Selected NSF STEM Education Programs
Corby Hovis

NSF's New Home:

2415 Eisenhower Ave.
Alexandria, VA 22314

https://www.nsf.gov/about/visit/

Directorate for Education & Human Resources (EHR)

- *"... supports excellence in U.S. STEM education at all levels, in all settings, for the development of a diverse and well-prepared workforce of scientists, technicians, engineers, mathematicians, and educators and a well-informed citizenry."*
- https://www.nsf.gov/dir/index.jsp?org=EHR
- Education research is an important feature (stressed to varying degrees) in *all* EHR programs.

Selected NSF STEM Education Programs
Corby Hovis

EHR Divisions

- **Division of Undergraduate Education (DUE)**

  "DUE's programs are intended to strengthen STEM education at two- and four-year colleges and universities by improving curricula, instruction, laboratories, infrastructure, assessment, diversity of students and faculty, and collaborations."

- **Division of Graduate Education (DGE)**

  "... provides funding to support graduate students and the development of novel, innovative programs to prepare tomorrow's leaders in STEM fields."

- **Division of Human Resource Development (HRD)**

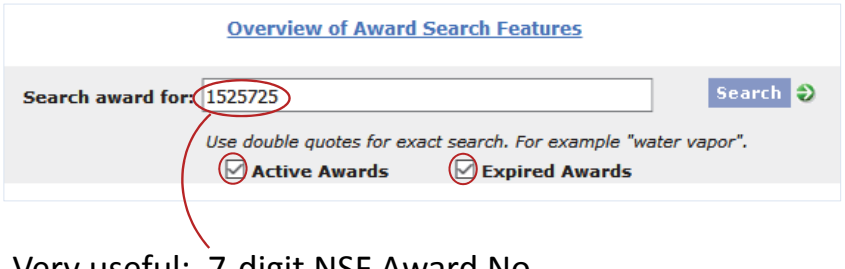
  "HRD programs support and promote activities that seek to strengthen STEM education for underserved communities, broaden their participation in the workforce, and add to our knowledge base about programs of inclusion."

- **Division of Research on Learning (DRL)**

  "... invests in the improvement of STEM learning for people of all ages by promoting innovative research, development, and evaluation of learning and teaching across all STEM disciplines in formal and informal learning settings."

Information About NSF Awards

nsf.gov: *Awards --> Search Awards*



Very useful: 7-digit NSF Award No.

Selected NSF STEM Education Programs for Participants in the Physics and Astronomy New Faculty Workshop

November 2, 2017

Corby Hovis, Ph.D.
Directorate for Education and Human Resources
National Science Foundation
chovis@nsf.gov

Division of Undergraduate Education (DUE)

Advanced Technological Education (ATE)

Education of technicians for the high-tech fields that drive the U.S. economy; focuses on associate degree programs at two-year colleges

https://nsf.gov/ate

See accompanying one-pager.

Robert Noyce Teacher Scholarship Program

Encourages talented STEM majors and professionals to become K-12 mathematics and science teachers

https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5733

See accompanying one-pager.

Improving Undergraduate STEM Education: Education and Human Resources (IUSE: EHR)

Improving the quality and effectiveness of the education of undergraduates in all STEM fields in all types of colleges and universities

https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505082

See accompanying one-pager and slides with examples of funded projects.

NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM)

Scholarships and high-quality curricular and co-curricular activities to promote the academic success, retention, transfer, and graduation of low-income, academically talented students who are pursuing associate, baccalaureate, or graduate degrees in STEM fields

https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5257

See accompanying one-pager and slides with examples of funded projects.

Division of Human Resource Development (HRD)

ADVANCE: Increasing the Participation and Advancement of Women in STEM Academic Careers

Promotes gender equity in the academic STEM workforce; invests in the development and implementation of systemic institutional strategies to increase the representation and advancement of women in academic STEM careers

https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5383

Alliances for Graduate Education and the Professoriate (AGEP)

Increasing the number of underrepresented minorities (including persons with disabilities) entering and completing STEM graduate education and postdoctoral training

https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5474

Centers for Research Excellence in Science and Technology (CREST)

Enhancing the research capabilities of minority-serving institutions (MSIs) through the establishment of centers that integrate education and research

https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=6668

(continued)

Historically Black Colleges and Universities Undergraduate Program (HBCU-UP)

Enhancing the quality of undergraduate STEM education and research at HBCUs as a means to broaden participation in the nation's STEM workforce
https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5481

Louis Stokes Alliances for Minority Participation (LSAMP)

Funding for alliances of institutions to implement comprehensive, evidence-based strategies that result in the graduation of well-prepared students from groups underrepresented in STEM (African Americans, Hispanic Americans, American Indians, Alaska Natives, Native Hawaiians, and other Pacific Islanders)
https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13646

Tribal Colleges and Universities Program (TCUP)

Supports Tribal Colleges and Universities, Alaska Native-serving institutions, and Native Hawaiian-serving institutions to promote high-quality STEM education, research, and outreach
https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5483

