



## ***KSTF: CASES OF LEADING TEACHERS***

**August 2014**

**Inverness Research**



## **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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## **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.

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## AN INTRODUCTION

KSTF provides beginning secondary STEM teachers with five-year Fellowships and then ongoing support for them through its Senior Fellows Program. The goal of KSTF is to create exemplary teachers who “lead from the classroom.” These “leading teachers” continue the work of improving their own classrooms while simultaneously providing their vision, expertise, and energy to contribute to the broader improvement of STEM education in their local venues. They work individually but also function collectively as a professional community, one that provides capacity over the long term to raise the quality of secondary STEM education nationwide.

As each individual “leading teacher” negotiates the opportunities for and barriers to improvement within their local systems, KSTF lends supports to their efforts through professional development, ongoing membership in the KSTF professional community, and special leadership programs and funding opportunities. Now in its 12th year of existence KSTF has many Fellows who have a multi-year track record of leadership. The contributions of KSTF-inspired teacher leadership expand geometrically as the number of Fellows increases, as individuals gain experience and stature, and as their efforts resonate outward.

The investment KSTF makes in teacher leadership reaps dividends in a wide range of ways. We at Inverness Research were contracted to document rich examples of KSTF leading teachers: how they develop, how they work and how KSTF best supports their efforts.

The following three cases of KSTF teacher leadership describe a slim but highly illustrative sample of the kinds of improvement efforts KSTF teachers have achieved. Heather Buskirk (2004), Bradford Hill (2003) and Charley Sabatier (2003) are all Senior Fellows with an impressive and growing history of leadership experience – so much so that these cases do not attempt to describe their leadership efforts comprehensively. That would require a long inventory of accomplishments. Rather, the cases focus on selective activities and strategies that illuminate the multiple and rich ways KSTF leading teachers can contribute to the improvement of STEM education. All these cases show the dynamic interplay that takes place among three entities: the leading teacher, the KSTF resources and supports, and the complex school system in which each teacher works.

Heather’s case focuses on her leadership as it developed through building her own professional practice. Bradford’s case focuses on his goal to create more meaningful science learning for his students and his development of an approach and curriculum called *Patterns*. And Charley’s case centers on his development of a small Professional Learning Community (PLC) devoted to improving the teaching of International Baccalaureate Physics. All three demonstrate how a leading teacher can work toward a shared vision of improvement and can, in local settings, achieve a fundamental shift in the status quo of teaching and learning. The cases also illustrate how the support KSTF provided these young teacher leaders was expressed not only in direct ways through stipends and grants, but in even more important indirect ways – through shared professional values and culture and through ongoing relationships and community.

## THE CASES

### Heather Buskirk: Leadership through Building Professional Practice

#### The Case

*I was determined not to be a teacher when I started college. I was going to be an astrophysicist and work for NASA, it was something that I thought would clearly be the most challenging and glamorous job for me... Teaching was a lesser pursuit. I thought being a scientist would be more intellectually challenging, and certainly in our society we hold scientists a bit higher than we hold up science teachers. I wanted to be one of them. I thought I had to do whatever was the hardest, I had to have the hardest major, and I had to go and have the hardest career. (Laughing) I think I did end up with the hardest career.*

Now a 9<sup>th</sup> year physics teacher in Greater Johnstown School District in upper state New York, Heather Buskirk is a KSTF Senior Fellow whose teaching career illustrates how a single determined leading teacher can transform not only her vision of herself as a professional educator, but also her classroom, her school and her district. Heather began teaching in a "small town," isolated and traditional setting, in a high school of 600 students from which many of the teaching staff had graduated and then gone on to send their own children. Never taking "no" for an answer, today she has achieved much. She has enlisted the active support of her district superintendent and assistant superintendent of curriculum and instruction in making innovative improvements in the district; spearheaded a successful Project Based Learning (PBL) program for seniors called The Learning Project at her high school; gone on to provide courses and support groups for local teachers seeking their National Board Certification after becoming the first National Board Certified teacher in her region; and continued to improve her own classroom teaching through instituting new programs and strategies learned from and co-developed with her KSTF colleagues.

Heather's successes in re-creating the KSTF learning community that gestated and launched her professional life and that defined the ethos and principles by which she developed her teaching career are the result of many convergent factors. A key factor among them and the focus of this case is the dynamic interplay between the KSTF program offerings, supports and relationships and the growth and development of an ambitious, intelligent and altruistic young teacher.

#### The Story

*My motivation really comes down to this – I want to do what I am doing better. Teaching is really, really frustrating work and you can never feel like you are doing it well enough. No matter how good you get, there is so much better that you can be. That is incredibly frustrating for me, but that is something that also keeps me moving forward. I never feel like my work is done, or that my work is good enough. I could teach these kids more, and I could challenge them more, and I could be reaching more kids. So that is what is behind the thing that pushes me to do what I do.*

Heather was a member of the 2004 KSTF Cohort, the third in the program's 12-year history. Importantly in her view, she had the same KSTF Program Officer, Nicole Gillespie who is now the Executive Director, as her mentor for the full five years of her fellowship. Gillespie offered Heather an important role model as "someone who was so smart, but at the same time was so willing to admit when she didn't know something or understand something... that showed me it wasn't having the right answers that was important, it was seeking the answers."

When Heather began teaching at Johnstown High School she found herself an outsider in a tradition-bound environment. Rather than succumb to frustration she sought out KSTF and her

former Program Officer in particular for advice and support in how to work through typical first-year teacher's challenges, and how to implement some of the ideas and practices she had learned about during her fellowship years. Following her own motto of "Make change, don't grumble," Heather took advantage of every opportunity KSTF offered her.

Three of many efforts she has pursued and sustained over her almost decade of teaching stand out as illustrative of the ways in which Heather pushed herself, marshaled all the available resources she could find, then shared her enthusiasms and learning with others, and ultimately helped institutionalize many of the innovations she initiated.

### National Board Certification

The first of these notable endeavors centered on the National Boards. In her fifth year as a Fellow, Heather began the National Board Certification process, completing it in the following year (2010), well before the KSTF Senior Fellows program was fully developed and available as a source of continued support. "It was my way to ensure that I wasn't going to stagnate or get bored." Heather's actual certification, the significant first in her district, was only the beginning. Soon afterwards KSTF invited her, as a National Board Certified Teacher (NBCT) in science, to participate at a meeting at the National Board in Washington D.C. where it was determined that the standards should be revised. Shortly afterwards she was asked to apply to participate with the revision committee charged with reexamining and revising the standards for accomplished science teaching. It gave Heather "a whole new perspective of another side of teacher leadership, totally outside of the classroom that I had never explored or thought about."

At the same time the certification process was so valuable for Heather that "I wanted to push and encourage other teachers to have that phenomenal experience I had; I wanted to share that." Both in her school district and at KSTF Heather created NBCT candidate support groups that she designed and facilitated. In her home district, there are now seven teacher candidates who are pursuing their national boards, and, according to the current superintendent, "That is a remarkable number considering the size of our staff, and in comparison to other Greater Capital Region district schools that have hundreds and hundreds of teachers." Not only did KSTF support Heather during her own certification through the \$2000 made available to Fellows for NBC, but later Heather applied for and received a leadership grant to create a candidate support group for KSTF Fellows and Senior Fellows. It funded her to attend a NBCT training where she learned to facilitate the process for others, and to launch and conduct the program. Over half of the first 11 KSTF candidates succeeded in achieving National Board certification. Just as importantly the program has been "institutionalized" under the aegis of the KSTF Senior Fellows program. Heather has mentored and passed the leadership baton on to another Senior Fellow who uses the foundation that Heather developed to now support a new round of KSTF candidates.

### Collaborating in the development and sharing of *Patterns*

A second effort illustrative of the interplay between Heather's own efforts at bettering her teaching practice and KSTF supports is the example of her involvement with the development of an approach to and curriculum for teaching physics called *Patterns*<sup>1</sup>. Initially created by Bradford Hill, a fellow physics teacher and 2003 KSTF Fellow, *Patterns* captured Heather's interest at the KSTF Summer Meeting in 2012 where she spent considerable time interrogating him. "I got excited enough

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<sup>1</sup>Another of the Teacher Leadership Case Studies focuses exclusively on how the development of the *Patterns* curriculum was an expression of leadership. See the case called "Bradford Hill: Leadership Through Rethinking the Teaching of Physics" later in this report.

about it that I wanted to start trying it out in my classroom. I started teaching it and Bradford and I committed to meeting online once a month to talk about it... we were teaching and developing new units...so we developed a kind of collaborative back and forth." As the 2012-13 school year and their discussions progressed they wrote a proposal to KSTF to fund a five-day *Patterns* workshop that they hoped to co-lead.

