected to what they are thinking about.

I know when I read about other teachers' experiences, and I feel like I can relate in some way that it resonates in some way with me and had an impact on my teaching overall.

Both of these together show how individual inquiries have strong resonance in communities of inquiry, amplifying the import of what teachers are asking about. Thus what teachers learn through these inquiries can generalize beyond the individual, not in a statistical sense but in a professionally meaningful sense for practice. This can give teachers courage to publish.

Here a teacher talks about how one can know intellectually that multiple perspectives are important; however, one has to participate in a community and use tools of inquiry deliberately to truly gain the value of perspectives of others. This teacher talks about how "getting over the hump" of meaning-making isn't done well alone or casually:

You don't have to explain to me why it is important to look at a situation from multiple perspectives, but it is a very different thing to get myself to actually look at a situation from multiple perspectives! I need to wrestle with that and I need to see other people wrestling with it before I could build some competency with those tools...And just being given them and told to go home and make them work is like sending kids home with homework—well, if they don't really know how to do the homework, they are going to stall out because their zone of proximal development...they need someone else there to get them over the hump ... that was really true of the meetings—there is just so much growth because you are trying things, you are getting feedback and you are seeing other people bringing different perspectives.

Expansive conceptual frames

The leaders offered the teachers conceptual frameworks that allowed them to examine their puzzling moments of teaching, their questions, and their data through multiple lenses beyond their internalized individual frames. The new frames had the effect of keeping participants' questions open longer and compelled more extended and deeper efforts at interpretation.

Social justice and the importance of "discomfort"

The PING launch meeting included a discussion of the links between practitioner inquiry and social justice, and the theme of social justice arose continually over the three years. For a number of people in the group, the link between practitioner inquiry and social justice was integral and immediate, rooted in a basic conceptualization of the purpose of education. One member of the leadership team put it this way:

I know that people think you can separate [social justice and practitioner inquiry] perfectly well...[but] to my mind education is about justice and so to separate education from justice, it does something to one's conceptualization of what education is, what an educator is and who is a learner and all of that."

From this stance, any practitioner-driven inquiry into teaching is fundamentally about advancing justice in and through education.

However, others in the group, while certainly seeing education as a social good for all, did not enter into their inquiries with social justice as a concept linked integrally to practitioner inquiry. Rather, their inquiries took them on a journey toward a consciousness about social justice. For these participants, offering the social justice theme on day one essentially opened the door to that consciousness, or prepared them not to be surprised when their inquiries brought them face to face with injustice and compelled them to ask what they would do about it. One member of the leadership team described a rationale for introducing teachers to the challenging theme of justice early on. She discussed the natural tendency to "edit out" things that seem too challenging to take on:

With every experience that I have had working with teachers, without exception, [a discovery of injustice] has come up, in one form or another... If there is no understanding that it might happen, there is sometimes a tendency to edit it out, because people just say, you know, this is too big for me to take on, I don't even want to think about it, because it is not germane to my being a better teacher with these kids. And over time, a lot of people then say, you know, it really is pretty germane... In some ways, [a social justice frame] becomes an ally for those of us who believe in this kind of research because people come to see that the kind of work they are doing is what uncovers [issues of justice], and makes it clear that those issues are something that can be dealt with and not shoved under the rug—that teaching is in fact political.

With math and science being "gate-keeper" subjects, the PING teachers eagerly embraced the need to focus their inquiries on students struggling the most, with the idea that they could improve their teaching practices. When the PINGsters probed more deeply into the sources of students' struggles with school—asking "what is going on here, and how can I make things better?"—they gained insights that tapped into their latent sense of justice and brought it into the foreground.

One dramatic example of rising awareness of how practitioner inquiry links with social justice occurred when a PING teacher discovered that the district's intervention for failing students was not only not helping students succeed, but was in fact driving them out of the school, further diminishing their chances of success. In sharing this insight with Fellows at a KSTF meeting, this teacher said that even though "student agency" was an important idea in his practice, he had originally not thought that the social justice agenda was relevant for his inquiry question. But as he examined the school's intervention more carefully, he realized that school structures were reducing

student agency, which was further diminishing their interest in school. In other words, the source of the “ill” of failing or dropping out did not reside in students, but rather the ill resided in the social systems in which students found themselves. This teacher then quite immediately felt his own sense of professional agency grow, as he considered ways to speak out, share what he had learned, and change the policy that was inadvertently causing students harm.

The PING leaders did not hammer this theme into all meetings; on the contrary, they facilitated the teachers’ inquiries such that the teachers gained the consciousness to see and to probe what made them uncomfortable. In this comment, a participant explains the value of reflective writing and the added benefit of getting others’ perspectives to help surface what is “uncomfortable”:

I think in the process of writing you do some useful filtering, and some filtering that maybe works against you, and I think then when you bring something to a group, I think we got really good at asking questions like, ‘what are you not telling at a certain point,’ or ‘what are you leaving out,’ or ‘what else is really going on in a certain story?’ I think sometimes what you leave out of what you write down is often the most important part because it is the uncomfortable part.

