

ANNUAL REPORT KNOWLES SCIENCE

KNOWLES SCIENCE TEACHING FOUNDATION

FISCAL YEAR 2015

Since 2002, KSTF has supported nearly 300 Fellows in their efforts to improve education in their own classrooms and beyond. This is the Foundation's most basic definition of teacher leadership.

KSTF's vision of teacher **LEADERSHIP** sees teachers as capable of and responsible for **EDUCATIONAL** improvement at all levels.

KSTF believes that all teachers have tremendous power in three critical areas: their own teaching practice, their schools and the teaching profession. Additionally, KSTF strongly believes that teachers—as practitioners in the field of education—should be the primary agents of educational improvement. This belief is woven throughout all aspects of the Foundation's programming.



ABOUT KSTF

The Knowles Science Teaching Foundation was established to increase the number of high quality high school science and mathematics teachers and ultimately improve math and science education in the United States. The KSTF Teaching Fellows Program, the Foundation's signature program, awards five-year Fellowships to promising early-career, secondary science and mathematics teachers, and supports them in their efforts to improve education in their own classrooms and beyond.

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TABLE OF CONTENTS

Message from the Executive Direc Teaching Fellows Program..... Senior Fellows Program..... Supporting Teachers as Primary **Three-Minute Observation** Northwest Regional Fellows **Thurston High School Criti** Standards-Based Grading a **Project-Based Learning Wo** National Presentations...... 2015 KSTF Teaching Fellows..... KSTF Fellows By-the-Numbers..... **Spotlight on New Board Members** KSTF Board of Trustees..... Statements of Financial Position. Statements of Activities..... Statements of Cash Flows.....

ctor	1
	3
	7
Agents of Educational Improvement.	9-16
Clubs	10
s Special Interest Group	14
ical Friends Group	14
at Lexington High School	15
orkshop at STEM High	15
	16
	17
	24
S	25
	26
	27
	28
	29



"Of course, great teaching is the root of successful teacher leadership and the wellspring of powerful practitioner-generated knowledge, so we continue to focus on supporting **Fellows to continually** improve their teaching."

2015 ANNUAL REPORT

Message from the Executive Director

January 2016

Dear Friends of KSTF.

The fiscal year ending May 31, 2015 (FY15) marked what I see as the end of transition period for KSTF and the beginning of significant, deliberate progress toward our vision of elevating and supporting teachers as the primary agents of educational improvement.

In the pages that follow, you'll read about how our Teaching Fellows Program has sharpened its focus to support early-career teachers as leaders from the beginning of their careers. You'll also learn about how the Senior Fellows Program has evolved to amplify and leverage the investments KSTF has made in our Teaching Fellows. And you'll find data throughout that speaks to the impact of our programs, our commitment to continuous improvement and the steps we are taking to generate and share knowledge for the field.

Because we are so passionate about supporting teachers as leaders, we have taken important, intentional steps this past year to give Fellows more agency over their experiences in the KSTF community. Fellows contribute to our decision making processes as reviewers for presentation proposals at the KSTF Summer Meeting and for KSTF Leadership Grant proposals. We have involved Fellows in the design, testing and implementation of our proprietary online community platform which was launched early in FY15. And, for the first time in KSTF's history, we have appointed a teacher and Fellow to our Board of Trustees.

We are equally passionate about supporting teachers as generators of professional knowledge for the field. In FY15, we launched KSTF's journal-Kaleidoscope: Educator Voices and Perspectives. With Fellows authoring articles, serving as editorial board members and reviewing submissions for the journal, we published the inaugural issue in December 2014 and a second issue in April 2015. Additionally we have supported Fellows to publish articles in practitioner journals such as The Science Teacher and The Mathematics Teacher, and op-eds in major newspapers. We support them to write proposals and present at national conferences for professional organizations including the National Science Teachers Association, the National Council of Teachers of Mathematics, and the National Association of Biology Teachers, and to conceptualize, plan and lead professional

development workshops for their colleagues. In these and other ways, Fellows demonstrate that they have both the capacity and willingness to share their considerable knowledge of and for teaching, to strengthen the profession and

This progress is exciting and, I believe, improve education beyond their own classrooms. necessary, but it comes at a cost. Through prudent management of our investments and Of course, great teaching is the root of successful the continued generosity of our Founders, Harry teacher leadership and the wellspring of and Janet Knowles, we have been able to operate powerful practitioner-generated knowledge, so off the endowment since KSTF was founded in we continue to focus on supporting Fellows to 1999. However, the time has clearly come for continually improve their teaching. Fellows hold us to explore other options for maintaining our themselves to high standards as professional operating budget while increasing our impact. teachers, as evidenced by the three reports from I'm honored and humbled to report that 100% commissioned studies that we published in FY15, of the KSTF staff and trustees made a financial contribution to KSTF in FY15 in support of these which are available at kstf.org/impact. In May 2015, for the fifth year in a row, a KSTF Fellow efforts. The realities of our current financial (Camden Hanzlick-Burton, of the 2012 Cohort) situation, while not dire, represents a new was named Outstanding New Biology Teacher challenge for KSTF. I remain confident that it is by the National Association of Biology Teachers. one we can meet. As one friend of KSTF put it, "That is definitely not random!" Five Senior Fellows-London As always, I am looking forward to leading this Jenks, Kirstin Milks, Meg Gildea, Matt Randall, remarkable organization through this and other and Geetha Lakshminarayanan—achieved challenges and opportunities that lie ahead of us. National Board Certification this year and two Fellows (Camden Hanzlick-Burton and 2014 Warmest regards, Fellow Jessica Peralta) received a teacher of the year award. Additionally, Senior Fellow Bradford Hill received the Paul W. Zitzewitz Excellence in Pre-College Teaching Award from the American Association of Physics Teachers. While data is Nicole M. Gillespie, PhD critical and the awards are certainly impressive, **Executive Director** the countless stories we hear from our Fellows

"While data is critical and the awards are certainly impressive, the countless stories we hear from our Fellows about how they learn from their mistakes and always strive to get better are what really convince us we are on the right track."

about how they learn from their mistakes and always strive to get better are what really convince us we are on the right track.