NSF Research Traineeship (NRT) Program [managed by the Division of Graduate Education]

Supports the development of innovative models for STEM graduate-student training which focus on high-priority interdisciplinary research and which enable students in research-based master's and doctoral degree programs to develop the skills, knowledge, and competencies to pursue a range of STEM careers
https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505015

EHR Core Research

EHR-wide program supporting fundamental research in STEM education, with a focus on STEM learning, STEM learning environments, STEM workforce development, and broadening participation in STEM
https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504924

Other Programs

Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (INCLUDES)

NSF-wide initiative developing a national network of projects, scholars, and organizations to advance broadening participation and inclusion in STEM
https://www.nsf.gov/news/special_reports/nsfincludes/index.jsp
https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505289

Research Experiences for Undergraduates (REU)

Provides stipends, housing and meal allowances, and travel funds to support the participation of college and university students in authentic research experiences in all areas of research normally supported by NSF
https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5517

Research Experiences for Teachers (RET)

Supports the participation of K-12 teachers in authentic research experiences

International Research Experiences for Students (IRES)

Supports the participation of U.S. undergraduate and graduate students in collaborative research projects in international locations, as well as other international research, training, and professional development for graduate students
https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=12831

ATE PROGRAM

Advanced Technological Education Program

National Science Foundation

For more information about the ATE program, visit **nsf.gov/ate** | For more information about ATE projects & centers, visit **atecentral.net**

The National Science Foundation's Advanced Technological Education (ATE) program improves the education of technicians who work in advanced technology industries that are important to the nation's economy and security. Most often, these technicians are prepared for their jobs through associate degree programs in community colleges and related technology programs in secondary schools.

ATE grants support a variety of activities to strengthen science, technology, engineering, and mathematics (STEM) education for undergraduates and secondary school students in technical programs. These include developing and testing innovative materials, courses, curricula, and teaching methods; building the knowledge and skills of college faculty and secondary school teachers to teach in rapidly evolving areas of technology; analyzing the educational needs of the workforce in different technical fields; and designing educational programs and pathways for students to meet those needs.

ATE proposals are accepted in three major tracks: centers, projects, and targeted research in technician education.

Centers:

- **National centers** lead nationwide, industry-specific reforms.
- **Regional centers** focus on a particular industry within a specific geographic area.
- **Support centers** provide products and services that assist a range of ATE educators in one or more areas of technology.

Projects focus more narrowly on an activity such as curriculum development, program improvement, or faculty development.

Targeted research focuses on understanding aspects of technician education and the technician workforce, so that ATE centers and projects can more effectively address the needs of industry and students.

Fields of technology supported by the ATE program include, but are not limited to:

- ADVANCED MANUFACTURING TECHNOLOGIES
- AGRICULTURAL & BIO TECHNOLOGIES
- ENERGY & ENVIRONMENTAL TECHNOLOGIES
- ENGINEERING TECHNOLOGIES
- INFORMATION TECHNOLOGIES
- LEARNING, EVALUATION & RESEARCH
- MICRO & NANO TECHNOLOGIES
- SECURITY TECHNOLOGIES

ATE CENTERS

Advanced Technological Education Centers

National Science Foundation

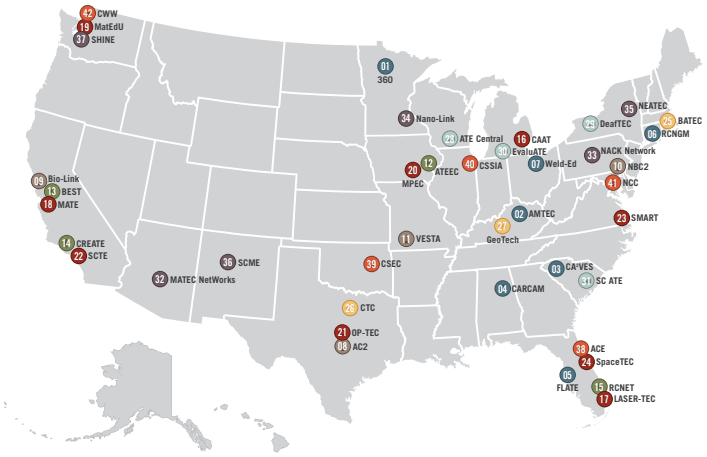
For information about the ATE centers, visit **www.atecenters.org**

ATE centers and projects incubate innovative STEM technician education programs.

They test new ways of teaching about established and emerging technologies at their host colleges and partner institutions. The results of these structured studies are instructional modules, new courses, and entire certificate and degree programs.

In tandem with producing resources that improve students' learning, many ATE centers and projects offer professional development for faculty. Through these programs, community college instructors and secondary school teachers learn about new technologies and teaching techniques, which enable them to educate their students to meet an array of current workforce needs in industry.

There are 42 ATE Centers located around the United States.



ATE Centers Impact 2016-2017 highlights the accomplishments of ATE centers and explains the centers' efforts to build a world-class technical workforce.