With a green light and advice from the Senior Fellows program, they spent the remainder of the year in intense collaboration preparing more *Patterns* units, as well as the agenda and activities for the professional development event. The development year, culminating in their successful *Patterns* summer workshop, generated strong repercussive effects reverberating through the KSTF community and beyond. For example, one of the first units Heather and her co-teacher taught this year in the new program for seniors started by the Greater Johnstown District, The Learning Project, was a *Patterns* unit. Her teaching partner applied some of the key concepts to an economics class she was teaching, and, in turn, one of the social studies teachers at the school became interested in incorporating aspects of *Patterns* in her classes. A unit partially developed by Heather was taken up, refined and used later by a student teacher of Bradford's in his own classroom. And perhaps most significantly, another KSTF Fellow with a teaching colleague from a high school in Aurora, Colorado attended the *Patterns* summer workshop using a leadership grant from KSTF. These two took *Patterns* back home to the other 9th grade Integrated Science teachers in their school, and as a result the vast majority of 9th grade students have experienced the innovative *Patterns* curriculum. Heather explained her role in the *Patterns* endeavor: "I was the cheerleader. I became so excited by the concept of *Patterns*. While the curriculum is developed for physics, it's a powerful idea, a way of thinking for our students and for teachers... I think it will make larger and larger ripples in the greater science teaching world and beyond."

### Project Based Learning

Perhaps the most influential of all of Heather's efforts, beginning at KSTF with her participation in several workshops offered to Fellows, and beginning in her district with her participation in a technology and then later a professional development planning committee, was her pursuit of Project Based Learning or PBL. Her pathway culminated this school year in the creation of The Learning Project.

At KSTF, Heather was inspired by a master physics teacher named Kevin Gant from Albuquerque, New Mexico who was practicing Project Based Learning in his own classes, and who has since gone on to serve as a School Development Coach at New Tech Network. KSTF invited Kevin to lead workshops on PBL and to serve as a resource teacher to KSTF Physics Fellows for several years. Heather became a central member of a growing group of Fellows interested in PBL, who continued worked with Kevin, assiduously trying out PBL strategies in their classrooms, attending additional PBL-focused workshops and communicating extensively with one another about what they were learning. They served as a kind of PBL network within the larger KSTF network. Still later, with the advent of a new wave of cohorts, KSTF sponsored another PBL workshop for Fellows, expanding the network still further.

Heather was not only a key node in the KSTF PBL network, but also an advocate in her own district for PBL. Through her district committee work she gained the ear of Trish Kilburn – the assistant district superintendent for curriculum and instruction – whose progressive views about teacher-led change provided Heather with a kindred spirit in her home environment for the first time. According the Heather, "Trish had a thoughtful view about teachers as needing to be empowered and being capable of bringing about positives change for the district and for the students in the community... so having conversations with her about my work with KSTF and the National Boards was really supportive." With the assistant superintendent's backing and another leadership grant from KSTF, Heather organized a five-day Project Based Learning summer workshop for anyone in the district who was interested. Heretofore professional development in the Greater Johnstown

School District consisted of the traditional fare, either a district-wide guest speaker or teacher conference days. A workshop for teachers by teachers was a first. Thirteen teachers attended the first summer event, and then, according to Heather, "That kind of established me as the champion for Project Based Learning in my district; I followed up the next two summers with other workshops on PBL or differentiated instruction."

Serendipitously a new progressive district superintendent arrived, Rob DeLilli, who according to Heather, "really believes in teachers." He immediately organized an informal committee that called itself the "Dream Team," consisting of interested district and school administrators, as well as teachers of whom Heather was one. The purpose of the committee was to talk about the future, about new opportunities for the district. One of the first questions DeLilli posed to the group pertained to Jansen, an empty elementary school building in the district. He asked: "Is this empty building a problem or an opportunity?" The committee members discussed what they would love to see flourishing there, and Heather carried her excitement back to KSTF and to Dina Portnoy, the new Director of the Senior Fellows Program, who suggested that Heather visit some innovative schools and programs in Philadelphia with which Dina was familiar for inspiration. At this point all jumped on the bandwagon of possibilities. In January 2013, when Heather asked her assistant superintendent and superintendent for permission to take a day to visit Philadelphia, they acquiesced but insisted on going too. Dina, Heather, Trish and Rob all visited schools, where they watched presentations, and talked to teachers and students. The day culminated with dinner with KSTF's Executive Director, where all shared their ideas and views about Project Based Learning schools. Only a week later Kilburn and DeLilli invited Heather to the central office and posed this question: "If we pull you out of the high school half time next fall, gave you 20 students, whatever rooms you wanted at Jansen, and another teacher to co-teach, what would you do?"

The Learning Project opened in the fall of 2013. Attending half day, fifteen high school seniors were selected from a group of students that were neither high nor low achievers, but somewhere in the middle – those who hadn't planned on taking a fourth year of math or science, who needed some special attention and motivation, and who could work together. Heather teaches math and science. The obvious choice for the second teacher responsible for English and Social Studies was one who had attended Heather's PBL workshops and had been trying to incorporate PBL strategies into her classes. Like Heather she had been frustrated in implementing PBL into 40-minute classes, and welcomed the opportunity to teach a group of students for a full three-hour block. Kevin Gant serves as consultant. The administration's pride in the new program is great, for it serves as a first step in setting a progressive course for the district. Thus far the program has met with students' enthusiasm and parental support. Heather looks to the future of The Learning Project:

*We have this vision that this program won't be just for students, but hopefully a program that is going to grow to be a professional development program as well, that would offer residencies for teachers, offer a place where teachers could spend time and push their own practice, whether through short visits to see something cool and different happening, or longer visits to participate in developing and delivering curriculum as a way of learning and pushing their own work back in their own classrooms.*

### **Key Supports for Heather's Leadership**

Heather Buskirk is an exceptional teacher leader, achieving much in only nine brief years of classroom teaching. Her drive and energy and intellect are key sources of her many accomplishments. But the trajectory of achievement of a single individual is a function not only of their innate capacity, but also of the surrounding contextual sources of either obstruction or support in their environment. In Heather's case, although she encountered substantial barriers to realizing her goals of improving her teaching and creating a nurturing professional community, the supports were many and strong.

## KSTF

Beginning with KSTF supports, the Fellowship years provided Heather with a rich and nurturing period of incubation before her teaching actually began. It's where her "family values" were developed.

Heather is very clear about the most meaningful and supportive aspects of the program. First, in her view, was the stance KSTF took toward teachers. "From the very beginning they treated us like professionals, like people of great value who were doing really good, hard, intellectually challenging work." Second, KSTF exposed Fellows to experts in the field, those who were doing "cutting edge work in the area of science teaching." Heather explains, "It was pretty special to get to meet some of those people, to talk and question them about their work, and to have them question me, and push my understanding about either physics or pedagogy." Third, the role modeling that her program officer provided, that we have already mentioned was an important support. And finally the collaboration the fellowship provided was also seminal:

*Collaborating, working with other Fellows, and the way we pushed each other was so important. Also, seeing what my fellows in my cohort were doing in their classrooms and thinking to myself: oh man, like wow, if she does that, then I've got to step up what I'm doing. We pushed each other, not in a competitive way – we always encouraged and supported each other and challenged each other too. This year in The Learning Center I love having another teacher to teach with; that's been a new experience. Because I'm the only physics teacher in the district up until now the only collaboration I knew was with my KSTF fellows... I've always equated that collaboration more with KSTF than with my career in general; it was a special case that I got to work with these great physics teachers around the country who I've gotten to know over the years, look at my own work with over the years, but it wasn't part of my daily life. This is the first year collaboration has been part of my daily life and that's really nice.*

But in addition, as Nicole Gillespie described, Heather had special qualities that enabled her to capitalize on the range of supports KSTF had to offer. "She had a lot of initiative. She took advantage of every bit of money that was available to her, and every bit of support. She did not let one cent go to waste. Where there were lots of other Fellows who got kind of stuck – they weren't sure what to propose or what they should be doing with the money we offered them – Heather never had that problem."

What follows is a long list of KSTF supports Heather utilized, although not a comprehensive one, because it refers only to the three major efforts featured above. Nevertheless a brief description of these demonstrates the interaction between Heather's pursuits and KSTF's backing, and how important the supports were to leveraging this teacher leader's work.

- In the fifth and last year as a Fellow, Heather sought out the \$2000 KSTF offers as part of the fellowship to support whatever application fees, video cameras, etc. are necessary for beginning National Board Certification. In addition, she received special counseling and advice from her Program Officer through the process, and still later (as we have already mentioned) KSTF funded her participation in a NBC training workshop that helped her step into the role of mentoring other teachers going through the certification process.
- With regard to her leadership role in the development of the *Patterns* curriculum with Bradford Hill, KSTF provided Bradford and Heather opportunities to meet and collaborate, as well as funding for the weeklong workshop they co-facilitated in Portland in the summer of 2013.
- Finally, KSTF's support for Heather in her pursuit of Project Based Learning was long and extensive. Beginning with KSTF's sponsorship of a Fellows-only PBL workshop – which Heather attended and in which she was a central figure – KSTF then provided continued support by funding additional PBL workshops. KSTF went on to fund Heather's PBL workshops in her home district through a leadership grant. The stream of support for PBL crested with the

establishment of The Learning Project, where KSTF provided moral support, technical assistance, and access to resources not only to Heather but to the entire Johnstown district team.