- Nicole Gillespie **Executive Director**



Teaching Fellows Program

KSTF Teaching Fellowships are awarded based on three criteria: **the potential to develop the content knowledge needed for teaching, the potential to develop exemplary teaching practices, and the potential to develop the qualities of a teacher leader.**

These same qualities are emphasized throughout the Fellowship. The program is divided into three phases, with each one building on the next. All Teaching Fellows who complete the full five years of the Fellowship become Senior Fellows for life.

Phase 1

YEARS 1 & 2

During the first two years of the Fellowship, Phase 1 Fellows focus on developing the content knowledge needed for high quality mathematics and science teaching. Equally as important, they are supported in becoming an inquiry community that shares their teaching practice with others, values generating and analyzing data collaboratively, and recognizes the power of engaging with and as critical friends. This emphasis on inquiry with others serves as the foundation for teachers leading from the classroom. Over the last year, Phase 1 program staff has refined the use of Planning, Teaching, and Reflecting (PTR) cycles that allow Fellows to engage in inquiry with their cohort colleagues. Even while Fellows are in the first two years of teaching and the Fellowship, the KSTF community actively supports them in developing the skills and dispositions needed to be agents of educational improvement.

YEAR 1 HIGHLIGHTS

Year 1 Fellows practiced sharing their teaching practice and considering others' perspectives by working with PTR cycle partners who teach similar courses. Fellows, supported by staff, explored mathematical and scientific disciplinary practices during meetings and then attempted changes in their practices supported by their PTR partners. They met online, shared classroom data about their attempts at improvement, and used their partners to understand their own contexts differently. This kind of support (deep engagement with new ideas at meetings and close collaboration with cohort members between meetings) helps Fellows feel equipped to change their practice. While less than 25% of Year 1 Fellows reported that they planned instruction that engaged their students in using disciplinary practices prior to their fall 2014 KSTF meeting, 96% report they are likely to do so during the 2015-2016 academic year.

That change in practice, however, is only part of the benefit. As Fellows share their teaching practice with members of their cohort, they are developing their abilities to give and receive feedback, learning about the roles and benefits of tools that support structured conversations, and becoming familiar with the challenges of opening one's classroom to other educators. We do this because teachers rarely get a chance to collaborate, but it's a powerful learning when they do. Near the end of their first year,

77% of Year 1 Fellows reported they had rarely or never collaborated with school colleagues about disciplinary practices, though 96% thought it was important that they do so. As one Fellow reported: "Collaborating with other teachers is what I see as one of the top areas where I could improve, and also one of the hardest areas to improve in."

YEAR 2 HIGHLIGHTS

Year 2 Fellows turned the attention of their inquiry to classroom talk-trying to deeply understand what kinds of talk in the classroom they (as teachers) use and how the tasks they provide students encourage or discourage student talk. They turned to two resources—*Five Practices for* **Orchestrating Productive Mathematics Discussions** (Smith & Stein, 2011) and Five Practices for Orchestrating Task-Based Discussions in Science (Cartier, Smith, Stein, & Ross, 2013)-to begin exploring research and theoretical frameworks on classroom talk. Fellows applied their understanding of the 5 Practices through continued use of PTR cycles with increased attention to their role as critical friends and the use of protocols. Protocols are guidelines for structured conversations that allow for purposeful and constructively difficult conversations-a key component of helping teachers be collaborative leaders in schools. By the end of the year, 100% of Year 2 Fellows reported that they were likely or very likely to use a protocol with a group of teachers looking at student data with the goal of improving instruction and 100% also reported that the reason they were likely to do so was a result of KSTF's support in using protocols. As one Fellow reported: "I found working on one common inquiry question incredibly valuable. It helped me clarify what inquiry is, how to engage in inquiry, and the importance of critical friends in a successful inquiry process....This felt very collaborative and supportive while also giving me autonomy to explore this guestion in my own unique way."

2015 ANNUAL REPORT

Phase 2

YEARS 3 & 4

Phase 2 Fellows use increasingly sophisticated ways of inquiring into their classroom cultures and instruction by applying analytical lenses to data that help them see (and then increase) the learning opportunities being offered to all of their students. As this phase progresses, Fellows are supported in bringing their school colleagues into this work and being open to their perspectives, which often serve as first steps toward building more collaborative cultures in Fellows' schools. This includes developing the skills needed to engage with colleagues and learning the key constructs of productive collegial relationships.