This book features the work of **national centers**, **regional centers**, and **support centers** that have received competitive grant funds to tackle the biggest technical workforce challenges.

NSF-ATE Centers and Projects

EDUCATED

114,963 students
(65% at Community Colleges)
91% completed
or continued in their
program in 2015

SERVED

47,090 Underrepresented
Minority Students **(44%)**
45,830 Educators with **2,190**
Professional Development Activities

DEVELOPED

2,430
Materials And
Educational
Activities

$ COLLABORATED

with **3,890** Businesses and
Industries and Received
over **$20 Million** in Monetary
and in-kind Support

Source: ATE 2015 Annual Survey Report by EvaluATE | www.evalu-ate.org

MARICOPA COMMUNITY COLLEGES

Prepared by the ATE centers with support from the National Science Foundation under grant **DUE-1261893** to the Academic and Student Affairs Division of the Maricopa Community Colleges.

NOYCE Program

Responding to the critical need for K-12 teachers of science, mathematics, engineering, and computer science

The National Science Foundation's Directorate for Education and Human Resources
Robert Noyce Teacher Scholarship Program

The **Robert Noyce Teacher Scholarship Program** seeks to encourage talented science, technology, engineering, and mathematics (STEM) majors and professionals to become K-12 mathematics and science (including engineering and computer science) teachers. The program seeks to encourage institutions of higher education to develop and sustain a culture in which undergraduate STEM majors, especially those of the highest achievement and ability, are encouraged and supported to become teachers in high-need local educational agencies.

The program provides funds to institutions of higher education to support:

- Scholarships, stipends, and academic programs for undergraduate STEM majors and post-baccalaureate students holding STEM degrees;
- Fellowships, salary supplements, academic programs, and professional development for STEM professionals; and
- Professional development and salary supplements for K-12 STEM teachers.

An additional component of the program provides support for research on the preparation, recruitment, and retention of K-12 STEM teachers in high-need local education agencies.

Noyce project components include partnerships with school districts, recruitment strategies, and activities to enable the Noyce recipients to become highly effective elementary or secondary STEM teachers. Proposals may be submitted by institutions of higher education accredited in, and having a campus located in, the United States, or consortia of such institutions, or U.S. nonprofit entities that have established consortia among such institutions of higher education. Additionally, proposals for the research track may be submitted by professional societies and similar organizations that are directly associated with educational or research activities.

The Robert Noyce Teacher Scholarship Program accepts proposals representing four different tracks:

- Robert Noyce Teacher Scholarships and Stipends
- NSF Teaching Fellowships
- NSF Master Teaching Fellowships
- Noyce Research

For more information, to view the most current solicitation and deadlines, and to see project abstracts, please visit: http://1.usa.gov/1HSJEjq

Contact information:
Division of Undergraduate Education
National Science Foundation
4201 Wilson Blvd., Suite 835
Arlington, VA 22230
Phone: 703-292-8670
Fax: 703-292-9015
e-mail: undergrad@nsf.gov

National Science Foundation

Highlighting the Robert Noyce Teacher Scholarship Program
Sponsored by the Directorate for Education and Human Resources
NSF 17-116

Robert Noyce Teacher Scholarship Program

The Robert Noyce Teacher Scholarship Program accepts proposals representing four different tracks, as well as Capacity Building proposals in anticipation of future proposals in Tracks 1, 2, and 3.

Track 1: Robert Noyce Teacher Scholarships and Stipends:

- This Track offers awards to institutions of higher education to provide scholarships and programs for junior and senior undergraduate STEM majors and stipends for STEM professionals.
- Proposals must provide for scholarships and stipends of at least $10,000 per year (not to exceed cost of attendance).
- Recipients are required to complete two years of teaching in a high-need school district for each year of scholarship or stipend support.
- Proposals may include summer internships for undergraduate freshmen and sophomores to introduce students to early experiences in STEM education.

The maximum award size is $1,200,000 for 5 years.* Capacity Building projects may receive up to $75,000 over 1 year.*

Track 2: NSF Teaching Fellowships:

- This Track offers awards to institutions of higher education to administer fellowships and programmatic support to STEM professionals who enroll in a master's degree program leading to teacher certification or licensing.
- Proposals must provide for recipients to receive a stipend of at least $10,000 while enrolled in a master's degree program. After completion of the master's program, recipients must receive salary supplements of at least $10,000 per year while fulfilling a four-year teaching commitment in a high-need school district.
- Proposals must include partnerships with high-need school districts and non-profit organizations.
- An institution submitting a proposal under this track must provide matching funds from non-Federal sources.

The maximum award size is $3,000,000 for 5-6 years.* Capacity Building projects may receive up to $75,000 over 1 year.*

Track 3: NSF Master Teaching Fellowships:

- This Track offers awards to institutions to administer fellowships and programmatic support to experienced and exemplary STEM teachers who already have a master's degree in their field, or a bachelor's degree in their field and who are enrolled in a master's program in their field.
- Proposals must provide for fellowships of at least $10,000 for each year of the five-year teaching requirement in a high need school district.
- Proposals must include partnerships with high-need school districts and non-profit organizations.
- An institution submitting a proposal under this track must provide matching funds from non-Federal sources.