What is the link between discomfort and social justice? Here one of the leaders used the example of the consciousness raising days of the feminist movement to explain how women, when they told their personal stories to one another, became conscious that their feelings of discomfort had less to do with their personal psychological failings and more to do with social structures that disenfranchised them:

People would sit down and talk about being a woman and why being a woman felt so uncomfortable sometimes... women who were not whining, but actually trying to understand their lives...you can’t tell me I am crazy, or that I am not coping well, what I am is very conscious of a life that is constrained, and the way I know that is that these other lives, these perfectly nice people, paralyzed, are also constrained... people have been trying to psychologize in women is in fact is a larger social issue. It reminds me of the C. Wright Mills thing, you know, personal troubles experienced on a broader scale are almost always indicative of social ill.⁵

For the PING teachers, an explicit awareness of social justice issues contributed to their capacity to avoid judging “disruptive” or “failing” students, and “resistant” colleagues, and ask, “what is going on here?”

The “four questions” heuristic for thinking through social problems

Another powerful frame that PINGsters used from the launch institute through until the end of the program earned the name the “4-square” or “4 questions” heuristic. Provided by Diane Wood, it draws from a wide range of scholars and researchers and tries to capture a way to think through social situations/problems.⁶ Wood used the heuristic to help teachers see the multiple dimensions of schooling and students’ experiences of school that may be implicated in their inquiries. Use of this frame helped to systematize links between practitioner inquiry and teaching as a political act in social context.

⁵See Mills, 1959. This influential work argues that the central task of the sociologist is to find connections between troubles that individuals have (e.g., not having work) and the wider social and historical forces they are enmeshed in (causes of unemployment).

⁶Wood reports that she was strongly influenced by feminist theorists (especially Peggy McIntosh and Jean Baker Miller), critical theorists (e.g., Antonio Gramsci and Michel Foucault), and sociologists (especially C. Wright Mills), who variously explored the range of cultural, structural, and social forces that shape consciousness, decisions, relationships, and actions. This heuristic is intended to help expand lenses that can be brought to examination of social situations.

Table 1. The "4 square" heuristic

<p>PERSONAL</p> <ul style="list-style-type: none"> • Personality • Family • Inheritance • Experiences • Beliefs, attitudes, desires, opinions, intentions 	<p>SOCIAL</p> <ul style="list-style-type: none"> • Behavior, actions, decisions • Affiliations, relationships, interactions • Privileging, excluding, isolating, including, relating
<p>CULTURAL</p> <ul style="list-style-type: none"> • Ideologies, norms, expectations, assumptions • Biases, prejudices • Lore, stories, rituals 	<p>STRUCTURAL</p> <ul style="list-style-type: none"> • Institutions • Economic arrangements • Governance, politics, • Power • Authority

The PING leaders felt that this frame was especially important in the particular context of PING, where all of the participants had strong academic training in quantitative scientific research, rather than the form of qualitative study that characterizes practitioner inquiry. One person said,

The typical science and math educational background really is mostly focused on the experimental method, and we really try to control the variables in that, and since it is next to impossible to control the variables in a qualitative kind of study, I want [PING participants] to be ready for that. I knew this was a very smart group and I thought it might also whet their appetites for seeing how useful practitioner inquiry can be for shedding light on some of those issues that people want to leave out of the mix.

PINGsters were immediately stimulated by this frame. The following example, taken from a meeting early in the first year, shows how an initial question (in red at the top) expanded dramatically when held up to the heuristic. The facilitators had asked them to ask, "What are implied cultural assumptions about how school is done? Range of personal intentions operating in a classroom? Social systems at work, implicitly and explicitly? Structures that create winners and losers? What dynamics are in the background, foreground, explicit, hidden? What are others ways to understand 'resistant' colleagues? 'Failing' students?"



One participant explained how what she called the “four questions” helped her see organizational structures that had been invisible before and shift her understanding of issues from “black and white to shades of gray” and beyond:

One of the things that has been the most helpful for me through PING is the four questions that we have talked a lot about, and those four questions are kind of the heart of an inquiry stance without all of the other things that make inquiry situational...this business of stepping back and asking questions about what is happening? are the way things are developing desirable? how is power implicated here?...Those four questions have been absolutely critical in thinking about how I re-imagine this class with people for whom school has been absolutely terrible...something that I guess PING has really helped me see are the social structures and power structures that wind their way through all organizations...I went from right and wrong, black and white, to shades of gray, to saying, oh it is really complex.