YEAR 3 HIGHLIGHTS

Year 3 Fellows developed their skills at designing and implementing classroom norms and activities that would provide increased opportunities for learning to all students. These included sophisticated teaching skills like: creating classroom norms that increase mutual accountability; understanding and elevating students' status in the classroom; designing tasks that promote deep, meaningful conversation among students; and gaining and using information about students' strengths to inform instruction.Staff and consultants modeled these norms and strategies for Fellows. Fellows then worked with their cohort colleagues to develop plans to implement the norms and strategies in their classrooms. Throughout the year, Fellows met with their cohort colleagues to look at data from their implementation, analyzed that data, and made decisions about how to proceed. Prior to the start of the year, Fellows reported low confidence and low frequency of use of strategies that increase opportunities for learning for all students in their classrooms. However, by the end of the year, over 80% of Year **3** Fellows reported using these strategies in their classroom regularly and attributed the reason for that use to KSTF's influence. As Year 3 ended, Fellows prepared to extend their collaborative inquiry to their school colleagues and considered the types of challenges they might encounter. After considering these challenges, Year 3 Fellows outlined the specific steps they would take to invite school colleagues to participate in collaborative work.

APPLY **ANALYSIS TO DATA -ENGAGE COLLEAGUES IN THE WORK** LEARNING OPPORTUNITIES **FOR ALL STUDENTS**

YEAR 4 HIGHLIGHTS

Year 4 Fellows were supported in extending their collaboration beyond KSTF colleagues to collaboration with school colleagues in two significant ways. First, Year 4 Fellows developed a plan for bringing a school-based colleague into their inquiry into their teaching practice—most Fellows engaged by seeking out a colleague they thought might be able to offer insight into the problem they were trying to confront. Through this exercise, Fellows connected with their colleagues in new ways and opened their practice to constructive, professional critique, something that many reported was not common in their schools. Second, they collected data about their school communities through the use of observation protocols that are intended to help them identify new insights about their students, their colleagues, and/or school cultures regarding issues of learning opportunities for all students. Ninety percent of Year 4 Fellows found that using these protocols supported new insights, and over 80% intend to continue the practice into next year.

Phase 3

YEAR 5

During Phase 3, the focus of inquiry shifts from a Fellow's classroom to the professional community in which the Fellow works. Fellows grapple with their own professional goals and commitments and what it means for them to lead in their context. They learn to understand their school and local community as a system, understand multiple leverage points for change, and experiment with ways to lead those communities toward better outcomes.

YEAR 5 HIGHLIGHTS

Year 5 Fellows engaged in a year-long inquiry into their professional communities. Fellows identified the community that they wanted to study. To engage in this inquiry, Fellows regularly shared and analyzed data about their professional communities with their inquiry groups, which typically consisted of three Fellows within their cohort. The collected data took a variety of forms, including observations/transcripts of meetings with colleagues, meeting agendas, interviews with colleagues and personal reflections. KSTF program staff supported the Fellows in this inquiry and provided a framework for exploring their community, analyzing data, and identifying leverage points to strengthen their communities. As part of their inquiry, Fellows also identified action steps that they could take to strengthen their professional communities. At the culmination of the year, 100% of Year 4 Fellows found those stories to be useful with respect to helping them think in new ways about teaching, leadership in general and their individual practice.



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6 2015 ANNUAL REPORT

Senior Fellows Program

The Senior Fellows Program is primarily focused on building and leveraging the leadership capacity of KSTF Senior Fellows and the KSTF network as a whole. The Program provides support that leverages and amplifies the investment the Foundation makes in Teaching Fellows. Their connectedness within the network allows them to build on,

refine, and spread the professional norms, practices and knowledge gained through the Teaching Fellows Program to strengthen the teaching profession and improve math and science education in the U.S., from the ground up.

Read on to learn about two Senior Fellow-led projects, —the KSTF Coaching Institute and KSTF's new journal, *Kaleidoscope: Educator Voices and Perspectives.* Additionally, highlights from leadership grants awarded to Senior Fellows to fund projects in their schools can be found interspersed between pages 9 and 16.



KSTF Coaching Institute

- The KSTF Coaching Institute successfully ran for its second year in FY15. The Coaching Institute has three goals:
- to provide Senior Fellows with the skills and resources to serve as peer coaches to other teachers
- to provide them with a safe space to practice those skills at the KSTF Summer Meeting
- to improve the quality of Fellow presentations at the Summer Meeting by providing all presenters with a peer coach

The second Coaching Institute was led by Senior Fellow Charley Sabatier with support from Brooke Bourdelat-Parks of BSCS in Colorado Springs. The 11 Senior Fellows who served as coaches met in February and May 2015 to learn about peer, instructional and Cognitive CoachingSM.

They prepared for their roles as coaches to KSTF Summer Meeting presenters by practicing these techniques and tools on each other.

KSTF's Online Journal

In December 2014, KSTF published the first issue of its new journal-Kaleidoscope: Educator Voices and Perspectives. Kaleidoscope provides substantive and reflective writing informed by the classroom practices and collaborative inquiry of KSTF Fellows, and is designed to inspire educators to reflect on their own practices, engage in dialogue with other teaching professionals and play a role in transforming teaching and schooling practices. A second issue of the journal was published in April 2015. Between the two issues, 10 articles authored by 15 KSTF Teaching and Senior Fellows were published. The articles explored a range of topics, including the importance of schooling, peer relationships, team communication and critical self reflection. The editorial board of the journal is made up of five Senior Fellows, who are responsible for seeking submissions, reviewing submissions and providing feedback, and making all final editorial decisions.

COGNITIVE COACHING IS A REGISTERED TRADEMARK OF THE CENTER FOR COGNITIVE COACHING.

8



Supporting Teachers as Primary Agents of Educational Improvement

All KSTF programs are geared toward supporting teachers as primary agents of educational improvement. The examples on the next eight pages are illustrations of some of the many ways KSTF Fellows are working to improve education in their classrooms and beyond.