### The School District

Masterful teachers can spend a career working quietly in their classrooms, remaining isolated and unrecognized. It is a sad statement about the school and district conditions in which many teachers toil, accounting in large measure for the high attrition rates among beginning teachers. Heather encountered challenging conditions when she first began teaching – desks in rows, no computers for teacher or student use, poor lab conditions, and an arid professional culture. As we have described, she was fortunate to possess an indomitable spirit and the support of a key person in the district, the assistant superintendent of curriculum and instruction. Through Trish Kilburn's understanding and backing, Heather was enabled to provide PBL-focused professional development to a pool of teachers in the district, and to gain some positive reinforcement for her interest and hard work.

When the current superintendent, Rob DeLilli, came to the Greater Johnstown School District in 2011, he came as a breath of fresh air for Heather. And Heather was an asset for DeLilli as well. He had heard that there was an NBC teacher in Johnstown and that was "exciting" to him. "I got to meet Heather early on, and I've had conversations with her about education philosophy and her pedagogical approach and what is going on in her classroom." DeLilli wanted to support Heather because she represented for him the kind of teaching he wanted to push for in his new district. Initially, just how to do that was a question. "The first few times I went to see her and get to know her a little, I kept asking her about her classroom space, if she needed more equipment, another lab... things like that, but it didn't get too much traction with her. The realization grew on me that what was needed was a kind of cultural shift in teaching in the district." He rightly assessed that what Heather wanted was to improve her professional space. Through his positive relationship with the School Board, good relationship with the assistant superintendent, respect for teachers, and aspirations to make Johnstown a district focused on cutting edge STEM programs in the future, he has strongly supported Heather. With the creation of The Learning Project and Heather's central role there, he has made sure she is valued. "You don't want to lose someone like that to another school district or to the private sector... She has so much to offer kids... it's working out, so far so good."

### National Board Certification

In the gap years between the completion of her KSTF Fellowship and the genesis of a viable Senior Fellows Program, Heather became a NBCT. The certification process was an important support to her, one that led her more deeply into dimensions of thinking that were relatively new: about teacher leadership. The certification process demanded that Heather think and write very critically about views on teachers as leaders. Soon afterwards, the process of serving on the National Board committee to write standards for science teacher leadership – where she was confronted with many diverse points of view not just KSTF perspectives – supported her in a rigorous examination of her ideas about what constitutes leadership.

*I used to think that teacher leadership was a particular experience, or that particular experience... but now I think it can be so many things. I think teacher leadership is employing what you think is best practice in your classroom, but doing so in a way where there is a window in, whether you are writing about it, or teaching with your door open, or inviting someone else to see it, or even having conversations about it. For me a big part of leadership is conversation, and it happens when you are talking with other teachers formally or informally. The more traditional view of leadership is that the conversation is very one sided. You have a principal giving directives, or you have a department chair who is overlooking what everyone is doing, and that is the leader. I think my ideas about leadership now are that leadership really*

*emerges when you have that two-way conversation. Leaders initiate those conversations and perpetuate them and foster and nourish those conversations... I don't think being a leader is just putting your knowledge into the world, but it is sharing it and getting feedback and getting other people's ideas and incorporating them – then taking all of that and making something new with it.*

### **Key Contributions of Heather's Leadership**

Heather serves as a quintessential example of "leading from the classroom." Her leadership has contributed much to many in the years she has been a high school physics teacher. First and foremost her leadership activities – becoming a NBCT and supporting others in achieving the same, helping with the curriculum and professional development of *Patterns*, and becoming proficient in Project Based Learning – have contributed to the growth, development and improvement of her own teaching and leading practice. Just as she stated above, the discussions, collaborations and shoulder to shoulder work that her various pursuits involved have enabled her to continuously "make something new" and better in her own classroom. As an example, becoming involved in *Patterns*, "made me excited about physics curriculum again... it forced me to create curriculum again and not just use material that I'd been using." As another example, the teaching Heather did at The Learning Project during the fall also stretched her. She spoke about two new discoveries that she felt deepened her teaching. The first was team-teaching with a like-minded colleague, a first for Heather. The second was getting to know students in more ways than before. No longer limited by 40-minute class periods, Heather gained new perspectives on teaching the whole child. "I spend three hours a day, every day with the same students, so I get to know these kids on a much deeper level... I'm not just watching them learn physics, I'm watching them learn everything – watching them work in groups, watching them learn to self-manage a lot more than they did in a traditional classroom, learning more about them..." And finally, for the first time, Heather is encountering mixed reactions from teachers in her district. Some "push-back" from teachers about the changes she has spearheaded has been negative. "The one thing that has been really hard for me is the whole political piece of establishing The Learning Project; I wasn't prepared for that." In response, her leadership style is maturing – "I am remembering to humble and center myself about the things I am not an expert in, to remember to seek out the advice of others, and admitting my own weaknesses and seeing those as gems, as places for growth."

Heather's leadership has also contributed to her district, not only in the most obvious ways – by providing professional development to teachers and helping to envision and implement The Learning Project – but also in less apparent respects. Rob DeLilli – who sees his district in the infancy stages of creating a new professional culture involving teachers supporting one another in building a learning community – feels that Heather, her efforts, and connections with both the National Board and KSTF have given his district's new direction an important jump-start. The Learning Project is just the beginning of what he envisions as a complex of cutting edge STEM-related programs, coupled with increased professional development opportunities for teachers. The state region of which Johnstown is a part, just won a Pathways in Technology (P-Tech) grant from the state; an elementary school in Johnstown will be a participant. In addition, the district is applying for and optimistic about receiving a quarter of a million dollar New York State teacher leader effectiveness grant. DeLilli thinks that "We will be able to provide opportunities for teachers to grow professionally and to grow their skills and enhance what they do in their classrooms... part of that philosophy is that the teacher leaders that participate in this will not only enhance their skill set, but also turn and support their colleagues along the way." For DeLilli, Heather serves as proof positive that his vision can be realized.

## KSTF

As Heather learned from KSTF, so did KSTF learn from her teacher leadership. In the early years when Heather was a Fellow in the third cohort, the program's vision of teacher leadership and of the supports necessary to nurture it were still vague. According to Nicole Gillespie, "We had this sense of leadership, but we didn't quite know what that meant."

Heather's work in her classroom, school and district contributed significantly to KSTF's developing efforts to build and support teacher leadership as a core element of the Fellowship. Nicole explained how her example served KSTF:

*...Early on at KSTF we needed to get clearer about questions such as: What does leadership look like from the classroom? How do we prepare people for that? What are the precursor skills that you need, what are the experiences that would make you feel like you are ready to step into this kind of stuff? With Heather's cohort, we were very trial and error, we didn't know what we were doing. But one of the interesting things with Heather was that she had this very strong sense of obligation, sense of responsibility to give back. She is one of the people that stands out for me, who helped us solidify what it was that we meant by leadership. Watching her and seeing the kinds of things that she did, we realized that this is what it might mean for someone to be a leader and still be a classroom teacher. Watching her we were able to backtrack; we could see what got Heather to the point where she felt confident enough to put together a professional development for her entire district on Project Based Learning, for example. We could see the trajectory that she followed; it was something we could learn from, and we could start to see the same happening with other Fellows. We had a concrete example of how it had been done, we had this at our disposal, so we could say to other emerging teacher leaders – "Okay if you really like PBL, you might want to think about pulling in another teacher at your school, or ask around about who else is interested in PBL and hasn't had the training. There may be ways that you can support them. And we can help you with it." So Heather gave us a concrete instantiation of what teacher leadership could look like. And having those concrete instantiations has helped us backward-design our supports for teacher leadership.*

### Summary Thoughts

Heather Buskirk's case illustrates how symbiotic relationships among key sources of support can work together to promote the influence of teacher leadership. With the seminal support from KSTF, but later important support from the National Board and her school district as well, Heather's story shows how their convergence and interaction created a strong professional dynamic that helped propel her into many leadership successes. Her story also illustrates how KSTF's approach to developing leadership – serving as an important starter and then following up with supports as needed – works well both to launch and to sustain KSTF Fellows' leadership endeavors.

Heather's pathway as a leading teacher began with the KSTF Fellowship. As she pointed out, the values and norms she learned there, the collaboration among fellow teachers and KSTF staff, and the rich array of experts and resources to which she was exposed created fertile ground for growing her own determination to be the best teacher she could possibly be. But Heather's trajectory of leadership would not have been possible without the mutually beneficial and mutually influential series of supports she was offered.

The image that comes to mind is leap-frogging. Heather's relationship with KSTF and the National Board serve as just one good example of that dynamic. In the 2nd or 3rd year of her Fellowship, KSTF introduced Fellows to National Board Certification, and to several NBCTs who talked about

their experience. As mentioned, it offered a \$2000 stipend for certification as part of the Fellowship, which Heather applied for and received. Back in her district, Heather talked to district leaders about her process, while KSTF offered additional support through the counseling of Nicole Gillespie. Afterwards, KSTF invited Heather to serve as NBCT science teacher on National Board committees to revise standards where her horizons expanded still further. She shared about certification both at KSTF summer meetings and back in her home district. KSTF's leadership grants enabled her to start and implement certification support groups both at KSTF and in the Johnstown district. Heather's NBCT status drew the special attention of her superintendent, and his support for her other KSTF endeavors including the PBL work. And so the leap-frogging continues, with one right action begetting another, with one beneficial achievement affecting still others.