The maximum award size is $3,000,000 for 5-6 years.* Capacity Building projects may receive up to $75,000 over 1 year.*

Track 4: Noyce Research:

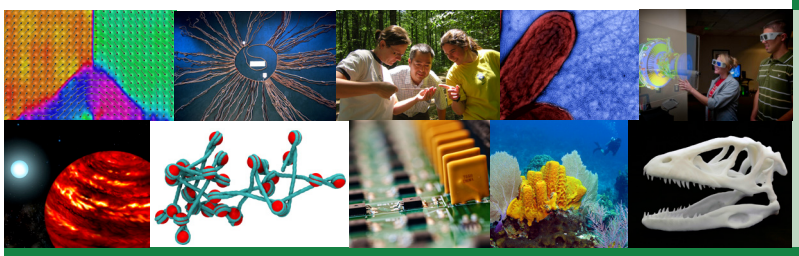
- This Track offers awards to institutions, professional societies, and similar organizations that are directly associated with educational or research activities to support planning, exploratory research, and research proposals that address the issues of STEM teacher effectiveness, persistence, or retention in high-need local educational agencies.
- Studies may range from research synthesis to experimental investigations in order to show relationships between teacher preparation and learning.

The maximum award size is $800,000 for up to 5 years.

Projects that involve collaboration with current or past Noyce awardee projects may request up to an additional $100,000 for each Noyce project that is substantively engaged in the research endeavor, with a maximum overall request not to exceed $2,300,000.

* Track 1, 2, and 3 proposals may request an additional $250,000 when submitted by a four-year institution collaborating with at least one two-year institution. Capacity Building proposals may request an additional $50,000 when submitted by a four-year institution collaborating with at least one two-year institution.

IUSE: EHR PROGRAM



Improving the quality and effectiveness of the education of undergraduates in all of the STEM fields

IMPROVING UNDERGRADUATE STEM EDUCATION

The goal of the IUSE: EHR Program is to catalyze colleges and universities and their faculties to provide highly effective, evidence-based teaching and learning experiences for their undergraduate students taking STEM courses. It supports the development and use of practices that are rooted in a solid research base. In pursuit of this goal, IUSE: EHR supports a broad range of projects on two tracks. The Engaged Student Learning track supports the development, use, and testing of instructional practices and curricular innovation that engage and improve student learning and retention in STEM. The Institutional and Community Transformation track supports efforts to increase the propagation of highly effective, evidence-based teaching and learning by promoting this activity broadly at the discipline, academic department, and institutional levels. IUSE: EHR, managed by the Education and Human Resources Directorate, is one component of NSF's larger cross-directorate investment in improving undergraduate STEM education.

IUSE: EHR invites proposals that address immediate challenges and opportunities that are facing undergraduate STEM education, as well as those that anticipate new structures and new functions of the undergraduate learning and teaching enterprise. Principal Investigators are encouraged to consider the value of the project from the perspective of the end users, as well as the relationships, partners, and structures which would eventually be needed to sustain the improvement on a wide scale.

Track 1: Engaged Student Learning

This track focuses on design, development, and research studies that involve the creation, exploration, or implementation of tools, resources, and models that show particular promise to increase engagement of undergraduate students in their STEM learning and lead to measurable and lasting learning gains. Projects are encouraged to form collaborations among STEM disciplinary researchers, education researchers, and cognitive scientists so that their projects can best leverage what is known about how people learn and/or contribute to the growth of that body of knowledge. The undergraduate audience for IUSE projects includes students from two-year colleges to four-year colleges and universities, both declared and undeclared STEM majors, students whose courses of study require solid skills and knowledge of STEM principles, and students seeking to fulfill a general education requirement in STEM.

Exploration and Design Projects:
$300,000 max, up to 3 years

Development and Implementation I Projects:
$600,000 max, up to 3 years

Development and Implementation II Projects:
$601,000 to $2,000,000, up to 5 years

Track 2: Institutional and Community Transformation

This track supports projects that use innovative approaches to substantially increase the propagation of highly effective methods of STEM teaching and learning in institutions of higher education or across/within disciplinary communities. Projects may use technology and distance education methods (or hybrid designs) when supported by evidence of potential effectiveness and are expected to leverage advances in STEM knowledge to motivate student interest. Projects may seek to transform high enrollment, lower division courses or may focus their efforts in multiple courses within a department or a college or in a particular disciplinary area. Faculty learning through continued professional development is also an important consideration for this track. Efforts to promote institutional change will typically require the efforts of teams of faculty members and support from the department chairperson, or college dean. They may also include Provosts and Presidents in the effort to elicit cultural changes required to achieve transformation at the institutional level. Leading members of academic and STEM/STEM education disciplinary professional societies may similarly lead change at the community level.