Three-Minute Observation Clubs

During a session on teacher leadership at the 2009 KSTF summer meeting, KSTF Senior Fellow Bradford Hill introduced the idea of three-minute observation clubs to the Fellows in attendance. Specifically, he shared his experience with starting a club for science teachers at Southridge High School (Beaverton, OR). Since then, the idea of three-minute clubs has spread throughout the KSTF community and 19 KSTF Fellows have implemented some form of the club in their own schools to build productive collegial relationships with their peers.

Three-minute observation generally involve teachers making short, frequent observations of one another's classrooms and meeting to share their findings. These seemingly small efforts have helped to transform Fellows' school communities by breaking down the walls of isolation that teachers often feel.

"KSTF gave me the confidence and the desire to step outside of my classroom and engage with other teachers about teaching. I do not think I would have had the support to do this without KSTF."

- Kristin Frew, Senior Fellow





10 2015 ANNUAL REPORT

Three-Minute Observation Clubs

"What KSTF does is gives you knowledge beyond your years. You know what people are trying. You have a network to reach out to. For a new teacher that gave me confidence to say I know what I'm talking about. I have things to learn from people with more experience but I also have things to share."

- Lauren Wiltsie, Senior Fellow



Megan Fretz Horizon High School, Thornton, CO

During the 2013–2014 academic year, 2011 KSTF Teaching Fellow Megan Fretz received a KSTF leadership grant to start the Hawk Watch Club, a three-minute observation club with a clever name that was inspired by the school mascot. Through the club, she aimed to foster more collegial relationships and to provide a forum for teachers to learn from one another while engaging in meaningful professional development. In its first year, 16 teachers from various departments-including mathematics, social studies, foreign language, English, and science-participated in the Hawk Watch Club. On a biweekly basis, the participants conducted one observation and met to debrief. At the end of the year, 89% of participants **reported having a positive experience**. Additionally, 68% of participants reported having strengthened relationships with others in the building. As an added incentive, the district approved relicensure credit for Hawk Watch Club members. Moving into its second year, the format was changed for the 25 members of the club. While the meetings continued on a biweekly basis, the first meeting each month was set aside for discussion of an article or video clip. The second meeting was used to discuss observations, which were conducted on a monthly basis. With the addition of written reflection, club members were able to earn salary advancement credit. Later in the year, a subset of the club engaged in observation for a half day and debriefed for a full class period. This new format was designed to meet the request of a member who desired more time for observations. The school even covered the cost of substitute teachers for the half-day observations. For its third year, the club is considering implementing longer observation periods for the full membership and/or a year-long professional development theme.

Lyudmila Shemyakina Summit Public School: Rainier, San Jose, CA

During her first year at Summit Public School: Rainier, 2010 KSTF Teaching Fellow Lyudmila Shemyakina sought to establish deeper connections with her fellow teachers. After surveying her colleagues about their interest in peer observation, Lyudmila received a KSTF leadership grant to form a three-minute observation club. From December 2014 to May 2015, the seven club members met before school on a biweekly basis to discuss their observations. The club members—which included English, history, Spanish, special education and science teachers, and the school principal-appreciated having protocols and meeting structures that helped to drive analysis and discussion. During a debriefing meeting, several participants reported that the club created a safe space to have intellectual discussions about teaching and learning, and was the most meaningful part of their year.



Jessica Broussard Wright Middle School, Los Angeles, CA

In order to build the relationships necessary to open the doors for true collaboration amongst the teaching staff at her school, KSTF Senior Fellow Jessica Broussard received a leadership grant from KSTF to fund a threeminute observation club. From February through May 2015, approximately 15 teachers observed one another and met to share their observations. The grant funds were used to provide meals for the teachers during their monthly meetings. As a result of this collaboration, new relationships were formed and a positive atmosphere was fostered.



Sophie State Westlake High School, Westlake Village, CA

Sophie State, a 2012 Teaching Fellow, wanted to create a small learning community in her school that would foster collaborative relationships among teachers. She received a leadership grant to start a three-minute club in her school that she hoped would help her and colleagues become more critically reflective through a practice of guided observation and peer feedback. From October 2014 to May 2015, Sophie led approximately eight teachers in conducting observations and meeting on a monthly basis to debrief. A KSTF leadership grant was used to cover the cost of refreshments and supplies for the meetings. Shared via a final survey for participants, all club members expressed a desire to continue their participation. They also reported that participation in the club provided an increased awareness of focus topics following discussions and an opportunity to truly reflect on their teaching. As the club moves into its second year, they plan to continue observations and to meet an additional time each month to discuss student work and texts related to teaching practice.







Mary Chin Arete Preparatory Academy, Gilbert, AZ

In her first year of teaching at Arete Preparatory Academy, 2012 KSTF Teaching Fellow Mary Chin found observing other teachers and being observed to be highly beneficial. When she became the mathematics department lead, Mary wanted to make peer observation more accessible, which led her to start the Teacher Growth Group (TGG) with support from a **KSTF leadership grant**. Prior to starting the TGG, she pitched the idea to the science department lead at her school, who expressed interest in the group. The Teacher Growth Group began meeting in the fall of 2013, with 10 of the 11 teachers in the two departments voluntarily agreeing to participate. During the first quarter, the group met on a weekly basis to discuss the observed "teacher of the week" on a rotating basis (each department met separately). Later in the year, the mathematics teachers in the group used their meeting time to discuss the National Council of Teachers of Mathematics 5 Practices for Orchestrating Productive Mathematics Discussions (Smith & Stein, 2011), while the science teachers in the group read selected articles. In the fall of 2014, the group resumed peer observations. The mathematics teachers in the group continued to meet to debrief, while the science teachers in the group shared their observations via email. Later in the year, Mary opened participation in the TGG to all faculty, which resulted in the addition of new teachers from five new departments. One TGG participant shared the following feedback, "I'm not sure if I learned more from getting feedback on my teaching, or from watching my peers teach. Either way, the safe environment and non-judgmental discussions made it a positive space for honing my craft. This is by far my favorite professional development."