## **Bradford Hill: Leadership Through Rethinking the Teaching of Physics**

### **The Case**

Bradford Hill was among the first KSTF Fellows. He began his Fellowship in 2003 (the second ever cohort) and has taught mostly physics for the last 10 years. Today, Bradford is a leading teacher who seeks to re-conceptualize the way he teaches physics and the way the discipline is understood and presented to students, and to inspire others to collaborate and participate.

In one of his first education courses in graduate school, Bradford remembers wondering why students should be required to study science. Throughout his Fellowship years and beyond, he was haunted by this question, and participated in a number and range of teaching and leadership activities to explore it further. His experiences have resulted in what he believes is an approach to teaching physics that is both foundational to science *and* antithetical to the traditional approach. *Patterns* – named for its emphasis on identifying and analyzing patterns found in nature to make predictions – is an approach that leverages students' natural curiosity and the predictive power of patterns to explore and discover physics. Through Bradford's leadership and persistence, *Patterns* is now the basis for the 9th grade physics program in the Beaverton School District where Bradford teaches.

This is a case of a leading teacher who, through inquiring into his own teaching practice, taking on leadership roles, and engaging in collaborations with KSTF Fellows and others over 10 years, has created an alternative approach to teaching physics for which he now serves as the intellectual and practical leader. While he loves teaching and has no plans to leave the classroom, he realized through the process of developing *Patterns* that he "wants his hand on a bigger lever." His various leadership roles have built on one another in ways that have created for him a strong desire to continue to make changes that he believes improve learning experiences for kids. When asked about his leadership perspective, and what he feels are important qualities in a leading teacher, he credited KSTF and the opportunities the Fellowship allowed with this major insight: 1) seek out and respect feedback, and 2) have a good, robust idea and bring people together to explore it.

### **The Story of the Development of *Patterns***

#### **What is *Patterns*?**

*Patterns* represents a fundamental shift in how teachers approach teaching science. The units focus on deducing laws or principles from data, which is contrary to most of traditional science teaching. In his [Science Teacher](#) article, Bradford wrote of his introductory unit:

*[T]his unit teaches students to make predictions, plan and conduct experiments, collect data, analyze results, argue from evidence, and evaluate conclusions. Harnessing their own experiences, students learn the value of evidence-based reasoning and data-informed decision-making.*

Each *Patterns* unit is comprised of experiments that engage students in improving their ability to make better predictions by comparing and contrasting low evidence and high evidence-based predictions. Moreover, *Patterns* emphasizes the mathematics involved in physics by requiring students to focus on the mathematical relationships among variables.

How did Bradford arrive at this particular approach to teaching physics? It began in graduate school, when Bradford worked with a professor at UC Berkeley, Andy diSessa, who focused on evidence-based reasoning and building on students' intuitive ideas about patterns in nature. This experience convinced him that learning science must reach beyond memorizing Newton's laws or the periodic table and include opportunities to collect data and reason from evidence.

Throughout the Fellowship, Bradford was exposed to other teachers who believed as he did, as well as to numerous professional learning opportunities that informed his evolving *Patterns* program. The Process Oriented Guided Inquiry Learning project, or POGIL, helped shape his thinking about how to help students see relationships among ideas. A workshop at Arizona State University called Modeling Instruction both pushed his thinking about how to teach physics as well as how to facilitate professional development. More recently, Practitioner Inquiry for the Next Generation (PING), a three-year teacher research program within KSTF that supported Teaching Fellows and Senior Fellows in conducting intensive and systematic inquiries into their professional practice, further developed his formulation of what kind of learning mattered, and provided a professional space to interrogate his practice in new ways.

At the 2009 KSTF Summer Meeting, Bradford attended a workshop on Essential Questions, where he formulated the question: “How can we discover and use patterns in nature to predict the future or understand the past?” This question now provides the basis for the *Patterns* approach. He began to develop lessons for his 9<sup>th</sup> grade classes, and then whole units. By this time he had something recognizable as a course: a comprehensive, mathematics-based, inquiry approach to teaching physics. Bradford shared his thinking and ideas with other teachers in his district and other Fellows. Then, a shift occurred – instead of Bradford feeling like he was pushing his idea on others, people started asking *him* about it, asking him to present his work and to share the approach. In fact, teachers outside of science have asked Bradford to help them think about how to apply the *Patterns* concept to their discipline (e.g., Spanish). KSTF was particularly supportive to Bradford’s effort to increase the dissemination of his ideas by providing him opportunities to present about *Patterns* at summer meetings and to hone his presentation skills.

In 2012, Bradford, along with other KSTF Fellows, visited High Tech High, where he saw the power of having students demonstrate their learning visually. Meanwhile, he taught patterns, and he studied his own teaching. He tried things that he thought would fulfill his desire to provide his students with complex, open-ended learning opportunities, but instead at times they were left confused and frustrated, so he continued to try different approaches.

All along, he took on leadership experiences, some KSTF-supported and some not, that pushed his thinking and his practice. His leadership of the “3-minute observation club”<sup>2</sup> with 15 other teachers at his school to encourage them to open up their practice and learn from one another led to a position as the English Language Learners (ELL) coach, where he supported teachers who worked with students for which English is not a first language. This, in turn, led him to discover that properly structured tasks with multiple representations of phenomena served students better than unclear, decontextualized, open-ended tasks. A POGIL workshop showed him that a complex task is one that provides students the opportunity to make connections among concepts and to see patterns.

Today, Bradford is leading the effort to shift his district to a “physics first” sequence using the *Patterns* curriculum he developed. In 2011, he was offered (and maintains today) a half-time Teacher on Special Assignment (TOSA) position through the Portland Metro Area STEM Center to make this work possible. He has worked with 50 teachers serving Beaverton’s 40,000 students. Bradford has also presented about the *Patterns* approach at national meetings of the American Association of Physics Teachers (AAPT) and the National Science Teachers Association (NSTA), and in 2013 published an article in [The Science Teacher](#). He now conducts two, five-day summer workshops on *Patterns*: one for his school district and state, and another – in collaboration with Heather Buskirk – for KSTF Fellows. He also serves in leadership roles outside of the *Patterns* work – he serves on numerous school and district committees and task forces, and continues to lead an ELL Professional

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<sup>2</sup>The three-minute observation club was an idea generated by a KSTF Fellow whereby teachers visit each others’ classroom for a few minutes in order to provide substance for conversations about teaching later in the week.

Learning Community (PLC) as well as a physics-focused PLC. He also participated in two KSTF groups – PING (now completed) and the Engineering Task Force (ongoing). He was named the 2013 Outstanding High School Teacher by the Oregon Science Teachers Association, is a current finalist for the Presidential Award for Excellence in Science and Math Teaching, and has received the 2014 AAPT Zitzewitz Award for Excellence in High School Teaching. He will take on the Presidency of the Oregon Science Teacher Association in fall 2014.

### Emerging collaborations around *Patterns*

Bradford initiated a key collaboration in 2012. Heather Buskirk, a KSTF Senior Fellow (and featured in another case study in this report) became interested in *Patterns* after hearing about it from other Fellows, and seeing a poster from one of Bradford's presentations. She recognized that it was something powerful to introduce to her 11<sup>th</sup> grade physics students, and in the summer of 2012, Bradford and Heather committed to working together on *Patterns* units.

Over the year, they worked on *Patterns* independently but shared what they were doing at monthly online meetings. Then, at a conference they both happened to be attending, supported by the KSTF Senior Fellows Program, they decided to focus their energies and time on taking their *Patterns* work together to the next step. Heather described it:

*We put every spare second of that conference talking about Patterns: Where can we go next, and what future articles do we think need to be written, and what presentations do we want to do and how. We thought 'this is such a good thing – how do we get it out there?' What conferences do we want and we made this huge long plan of where we thought Patterns should go.*

Following that conference, they continued working together on the curriculum and began planning a week-long *Patterns* workshop for KSTF Fellows which was held in the summer of 2013. This workshop resulted in the formation of several ongoing "affinity" groups of Fellows (e.g., AP Physics, IB Physics, Freshman) that are meeting online monthly and following a structure similar to the IB Physics collaboration (described in another case). Lead by Bradford and Heather, these groups meet to discuss issues, challenges, and questions they have around the implementation of *Patterns* in their classes.

### **Key Supports for Bradford's Leadership**

Bradford describes the history of his leadership around *Patterns* as a series of serendipitous events that happened at the right time and in the right order such that he was able to build on each successive experience in meaningful ways.

### KSTF supports

KSTF provided the financial, intellectual and moral support for Bradford to develop and gain confidence around the *Patterns* approach. The various professional development experiences he was able to participate in, such as POGIL, Modeling, visits to innovative schools and programs, and the PING group pushed his thinking and practice. These special opportunities coupled with the ongoing discussions and projects within the Fellowship strengthened his conviction that there are better ways to teach (and therefore learn) physics.

