The goal of the pre-doctoral training Program in Interdisciplinary Education Research (PIER) at Carnegie Mellon University is to produce scientists who are qualified to conduct research needed for evidence-based educational practice and policy.

PIER aims to produce a new generation of researchers who will be (a) grounded in cutting-edge theories and methodologies in cognitive and developmental psychology, statistics, human-computer interaction and instructional technology; (b) familiar with many of the fundamental problems facing education in America, and (c) committed to applying their skills and knowledge to solving those problems.

PIER students deal with the bi-directional flow of ideas and challenges between laboratory studies and instructional applications. In addition to achieving expertise in a chosen discipline such as Psychology, Statistics, Human Computer Interaction, or Philosophy, PIER students from these fields form interdisciplinary teams to assess learners' knowledge at vastly different temporal and cognitive grain sizes. They develop skills necessary to utilize cognitive science, educational technology and advanced statistical methods to further our understanding of learning in a variety of real-world contexts and settings.

### Core Curriculum Foundations

**Scientific Research in Education**  
(Taught by Training Director David Klahr, Spring 2004, 2005, 2006)  
Overview: Discussion-oriented overview of the national policy and funding landscape relating to rigorous scientific research in education, yielding group project proposals responsive to a federal RFP

**Goals**  
- How can traditional academic research in cognitive science contribute to improving the science of education? Can such research inform policy and practice in ways that have substantial impact? What happens when other stakeholders, such as practitioners, academics from other disciplines (historians, philosophers, "hard" scientists), professional groups, advocacy groups, policymakers, and the media begin to assess and comment on what the research enterprise is producing?

**Central readings:**  

**Projects:**  
- Project: This project involves the choice of a specific unit to teach at a particular age level, followed by progressive development of a learner model, tasks, analysis of the learning goals, and design of instruction and assessment. This design will be supplemented by briefly outlining a research program to test key components, and then culminated by class and public presentations of the project.

**Additional features:**  
- Summer reading response: review a book (see above) to provide a common foundation for initial discussions  
- Field Trips related to Educational Research (lab school, charter school, and children's museum all with strong research base and active research programs)  
- Mid-course student evaluation and choice of topics for subsequent weeks

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**Interdepartmental Admissions & Evaluation**  
All PIER students are first admitted to an existing Carnegie Mellon Ph.D. program and secondarily admitted to PIER. PIER offers U.S. citizens or permanent residents up to 5 years of support, including a stipend and partial tuition grant.

**Cohort 1 (Beginning Fall 2004)**  
- 7 Students - 3 Psych, 3 HCI, 1 Philosophy, 1 HCI Student Affiliate

**Cohort 2 (Beginning Fall 2005)**  
- 5 Students - 1 Psych, 1 HCI, 1 Robotics, 1 Machine Learning & 1 Psych Affiliate

**Cohort 3 (In Process for Fall 2006)**  
- 2 Students - 1 Psych, 1 Statistics & 3 Students Pending

**Students meet all of the requirements for the Ph.D. in their home departments, plus participate in PIER Community, complete a series of three PIER Core Courses (years 1 & 2), and develop an Interdisciplinary Research Project (year 3), in addition to pursuing an education that is guided by an interdisciplinary committee and involves educational research. Students are evaluated annually via their home department process. In addition, each student completes an annual PIER self-evaluation for review by the Steering Board. Based on the committee's discussion of each student's performance, the program director provides feedback in writing to supplement the verbal feedback provided by the student's advisor(s).**

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**Local Community Building**  
The PIER community includes faculty, research associates, graduate and undergraduate students at Carnegie Mellon, together with colleagues at other institutions in Pittsburgh. An ongoing series of activities open to broad participation. Our current distribution list includes 270 individuals.

**Biweekly EdBag Discussions**  
Coordinated by IES Post-Doc Mari Cary. The diverse sessions include research presentations, funding and policy discussions, updates on research in practice, etc. In 2005, launching the EdBag in January of 2005, we have sponsored 28 sessions. EdBag participation ranges from approximately 10 to 30, with an average attendance of roughly 15. The total number of distinct participants during the first year and a half of discussions is estimated by the coordinator to be close to 70.

**PIER Community members may also participate in events sponsored by the Pittsburgh Science of Learning Center (PASC) and the Learning Research and Development Center (LRDC), and vice versa.**

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**Integrative, Interdisciplinary Field-Based Projects**  
Project Goals  
Participate in an interdisciplinary research team for a real-world educational research project prior to the dissertation phase of graduate studies (a) to experience and appreciate the real-world constraints encountered in educational research  
(b) to develop project management, organizational, and research skills necessary to conduct research in field settings to stretch by learning new methodologies and theoretical frameworks

**Project Topics for Cohort 1**  
**Evaluation On Line Mathematics Games**  
Matt Easterday, Elisabeth Lesh and Amy Ogan (PIER Coach: Marsha Lovett)  
- Collaborators from the Pittsburgh Public Schools – Elem Math  
- How effective are the computer math games used by elementary school students in the Pittsburgh Public schools at teaching the intended skills?

**Planning in Tutoring Systems**  
Yvonne Kao and Ido Roll (PIER Coach: Ken Koedinger)  
- Collaborators from the PSLC LearnLab - Geometry  
- In what ways is high school students' learning affected by giving them more control of their solution paths during geometry tutor lessons?

**Meaningful Assessment for Professional Development Education in the Software Architecture Domain**  
Elsa Golden (Coaches: Sharon Carver and Brian Junker)  
- Collaborators from the Software Engineering Institute - Post-Grad Certificate Courses  
- How can adult learning from short-term workshops be effectively assessed?

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**Interaction with Prominent Education Researchers**  
PIER sponsors a colloquium series to provide opportunities for trainees to benefit from in-depth interactions with diverse role models in the learning sciences field. Each guest has at least one faculty and one graduate student host. Scheduled details for each visit are oriented to graduate student interests: topics, methods, and career paths, with the majority of each visitor’s time being spent with graduate students.

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**Training Program Goals**

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**Carnegie Mellon University Program in Interdisciplinary Education Research (PIER)**  
http://www.cm.edu/pier  
Sharon Carver, Assoc. Training Director  
Steering Committee: Brian Junker, Ken Koedinger, Marsha Lovett, Brian MacWhinney, Jack Mostow, Richard Scheines, Robert Siggler, Vincent Aleven

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