Northwest Regional Fellows Special Interest Group

KSTF provides support for groups of three or more Fellows to work together in person or online as a special interest group (SIG). The Northwest Regional Fellows (NWRF) SIG was formed to address local and regional issues in teaching, to improve teaching through mutual observation and reflection, and to foster leadership growth for Fellows in Washington, Oregon and Idaho. During the 2014–2015 academic year, KSTF funded two full-day regional meetings, one at Todd Beamer High School in Federal Way, WA, in the fall and one at Armadillo Technical Institute in Ashland, OR, in the spring. The agenda included pre-observation, observation and postobservation meetings, and meals. The fall meeting was attended by six Fellows and two non-KSTF affiliated teachers and the spring meeting attended by four Fellows and one non-KSTF affiliated teacher. Meeting participants reported the strengthening of professional relationships, as well as the implementation of strategies observed at the meetings.

Thurston High School Critical Friends Group

In the summer of 2012, 2007 KSTF Teaching Fellow Victor **Chen used a professional development grant from KSTF** to attend Critical Friends Group® (CFG) New Coaches **Training.** In this training, he learned to provide teachers with the tools needed to create a collaborative culture and improve student achievement. By the end of the training, he was equipped to coach and lead peers in developing Critical Friends Groups. During the 2012–2013 academic year, he trained seven colleagues at Thurston High School (Redford, MI) to become CFG facilitators. Four interdisciplinary groups, composed of approximately 40 of the school's 48 teachers, began meeting on a monthly basis during the 2013–2014 academic year. The meetings typically involve a group member presenting a lesson, student work, an assessment, or a dilemma about teaching and learning, and a facilitator running a pre-selected protocol that allows the rest of the group to help the presenter think more deeply about his or her teaching. During the 2014-2015 academic year, the groups continued to meet and began to choose their own meeting topics and agendas. Most of the groups have incorporated peer observation and video protocols



into their meeting agendas and are continuously looking for new ideas to further their work. **The existence of Critical Friends Groups at Thurston have improved the sense of community within individual groups and positively impacted how teachers talk about teaching and learning.**

Standards-Based Grading at Lexington High School

Through her work in the Fellowship, 2010 KSTF Teaching Fellow Susan McClellon was introduced to Standards-Based Grading (SBG), a system of reporting student proficiency in a number of specific learning goals (or standards). In the spring of 2014, she approached her department chair at Lexington High School (Lexington, MA) about her desire to implement SBG in her classroom. He agreed, and supported her throughout the 2014–2015 academic year. By implementing SBG, Susan felt that she was able to teach her students more content, at a deeper level, than she had been able to in the **past.** She shared her experience with SBG with her peers via a professional development session, which was attended by the science department chair and approximately 15 teachers from her school and the feeder middle school in her district. Although she will be transitioning to a new school next year, several teachers at Lexington plan to implement SBG in their classrooms this year based on what they learned from Susan.

Project-Based Learning Workshop at STEM High

2009 KSTF Teaching Fellow Tracy Schloemer and 2012 KSTF Teaching Fellow Ian Caldwell began teaching at STEM High and Academy in Highlands Ranch, CO, during the 2013–2014 academic year. To learn more about the needs of the teachers in the mathematics and science departments, Tracy and Ian surveyed their colleagues. Based on the input received, they developed a proposal to host two three-day summer workshops at the school on problem-based learning (PBL). Their proposal was funded by a KSTF leadership grant. Led by University of Colorado Boulder master teachers Julie Andrew and Kim Bunning, the workshops were held in June 2014. They were attended by four math teachers and three science



teachers, including Tracy and Ian. **Throughout the course of the workshops, the teachers experienced mini-PBL problems, refined their understanding of PBL and explored problem design.** The participants also discussed next steps, including curriculum development, continued collaboration and sharing their learnings with others in their respective departments.

National Presentations

Supported by KSTF leadership grants, KSTF Fellows delivered presentations at a variety of national conferences related to science and mathematics education. **By sharing their learnings with other teachers, Fellows are working to improve education beyond their own classrooms.**

Haines, H. (2015, March). Implementing Engineering in Chemistry. Presentation at the 2015 National Conference of the National Science Teachers Association, Chicago, Ill.
Hill, B. & Buskirk, H. (2015, March). Physics for the Next Generation. Presentation at the 2015 National Conference of the National Science Teachers Association, Chicago, Ill.
Hill, B., Haines, H. & Wells, L. (2015, March). Data-Informed Engineering Design Decisions. Presentation at the 2015 National Conference of the National Science Teachers Association, Chicago, Ill.

Murphy, S., Hill, B., Hartman, M., Hotchkiss, H. & Pasqualin, P. (2014, July). *Patterns Approach to Physics*. Presentation at the 2014 American Association for Physics Teachers Summer Meeting, Minneapolis, Minn.
Pasqualin, J. & Shirey, K. (2015, March). *Engineering Project "Slices.*" Presentation at the 2015 National Conference of the National Science Teachers Association, Chicago, Ill.

 Shirey, K., Pasqualin, J. & Wells, L. (2015, March). *Implementing Engineering in Physics*. Presentation at the 2015 National Conference of the National Science Teachers Association, Chicago, Ill.