KSTF also provided Bradford opportunities to develop leadership skills. The 3-minute observation club to support other teachers' peer observation skills was born out of conversations at KSTF and funded by KSTF, and when implemented was met with enthusiastic participation and support from his colleagues at school. Through this work, Bradford began to shift his school culture to be more

open and collaborative. This also made his administrators notice him as more than an excellent classroom teacher – his leadership skills were recognized and put to use as the ELL coach for his school. Leadership begets leadership, and soon other leadership opportunities arose at the school and in the district. All this cascade of activity can be seen as stemming from the initial project supported by KSTF.

In addition, KSTF summer meetings provided the perfect setting for Bradford to begin honing his presentation of *Patterns* to other teachers. The setting was perfect in the sense that it was welcoming and supportive, where mistakes could be made and addressed in a non-threatening environment. Bradford explained:

*In one sense, I was always sharing what I was doing, partly just because I wanted it to get better, and I thought telling people what I did and hearing their reactions and criticisms would help. ...A big part of being able to do that was the KSTF community... I felt strongly encouraged to [share Patterns]. We had presentations and I presented at many summer meetings on pieces of Patterns before it was as coherent as it is now.*

The workshops and leadership opportunities have provided what matters most to Bradford now: the opportunity through KSTF to meet with like-minded colleagues and have meaningful discussions about teaching and learning. The workshops alone are beneficial, but the value increases dramatically with the opportunity to share, discuss, and critique what he learned:

*I am a reflective person, and I would say largely I am an introvert who just likes to ponder things – and then to talk about them.... But [before KSTF] I had no structure for it. I would have done it no matter what, but who knows what I would have gotten out of that. [KSTF] accelerated my experience, and maybe I would have gotten here, but it would have taken me 15 years to get here versus 8 years. It is so much more nurturing, and in that community context reflection is so much more powerful.*

KSTF has played a major role in providing the foundational habits of mind and practices that have enabled Bradford to take on this work. Specifically, the professional development opportunities KSTF offered during his Fellowship and the freedom to choose it; the culture of collaboration, critical review, and reflection that KSTF emphasizes and fosters; and the support he has received from his teaching context have been a major contributor to Bradford's success so far.

#### School, district, and community supports

Early on in his career, Bradford relied heavily on KSTF and other Fellows for both moral and professional support. Today, another key contributor to Bradford's ongoing success and the impact *Patterns* has made and continues to make in his district is that he works on a daily basis with people who trust and respect his vision. He explains:

*Earlier in my career, KSTF was the biggest chunk of my support, but now, my local context is. It is just great, and I have really good colleagues in my school who I have worked with on a daily basis, and they are friends as well as colleagues. Also I have the science coordinator who is just another comrade in arms in this fight to improve science education and so supportive. Recently, and I am reluctant to say this, because I don't know how true it is, but I definitely feel like even my superintendent knows who I am. I have a couple of meetings a year with my assistant superintendent and he is really supportive and has made offers to make sure I go in and talk to him when I think I need something that I am not getting.*

With the support and confidence of his district science coordinator, Bradford has been key to driving the successful transition of his entire district to a 9<sup>th</sup> grade physics program, and establishing *Patterns* as the curriculum for the course. In addition, Bradford has been tapped to

play key roles representing teachers on numerous district committees and groups. Outside of the district, Bradford has served on state-level committees related to state standards and assessment, and has developed a close partnership on a research project with professors at Portland State University. All of these experiences have contributed to his knowledge base and growth as a leader.

Through his work over the years Bradford has created a positive and potentially lasting change in his large school district. And, Bradford himself has benefited greatly from the opportunities he has had within his own district; they have provided the challenges through which he has learned, grown and made contributions to other teachers and students in ways that matter to him. His position as a TOSA, his leadership of the ELL and Physics teacher PLCs, support for leading workshops, and the ongoing mentorship and support of his district science coordinator have all contributed immensely to his growth as a leader.

Bradford's is a case of a motivated and thoughtful teacher in a nurturing and supportive district context supplemented by a host of learning and leadership opportunities offered by KSTF; each success has spawned additional leadership and learning opportunities. The history of support provided by KSTF, coupled with his current school context and the many relationships he has developed across the district, community, and state, sets the stage for Bradford to continue to develop as an effective and dynamic leading teacher.

### **Key Contributions of Bradford's Leadership**

Bradford made a range of contributions through his *Patterns* work – from effecting his district curriculum and policy, to participating in research projects, to supporting individual teachers in changing their teaching practice and curriculum. One way to consider the value of Bradford's contribution is to explore more deeply the extent and ways he has impacted other teachers. One such teacher is Emilie Cross, also a 2003 KSTF Fellow, and one of six National Board certified teachers in her science department. Emilie has been teaching for 10 years, and currently teaches International Baccalaureate (IB) Physics and 9th grade Integrated Science in a large comprehensive high school in a suburb of Denver, CO. In 2013, having missed the 2012 KSTF summer meeting for the first time in nine years, and after some time off for maternity leave, Emilie was eager to get re-engaged with her KSTF colleagues. She had heard positive comments about the *Patterns* work from other Fellows, and decided to apply to Bradford's summer workshop. She applied for a leadership grant from KSTF for both herself and her colleague Jason (not a KSTF Fellow) to attend the course. During the week in Portland and then after returning home, Emilie and Jason became convinced that the *Patterns* approach should be implemented across their 9<sup>th</sup> grade science program. Using district teacher work-days, Emilie and Jason worked one-on-one with the three other 9th grade Integrated Science teachers at their school to prepare them to start the 2013 school year using the *Patterns* curriculum. This year, 85% of the 9<sup>th</sup> grade students are experiencing *Patterns*. Emilie now hopes to see *Patterns* adopted across the district.

Emilie believes that KSTF "changed her DNA" – her experiences as a KSTF Fellow compels her to seek out and share new ideas with colleagues. To her, *Patterns* is a perfect opportunity to stay true to her focus on providing quality experiences for students and leading other teachers in her school and district in a new and exciting direction. She said:

*If I am going to continue teaching this 9th grade course, I need to be always figuring out what it is I have really enjoyed about teaching – and that is getting students excited about science as freshmen and then keep them interested, helping them see that that learning is a skill that they can get better at. A power for me that comes from using this curriculum has been that it not only has the capability of helping kids get better skills in science and math, but that there are opportunities for doing other things like engineering projects. The mindset of a *Patterns* approach will help them be more successful; it helps me create more rich projects for them to do and be able to experience science more authentically.*

Emilie has a strong desire to connect with other teachers, collaborate on quality, effective products, and lead improvements in her district. Since being exposed to *Patterns*, she is more committed than ever to take this on. As she stated:

*My vision with this is I want to take on a role that would be as a leader to help not only become the expert and to help make it happen in our school, but to be the resource that people will come to and ask questions. What I envision my role as within the building, is a person who hopefully is the catalyst for making this change happen and helping support it along the way that it is not only talk, but I am actually helping make sure that it happens.*

Emilie is an example of a teacher with latent leadership desires and qualities who was triggered into action through exposure to *Patterns*.

### **Summary Thoughts**

This case illustrates how Bradford's leadership has been expressed through developing and sharing the *Patterns* approach. At this point, however, Bradford feels he has reached a limit in terms of his own capacity and bandwidth to disseminate it. With his teaching and teacher development commitment, other leadership roles large and small, and two small children at home, he is ready to "pass on the torch" and help others spread the idea. Indeed, Emilie's story is exactly the kind of scenario Bradford hopes is happening out there, as well as the KSTF *Patterns* online collaboration following last summer's workshop. Now that most of the 9<sup>th</sup> grade teachers in his district have attended the summer workshop, he is not sure who might show up next summer, but he hopes for a good turnout. He also hopes that one or more of the Fellows that attended his five-day workshop in Portland last summer will take it somewhere and share it. He said: *I really think that the future is to get everyone who is interested in this to not only teach it but also to share it. I think there is a lot more opportunity these days for teachers to engage in that level of work.*

Going forward, Bradford would like to find opportunities to further develop his leadership and presentation skills and knowledge. He wonders if KSTF might create a Leadership Task Force that develops ways to support the growth of leadership skills in Senior Fellows, and a "structure to process their own situation."

Bradford is a leading teacher who thinks deeply about the discipline he teaches and how he could do better in sharing that discipline with his students. *Patterns* is one very visible manifestation of his intention and commitment not only to improve his own practice but to work with his colleagues to raise the overall level of the profession. Bradford's case, we believe, is highly illuminative of the importance and viability of the idea of *leading teachers* – individuals who can significantly contribute to educational improvement from the grassroots level. Bradford presents clear evidence that such leadership is possible, and that each case will be as different as the individuals and contexts involved.

## **Charley Sabatier: Leadership through Developing a Professional Learning Community (PLC)**

### **Overview**

1. *We are open-minded towards the ideas of all group members, respecting that their ideas are as valid as our own.*
2. *We are committed to staying in alignment with each other because it enables our collaborative community to be more powerful.*
3. *We make decisions by consensus, because of our commitment to alignment, and because it challenges what we take for granted.*
4. *We believe that reflection is critical to growth and supports continuous improvement.*

These four statements summarize the “norms” developed and lived by a group of teachers, led by Charley Sabatier, a KSTF Senior Fellow. Together Charley and his group are focused on improving their International Baccalaureate Physics teaching while also feeding their desire to be part of a thriving and intellectually engaging professional community. Now in its 3<sup>rd</sup> year, the IB Physics Professional Learning Community (hereafter PLC) meets on a weekly and monthly basis to design, discuss, and reflect on their IB Physics courses, their teaching challenges and successes, and the collaboration itself. This group is not part of any school or district structure; it is entirely carried out by the teachers involved in the way they decide and for the purposes they choose. By design, this collaboration is more than a planning group. It functions also as a mechanism to provide professional support and intellectual stimulation to the participating classroom teachers, giving them a chance to challenge themselves and each other in a setting where they feel trusted and safe.