Exploration and Design Projects:
$300,000 max, up to 3 years

Development and Implementation Projects:
$3,000,000 max, up to 5 years

National Science Foundation

Highlighting the Improving Undergraduate STEM Education program sponsored by the National Science Foundation.

IUSE: EHR PROGRAM

IMPROVING UNDERGRADUATE STEM EDUCATION

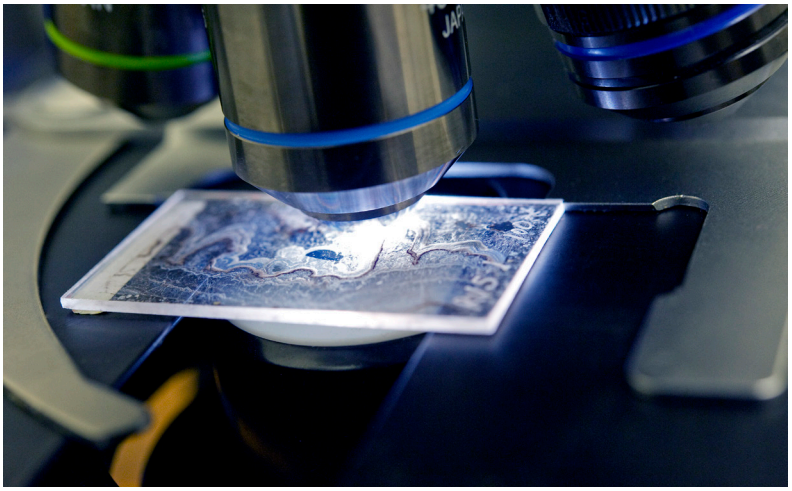
Project Approach 1: Exploration and Design Small-scale projects may seek to establish the basis for development and implementation of new interventions or strategies, develop strategies for the adoption, adaptation, and implementation of effective practices, or adapt and implement strategies shown to be effective at other institutions. They may also pose new interventions or strategies, and explore challenges to their adoption, with the goal of informing policy, practice, and future design or development of components in the STEM higher education enterprise. Results of Exploration projects are expected to be significant enough to contribute to the body of knowledge about STEM teaching and learning and/or effective means to broader implementation.

Project Approach 2: Development and Implementation Larger-scale projects may focus on new or promising interventions or strategies to achieve well-specified STEM learning objectives, including making refinements that build on small-scale testing. The Engaged Student Learning Track has two levels of Design & Development projects. Level I projects focus on achieving propagation beyond a single institution or work to promote change across multiple STEM disciplines within an institution. Level I projects should carry the development to a state in which the evaluation of the project produces evidence to determine whether or not the project's efforts are effective. Level II projects are intended to support large-scale efforts. This level also supports long-term research on efforts to effect change in student learning practices, in order to learn what has been achieved.

Proposals for **Workshops, Conferences, and Special Projects** addressing critical challenges in undergraduate STEM education may be submitted at any time following consultation with a program officer.

Both tracks of the IUSE: EHR program support:

- research and development of innovative learning resources;
- design research to understand the impact of such resources;
- strategies to implement effective instruction in a department or departments, within or across institutions;
- faculty development projects;
- design and testing of instruments for measuring student outcomes; and
- proposals for untested and unconventional activities that could have a high impact on learning and contribute to transforming undergraduate STEM education.



For more information, to view the most current solicitation, and to see abstracts of current awards, please visit:
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505082

Contact Information:

Division of Undergraduate Education
National Science Foundation
4201 Wilson Blvd., Suite 835
Arlington, VA 22230
Phone: 703-292-8670
Fax: 703-292-9015
e-mail: *undergrad@nsf.gov*

National Science Foundation

Highlighting the Improving Undergraduate STEM Education program sponsored by the National Science Foundation.

NSF 15-023

Examples of IUSE Physics & Astronomy Awards

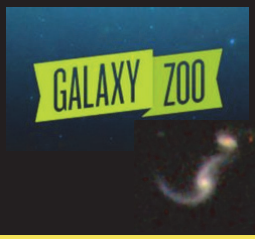
(slides furnished by PIs)

Engaging Non-Major Intro Astronomy Students in Authentic Research with Zooniverse Citizen Science

#1525725

Laura Trouille (Zooniverse), Tommy Nelson (UMN), Dave Meyer (NU),
Lucy Fortson (UMN), Julie Feldt (Z), Sarah Allen (Z), Fred Finley (UMN), Cody Dirks (NU)

Stage 1:
Intro to data, tools, and crowd-sourced research



Stage 2:
Data analysis & discussion in research groups

Stage 3:
Communicating results via Video

Examine impact of authentic research experience on attitudes and understanding of the nature of science

IUSE grant

ZOONIVERSE

Contact: trouille@zooniverse.org

CIERA NORTHWESTERN UNIVERSITY

Distance Learning Labs for Introductory Physics

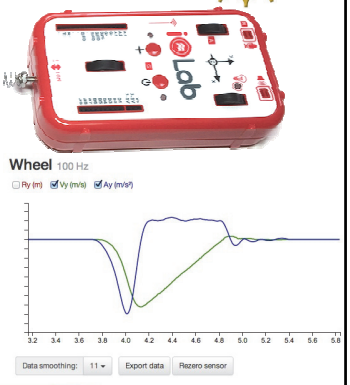
#1505086

Problem

Physics lags behind other scientific fields in the development of cost-effective, research-validated hands-on labs for distance education.