2015 KSTF Teaching Fellows

This year, 34 promising high school mathematics and science teachers who are just beginning their careers were awarded KSTF Teaching Fellowships. Bringing a myriad of personal and professional experiences to the classroom, the 2015 cohort includes five published authors, a NASA K–12 STEM Educator Program participant, the co-founder and organizing committee chair of ComSciCon, a wilderness trip leader, a Formula SAE competition director, and an Engineers Without Borders volunteer. Their Fellowships began on June 1, 2015 and will continue through the summer of 2020.



Christine Askham

Lakewood High School Lakewood, Colorado

Completed natural resource projects and emergency response work as a field crew member with the Minnesota Conservation Corps



Mary Clare Bernal Cristo Rey San Jose Jesuit High School San Jose, California

Taught students in grades four through eight about the human body as a Tech Summer Camps "Junior M.D." Lead Instructor



Michael Delfino STEAM Academy Lexington, Kentucky

Worked as a firmware engineer at Lexmark International, Inc. before transitioning to education





Emily Berman

Blackstone Academy Charter School Pawtucket, Rhode Island

Taught English, science, math, and social studies to fourth and fifth graders while studying abroad in Ecuador



Kelsey Brax Erie High School Erie, Colorado

Conducted research on teaching mathematical modeling, which led to the development of case studies that focus on how students learn through mathematical modeling



Samantha Dougherty North Hardin High School Radcliff, Kentucky

Discovered her passion for teaching while planning and organizing events for middle and high school students and encouraging personal development through one-onone meetings, two of the key functions of her internship with Severns Valley Baptist Church



Kylie Ford Summit Olympus Tacoma, Washington

Learned the importance of relating to students on a personal level while working as an English tutor during a study abroad experience in Rome



Riley Germanis Mount Tahoma High School

Tacoma, Washington

Elected to serve as an Alumni Board Member for the Washington State branch of the College Success Foundation, an organization that is committed to improving college access for underrepresented students



Halimeda **Glickman-Hoch**

Newton South High School Newton Centre, Massachusetts

Spent one summer teaching math and computer skills in Onankali, Namibia (somewhat north of Ondongwa) as a World Teach Volunteer



Sarah Gray Muskego High School Muskego, Wisconsin

Worked as a community volunteer tutor for Schools of Hope-a unique collaboration of the Madison Metropolitan School District, United Way of Dane County, and local area non-profit agencies designed to increase the academic performance of students of color and those from lowincome families



Faven Habte Bronzeville Scholastic Institute Chicago, Illinois

Provided more than 1,700 hours of tutoring and mentoring to middle school students as an AmeriCorps City Year Chicago Corps Member



Destinee Johnson Westside High School

Anderson, South Carolina

Designed and tested an observation rubric to evaluate inquiry-based chemistry instruction, which she presented at the 2014 National Meeting of the American Chemical Society, as a National Science Foundation-Research Experience for Undergraduates Program (NSF-REU) participant at Miami University in Oxford, Ohio



Carrie Kerchner

Wicomico High School Salisbury, Maryland

Worked in sales and marketing at Enterprise Rent-A-Car and Nationwide Insurance before transitioning to the field of education

John Maddux

Collegiate School of Medicine and Bioscience Saint Louis, Missouri

Reaffirmed his love of finding and collecting insects while earning a Master of Science in entomology from the University of Illinois at Urbana-Champaign

Shannon Morey East Boston High School

East Boston, Massachusetts

Co-founded ComSciCon, a leading organization that hosts national workshops on science communication skills for graduate students





Allison Kipping Wilde Lake High School Columbia, Maryland

Designed experiments that were sent to the International Space Station while participating in the National Aeronautics and Space Administration K-12 STEM Educator Consortium Grant Program



Zoe Masters

Community Charter School of Cambridge Cambridge, Massachusetts

Completed the Match Teacher Residency Program, a twoyear program that prepares beginning teachers for success in high performing urban schools



Meghan Mosher Monarch High School Louisville, Colorado

Led small groups of female teens on two 45-day backpacking trips to the Brooks Range of Alaska as a wilderness trip leader



Brian Moshofsky

Orange High School Orange, New Jersey

Developed new syntheses for tungsten oxide nanowires and demonstrated their application in electrochromic smart windows while completing doctoral studies in nanoscale science and engineering at Ben-Gurion University of the Negev



Alma Nuñez Vaughn International Studies Academy San Fernando, California

Used a variety of instructional strategies to support the learning of middle school students as a City Year Los Angeles Corps Member

Erin Oakley Janesville-Waldorf-Pemberton School Janesville, Minnesota

Assisted elementary school students in their math and English classrooms while studying abroad in Germany



Lucas Osterbur **Glenview South High** School Glenbrook, Illinois

Developed demos and labs that educated community members about the benefits and science behind nanotechnology as part of the Integrative Graduate Education and Research Traineeship Outreach Leadership Team at the University of Illinois

Adrienne Pinsoneault

Luis Valdez Leadership Academy San Jose, California

Helped a local community center add science enrichment to their after school program and a science class to their academic summer camp while working with the Jesuit Volunteer Corps



Adam Ramirez

Academy of Arts & Sciences San Diego, California

Worked as a biology and cell biology teaching assistant and as a physical science classroom assistant at a local junior high school before enrolling in a teacher prep program

Brooke Ravanelli

Denver School of Science and Technology Denver, Colorado

Studied the signals involved in wound healing and tissue regeneration with the goal of developing compounds and treatment protocols to enhance wound repair and promote regrowth of damaged tissue while working as a Research Technician in the Regenerative Medicine Department at the Naval Medical Research Center