The leadership of Charley and the formation of the IB Physics PLC illustrates how involvement in KSTF catalyzed the desire, wherewithal, and know-how to engage in a mutually supportive and productive collaborative experience. It shows that with KSTF training and support, teachers can create a learning community by themselves, of themselves, and for themselves. The group’s stance is that teachers are responsible for and best positioned to improve their own teaching, and that they can work collectively to do that.

### **The Story of Charley’s Leadership and the Development of the IB Physics PLC**

The idea to form this group started at a 2011 KSTF summer meeting – a lunch where Fellows from across cohorts were assigned to sit at tables by geographic region. As a few of the Fellows at the table began sharing their stories, they quickly realized that in addition to working and living near one another, they also taught the same course in a similar structure. Charley, the Fellow with the longest teaching experience in physics, recalls that fateful lunch, and their decision to keep the conversation going:

*There was a pocket of us in northern Virginia, and we were at that table and through that conversation, we realized that we were all teaching IB Physics and we were all teaching it at the standard level and we all had 90-minute blocks that met every other day. We thought, ‘this is ridiculous!’ I had been trained as a Collaborative Learning Team (CLT) leader, where teachers get together and write common assessments, and I had been frustrated by the fact that I didn’t have that for my IB, because I was the only IB teacher at my school and the team at my school was kind of mediocre. So I had this training and I said, ‘hey, we can form an IB CLT, and we can meet once a week and we can do these things that I know about that I never get to do in my school because the teachers aren’t willing to do it.’*

Drawing on Charley’s inchoate notions of leadership and KSTF training, Charley and the other three teachers at the time began meeting every Tuesday afternoon to work together on improving their IB Physics courses. It started as an experiment in a cycle of planning-teaching-reflecting, and quickly

evolved to include questions of vision, accountability, their identity as leaders, and how the work they did together impacts their students' learning.

The original group of teachers included: Charley Sabatier, Katey Shirey, Heather Moore, and Jennifer Weidmann. Today, the group is comprised of four teachers – three KSTF and one non-KSTF: Heather Moore, Mark Hartman, Kate Miller (all KSTF), and Christy Buzan. Charley and Katey are no longer in the classroom, but Charley is still involved in the group when his new job allows (described below). Katey's replacement Christy Buzan has joined, and one KSTF Fellow, Mark Hartman from North Carolina, joined in the second year and participates virtually. Heather Moore continues as an original member, and Kate Miller joined in the third year when Jennifer went on maternity leave (both Heather and Kate are in the Washington D.C. area). It should also be noted that Jennifer actively mentored Kate the year she was on leave.

Today, Charley is the High School Science Specialist for Fairfax County, which means he is responsible for district-wide high school science curriculum, professional development, summer projects, and the district science fair, and he is the point of contact for all vendors looking to sell science-related products and materials to the district. He meets on a regular basis with all of the district's science department chairs and is responsible for leading their professional development. Katey is now out of the classroom and in graduate school.

The group met face-to-face every Tuesday for the first two years; now they meet on-line virtually. The group still meets once per month face-to-face for dinner and reflection, to talk about how the group is functioning, their successes and challenges, and concerns and interests going forward. It is worth noting that one teacher mentioned that to her knowledge, nobody has ever missed a meeting without a very good reason.

Each weekly meeting is kept to a tight agenda that is jointly created beforehand. Approximately half of the meeting is devoted to the first year IB Physics course, and the other half to the second year course. Two teachers (Heather and Mark) teach both of these courses and therefore attend the whole two hours of every meeting. At the end of each course meeting, action items are discussed and assigned for completion by the next meeting.

Already a department chair and Collaborative Learning Team leader at his school, Charley had been doing a lot of thinking about how to lead teams of teachers, how to help teachers work together, how to prioritize tasks for a team, etc. Through his experience with the IB Physics PLC, he figured out the most important aspect of being a strong leader – having a vision for the work of the group:

*I feel like a big part of leadership is coming up with a vision, because if you have this common vision, everybody knows where we are going, and all of the decisions that we make are based on that vision. Until I was a member of this group, I always thought that the school talked about vision and mission but I thought it was a bunch of hooey, because it was just something that they said.*

For Charley, having a vision means the difference between leading and something many mistake as leading – managing:

*I observed leadership models in my school that were more managing than leading, and I think most department chairs in my district right now, they are really good managers, but they are not leaders. They are good at managing resources and managing schedules and managing budgets, but they don't set a vision for where they want the department to go, and then come up with a plan of how they are going to try and get their department there.*

Even though Charley is no longer in the classroom, he still has a vested interest in this group and attends meetings whenever he can. He believes that the IB group meetings are like "weekly KSTF

meetings” which he uses as a model for what highly functional collaborative groups can achieve. He plans to draw heavily on this experience in his current role as the coordinator of 25 high school science department chairs (among other roles related to high school science in the district).

### Distinguishing features of the IB Physics PLC

The four norms stated at the beginning of this case are worth expanding upon, as they provide the basis for the work the teachers do together. It was important to the group – and Charley in particular – that they establish norms for working together that extended beyond the standard behavioral norms for running a good meeting, such as starting on time, have an agenda, etc. These procedural norms are important, but the group felt strongly that their work would operate from deeper, more philosophical assumptions.

The first norm – *We are open-minded towards the ideas of all group members, respecting that their ideas are as valid as our own* – reflects the desire to have a professional space where participants feel safe to express their concerns, ideas, even feelings about the work, and where they trust that their relationships will not be impacted by what they contribute or do not contribute. As one teacher in the collaboration put it:

*Having the trust where we can push on each other I think allows everybody to have a little bit more leadership, because everybody knows that anybody can say, ‘well tell me why you think that we should do it that way?’ And you realize that it is not because somebody has their own personal way that they want to do it, just because they want to do it, but they are genuinely interested in what is the educational advantage of doing it that way. I think we have developed enough trust in order to have that ability to push back and not let that close people down.*

For Charley and the teachers in the group, the training they received from KSTF in terms of opening up their practice and ideas to others without fear has been a key to the success of this effort, and central to this first norm.

Closely related is the group’s commitment to stay aligned in their teaching, as stated above: *We are committed to staying in alignment with each other because it enables our collaborative community to be more powerful.* The teachers strongly believe that staying together in their curricular pacing – preferably to the day – creates both an urgency and an efficiency; if a group member isn’t teaching a concept under discussion at the time, there is less incentive for that person to participate fully. Staying aligned also ensures the highest quality ideas and resulting products and materials, as at least two of the teachers will have reviewed them, and everyone will have discussed them thoroughly. Charley describes their decision to commit to this norm:

*We agree that we work better when we stay aligned with each other. That is one of the things that we learned. There is this huge outcry about classrooms being aligned, and the negative connotation of “lockstep,” and that the standards are forcing teachers into lockstep, giving up their creativity. I would say that getting into lockstep allowed us to increase our economy of collaboration... because we all had the same need and we were better as a team. When one person got ahead, they needed things that the rest of the group didn’t need, and all of a sudden we are working on things that aren’t pertinent to what we needed to do.*

The connection between agreeing to stay in alignment and mutual trust is evident in these teachers’ comments:

*We committed to staying in lockstep with each other because that makes the need of collaborating immediate. You know that if you are asked to do something, that not only do you need it for your classroom, but three or four other people are counting on you to do that.*

*[Staying aligned] works because I trust [the other teachers]. I trust they are going to make their products on time and they are going to be really good. And probably better than any one of us could do on our own, because there are so many eyes on it and people thinking deeply about it. I'm happy to stay aligned, even if I don't see their vision – it will probably go really well in class. That is why it works and why we can get away with that. That is unique and definitely plays into a standard that you expect from KSTF Fellows.*

The teachers all felt that while the commitment to stay aligned might take away some of their personal autonomy in the classroom, the higher quality of the materials produced, and the time-savings incurred by distributing the work among three to four outstanding teachers, was worth it.

The third and fourth norms – *We make decisions by consensus, because of our commitment to alignment, and because it challenges what we take for granted, and We believe that reflection is critical to growth and supports continuous improvement* – relate to the particular stance they have cultivated through their KSTF experiences and that emerged from their work together. They felt that without thorough discussion that led to total consensus, the power of the collaboration was diminished. There would be no “agreeing to disagree,” as Charley explained:

*If your model isn't a consensus, then people can hold out indefinitely. If you have to have consensus before you can go forward, and you have that understanding, then you make decisions a lot faster. This is what pisses me off so much about Congress, they don't ever have to come to consensus and it is ridiculous.*

KSTF continually emphasizes reflection, and the IB Physics group was a perfect opportunity for them to practice what they learned about reflection in an authentic context. While the monthly meetings were expressly designed for this purpose – to reflect on their work together – their weekly meeting naturally also included a great deal of reflection about the lessons, assessments, and other curricular materials they were producing and trying out in their classrooms.