PINGsters initially experienced an inevitable feeling of overwhelm at the explicit recognition that there are what one called “layers and layers” of contributors to problems of teaching. At one point early on, the PING leaders paused to make a point related to their intention of helping the teachers build an inquiry stance rather than seek simple solutions: “Talking about ‘best practices’ just makes me mad!” said one of the leaders, pointing out that the art of teaching and the process of gaining insight into problems of teaching are too complex to reward simple solutions such as a list of best practices. The important thing, she added, is to look beyond what may be the most obvious or immediate answers and to dig deeper, taking into account multiple forces at work.

Questioning and storying: hermeneutics rather than logical positivism

Two modes of intellectual work threaded through every activity of PING in multiple iterative cycles: questioning and storying. PINGsters formed initial “candidate” questions from their first narratives of puzzling moments; they questioned their questions to expand the possibilities in them; they narrated the stories of the evolution of their questions; they cast themselves as protagonists in the stories of their inquiries as teachers and leaders; they questioned their data; they narrated stories of what their data helped them to understand. The modes of capturing, interrogating, and expressing their questioning and their stories varied: they wrote in their journals, posted thoughts on the PING wiki, created Prezi or Microsoft PowerPoint presentations, created posters, and used dialogue protocols.

Both modes of inquiry were intended to help these very rigorously academically trained STEM teachers to stretch beyond the limitations of their quantitative frames and become *interpreters* of complex problems of teaching and schooling. PING participants were introduced to hermeneutics, the theory of understanding through interpretation of complex text, with “text” coming to mean any form of communication, including teaching. Rather than narrowing to a single question, eliminating variables, testing defined hypotheses, and measuring single outcomes, the PINGsters framed questions, reframed them so as not to artificially simplify the assumed dynamics at work, explored possible sources of evidence that could provide insight, gathered evidence, explored what it might mean, re-framed questions again, looked for additional sources of evidence that could expand interpretation, and so on. One PING leader described the design intent behind narrative as the primary mode of sense-making:

There is a certain alchemy and yet very serious places for people to release their experience, their knowledge, their confusion, their doubts, their struggles, all of that through stories...then with some interpretive frames for making your meaning out of those stories and some efforts at looking for the questions, problems, dilemmas, nagging doubts, whatever comes to mind, some ways to take those on, through qualitative work. To me, that is a hermeneutic move, that they are learning to read the landscape of their own lives, and they are helping others make meaning of theirs and they are allowing others to help them make meaning of their own. There is something very vitalizing in that, and it is deep intellectual work.

Questioning as a continual process—as opposed to narrowing to a specific question—thus served the intent to develop the inquiring stance. Storying as a continual process—as opposed to explaining or arguing or concluding—served the intent to compel cycles of interpretation. Furthermore, the process of storying positioned the teachers in the action as protagonists—as active players in the scenes of the inquiries. These intellectual processes clearly differ from those of logical positivism, the reigning paradigm of 20th century science, where empirically verifiable conclusions, drawn from “objective” testing, are the only meaningful ones. Importantly, practitioner research and its basis in qualitative study, argues that phenomena such as schooling are complex social constructions and as such demand modes of inquiry that take into account culture, belief, and variation in subjective experience.

Additionally, “story” by nature addresses the full panoply of human relationships and conflicts. Logical positivism, on the other hand, tries to reduce nuance. One PING leader described the role of story in making sure that both the heart and the intellect are working together as teachers make sense of puzzles of teaching:

I believe that Mary Shelley was right when she wrote Frankenstein. Intellectual effort that is not coupled with compassion and human understanding can create a monster. So I think story awakens the hearer, and it gets people interested from the get-go in doing research to alleviate human suffering, because stories carry conflict.

Finally, the narrative as a form of knowing and of communication strengthened the relationship bonds among the PINGsters, contributing to formation of an especially tight-knit inquiry community. Several of the PINGsters described the design of PING as some form of “magic” that took them from the respect they had at the beginning to a much deeper level of psychological trust, which enriched their experiences and also their interpretive powers. The “alchemy” of storytelling together lent their experience this magical power.

All this being said, the PINGsters found it challenging at times to embrace the uncertainty that comes with continuous questioning and re-examination of the multiple and sometimes overwhelming possible “root causes” of the most challenging problems of teaching. This is understandable, given they were trained in disciplines where certainty can be mathematically defined—certainty can feel more comfortable! The stress of pursuing the uncomfortable made it all the more important that the process of storying helped enrich their bonds as a group.

Generative structures for systematic description and reflection

PING leaders engaged the teachers in a variety of activities designed to support their questioning, storying, and development of an inquiry stance. These we refer to as generative structures, meaning that the activities have a visible structure, with the structure designed not to limit or constrain, but rather to open up thinking and generate new insights. A PING teacher defined generative structure perfectly in this comment:

It is opening up and so where you can have authentic conversations ... not contrived.