Natasha Singh

Back of the Yards College **Preparatory High School** Chicago, Illinois

Started the first English as a Second Language class and created a curriculum for students who are pursuing U.S. citizenship in Punjabi and English at the Sikh Temple of Chicago

Hallie Trauger

Back of the Yards College **Preparatory High School** Chicago, Illinois

Lived and worked in Mt. Rainier National Park as a member of an invasive species control crew

2015 ANNUAL REPORT 21





Cassandra Seiboldt

Lincoln Northeast High School Lincoln, Nebraska

Uncovered her passion for teaching while tutoring University of Nebraska athletes during her undergraduate studies

Ginger (Xingjia) Tang

St. Catharine Academy Bronx, New York

Worked as an academic peer advisor, a proficiency algebra and mathematics lecturer, a teaching assistant and a math tutor while studying at Stony **Brook University**



Verdiana Wagner Dulles School of

Excellence Chicago, Illinois

Became interested in education while working as a teaching assistant for High Jump, an enrichment program for high-achieving middle school students in the Chicago Public Schools District



Kristin Weakly

Abraham Lincoln High School San Francisco, California

Spent one year in Quito, Ecuador teaching adult education classes, as well as reading, writing and math to students who missed years of schooling and needed help catching up



Jerick Wilson T.C. Williams High

School Alexandria, Virginia

Volunteered with Engineers Without Borders to help construct a cleaner building cook stove for El Salvadorians and traveled to the canton of Santa Clara to refine the design and inspect their villageinstalled, gravity-powered water infrastructure

Helen Yan West High School

Madison, Wisconsin

Worked on the development of new probes for stoppedflow nuclear magnetic resonance spectroscopy (NMR) as a Research Assistant at the University of Wisconsin, Madison



Dawn Yetter William Smith High School Aurora, Colorado

Taught English to elementary school students in South Korea for one year

KSTF FELLOWS BY-THE-NUMBERS:

215 Fellows taught science and mathematics to over

22,000 students in







- 192 schools in 41 states
- during the 2014-2015 school year.

SCHOOL TYPE:

- PUBLIC
 - **PRIVATE**
 - **CHARTER**
 - **OTHER**

SCHOOL LOCALE:

- CITIES
- **SUBURBS**
- **OTHER**
- RURAL
- **TOWN**



Spotlight on New Board Members



Heather Buskirk

In May 2015, Heather Buskirk became the first KSTF Fellow to be appointed to the Foundation's Board of Trustees. Currently in her tenth year in the classroom, Heather teaches physics at Johnstown (NY) High School and serves as an instructional coach at Hamilton Fulton Montgomery Pathways in Technology School (HFM PTech), a new career-focused school in her area. Buskirk successfully completed the five-year KSTF Teaching Fellows Program in 2009 and is still actively involved with the Foundation. She is in the slightly more than 3% of teachers in the U.S. who have achieved National

Board Certification, an advanced teaching credential governed by the National Board of Professional Teaching Standards. In 2010, Heather earned this distinction then went on to start a support group for KSTF Fellows seeking the same. In 2013, she co-facilitated a week-long workshop for KSTF Fellows on the Patterns Approach to teaching physics with KSTF Senior Fellow and Patterns Approach developer Bradford Hill. As a member of the KSTF Engineering Task Force, she and nearly 20 other KSTF Senior Fellows are exploring how to integrate engineering into mathematics and science courses, as spelled out by the requirements found in the Next Generation Science Standards. Buskirk holds a Bachelor of Arts in astronomy-physics and a Master of Arts in secondary science teaching from the University of Virginia.

2015 ANNUAL REPORT 25



Lucy Balian Rorke-Adams In April 2015, Dr. Lucy Balian Rorke-Adams joined the KSTF Board of Trustees. Rorke-Adams began her career in clinical psychology. Following graduation from the University of Minnesota Medical School, and the completion of a general rotating internship and a residency in Anatomic and Neuropathology at

Philadelphia General Hospital, she chose to focus on pediatric neuropathology-a long-neglected field. Her pioneering studies of the normal/abnormal development of the infant brain, childhood brain tumors, the effects of inadequate oxygenation during the perinatal period and various nervous system disorders unique to children resulted in the publication of 294 peer-reviewed papers, multiple chapters in textbooks and two books. She has served on the editorial boards of leading journals, including the Journal of Neuropathology and Experimental Neurology, Brain Pathology and Pediatric Neuroscience. Throughout her legendary career, Dr. Rorke-Adams has received many honors, including being elected President of the American Association of Neuropathology and receiving the Bronze Plaque from that organization for her contributions to the advancement of the field of neuropathology. She has been awarded honorary membership in several international neuropathology societies and in the American Society of Neuroradiology. Additionally, Dr. Rorke-Adams received the Provost's Award for Excellence in Teaching from the University of Pennsylvania in 2003. In 2010, The Children's Hospital of Philadelphia established the Lucy Balian Rorke-Adams Chair in Pediatric Neuropathology. She is currently Secretary of the College of Physicians of Philadelphia, the oldest organization of physicians in America.