Solution

Develop mechanics labs combining proven pedagogy of ***RealTime Physics*** with the ***IOLab***, a versatile and inexpensive lab tool.



Validation

Use the Force and Motion Conceptual Evaluation (FMCE) and the Colorado Learning Attitudes about Science Survey (CLASS) for Experimental Physics

Erik Jensen, Chemeketa Community College
erik.jensen@chemeketa.edu
Erik Bodegom, Portland State University
d4eb@pdx.edu
David Sokoloff, University of Oregon
sokoloff@uoregon.edu

Discover Chemeketa Community College

Examples of IUSE Physics & Astronomy Awards

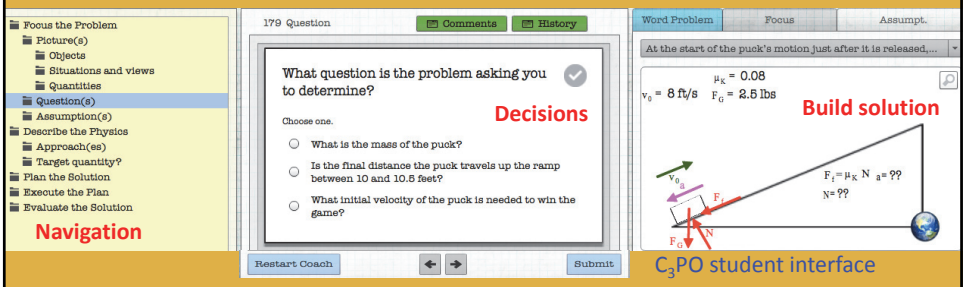
(slides furnished by PIs)

C_3PO: Customizable computer coaches for physics online

UNIVERSITY OF MINNESOTA Driven to Discover℠

PIs: Leon Hsu and Ken Heller (University of Minnesota, Twin Cities)

Collaborators: Tom Carter (College of DuPage), Andrew Heckler (The Ohio State University), Koblar Alan Jackson (Central Michigan University), Susan Kasahara (Normandale Community College), Andy Pawl (University of Wisconsin, Platteville)



Goal: Allow students on-demand coaching for introductory physics problems by developing web-based software that emphasizes the metacognitive nature of problem solving.

- C_3PO focuses students on the decision-making processes necessary for problem solving to combat the idea that problem solving is the formulaic application of specific recipes.
- C_3PO allows instructors to customize the coaching to fit their needs and preferences, without specific knowledge of the underlying software.

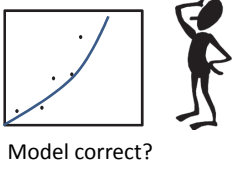
Contact: Leon Hsu, lhsu@umn.edu

Supported in part by NSF DUE-1504649

Creating a new assessment tool for quantitative critical thinking in introductory lab courses

Carl E. Wieman (Stanford University) & Natasha G. Holmes (Cornell University)

Goal: Develop and validate an efficient assessment instrument to evaluate students' critical thinking skills as related to experimental data and models



The Physics Lab Inventory of Critical thinking (PLIC)

Year 1: Development & preliminary validation → Year 2: Statistical validation & reliability analysis → Year 3: Implementation & testing

- A tool for pre- and post-tests of students' ability to evaluate experimental methods and data, improve data quality, and draw conclusions from data and models
- Preliminary research on:
  - Student understanding & difficulties about experimental data and uncertainty
  - Effects of lab pedagogies on student performance
  - Characterizing performance of various populations of students

Support from NSF IUSE #1611482

Examples of IUSE Physics & Astronomy Awards

(slides furnished by PIs)

UNCG

Self-Efficacy Intervention to Improve Stem Performance (SIISP)

NSF

#DUE-1612053

Design, develop, validate, document, and disseminate a practical self-efficacy intervention to improve students' self-efficacy and academic performance in STEM courses.