### **Key Supports for Charley's Leadership**

Charley applied for and received a three-year grant from the newly-launched KSTF Senior Fellows program to support the collaboration. In the first year, the money helped purchase textbooks and other resources that they wanted to be sure each member was able to access. In addition, the grant paid for their monthly dinners, some travel, and materials and resources they could share. While these funds were helpful and provided the impetus to get the group going, the KSTF support reaches far beyond the grant money. That is, while KSTF did not have direct involvement in the creation or operation of the group itself, the way in which the group shaped itself and operated came out of the experiences and habits of mind that are cultivated throughout the Fellowship experience.

Charley in particular feels that KSTF has provided an enormous amount of support – not just for the IB Physics group but also for him personally and professionally. He feels it is up to him to figure out how to create a return on KSTF's investment, which in his mind comes in the form of impact on those he touches, as he describes:

*I think one thing that that the Fellows program did from its inception is that it challenged us to think about what you look like as a teacher leader. I have always had this idea that KSTF has made an incredible investment in us, and now we have a responsibility to earn dividends. We have a responsibility to take the investment that Harry made in us and to start multiplying it, to start earning interest on his investment. I definitely think that the investment that he made in me had an impact on the teachers at Mt. Vernon High School, the students in my classroom, and I expect the students in my colleagues' classrooms. ...And one of my visions in the new job is 'how do I take what I have learned from the IB collaboration and how do I create*

*opportunities for teachers to have an experience like that in my district? How do I take the investment that I make in that group and to help them start spreading it through other groups that they are involved in?’*

Others in the IB Physics PLC group state clearly that without their KSTF involvement, they would not have the knowledge, experience, ways of thinking, or even confidence to participate in this collaboration. Kate, who joined in the third year as a first-year teacher, said of the role of the Fellowship:

*KSTF does a really good job of valuing you as a professional. With that comes your ability to create good things. They are confident that you can do good work. They encourage you to reflect and ask: ‘Is it good enough, [or] can I improve it?’ They recognize that you are doing a tough job, you are doing a good job, and you keep going. The value they place on us as teachers, and as intelligent, capable people, can’t be overstated. I think I internalized that. I think to myself, ‘I can do it, I can push myself to be better and I can be better.’ That pushes me to want to do the extra work [in this group]. I try and make sure I’m fulfilling that standard of being a great teacher that is reflective. I also know it doesn’t happen in one day; it’s a process. This is all wrapped up in how KSTF develops your mindset as a teacher.*

Christy, who is not a KSTF Fellow, was supported by KSTF in indirect and important ways. She greatly appreciates what her KSTF colleagues in the group bring to the collaboration, and feels fortunate to be connected to the organization through them. For her, the commitment the teachers bring to the effort, the attitude of genuinely wanting to support and help one another, and the resources available to the KSTF teachers are all invaluable. Of her KSTF colleagues she said:

*In general, they are people who want to challenge themselves and not take the easy way out. To a person, they strive for excellence, and that is huge. It brings the energy to the group that I don’t get outside of it. We talked about how we don’t think we will ever arrive at a perfect curriculum, because you can always improve it. It is great to work with people who are striving for that.*

This is the third and final year of the original grant that Charley wrote, and it is unclear if one of the Fellows now in the 5<sup>th</sup> year of the Fellowship will write another grant for the group. However, this does not suggest that they will not continue – indeed, they all felt that while the materials purchased in the first year and the dinners are nice, they are not necessary to the collaboration, and they would very likely continue whether or not there is any money to support them.

### **Key Contributions of Charley’s Leadership**

For the KSTF teachers working who were now engaged in this group outside of the KSTF program boundaries, this collaboration has been a defining experience in their careers thus far. For Charley, it has helped prepare him for his current position and create more meaningful collaborative experiences for teachers he leads in his district. The core KSTF values that he has brought to IB Physics collaboration now provide the foundation for his work at the district level. In this new job, Charley is charged with overseeing the coordination of the high school science program through the department chairs in the district, which includes leading professional development for the chairs and for summer curriculum and assessment development participants, as well as managing the district science fair. As Charley said, “I think that group set the stage for me to be able to think that I could even possibly do the job that I have now.”

For Heather, it has motivated her to create a similar group for regular physics teachers; she now leads a (slightly looser) group of about 15 Active Physics teachers in her district focused on improving the implementation of that program. All of the teachers in this group are non-KSTF, and

Charley is watching closely to learn from Heather as she leads this collaboration. Mark is highly motivated to share what he has learned about collaboration with others (in fact, he and Heather are presenting on this collaboration at the 2014 National Science Teachers Association conference). For all of them, the desire to be better teachers and leaders – the best they can possibly be – fuels their commitment to the group. They see that by working together they can create better materials, increase their knowledge, build their confidence, and generally improve in ways that they simply cannot accomplish on their own. For them, there are strong and meaningful rewards for taking on leadership roles.

As a “latecomer” to the group, and a first year teacher, Kate cannot imagine not having this group to support her teaching such a challenging course. When asked about the personal benefits to her of being a part of this collaboration she said:

*I think I am a halfway decent first-year teacher. I am pretty confident that I'm doing things that are good, I'm using best practices, and I'm on my way to being the kind of teacher I want to be. This group is a good kick-start to my career; I am open to ideas, and open to trying risky things. I envisioned wanting this in a teaching career, and I do not know how I would teach without the group.*

#### Christy's experience

One of the leadership challenges the group faced was bringing a non-KSTF Fellow into the group such that she felt both welcomed and a productive member of the collaboration. Three of the four teachers are KSTF Fellows and are familiar with the language and processes that Charley implemented in the first two years of the collaboration. Their way of talking and working was new to Christy, the non-KSTF Fellow who joined the group, but it has nonetheless made a large impact on her teaching – both IB Physics and her other classes. She said:

*I am definitely far beyond where I would have been on my own. My year-2 curriculum would not be nearly as good. I'm amazed at the content that we have put together. It is not perfect, but it is really good, and I'm impressed by that. I feel less stressed than I would have felt, because there are now two other people I can talk to that know exactly what I'm talking about, and will respond to me and support me. It has affected my other preps, because I'm now collaborating with other teachers, making better curriculum, etc. I'm frankly a better teacher.*

However it took some time for her to feel as comfortable as she does today. Entering the KSTF culture had its challenges, but she was able to adjust to the routines with the support of the other teachers. Here is how she described her experience:

*The first year was hard, because KSTF has its own language and goals, as well as all these professional development backgrounds, all the many resources, etc. I jumped into an already running ship, because the IB meetings were going on for a year before me. What was hard was interpreting their lingo, like “protocols” and “action items”... all the fancy things they did. Even the fact that they did objectives-based grading – I didn't do that. I wasn't there yet; I had to catch up with that. I had the same goals and motivations, so that part was easy to step into. Our hopes as teachers in our classrooms are similar, and that was a strong foundation for us to go with. So the biggest thing was I had to learn all the assumptions and things they worked out from the year before and from KSTF. And time becomes so valuable in meetings like that – don't want to rehash anything and waste time. But they did need to sit with me – the new person – and talk about the vocabulary, the methods for communicating, the protocols, etc. I was new enough, and working in the same school as Jenn it was an easy integration for me in that we could have side conversations during lunch or outside the meetings. Once we step into the meeting, we want to hit the ground running.*

At first, staying in alignment and sharing the responsibility for developing materials, seemed a bit stifling to Christy. She likes the autonomy of teaching and to be able to do things spontaneously with her students. But she soon realized that the payoff was worth it:

*I was worried at first to have to be in synch with everyone, and there is always some slippage. The question is do we stay lock-step and therefore allow each other to access the same materials, know the timing, the order, how kids react, or do we go at different paces? The power in the collaboration comes from the higher quality materials produced in less time, so we divide and conquer the different pieces. Having that collaborative support is so valuable that it is worth staying in step with these people. It is not just that we are able to put more time into one thing, but we also have more brains checking on them, so we get better materials.*

She also realizes that she is benefiting from the KSTF Fellows in a range of ways, not least are the resources they bring to the collaboration that she would otherwise never have access to. She described her appreciation for KSTF this way:

*In the public school systems, we are encouraged to do professional development, which is usually lame or not useful. KSTF pushes professional development in a really applicable and valuable way. I see them come back from these [cohort] meetings in the fall and spring, and they are saturated with new ideas, new ways of getting students to interact – all the good things that grad school told you about, but that is hard to make happen. ... There are some good professional development programs accessible to anyone, but it is easy to let life get in the way. [KSTF Fellows] are given sweet resources and challenges, two times a year, and it is great for them to come back and talk about things they learned at their meetings and conferences.*

All of the teachers including Christy feel that the composition of the group works, and that everyone has something to contribute. During her first year, Christy admitted she was mostly a “leach” – taking in what the other teachers were providing without much reciprocation. Now, she feels she contributes equally and that in general, everyone in the group is able to play to their strengths. As Christy said: “All of our personalities lend to different strengths, everyone has equal say, and it is a safe place to vocalize misunderstandings.”