Well-designed protocols are examples of tools that give both structure and openness to professional development activities. For example, the “questioning your question” protocol (which generated the expanded questioning shown in the photo above) includes a series of three focused discussions:

1. The teacher shares the candidate question and a sample artifact that could reflect the puzzle embedded in the question,
2. A round of questioning about the quality of the question, e.g., Is it authentic? Open-ended? Exploratory rather than explanatory? Worth pursuing?
3. A second round of questioning about the broader implications of the question, e.g., is it grounded in belief or assumption? Who gains and who loses from insight gained? How might power/authority be implicated? What might silenced/invisible in the framing of the question?

Here we can see how this series of structured discussions, when conducted in a disciplined way that promotes listening and critical reflection, opens up the question to a wide range of possibilities for new formulation.

The Descriptive Review

It could be said that every activity in the PING program was structured in a generative way. However, one protocol that stands out as especially powerful and memorable for the participants was the Descriptive Review. An intensive 90-minute process, it was originally developed for the Prospect School in Vermont by Pat Carini, and has become a widely used and respected tool for close observation, detailed description, and reflection on education phenomena. The PING leaders invited Rhoda Kanevsky, a long-time collaborator of Carini's, to work with PING teachers to demonstrate and facilitate the process of the review. She did this by working with a teacher who volunteered to try the process and be observed by the others, who would then participate in the process themselves. Below is an excerpt of Carini's book (2000) and part of a handout that PINGsters received describing some of the spirit and structure of the review. Note the emphasis on close, judgment-free observation and listening, and on opening, not closing, possible meanings:

The descriptive processes all begin with immersion – observing a child or space or activity... They all have a focus or focusing question that the chair and the presenting teacher or parent or administrator work out thoughtfully ahead of time and that gives the participants a sense of how to listen and respond to the review. The processes are always collaborative. They have rules and roles necessary for making the inquiry process democratic and inclusive, and for guaranteeing respect and privacy for the individuals involved.

A review typically takes about two hours. All the processes use descriptive language: language that is particular, concrete, ordinary language that avoids the categories, labels, and assumptions of educational theory or assessment. They are organized by a series of go-rounds, in which everyone speaks and no one is interrupted by cross talk. What people say is not commented to across the circle. There are typically three roles:

Chair: She works with the presenter ahead of the review, introduces the review, makes sure the review follows the procedures, offers restatements at key moments, and calls for an evaluation of the process at the end.

Presenter: This is a teacher or parent or administrator who works with the chair to find a focus for the review, gather materials and observations, and organize the actual presentation.

Note-taker: For each review, someone is asked to take notes during the review, to transcribe them later for others, to gather the materials, and to add them to the archive. Each process strives for richness, complexity, balance, texture, and multiple perspectives...

The language used in the review is descriptive and concrete, not jargon-y or judgmental. We assume, too, that the knowledge that emerges from the review is always situated and partial, always open, never finished or finalized. The purpose of learning to describe is to develop a descriptive stance, one that keeps educational possibility open and in motion.

In retrospective interviews, PING participants pointed back to the Descriptive Review experience and protocol, saying they gained new insights about their own inquiries, about the inquiry process, and about the experience of participating in a community of inquiry. One said that "those collaborative, reflective and inquiry situations" where "others were helping me to recognize what may be some assumptions or questions that I might have, or helping me to look at and understand some of the experiences in the data" were "the biggest thing that helped my inquiry to move forward." Another

said the descriptive review protocol helped her see a frustrating situation at a “broader philosophical level” that helped her “and think about how to approach my work because now I had this sort of mental model for what was going on.”

The first PING Descriptive Review took place just eight months into the first year—at a time when the teachers had re-worked their questions a couple of times and begun close observations related to them. Some had done quick surveys of students or colleagues, or done some interviews, and all had started observation journals focusing on puzzling issues. The descriptive review experience played an especially formative role in the evolution of PING both for individuals and the community collectively. The process generated discussions at a new level of emotional depth and honesty, strengthening trust in the group and opening the door to the deeper identity work that yielded the powerful shifts of perspective described earlier.

Working at a distance: A challenging feature of PING

Typically, teacher research groups are local or at least regional, with proximity and some shared context. The fact that PINGs was a national, not local, group had an effect on the experience and probably the outcomes as well.

Teachers who form strong inquiry groups within a single school or district have the advantage of developing a stronger collective voice and change agent efficacy when their inquiries surface issues of inequity or shed light on new ways to interpret and address problems. The PINGsters, in contrast, often faced resistance or increased isolation, rather than solidarity, when they tried to promote the process or lessons learned from inquiry in their home schools. Several times they found themselves in tears when reporting clashes with colleagues who did not share their perspectives on local school problems, particularly problems associated with equity and social justice. The reality is that working to correct social ills is psychologically demanding, requiring collective effort and support.

