Janet H. and C. Harry Knowles

ANNUAL REPORT 2004

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Front Cover: Knowles Science Teaching Fellows at Summer Fellows Meeting. From left to right: Kevin Henson, Bradford Hill, Janae Deverell Pritchett, Ben Buehler, Katie Jennings, Anne Watson, Jen Stauffer, Doug Dagan, Ken Burns, Jill Rhoden.

MESSAGE FROM THE EXECUTIVE DIRECTOR

The Janet H. and C. Harry Knowles Foundation (the Knowles Science Teaching Foundation or KSTF) was established in 1999 to enhance the quantity of high quality high school science and mathematics teaching. With this mission in mind, the year 2000 was spent meeting with many stakeholders in science and mathematics teaching and learning as well as with existing foundations with interest in education. In 2001 the decision was reached that KSTF would realize its mission by infusing the science and mathematics education system with individuals of exceptional ability and promise. In 2002 KSTF admitted the first Science Teaching Fellows.

When the history of the Knowles Science Teaching Foundation is told, there is no doubt that 2004 will be viewed as a landmark year.

- Mr. Boyce Adams joined the KSTF Board. He brings extensive experience in all aspects of building a business.
- Kevin Aylesworth Ph.D., Nicole Gillespie Ph.D., and Rachel Foster Ph.D. joined KSTF as program officers. Dr. Aylesworth, as senior program officer in mathematics, inaugurated a mathematics teaching fellowship program that parallels the science teaching fellowship. Dr. Gillespie, as senior program officer for science, planned and conducted all the activities for the 2004 science teaching fellows. She also re-designed the research program and began working on the design of the first KSTF Conference. Dr. Foster, as program officer for science, assumed all the responsibilities for the 2002 and 2003 science teaching fellows and designed and conducted the recruiting plan for the 2005 mathematics and science teaching fellows, as well as assisting Dr. Gillespie.
- The pioneer teaching fellows, those selected in 2002, all were full-time high school physics teachers.
- Ten outstanding individuals became KSTF teaching fellows.
- Three research projects, with funding from KSTF, explored issues in science teacher preparation.