### **Summary Thoughts**

A key component to the success of this group of teachers is that they are connected by a common and immediate need: to improve their IB Physics curriculum. Without this common problem to solve, and without the leadership and vision of Charley to get it going, their work together would have likely looked quite different, if it would have existed at all. The common desire to improve their IB teaching provided the *raison d’être* for their collaboration. Then, the KSTF mindset embodied in Charley’s encouragement and leadership enabled the teachers to recognize the power in working together and how to best work as a team.

The IB Physics PLC is a strong example of a new vision of educational improvement that is teacher-initiated, collective, self-guided, and ongoing. KSTF culture and values were and continue to be central to making this group successful. In many ways, it shows that KSTF is a generator of “subcultures” that can be re-created, shared, and sustained by the sheer will and passion of the teachers involved.

This collaboration regularly practices what can be called “collective accountability.” In an era when the term has such negative connotations, these teachers are embracing it, but in a way that reflects what they value; their voluntarily-chosen responsibility to each other empowers them to work together and act in ways that makes them all better – both as teachers and as people. These teachers

deeply believe they are responsible for improving their own practice, and that improvement can be achieved more fully in collaboration than in isolation.

There have been multiple repercussive effects of Charley's leadership of this ongoing collaboration. A few of the teachers working together have developed a presentation that describes their journey and process in hopes that others will be able to learn from it and perhaps replicate some version of it. As noted earlier, one of the teachers is attempting to replicate it with another group of physics teachers in the district. And, Charley has plans to incorporate much of what he has learned and continues to learn in the group into his current district role. There is no doubt that for all of the teachers, participating in this collaboration has influenced their views of what effective collaboration can be, and what it takes to make it work.

## EMERGING THEMES

As we looked across the three cases of leading teachership – Heather Buskirk’s, Bradford Hill’s and Charley Sabatier’s – common themes emerged about the nature and efficacy of KSTF’s investment in growing and supporting leading teachers. We have selected four major themes that appeared across the cases. Each of these themes presents a different aspect of the work of leading teachers and of the ways in which KSTF supports the development of their leadership.

**1) The KSTF program creates a powerful professional culture for beginning teachers. As teachers gain experience and take on leadership roles they reflect the values and principles of that KSTF culture in crafting their own leadership work.**

- KSTF leading teachers internalize and retain the values and principles with which they were imbued during their Fellowship years. They seek to realize these same values in both their teaching practices and leadership efforts. They desire to make these values central to recreating KSTF community-like efforts or venues in their home settings. Chief among these values are respect for teachers, reflection and inquiry in the examination of one’s own teaching practice, collegial collaboration, opening up teaching practice, and the idea that teaching is intellectually challenging.
- Of special note is the value of collegial collaboration. KSTF provides many opportunities for Fellows to work together. Later, as they initiate leadership activities, leading teachers deliberately design and structure their efforts to feature collective reflection, collegial effort, and group responsibility for improving what they teach and how they teach it.
- Overarching all of the cultural norms and values KSTF promotes is what drives its leading teachers, namely, a deep-seated ethic of continuous improvement. The driver, the ongoing motivation for leading teachers is the idea of constant advancement: “I have to get better.” Leading teachers strongly challenge themselves to gain knowledge and skills to improve their teaching practice in order to do a better job for their students.

**2) KSTF leading teachers assume professional responsibility for the improvement of their own teaching and that of their colleagues.**

- One of the fundamental beliefs instilled early on at KSTF is the idea that teaching is a challenging and worthy profession. When Fellows take on that belief they also develop a professional stance toward their work and toward their colleagues. As a result, KSTF leading teachers seek to create a satisfying professional life for themselves, which by definition must also include their colleagues. They endeavor to create a professional milieu that is stimulating and intellectually rich, that requires hard thinking and effort, and that involves others interacting in collegial ways, not alone or in isolation or in competition.
- In order to recreate the professional community they experienced at KSTF and emulate it in their home settings, KSTF leading teachers seek opportunities to create a “context within a context,” or a “third space” – a professional space that resides in close proximity to, but outside the norms of the larger school system, where the kind of teaching and learning they hope to promote can flourish. Charley created a small Professional Learning Community of like-minded IB physics teachers; Heather developed a group of teachers interested in Project Based Learning; and Bradford shared his *Patterns* approach and units with the other 9th grade teachers in his district.
- Both KSTF and its leading teachers pursue a fundamental axiom: teacher authority and autonomy are central to educational improvement. The crucial guiding idea is that teachers

are not only responsible for, but also best positioned to improve their own teaching. Fostered by KSTF, and internalized by its leading teachers, the idea of teachers leading reform is fundamental; they are not to be the implementers of reform, but rather the instigators – the driving force, not the reactive force. The three case studies reveal the imperative that it is *teachers* who must lead improvement. The work of KSTF and these individuals reflects the deep commitment to the idea that teachers are the primary agents of change.

**3) The cases reveal that the process of realizing leadership involves a dynamic interplay between the leading teacher, the KSTF community, and the school worlds they seek to influence.**

- In each of the three cases of successful leadership, we see a dynamic interplay among three entities: the individual KSTF leading teacher, the KSTF community supports and values, and the emergent demands (and/or supports) of the school systems in which they work. The teacher leader is at the center, negotiating the forces – the combination of inputs and outputs – on either side.



- KSTF provides the kind of professional supports for teachers that are often lacking in education, but integral to other professions, e.g., medicine, science, technology, etc. They include access to cutting edge thinking and research, relationships with experts in the field, a multitude of resources, opportunities for professional growth and membership in professional networks and communities of practice.
- Commensurate with the kind of professional interchange that is characteristic of other professions, KSTF leading teachers are able not only to “take,” but also “give back” to KSTF in important ways. The three cases highlighted this important back and forth – the exchange of benefits and contributions. Heather’s example of taking on leadership roles informed KSTF about its approach to developing leadership. Bradford’s *Patterns* development has sparked interest and participation in the curriculum from other KSTF staff, Teaching Fellows and Senior Fellows. And Charley’s IB Physics PLC has inspired other Fellows to replicate something similar with new teachers. Even more importantly, all three of the leading teachers featured in the cases serve as important role models for leadership within the KSTF community, showing and inspiring others how to think about and act on leadership.
- The cases demonstrate that to work successfully both as classroom teachers and as leaders in their systems, leading teachers need (and appear to have developed) three important kinds of capacity: 1) content knowledge or expertise; 2) pedagogical knowledge and expertise; and 3) political skills: the knowledge of “political engineering” and how to navigate and negotiate the systems (classroom, school and district) in which they practice their profession.
- KSTF leading teachers not only give with great energy and determination – to their classrooms, other teachers, their schools and districts – but they are also deeply nourished by their work.

They get back acknowledgment in the form of prominence, kudos, and honors. But, even more importantly they get back rich and varied learning experiences, challenges, and creativity – the intangibles that are powerfully motivating to teachers whose goal is to get better. Bradford, Heather and Charlie are the types of individuals who need more than a steady state routine of teaching. KSTF helps them make teaching a profound and rewarding profession.

#### **4) The cases demonstrate that KSTF's approach to growing leading teachers is effective.**

- Growing leading teachership begins with the initial selection of candidates to receive Fellowships. The KSTF selection process works well, as shown in the three case examples. These cases showcase extraordinary individuals who are deeply driven by the desire to get better in their own classrooms and to simultaneously contribute to their colleagues. Although their KSTF experiences helped strengthen these inclinations, they came to the Fellowship with intellect, ambition and a commitment to serve.
- The KSTF leadership development model has evolved to include roughly two tiers of support:
  - » First the Teaching Fellows Program provides an array of offerings or exposures to teachers that improves their own knowledge and practice and introduces them to the possibility of assuming leadership roles.
  - » Second, the Senior Fellows Program provides support and resources for those who wish to maintain their connection with KSTF and to work as leading teachers in a deliberate and effective fashion.
- KSTF introduces Fellows to new ideas in education and connects Fellows with national leaders championing major innovative approaches. KSTF also provides Teaching Fellows and Senior Fellows with the opportunity to specialize or “go deep” in an area of their interest and choice. The Fellows develop their areas of expertise through special projects, mentoring and coaching, additional grants or stipends, and/or some of the KSTF-sponsored “networks within the larger network” (e.g., the Engineering Task Force (ETF), the Project Based Learning (PBL) network, or the group of interested teachers focused on Process Oriented Guided Inquiry Learning (POGIL)). In this way, KSTF provides multiple learning opportunities for Teaching Fellows and Senior Fellows, multiple doors into the house of becoming a professional life-long learner and leader.

#### **Proof of Concept**

Heather, Bradford and Charley are all stellar examples of leading teachers; they have all accomplished much through receiving KSTF support designed in both a generative and responsive fashion. Their stories illustrate 1) the largely untapped and unrecognized power of leading teachers, and 2) the fact that with strong intentions and ongoing support, it is possible to select, develop and support such teachers so that they can be an important impetus to improved education in the United States.

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