3 years, 2 university populations, 1 goal:

to improve

students' belief in their own ability to overcome setbacks and ultimately succeed in STEM courses

by creating

a 60 minute intervention suited to a single lab session in any University STEM course

based on

successful interventions in success/failure attributions (AR) and growth/fixed intelligence (mindset)

Principal Investigators:
William J. Gerace, Ian D. Beatty, Stephanie Carrino, Michael J. Kane

Collaborative Research:

Research as a base to develop adaptable curricula bridging instructional paradigms in Quantum Mechanics

Articulate Learning Goals (National conversation)
Investigate student difficulties in different "paradigms"
(spins first or wave functions first approaches)
Develop research-based materials and curricula
Disseminate results and provide community support

Project Team:

CALIFORNIA STATE UNIVERSITY FULLERTON
PI: Gina Passante
gpassante@fullerton.edu

PER @ CU-Boulder
PI: Steve Pollock
steven.pollock@colorado.edu

CAL POLY POMONA PER
PI: Homeyra Sadaghiani
hsadaghiani@cpp.edu

NSF

Supported by NSF DUE 1626280, 1626594, & 1626482

Examples of IUSE Physics & Astronomy Awards

(slides furnished by PIs)

Collaborative Research: University Student Conceptual Resources for Understanding Physics

DUE 1608510

Amy D. Robertson Paula R. L. Heron Rachel E. Scherr Lisa M. Goodhew

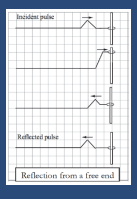
Observation:

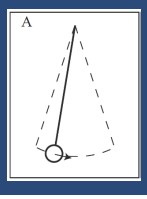
Misconceptions theory of knowledge: Students' ideas are a *barrier* for instruction. → **Strong** influence on university physics instruction

Resources theory of knowledge: Students' ideas are a *foundation* for instruction. → **Minimal** influence on university physics instruction

Goal of proposed project: To promote university physics instructor framing of student ideas as resources, by:

- Conducting large-*N* research to document the common, prevalent resources that students use to reason about forces and waves.
- Developing and testing instructional materials that embed a resources orientation toward student thinking.





UNIVERSITY of WASHINGTON NSF Engaging the culture, changing the world® Seattle Pacific UNIVERSITY

Identifying best practices for inclusive physics learning environments

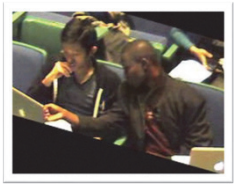
A collaboration of physics education researchers, social justice professionals, and physics professional societies to learn:

- **What great things are physics faculty already doing** to improve physics learning environments for women and people of color?

  Teaching transformations – Assessment practices – Admissions – Mentoring – Advising – Faculty training

- **What do physics faculty know, believe, value, and desire** about making physics more diverse?

  For example, is the status quo wrong? Is White male privilege a problem in physics? Are there troubling interactions in the classroom? Are there systemic inequities?

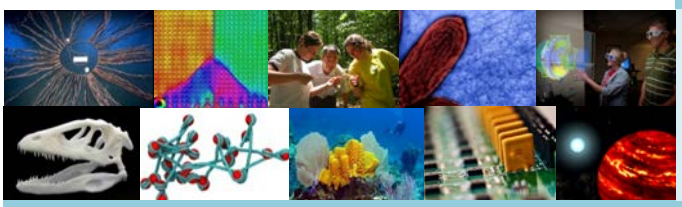


- **What resources will support physics faculty** in creating inclusive physics learning environments?

  Teaching workshops, assessment guidance, faculty education

Seattle Pacific UNIVERSITY PHYSICS EDUCATION RESEARCH John Perkins Center FOR RECONCILIATION APS physics Supported in part by NSF Grant No. 1611318 NSF

NSF S-STEM PROGRAM



Supporting talented students in science, technology, engineering, and mathematics

NSF Scholarships in Science, Technology, Engineering, and Mathematics Program

The National Science Foundation Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) Program addresses the need for a high-quality STEM workforce in areas of national priorities. The program seeks to increase and understand the success of low-income, academically talented students with demonstrated financial need who are pursuing associate, baccalaureate, or graduate degrees in science, technology, engineering, and mathematics (STEM). Recognizing that scholarships alone cannot address low retention and graduation rates in STEM, the program provides funds to institutions of higher education for scholarships and for establishing systems of high-quality, evidence-based curricular and co-curricular activities that support student success, retention, transfer, and graduation in STEM.

The NSF S-STEM program emphasizes the importance of recruiting students to science and engineering disciplines, mentoring and supporting students through degree completion, and facilitating student career placement in the STEM workforce. The goals of the NSF S-STEM program include:

- Improved educational opportunities for students;
- Increased retention of students to degree attainment;
- Improved student support programs at institutions of higher education;
- Increased numbers of well-educated and skilled employees in technical areas of national need.

Scholarship money may be used for any item in the institution's cost of attendance, and individual student scholarships may be for up to $10,000 per year. At least 60 percent of the funds must be used to support student scholarships, leaving up to 40 percent for implementation and investigation of curricular and co-curricular activities (e.g. curriculum, professional, and workforce development activities). Grantee institutions may elect to support individual student scholars until graduation or may elect to support several cohorts of students for a shorter duration within the award period.

Track 1: S-STEM Institutional Capacity Building projects seek to increase the participation of institutions that have limited experience with designing and conducting activities that occur in S-STEM Design and Development projects. These projects may request up to $650,000 for up to five years.

