ISEE raises funds from a wide range of sources to support participation in the PDP (see “ISEE Funding Sources & Priorities”), and receives core funding from the following units at University of California, Santa Cruz:

- Division of Social Sciences
- Division of Physical & Biological Sciences
- Division of Graduate Studies
- Vice Chancellor for Research
- Jack Baskin School of Engineering
ISEE manages a range of funding sources and collaborates with others to support participants from many locations, and in many disciplines. Below is a list of current funding commitments:

- **NSF Astronomy grant supports astronomy graduate students and postdocs nationally** (NSF grant AST#1347767 and AST#1643290, PI: L. Hunter).
- **Howard Hughes Medical Institute grant supports UCSC graduate students and postdocs to teach in UCSC “demonstration labs” as part of a project to transform introductory biology, chemistry, and physics (52008112, PI: P. Koch).**
- **Air Force Office of Scientific Research grant supports participants who will teach in the Akamai PREP course (FA95501510427, PI: L. Hunter).**
- **UCSC campus funds some UCSC participants.**
- **Dunlap Institute funds participation of Dunlap affiliated graduate students, postdocs, and professionals.**
- **Mitchell Institute at Texas A&M supports graduate students and postdocs in astronomy and astrophysics (PI: R. Quadri).**
- **NSF Astronomy research grant supports UCSC astronomy-related graduate students and postdocs (AST-1412851; PI: C. Max).**
- **Graduate Assistance in Areas of National Need (GAANN) grant (P200A150100) supports Conservation Biology Fellows at UCSC (PI: R. Mehta; Co-PI: I. Parker).**
- **Thirty Meter Telescope provides support for travel costs for participants teaching in the Akamai program.**

ISEE is continually raising funds, so participants should still apply even if they do not fit the above funding sources. Please contact Lisa Hunter if you have questions about funding sources.
ISEE HEADQUARTERS, CHAPTERS, REGIONAL SITES

ISEE has grown to include a range of Chapters across the U.S. and internationally, and continues to expand to new regional sites. Chapter Liaisons and regional contacts work with ISEE to identify appropriate teaching venues, give input on participant selection, and decide on the topical or disciplinary focus for their site. Individuals connected with our sites listed below are invited to apply to the PDP. Other interested people are encouraged to contact ISEE headquarters.

- Santa Cruz Chapter: Lisa Hunter (lhunter@ucsc.edu)
- Akamai-Hawaii Chapter: Austin Barnes (isee.austinbarnes@gmail.com), Michael Nassir (nassir@hawaii.edu)
- Dunlap Institute Chapter: Michael Reid (mike.reid@utoronto.ca)
- UCLA Astronomy & Astrophysics Chapter: Michael Fitzgerald (mpfitz@ucla.edu)
- Houston Chapter: Jason Porter (jporter@central.uh.edu)
- Boulder Chapter: Seth Hornstein (seth.hornstein@colorado.edu) and Mark Rast (mark.rast@lasp.colorado.edu)
- Carnegie Observatories: Gwen Rudie (gwen@cargogiescience.edu)
- Pasadena, California: Lisa Hunter (lhunter@ucsc.edu)
- New York, New York: Emily Rice (emily.rice@csi.cuny.edu)
- Michigan State University: Devin Silvia (dasilvia@msu.edu) and Saul Beceiro Novo (beceiro@msci.msu.edu)
- Texas A&M University: Ryan Quadri (ryan.quadri@gmail.com) and Lisa Hunter (lhunter@ucsc.edu)
- University of South Carolina: Steven Rodney (srodney@sc.edu)
- University of California, San Diego: Quinn Konopack (qkonopacky@ucsd.edu)

PDP PARTICIPANTS TEACH

PDP participants teach in a range of ISEE affiliated venues that offer supportive environments for innovative teaching and piloting new activities. Venues are often workshops or programs, although experienced PDP participants may also teach in formal courses. The general teaching venues are:

- Undergraduate Research Programs
- Bridge Programs
- Technical Short Courses
- Summer Schools
- College Courses

For further details see PDP Team pages: http://isee.ucsc.edu/programs/pdp/teams/index.html

PDP ALUMNI

PDP PARTICIPANTS GET JOBS

“The PDP has had the largest impact on my teaching philosophy than anything else in my academic career. The specific values and techniques taught in the PDP were directly cited as a major reason I was chosen for my current faculty position.”

“During my interview I had to give a teaching demonstration and discuss inquiry and learner centered models of education. I felt confident doing this as a direct result of my participation in the PDP program.”