Lack of proximity also meant less frequent face-to-face time than would have been likely in a local teacher research group. PING teachers had to work at a distance much of the time, and they sometimes had a hard time focusing or getting tasks done. In particular, they found it difficult to comply with the leaders’ requests to post or respond to writings on the on-line workspace, and this made it more difficult for the leaders to stay abreast of their progress. The leaders and the PINGsters alike put considerable effort into designing ways to work together at a distance, and none of them felt like they really solved it. One PINGster described the ways in which other demands for “me” could sweep her inquiry off the table:

I have a few journal entries, but again I have sort of pushed it off to the side because I don't know who is going to look at it. And it is for me, but at the same time if it is saved only for me, it is really easy for me to go, like, I have lots of other things for me to do.

Perhaps because of the closeness of the bonds among the group and their growing reliance on the community as a support for their individual work, they strongly preferred to meet in person. This is just one of many similar sentiments:

There is definitely something to be said about being able to see somebody face to face and spending that time together, I think it is definitely a very vital piece.

That being said however, the leaders also recognized that if PING had been a local group that could meet face-to-face more frequently, they would likely not have had nearly as many two- or three-day meetings where the teachers were removed from their daily lives and fully immersed in their inquiries. So...ultimately there is a trade-off of experience. For KSTF, it will be important to continue learning lessons about the similarities and differences in dynamics of inquiry done in local vs. national/distributed context because both will become part of the KSTF organization.

A reminder that the learner must be the agent of the learning

The architects of PING had many years of experience facilitating teacher inquiry groups and observing how teachers experience the power of inquiry. While some of what they saw in PING was new for them—particularly the shift that science and math teachers made in notions of what research is—much of what they saw was not new. They had seen teachers undergo many of the same epiphanies and struggles over the years, much as an experienced teacher sees students experience many of the same things year after year. As the facilitator/teacher of inquiry in any context, the most important principle to follow is not to co-opt the inquirer's project—not to re-frame questions, not to impose meaning, not to cover the lens of the inquirer. In other words, the learner is the agent of the inquiry. On rare occasions, PINGsters felt that the leaders were pushing or pulling them in directions they did not want to go in or could not grasp. One person described an experience of her learning being co-opted this way:

[The only time PING] has made me unhappy has been where someone has tried to tell me what my inquiry was about. It has happened a couple of times. In one case, I wasn't there quite yet. The thing that the person was trying to tell to me, I was not developmentally ready...as a teacher, right, you try to think about how you can push somebody or nudge somebody, and I was about 3 to 6 months away from hearing that and being like oh, yes...The other experience that I had was just somebody clearly taking the work that I was trying to describe and dragging it through their lens, which is very important to that person.

The question of ownership of meaning and knowledge is complex, of course. Here the basic implication seems to be a reminder that learners are the makers of knowledge and that it is very easy, even for experienced and effective teachers, to inadvertently undermine the agency of the learner. Going forward, this awareness may be of value in KSTF as many members of the organization strive to imbue all facets of the organization's work with a stance of inquiry.

In sum, the results of PING emerged from a convergence of intellectual traditions, core values about education, the KSTF cultural context, and design components. Some of these were made explicit from the beginning and some lay further under the surface. It seems important going forward that KSTF members strive to examine, and continue to learn about the effects of, the many components that go into the inquiry processes they design for themselves and others both within and beyond KSTF.

VI. CONTRIBUTIONS OF PING TO KSTF AND THE FIELD

This brief section provides an overview of the multiple ways in which the PING program and PINGsters as individuals are contributing to KSTF's broader move toward becoming a national community of inquiry, a community that amplifies the voice of teachers in local and national education dialogue.

A. DEEPENING CULTURE OF INQUIRY IN KSTF

The intention of KSTF's leadership

PING occurred at a time when the KSTF leadership was well poised to define the "next generation" for the organization following the departure of the founding director. Early steps toward embracing inquiry practices occurred when one of the Teacher Developers, taking a graduate course from Susan Lytle, initiated an inquiry into the KSTF teacher development practice of lesson study. Teacher Developers and the Teaching Fellows Director continued to gain interest in inquiry as a generative process for professional growth. Further, as the KSTF-funded research projects of early career academics were ending, funds were re-directed toward the PING program's teacher research mission. This shift meant that research and practice would not be separated within KSTF as they are traditionally in education, but rather would be joined through teachers engaging in inquiry. The funding of PING signaled a deepening intention toward developing a stance of inquiry in KSTF programs. Including the KSTF Teaching Fellows (and later Executive) Director, Senior Fellows Director, and a leading TD on the PING Planning Committee ensured their commitment and contribution to the success of PING, as well as ensured their witnessing first-hand the powerful impact of PING on the participants and thinking through how to learn from PING as a pilot for the broader benefit of KSTF.