Track 2: S-STEM Design and Development: Single Institution projects leverage existing institutional efforts and infrastructure to increase student success, transfer (where appropriate), graduation in STEM and the quality of the STEM workforce. These projects may request up to $1 million for up to five years.

Track 3: S-STEM Design and Development: Multi-Institutional Consortia projects implement, evaluate and investigate a common set of curricular and co-curricular activities associated with student success in STEM across multiple institutions. These projects may request up to $5 million for up to five years.

NSF S-STEM Program

NSF Scholarships in Science, Technology, Engineering, and Mathematics Program

The S-STEM program does not make scholarship awards directly to students; students should contact their institution's Office of Financial Aid for this and other scholarship opportunities. Students to be awarded scholarships must be low-income, academically talented students with demonstrated financial need and be enrolled full-time in a degree program in an S-STEM discipline. In addition, they must be U.S. citizens, permanent residents, nationals, or lawfully admitted refugees.

It is expected that scholarship recipients will achieve at least one of the following by the end of the scholarship award period:

- Receive an associate, baccalaureate, or graduate degree in one of the S-STEM disciplines;
- Transfer from an associate degree program to a baccalaureate degree program or from an undergraduate program to a graduate program in one of the S-STEM disciplines;
- Successfully complete a stage within a degree program that is a point of unusually high attrition.

S-STEM disciplines include biological sciences (except medicine and other clinical fields); physical sciences (including physics, chemistry, astronomy, and materials science); mathematical sciences; computer and information sciences; geosciences; engineering; and technology areas associated with the preceding disciplines.

NSF expects to make approximately 60 to 80 grants each year in the NSF S-STEM program.

Students are often able to shorten time to degree completion and are able to have an augmented academic experience because the scholarship allows them to concentrate full-time on academic studies while limiting the need to work to fund their education. S-STEM also encourages projects to implement activities such as research experiences, internships, and tutoring.

"The program helps to make college affordable and enables me to advance my knowledge of chemistry."

-Olivia Zanolli, STAR Chemistry S-STEM scholar at Walsh University

NSF Solicitation 17-527
Proposal Deadline: March 29, 2017
(Last Wednesday in March every year)
For more information and to see abstracts of current awards, please visit:
https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5257

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Examples of S-STEM Awards with a Focus on Physics/Astronomy

National Science Foundation

S-STEM project:

Physics & Astronomy Scholarships for Success (PASS)

TEXAS A&M UNIVERSITY COMMERCE

NSF Award No. 1643567
Texas A&M University - Commerce

- Provide at least 45 scholarships over 5 years to academically talented physics majors with demonstrated financial need.
- Focus on students transferring from 23 regional community colleges that serve high percentages of underrepresented minorities from rural areas.
- Innovative support system to help students proceed to top graduate schools or STEM jobs
- Goal: Retain 85% of students to degree completion.

National Science Foundation

S-STEM project:

Multidimensional Support to Increase Retention of Physics Majors

NSF Award No. 1565073
University of California - Irvine

- Provide at least 60 scholarships over 5 years to financially eligible, academically meritorious physics majors.
- UC-Irvine is a leader in serving low-income, first-generation, and underrepresented students, and recently the number of incoming physics majors has doubled — but the retention rate has remained low.
- Goals: Double the number of students who graduate with a physics degree; increase the graduation rate of low-income students to 75%; and improve academic success in introductory physics and math courses.
- Education research on students' persistence, attitudes toward science, and changes in physics identity

Examples of S-STEM Awards with a Focus on Physics/Astronomy

National Science Foundation

S-STEM project:

Focus on Physics

NSF Award No. 1356653
University of Maryland - College Park

- Provide scholarships to 24 students (3 two-year cohorts of 8 students each) while they are completing upper-level requirements in the physics major.
- Goal: Significantly improve overall retention for students graduating with a physics bachelor's degree.
- Retention effort de-emphasizes remediation and emphasizes collaborative group work on challenging problems, early research opportunities, mentoring, and community building.

National Science Foundation

S-STEM project:

Supporting Students for Success in Computer Science, Physics, and Mathematics

NSF Award No. 1457876
Westminster College of Salt Lake City

- Provide scholarships for 18 students majoring in CS, physics, or math (CSPM), with two 6-student cohorts beginning in their freshman year and two 3-student cohorts beginning in their sophomore year.
- Target first-generation college students, female students, and underrepresented minority students.
- "Cultural Seminar" taken by scholars during their first two semesters will address cultural sensitivity, socially relevant applications of CSPM disciplines, study skills, student research and internship opportunities, and career and graduate school information.
- Other features: monthly meetings of students to support advising, mentoring, and professional opportunities; matching scholars with faculty, peer, and alumni mentors; and one-on-one private tutoring for struggling students

Volunteer to review proposals!

- One of the best ways to learn how to write a good proposal is to serve on a panel that reviews and discusses proposals.
- DUE's reviewer recruitment form:
  http://bit.ly/due-reviewer