KSTF Board of Trustees

- Heather Buskirk Physics Teacher, Johnstown High School; Instructional Coach, HFM PTech; KSTF Senior Fellow
- Nicole Gillespie Executive Director, KSTF
- C. Harry Knowles Founder and Chairman, KSTF Board of Trustees
- Janet H. Knowles Founder and Secretary, KSTF Board of Trustees
- Paul Kuerbis Retired Professor of Education. Colorado College
- Scott McVay Founding Executive Director, Geraldine R. Dodge Foundation and the Robert Sterling Clark Foundation
- Lucy Balian Rorke-Adams **Retired Senior Pathologist**, Children's Hospital of Philadelphia; **Retired Clinical Professor of** Pathology and Laboratory Medicine at the Perelman School of Medicine at the University of Pennsylvania
- William Rulon-Miller President, KSTF; Treasurer, KSTF Board of Trustees
- Lawrence Tint President, Cantor Comparative Advantage; Senior Managing Director, Cantor Fitzgerald
- Edward D. Viner Senior Vice President for Institutional Advancement and Senior Advisor to the Dean. **Cooper Medical School of Rowan** University
- Suzanne M. Wilson Neag Endowed Professor of Teacher Education, University of Connecticut

Statements of Financial Position

JANET H. & C. HARRY KNOWLES FOUNDATION, INC. D/B/A KNOWLES SCIENCE TEACHING FOUNDATION, INC.

Statements of Activities & Changes in Net Assets

	Year E	nded May 31 2015	Year E	nded May 31 2014
ASSETS				
Cash and cash equivalents	\$	746,336	\$	1,524,689
Accrued interest and dividends		6,012		10,310
Other receivable		30,792		34,828
Prepaid expenses		281,217		48,293
Unconditional promises to give, net		7,093,028		7,181,706
Investments		63,803,963		62,823,282
Property and equipment, net of accumulated depreciation of \$1,338,366 in 2015 and \$1,028,338 in 2014		2,795,793		2,171,985
Other assets		2,871		12,430
	\$	74,760,012	\$	73,807,523
LIABILITIES				
Accounts payable and accrued expenses	\$	490,904	\$	291,783
Line-of-credit		3,500,000		2,050,000
Deferred federal excise tax liability		175,975		136,357
Mortgage note payable		641,586		_
Total liabilities		4,808,465		2,478,140
NET ASSETS				
Unrestricted		62,858,518		64, 147,677
Temporarily restricted		7,093,029		7,181,706
Total net assets		69,951,547		71,329,383
	\$	74,760,012	\$	73,807,523

Miscellaneous income Net assets released from restrictions Expenses: Program services: Teaching fellows programs Research programs Senior fellows programs Supporting services: General and administrative Transfer of net assets from acquisition of the Knowles **Science and Mathematics Institute** Change in unrestricted net assets Change in temporarily restricted net assets: Net assets released from restrictions Change in net assets Net assets at beginning of year Net assets at end of year

Change in unrestricted net assets:

Investment income, net

Support and revenue:

Contributions

Year E	nded May 31 2015	Year Ended May 31 2014		
\$	423,951	\$	2,280,141	
	4,533,732		5,987,208	
	3,650		7,510	
	88,677		1,929,317	
	5,050,010		10,204,176	
	4,449,959		4,597,145	
	654,562		843,574	
	521,316		440,299	
	5,625,837		5,881,018	
	814,795		973,488	
	6,440,632		6,854,506	
	101,463		-	
	(1,289,159)		3, 349,670	
	(88,677)		(1,929,317)	
	(1,377,836)		1,420,353	
	71,329,383		69,909,030	
\$	69,951,547	\$	71,329,383	

28 2015 ANNUAL REPORT

Statements of Cash Flows

	Year E	Year Ended May 31 2015		Year Ended May 31 2014	
Cash flows from operating activities:					
Change in net assets	\$	(1,377 ,836)	\$	1,420,353	
Adjustments to reconcile change in net assets to net cash used in operating activities:					
Depreciation		188,213		166,417	
Deferred federal excise tax		39,618		40,884	
Donated investments		-		(3,759,458)	
Proceeds from sale of donated investments		-		3,759,458	
Change in present value discount		(159,217)		(780,141)	
Net realized gains on sales of investments		(154,046)		(368,939)	
Net unrealized appreciation in fair value of investments		(3,961,844)		(5,498 ,007)	
Transfer of net assets from acquisition of The Knowles Science and Mathematics Institute		(101,463)		-	
Net change in:					
Accrued interest and dividends		4,298		(31)	
Other receivable		4,036		37,727	
Prepaid expenses		(232,924)		(31,685)	
Unconditional promises to give		247,895		2,709,458	
Other assets		9,559		20,606	
Accounts payable and accrued expenses		205,631		(25,237)	
Net cash used in operating activities		(5,288,080)		(2,308,595)	

Cash flows from investing activities: Proceeds from sales of investments Purchase of investments Purchase of property and equipment Net cash provided by (used in) investing **Cash flows from financing activities:** Payments on mortgage note Proceeds from line-of-credit, net Net cash provided by financing activities Net decrease in cash and cash equivalents Cash and cash equivalents at beginning of ye Cash and cash equivalents at end of year Supplemental disclosure of noncash operating and financing activities:

Transfer of building and land from KSMI acqu Transfer of mortgage note from KSMI acquisi

	Year E	nded May 31 2015	Year E	nded May 31 2014
	ċ	10 777 79/	Ċ	6 301 457
	Ŷ	(7,642,585)	Ş	(7,060,763)
		(59,477)		(61,907)
activities		3,075,732		(821,213)

	(16,005)	-
	1,450,000	2,050,000
3	1,433,995	2,050,000
	(778,353)	(1,079,808)
ear	. 1,524,689	2,604,497
	\$ 746,336	\$ 1,524,689

uisition	\$ 752,544	\$ _
ition	641,586	_

Knowles Science Teaching Foundation

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