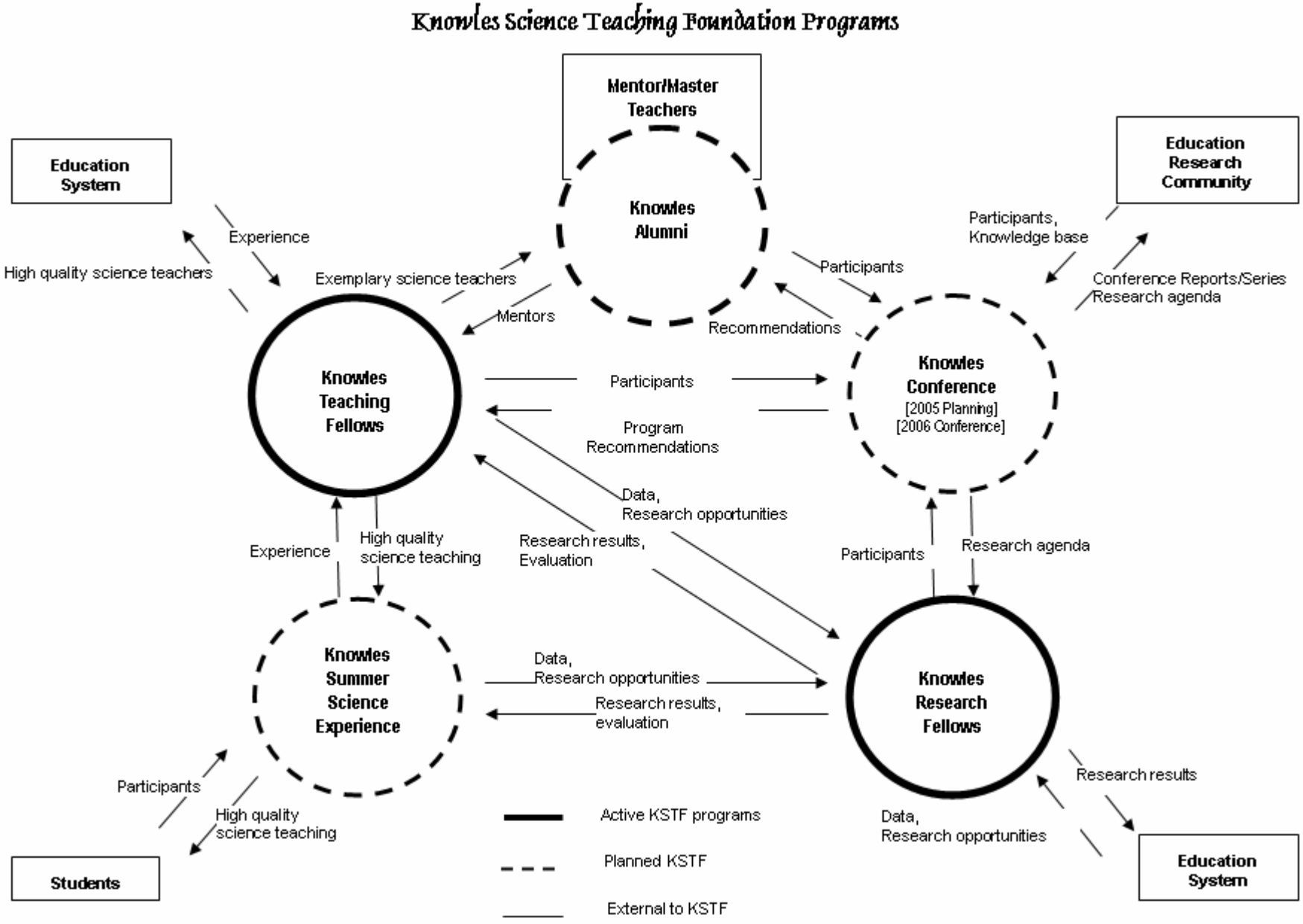
What began as a vision in 2000 was clearly a reality in 2004. **This vision is captured in the figure on the next page.** The vision was to support young men and women who hold degrees in science and enable them to become professional high school teachers was actually happening. Each phrase in the previous sentence has special meaning to KSTF. *Young men and women* are at the beginning of their careers. *Understanding science* is a necessary but not sufficient condition for teaching science. *Professional* implies that these teachers rely on both theory and practice to inform their teaching; and *high school* is where science can be experienced in depth.

Each generation rightly claims that theirs is a critical period in education. The year 2004 is no exception due to the No Child Left Behind legislation. This legislation calls for highly qualified teachers in every classroom. The vision of KSTF goes well beyond legislation. KSTF's goal is to find and enable those novice teachers who will invigorate their students to attain deep understanding of essential science concepts and the mental abilities to query natural events, gather evidence, find patterns in this evidence and structure arguments based on the evidence.

KSTF anticipates the wonderful things that will be happening in 2005. Everyone who is influenced by KSTF is grateful to Janet and Harry Knowles for their vision and generosity.

Angelo Collins

Angelo Collins, Ph.D.


Knowles Science Teaching Foundation Programs
Mentor/Master Teachers
Education System
Education Research Community
Knowles Alumni
Experience
High quality science teachers
Exemplary science teachers
Mentors
Participants
Recommendations
Participants, Knowledge base
Conference Reports/Series
Research agenda
Knowles Teaching Fellows
Participants
Knowles Conference
[2005 Planning]
[2006 Conference]
Program Recommendations
Data, Research opportunities
Experience
High quality science teaching
Research results, Evaluation
Participants
Research agenda
Knowles Summer Science Experience
Data, Research opportunities
Research results, evaluation
Knowles Research Fellows
Participants
High quality science teaching
Students
Active KSTF programs
Planned KSTF
External to KSTF
Data, Research opportunities
Research results
Education System

Janet H. & C. Harry Knowles Foundation, Inc.