“I just passed my tenure review … and based on the feedback I received about my teaching and mentoring, there is no question in my mind that I would not have been half as successful without my experiences with the PDP…”

“Examples of important skills that Ph.D.-level employees typically need, whether they are employed in academia or elsewhere, but for which most new Ph.D.s are ill prepared include project management, leadership, the ability to work in teams, the expertise to address complex interdisciplinary problems, and the ability to teach.”

President’s Council of Advisors on Science and Technology, 2012

AS OF 2015, AT LEAST 104 PDP ALUMNI HAVE MOVED INTO JOBS

Where Participants Teach

- Carnegie Observatories: Gwen Rudie (gwen@cargogiescience.edu)
- Pasadena, California: Lisa Hunter (lhunter@ucsc.edu)
- New York, New York: Emily Rice (emily.rice@csi.cuny.edu)
- Michigan State University: Devin Silvia (dsilvia@msu.edu) and Saul Beceiro Novo (beceiro@msci.msu.edu)
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WHAT PDP PARTICIPANTS TEACH

PDP Participants design an “inquiry” activity – in which learners gain an understanding of scientific concepts by applying cognitive science & engineering research practices. The activity should mirror authentic scientific research or engineering design, and learners should come away with transferable cognitive skills that can be applied in other contexts. A few examples of past activities are included below. Also see the PDP team pages on the ISEE website, http://isee.ucsc.edu/programs/pdp/teams/index.html.

Activity Name
Central Dogma of Molecular Biology

Shining Light on the Sun

Digitizing an Analog World

InGENEious Information: A Computational Biology Inquiry

Optimizing Renewable Energy Systems

Audience & Location
Preparation for Research Experiences (PREP)
UCSC Summer Research Institute

Technical Short Course
Akamai-Hawaii Chapter

Biomolecular Engineering
150 Course, UCSC

Workshops for Engineering & Science Transfers (WEST), UCSC

Brief Description Of Activity & Learning Goals
Using the worm as a model organism, students design experiments to learn about how the integrity of a gene influences physical attributes. Students explain their findings, coordinating results from multiple experiments with findings from literature and databases.

Students investigate solar phenomena with lab equipment to model the sun and actual satellite data. They learn about selectively applying theoretical models of radiation processes (specifically black body, emission, absorption lines) to the solar spectrum in order to infer physical properties of the sun.

Students choose a real-world imaging problem (e.g., tracking wildlife) and figure out optimal sampling rates (resolution) for both the temporal and spatial domains. They learn about digitization, translating a science goal into requirements, and supporting a solution while considering tradeoffs and constraints.

Testing hypotheses and controlling variables, students mine large genomic databases to predict gene function using homology. They learn how to effectively use and interpret results from computational tools, as well as gaining a deeper understanding of how evolution, mutation, sequence similarity, and gene function are related.

Students use models of different sustainable technologies to evaluate efficiency of a real world scenario. They learn about optimizing a system for energy efficiency, relating conservation of energy in a system, and power conversion to evaluate and compare efficiencies.

INQUIRY INSTITUTE
Workshops & Team Formation over 4 days
The Inquiry Institute Includes the following:
• "Comparing Approaches: Three Kinds of Hands-On Science" activity and discussion
• "How People Learn" discussion
• Inquiry activity and discussion (Light & Shadow or Digital Images)
• Diversity and Equity workshops
• Introduction to "Backward Design"
• Learning goals; content, practices, attitudes
• Begin working with activity Design Team

Here, participants experience inquiry from the learner’s perspective, reflect on that experience, and are introduced to strategies for designing and teaching science/engineering inquiry activities inclusively and effectively.

REFLECT & REPORT
Design Teams meet after teaching to debrief and evaluate their experience, and each PDP participant completes a Post Teaching Report. These activities help participants evaluate how well their design and teaching worked, in relation to their intended learning goals. It is also a time to reflect on the overall PDP experience.

TEACH
PDP participants gain practical experience as they co-teach the inquiry activity they designed with their fellow Design Team members. Teaching experiences may range from fairly short (few hours) to week-long or longer activities. Teaching often takes place in ISEE affiliated programs and special courses.

INDEPENDENT DESIGN TIME
Teams independently continue planning and preparing to teach their inquiry activity up until the scheduled venue. Teaching generally occurs May–November.

FACILITATION WORKSHOP
Training in facilitation strategies, techniques, and how to effectively progress students toward learning goals is provided at several intervals close to the time of teaching.

PDP CYCLE of ACTIVITIES
DESIGN INSTITUTE
Workshops & Design Time over 2.5 days
Participants spend roughly one-half of Design Institute time working directly in their Design Teams planning out and preparing to teach science/engineering inquiry activities. As they work, Design Teams consult with ISEE staff members and participate in relevant workshops, including:
• Practicing "Backward Design"
• Assessing students’ explanations of their understandings
• Designing a sequence of activity components

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