Processes to support infusion of inquiry throughout KSTF

KSTF leaders are building inquiry stance into the Fellowship program, using inquiry practices to deepen teachers' learning. For example, the core lesson study process and portfolio projects are being re-designed as inquiries. Here, the fact that the PING planning committee included all three KSTF Program Directors, as well as a TD, means that strong collective organizational leadership can bring an informed perspective to these changes. Additionally, these leaders are encouraging PING teachers to share their experiences and help guide new program efforts. For example, as early as Summer Meeting 2012, PINGsters were making presentations about inquiry to groups of Fellows. The incoming 2012 cohort was introduced to inquiry as a core mode of work from the beginning through reading professional literature and hearing from PING members. Two PING members are serving on the leadership team for Fellows in their fourth and fifth years to help facilitate their inquiries. Diane Wood has been asked to stay on as a consultant, working with the TDs on inquiries into their own professional practice. Insights they gain about practitioner inquiry from personal experience will help them facilitate Fellows' inquiries with greater confidence. A PING member is also serving on the editorial board for the new KSTF journal, an additional avenue to spreading knowledge and establishing professional culture.

The ways in which Fellows at different levels will experience inquiry reflects lessons learned from PING. For Fellows in year one, the emphasis is on close observation, with questions eventually arising out of the puzzles that they encounter. This will help re-direct the new Fellows' assumptions about research as narrow and quantitative toward the more open and probing stance of practitioner inquiry. For year five, which emphasizes leadership development, there is a focus on ways of understanding and building relationships with colleagues as fellow inquirers.

Contributions already visible: Leading by example

As much as structural changes are critical to the infusion of inquiry stance throughout KSTF, it is a truism that cultural change happens not only through restructuring but also through cultural

leadership, that is, by the ways in which leaders enact the cultural norms and behaviors they want to grow. In fact, some say that culture change is more about cultural leadership than about structure. There is already some anecdotal evidence that this is happening. For example, one KSTF staff person noted that the participation of three PING members on the Engineering Task Force is “changing the dynamic” by contributing to a more systematic process of examining the quality and value of the teaching resources the group is developing. Another person said that a “sea change” toward teacher agency for knowledge-building happens when PING teachers are in a KSTF group:

It was about taking initiative, assuming that things could be explored or found out without consulting a million authorities, and that you could actually figure it out and take it on. There was kind of initiative and confidence about knowledge building that was really refreshing, and about openly consulting with people and saying, this is what I am thinking right now, what do you think? There was sea change when a person in PING entered a room.

The views of the PING participants about inquiry as stance in the Fellowship

The PING participants have quite strong and consistent views about the KSFT shift toward inquiry. They are unanimous in wanting to continue developing as inquirers themselves as Senior Fellows, and as noted above, are already contributing in many ways to the broader shift. They know that developing the kind of inquiry stance they now have is not likely to develop on its own unless it is deliberately facilitated and supported.

With regard to the Teaching Fellows program specifically, they see the great positive potential that everyone sees. First, however, each of them expressed a caution about the diminishment or loss of lesson study that warrants reporting here.

The PINGsters experienced lesson study as a highly valuable process as first and second-year teachers because it taught them to be analytical and reflective about the nuances of lesson design, important to them as novice teachers. Also, as new Fellows, they were given some concrete teaching strategies that helped stock their teaching toolkit. They are concerned that an over-emphasis on inquiry in the first year or two of a teaching career could put too much pressure on the Fellows to figure everything out on their own. They feel there are some basics about teaching they could learn more directly from their more experienced peers:

There are elements of telling you how to do stuff that the Fellowship has that I think are incredibly important for me as a new teacher...Like I am really glad that at some point, I had a day or two of someone showing me how to use [a computer-based tool] and even if I don't use it now, just to understand that there are options out there with technology. I felt like I was equipped with more options...

Many years ago, Judith Warren Little, well known for advocating teachers as intellectuals and leaders, commented⁷ that not all professional knowledge should be learned through inquiry: “You would not ask a sailor to learn how to deal with ‘man overboard’ through inquiry. There are some best-known professional techniques you would want to make explicit.”