Statement of Assets, Liabilities and Net Assets — Modified Cash Basis

December 31, 2004

Assets		
Current Assets		
Cash and cash equivalents	$ 654,853	
Investment — current	2,112,000	
Total current Assets		$ 2,766,853
Equipment, net of depreciation		18,417
Other asset		
Long-term investment — net of current portion		31,891,200
		$ 34,676,470
Liabilities and net assets		
Payroll taxes payable		$ 390
Unrestricted net assets		34,676,080
Total liabilities and unrestricted net assets		$ 34,676,470

Statement of Revenue and Expenses — Modified Cash Basis

For the year ended December 31, 2004

Revenues		
Contributions	$ 19,990,000	
Gain on Investments	877,482	
Dividend and interest income	7,317	
Total revenues		$ 20,874,799
Functional Expenses		
Program services	957,257	
Supporting services	54,270	
Total functional expenses		(1,011,527)
Other income		
Unrealized gain on investment		3,495,202
Change in unrestricted net assets		23,358,474
Net unrestricted assets as of the beginning of year		11,317,606
Net unrestricted assets as of the end of year		$ 34,676,080

2004 COHORT OF SCIENCE TEACHING FELLOWS

The Teaching Fellowship is the cornerstone program of KSTF. The following criteria are used to select teaching fellows:

- **Ability and Promise** KSTF Teaching Fellowships are awarded based on ability and promise.
- **Science** KSTF expects that Teaching Fellows have above-average content knowledge, having earned at least a bachelor's degree with a solid academic record.
- **Commitment to Teaching** KSTF expects Teaching Fellows will have had some experiences working with adolescents and/or out-of-school teaching and will have learned more about teaching from these experiences. KSTF also expects that the written and spoken communication will be correct, well-organized, persuasive based on evidence and have style.
- **Leadership** KSTF expects that Teaching Fellows have begun to learn the many opportunities and obligations of leadership by having held such positions. Fellows have developed accountability, interpersonal relationships, responsibility and maturity, as well as ethical and professional behavior.

The selection process is rigorous. Applicants submit three essays, transcripts and letters of recommendation. The staff then conducts telephone interviews of those applicants who minimally meet all the criteria. Finally, those applicants who show greatest promise are invited for personal interviews conducted by teams of scientists, teachers and education researchers as well as additional interviews by KSTF staff and social events with members of the Board of Trustees. In 2004, ten new science teaching fellows were selected.

CAREY BORGHI grew up in Pinedale, Wyoming and earned her bachelor's degree in physics from the University of Wyoming. As an undergraduate, she was one of five U.S. students selected for an astronomy internship in La Serena Chile at Cerro Tololo Observatory. She is currently pursuing a teaching credential and master's degree in education at Georgia State University and plans to complete both in Spring 2005.

KIM BORRENPOHL (now LINTKER) grew up in Okawville, Illinois and earned a bachelor's degree in chemistry at St. Louis University, where she participated in research in surface chemistry. She completed a master's degree in chemistry at St. Louis University in December, 2004 while concurrently working on her teacher credential at Southern Illinois University at Edwardsville. She plans to complete her credential program in Spring 2005 and will teach at Freeburg (IL) Community High School in the Fall.

KATHERINE JENNINGS grew up in Rockton, Illinois, and received her bachelor's degree in chemistry from Purdue University, where she has worked with the Science Ambassadors program and as a departmental tutor in chemistry. She is currently pursuing a master's degree in chemistry education and teaching credential at Purdue and plans to complete both in Fall 2006.

CASEY O'HARA grew up in Portland, Oregon, and earned his bachelor's and master's degrees in engineering from Stanford University. After working in industry for several years designing process automation robots and implantable defibrillators (earning several patents) he obtained his teaching credential from San Francisco State University in Spring 2004. He began teaching physics and integrated science at Carlmont High School in Belmont, California in Fall 2004.

2004 COHORT OF SCIENCE TEACHING FELLOWS

DANA KLOCKOW PICKERING grew up in Brandenburg, Kentucky, and received her bachelor's degree in chemistry from Bellarmine University. She is currently pursuing a master's in teaching at the University of Louisville where she has worked as a supplemental instructor for general chemistry courses. She plans on completing both her master's and credential in Spring 2005.

KATHERINE POINTER grew up in Santa Barbara, California, and earned a bachelor's degree in chemistry from Westmont College. As an undergraduate, she worked as a tutor and teaching assistant for general chemistry courses, participated in research and helped edit two college-level chemistry textbooks. She is currently pursuing her master's in education and teaching credential at the University of California Santa Barbara and plans to complete both in Spring 2005.

ZACHARY POWERS grew up in Sebastopol, California, and earned a bachelor's degree in physics from the University of California San Diego. He taught English to science and engineering students at the Technical University of Sofia, Bulgaria and taught science to students from low-income families in an after-school program in San Diego. He is pursuing a master's degree in education and a teaching credential at the University of California, Berkeley and plans to complete both in Spring 2005.

HOLLY RISTAU grew up in Warren, Pennsylvania, and earned a bachelor's degree in chemistry from Pennsylvania State University, Erie. After eighteen months as an inside sales representative of chemical laboratory products, she decided to pursue her master's in education and secondary science teaching credential at the University of Virginia. She plans to complete both her master's and credential in Spring 2006.

ANNE WATSON grew up in Essex, Vermont, and earned her bachelor's degree in physics at Pennsylvania State University. While an undergraduate, she published the results of her research in a number of journals and at conferences, including the International Reliability Physics Symposium (IRPS). She completed her teaching certification and will complete a master's in education at the University of Vermont in May 2005. She began teaching at Montpelier High School in Fall 2004.

HEATHER WELCH grew up in St. Louis, Missouri, and is currently enrolled in a 5-year joint program for a bachelor's in physics and master's in teaching at the University of Virginia. She has worked in the University of Virginia Physics Department to program computer applications in Flash for use in teaching physics and astronomy concepts. She plans to complete her bachelor's in physics, master's in teaching and teaching credential in Spring 2005.

2002 AND 2003 COHORTS OF SCIENCE TEACHING FELLOWS

Photo left: The 2002 and 2003 Fellows at the Argonne meeting. From left to right: Janae Deverell Pritchett, Ben Buehler, Jen Stauffer, Ken Burns, Doug Dagan, Jen Barchie, Jill Rhoden, Lisa Weltzer and Kevin Henson.

2002 Cohort
Jennifer Barchie
Ben Buehler
Lisa Sitek

2003 Cohort
Ken Burns
Doug Dagan
Janae Deverell Pritchett
Kevin Henson
Bradford Hill
Jill Rhoden
Emily Rinner
Jen Stauffer
Lisa Weltzer

The KSTF Teaching Fellowship is renewable for up to five years. During this period, the Fellows meet three times a year and hold regular discussions on an electronic discussion board. They also engage in some form of professional development activity each summer.

In the Spring of 2004, the 2002 and 2003 Fellows met near Argonne National Laboratories and toured the Lab. They had an opportunity to observe sites of experiments of historical significance and to learn about current research in physics. The Fellows also brought a ten-minute video of their teaching, which they watched and discussed.

In the Summer of 2004, all of the KSTF Teaching Fellows met in Colorado Springs. The summer meeting focuses on what KSTF terms Inquiry into Instruction. Working in teams of three or four, the Fellows design a series of lessons on an important topic. They commit themselves to teaching these lessons during the coming academic year and returning the following summer to discuss the plan and revise it. The summer meeting encourages much cross-collaboration among Fellows.

In Fall 2004, the 2002 and 2003 Teaching Fellows went to San Diego. The San Diego Unified School District had adopted an approach to science teaching called Physics First, in which physics is taught to 9th grade students. The fellows visited classrooms on Friday and had an opportunity to meet with the teachers on Saturday. Later, Dr. Fred Goldberg from the University of California San Diego led a workshop on integrated science curriculum.