On the pro side, the PINGsters were quite eloquent in explaining the benefits of the shift toward inquiry in the Teaching Fellows program. Here, a PING teacher discusses the advantage of getting help re-examining one’s practice over being offered simple solutions to teaching challenges:

One of the things that would always frustrate me when I was a brand new teacher, like if I have a problem with my classroom and would try to talk to someone about it, you know, the

⁷Personal communication circa 1990.

inevitable response was, well have you tried any of these things and whoever it was would name off a lot of things and a lot of workshops that I went to with Teach for America or whatever were like here are 17 strategies to blah, blah, blah... I think as new teachers, it is a good time to be taking a thoughtful approach to like okay, something is not working in my classroom, yes, there may be a different strategy that I should be trying that would help, but possibly also I need to re-examine a large part of what I am doing or why I am doing it, or what is happening in my classroom and look at it with a very different lens and get some outside perspectives. The inquiry stance has really helped me when I see issues in my classroom to not jump to the obvious 'well, just penalize them for not turning their homework in on time.' I just feel like a lot of things like that are just too easy to resort to without really thinking about whether they are the right solution.

This PING teacher speaks about the difference in learning between completing and portfolio and becoming an inquirer.

I can see in the long run as a teacher the inquiry stance will have a longer lasting effect in my teaching ... whereas the portfolio, once KSTF is gone, the chances of me sitting down and writing a portfolio every year, now that requirement is gone...I can see the inquiry stance taking root in my teaching and will endure past KSTF for 5 years...because it builds those habits of mind and those practices that need to be there to sustain it.

In sum, the PING pilot generated the human capital that KSTF needed. One KSTF leader said that, "in terms of knowledge generation itself, PING has really outperformed, both in terms of its spillover effects in fellowship and just the organization in general actually." This leader added that "trying to understand how to support practitioner inquiry is now a joint venture" involving everyone at KSTF, rather than a pilot positioned within the R&E unit. Even so, it is important to keep in mind that PING provided the container for an intense brew of inquiry experience and know-how; infusing that into the larger community could yield a diluted form. There are what one KSTF leader described as "pulls" on KSTF staff, especially the TDs, as they seek to develop habits of inquiry themselves, infuse inquiry into the Fellowship program, and still address content knowledge and pedagogy as foci for professional growth. Even with all that is in place, it will take long-term and consistent effort to continually develop and support inquiry stance, habits of mind, and tools.

B. CONTRIBUTIONS TO THE FIELD BEYOND KSTF

The experience of PING will contribute to the field in a wide range of ways, some that can be readily documented and others that will be invisible but present nonetheless. Perhaps the most important contribution is that the PING participants, wherever they work as educators, are likely to work in a qualitatively different way after experiencing and adopting a stance of inquiry. PING has made a transformative contribution to their professional lives. Just as they will work differently now on the Engineering Task Force or the Teaching Fellows program, and have impacts there, they will also work differently in their daily workplaces. The effects of these differences will be less tangible perhaps, but will be vital to the core mission of KSTF, to strengthen the teaching profession.

There are two specific and more observable ways that KSTF expected the PING participants to make a broader impact. One was for them to share their inquiries through the professional channels of society meetings and publications. The other was for them to facilitate local inquiry groups in their schools.

Speaking out to their profession

The following is a list of PING participants' papers and presentations in spring and summer of 2014:

- An article in the May 2014 issue of *Educational Leadership*, "The Trouble with Top Down," about the importance of teacher-led professional development
- Two presentations at the February 2014 Philadelphia Ethnography Forum, about key components of the practitioner inquiry stance and process

- Two have pieces ready for the new KSTF journal
- One NSTA presentation on students' identities as science students
- One NSTA presentation on how PING practices have helped form a local critical friends group
- An article about learning from students that that was published in the summer 2014 online edition of *Educational Leadership*
- An article to be submitted to the *Phi Delta Kappan* on stances toward teacher leadership
- Two additional papers in process—different takes on how “solutions” in the name of equity can inadvertently disadvantage already disadvantaged students

There are two notable features of this list. First, it reflects a considerable amount of output from 10 teachers. It demonstrates what teachers can and want to produce for the field when they gain the skills, insights, authority, and voice of the inquiry stance. Second, it reflects the wide range of ideas and learnings that teachers want to write about when they find their voice. Teachers have knowledge to share and questions to ask of their field that include issues of classroom practice but go far beyond that boundary. These are professional educators in the full sense of the word, able and insistent upon contributing to dialogue about all aspects of education. In particular, as much as they want to speak with their peers, they are even more strongly moved to speak truth to power.

Supporting inquiry in their schools

An early expectation of PING participation was that the teachers would express leadership by creating inquiry groups in their schools. As noted earlier, several made attempts during the three years and often were rebuffed. By the end of the project, all were able to form a plan to start local groups, and as one PING leader put it, they “are gung-ho to try.”

There is no question that the PINGsters want to do this; as one put it:

That is always kind of like my end goal, to try to create more of a KSTF community here within my own school.

We suspect, however, that launching local groups may present a challenge. Quite a few PINGsters report that they do not yet have the skill and know-how to design and facilitate a group. One who described PING as a “mystery” wonders whether it can be replicated:

It is hard to define practitioner inquiry without thinking about those specific people and those specific stories, all like sort of converging in New Jersey.

Another spoke about the important behind-the-scenes elements of PING that remain invisible:

I feel like there is a lot of behind-the-scenes work that we don't know of, but I feel like the PONG⁸ group is definitely a very vital piece of the whole puzzle. It is kind of like that cooking show scenario, we don't really see what goes on behind-the-scenes. It is definitely necessary in order for it to work.

In sum, the PING participants are motivated to support their colleagues in developing an inquiry stance. There is no question that these teachers can go a long way on the fuel of their desire and the knowledge they have gained to date, for example about leadership begins with relationship. The above comments, however, serve as a reminder that the PINGsters will continue to require guidance and opportunity for ongoing reflection on their local leadership efforts.

⁸PONG is the nickname given to the Planning Committee as the counterparts to the PING group.

VII. A FINAL THOUGHT

A reflection on leading as a natural outgrowth of teaching and learning

In a study of teacher leadership in the National Writing Project (2009), Barbara Heenan describes a dynamic and generative relationship between teaching and learning and leading:

We see teacher leadership as a naturally occurring expression emerging from authentic teaching and learning experiences, as a spontaneous expansion of the human imperatives to learn and to share learning and knowledge... As fundamental as the human drive to learn is, so is the human drive to share what one has learned. [This human drive to share] is the heart of (good) teaching, and one of the sources of teacher leadership. The impulse to teach leads naturally to more learning. And thus begins a self-generating cycle of learning, teaching and ultimately leading. Almost any teacher will testify that teaching someone else inevitably leads to learning... Teaching begets learning, and learning begets teaching... Finally, when teaching extends out from the classroom into other, especially adult venues, it becomes what we call teacher leadership. But its essence is still teaching – the impulse to share with others what one has learned remains the same. (pp. 9-11)

Heenan points out that in the NWP, inquiry is a core value and generates the kind of “authentic learning” that ignites the impulse to share and lead.

In the KSTF PING group, we see similar dynamic relationships in play. Through inquiry, PING teachers learn about their teaching practices and themselves as teachers (and their leadership practices and themselves as leaders) to a depth that reaches professional identity and is transformative. These insights motivate them to change their stances and practices of teaching (and of leadership) and also motivate them to continue professional learning through inquiry. And these transformative experiences amplify the intrinsic drive to share their insights with others—to “get my story out there,” as one PINGster put it—both in their own schools and more generally in the field.

The implications of seeing this teaching-learning-leading dynamic in play are critically important to KSTF. KSTF’s accomplishment of its mission relies heavily on its Fellows developing capacity as leaders. The more KSTF fosters authentic learning experiences that strengthen teaching, and strengthen insights into teaching, the greater will be the Fellows’ drive and capacity for leadership. KSTF’s deliberate evolution toward transformation into a national community of inquiry will add considerable force to the dynamics of teaching-learning-leading.

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ABOUT INVERNESS RESEARCH INC.

The mission of Inverness Research Inc. is to provide insight into the design, quality and effectiveness of educational improvement initiatives.

Inverness Research is an independent and national educational research organization with its headquarters located in Inverness, California – a small town 50 miles north of San Francisco. Founded more than two decades ago, the firm is operated by Dr. Mark St. John. While Dr. St. John is the lead investigator on all studies, Inverness Research has a team of more than a dozen senior researchers around the nation who have the skills, experience and knowledge appropriate to each project the group undertakes

The work of Inverness Research Inc. primarily involves the study of reform initiatives taking place at the K-12 grade levels, but also includes higher education and teacher education. Inverness also has a long history of studying informal science education initiatives. The research designs used by Inverness Research are multi-faceted and rely on data gained from participant observation, in-depth interviews, focus groups, surveys, and document reviews. By studying the congruence of project theory and field realities, Inverness Research helps projects assess the quality and efficacy of their efforts, and helps funders better understand the design of their initiatives and the value of their investments.

More recently, Dr. St John and the Inverness team have been working with Foundations (Gordon and Betty Moore Foundation, the Paul G Allen Family Foundation, the Gates Foundation, and the Knowles Science Teaching Foundation) to help design and implement networks of leading teachers and other educators to serve as mechanisms for bottom-up change strategies.

ABOUT KSTF

The Knowles Science Teaching Foundation (KSTF) was established by Janet H. and C. Harry Knowles in 1999 to increase the number of high quality high school science and mathematics teachers and ultimately, improve math and science education in the United States. KSTF operates three programs that build national capacity for improving STEM teaching, leading, and learning: Teaching Fellows, Senior Fellows, and Research & Evaluation. To date, KSTF has supported more than 250 Fellows in 42 states.

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