The 2004 Teaching Fellows met in Seattle in Fall 2004. They had opportunities to compare science instruction in classrooms with the printed curriculum, engage with physics education researchers from the University of Washington in activities that stretched their understanding of physics; and they did a workshop with Dr. Mark Windshitl, also from the University of Washington, on how to adjust existing curriculum materials into lessons that promote understanding and inquiry in science.

2002 AND 2003 COHORTS OF SCIENCE TEACHING FELLOWS

Clockwise from top: Jennifer Barchie, Lisa Sitek, Kevin Henson, Bradford Hill, Emilie Rinner, Lisa Weltzer, Jill Rhoden, Ken Burns, Doug Dagan, Ben Buehler. Center top Janae Deverell Pritchett and Jen Stauffer.

KSTF RESEARCH PROJECTS

In December, 2004, the Board of Trustees approved a plan to restructure the KSTF Research Grants program to fund research fellowships awarded to Early Career and Senior Scholars. The Knowles Research Fellows Programs are intended to contribute to science and/or mathematics education research, practice, and policy and to inform the KSTF Teaching Fellows and Conference Programs.

In 2004, KSTF supported three research projects:

BEGINNING SCIENCE TEACHER DEVELOPMENT AND PROGRAM DESIGN IN SCIENCE TEACHER EDUCATION

Awarded to Charles W. (Andy) Anderson Ph.D., Gail Richmond Ph.D. and colleagues at Michigan State University

Through two previous years of research funded by KSTF, the researchers have begun to understand both the cognitive and social dimensions of teacher candidates' development through a teacher education program and into their first years of teaching. They have identified four core domains: (1) Scientific Understanding , (2) Knowledge Needed for Teaching, (3) The Practices of Teaching including: Clarifying goals, Planning instructional activities, Assessment, Reflection and Revision and (4) Socialization into the Teaching Profession. In 2004, the researchers designed a set of model lessons aligned with these domains so that beginning teachers have resources for teaching. They also received a contract from Kluwer Publishing to write a book on the model and their experiences using it.

MENTORING AND INDUCTION EXPERIENCES OF NOVICE PHYSICAL SCIENCE TEACHERS

Awarded to Thomas Koballa Ph.D., Leslie Upson Ph.D. and colleagues at the University of Georgia

The question driving this study is: What kinds of school-based mentoring experiences contribute to the development of beginning physical science teachers participating in a multi-year induction experience?

The researchers intentionally used the same domains as the Michigan State Research Group: the dimensions of scientific understandings, knowledge needed for science teaching, practices of science teaching, and socialization into the science teaching profession. Narrative case studies were produced. Reports of the case studies were presented at the National Association for Research in Science Teaching (NARST) meeting in October 2004. Their findings concluded that there are few supports for mentoring and no benchmarks. In the 2004-05 school year, the research project focuses on designing and implementing a web-based system to support mentoring.

LONGITUDINAL CASE STUDY

Awarded to Lisa Stooksberry-Hill, Ed.D.

The intention of this study is to follow the growth and development of a single KSTF Teaching Fellow in an attempt to identify the value-added aspects of the Fellowship. In 2004, the project was in its second year. Data include classroom observations and interviews. This project is ongoing.





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The Janet H. and C. Harry Knowles Foundation was established in 1999 to strengthen the quality of science and mathematics teaching in grades 9-12 in United States schools. The Knowles Science Teaching Foundation supports individuals and programs designed to encourage and sustain young scientists and mathematicians as they dedicate their lives to teaching other young people and to becoming leaders in the field of education. The Foundation also supports efforts that provide insight into how to best prepare high school science and mathematics teachers.

2004 Science Teaching Fellows at the Fall Meeting. From left to right are Carey Borghi, Zach Powers, Katie Pointer, Heather Welch and Casey O'Hara.

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