FIPSE Focus on Mentoring in the STEM Fields

Over the years FIPSE has supported several projects which address mentoring in the STEM fields. The FIPSE Comprehensive Program projects funded in this area include Science, Engineering, and Mathematics (SEM), Montgomery College - Rockville’s Project “Portal to Success in Engineering”; Hood College’s “Creating a Science Program to Benefit Women and Minority Students: An Interdisciplinary Travel Semester in Environmental Studies”; both the University of Washington’s “Training Mentors and Mentees: A Catalyst for Changing the Climate for Women in Science and Engineering” and “Increasing the Participation of Women in Science, Engineering, and Business: A Dissemination Project”; and MentorNet’s “MentorNet: The National Electronic Industrial Mentoring Network for Women in Engineering and Science”.

With over 1,100 students, SEM Montgomery College’s Rockville Campus is home to the nation’s largest engineering transfer program at a community college. Montgomery College officials learned that one area where receiving institutions indicated that Montgomery College students are disadvantaged as compared with non-transfer students is in exposure to early research opportunities with faculty. Since the inception of the FIPSE grant, Montgomery College’s Rockville Campus has hired faculty with considerable expertise in research training. Faculty mentor training was a key component of their integrated, holistic model targeting under-prepared students who tested at the developmental math or intermediate algebra level. Although the high school academic records of students participating in the pilot project suggested that they could not complete the first two years of a demanding engineering curriculum, their determination and interest in STEM, coupled with intensive faculty support, proved otherwise.

The pre-enrollment, summer bridge program exposed students to engineering technologies and tools, improved their academic self-confidence and math skills, and developed a strong peer and faculty support network. Career and transfer advising as well as education planning, internships, visits to four-year schools, and a seminar class focusing on the world of working engineers helped students develop a strong professional identity and goals. The pilot early research experience component enhanced students’ “readiness to transfer” and increased interest in pursuing graduate studies.

continued on page 4
What does FIPSE mean by “innovation”?  

Since 1973, FIPSE has stressed the need for improvements in postsecondary education and funded over 2,000 projects to that end through its Comprehensive Program competitions. Comprehensive Program announcements have particularly called for “innovations” in priority areas of postsecondary education. However, prospective grant applicants are often unclear about what constitutes an innovation from FIPSE’s standpoint, which isn’t surprising, considering that innovation is ultimately a matter of perception.

Innovation means “renewal.” For FIPSE’s purposes innovation means new or improved substantive ideas, information, or content perceived by postsecondary educators as new from a national perspective. It may take the form of a product, a format, a program, a practice, a process, or any other structure or dynamic phenomenon that is not conventional or standard in a field or discipline. Project ideas may be innovative if they have rarely or never been tried before, or if there is a significant challenge in adapting them to new settings or new target populations. One typically defines an innovation through comparisons with standard or conventional practices. The innovation may not be revolutionary or paradigm-shifting, but it should be a significant next step.

Many innovations occur when educators borrow an idea from one field or domain and apply it to another where it is unknown, such as a patient safety curriculum for medical schools modeled on airline crew protocols. Innovation may involve a new instructional process that increases the depth and speed of learning. It may be a set of administrative procedures that is significantly more effective or more cost-effective than conventional procedures. It may be quantitative information that is not typically included in a humanities course. Different degrees of innovativeness may be found in FIPSE projects, but even those with minor, but well developed and implemented, improvements may yield significant benefits.

FIPSE views innovations in a national context. We are looking for new or improved models that grantees may develop for their own use but are adaptable and affordable for many other users nationwide. Successful applicants frame their improvement efforts with a view toward more widespread utility.

Innovations obsolesce. Many previous innovations in postsecondary education have become standard practices. In the late 1990s, FIPSE funded Web-based courses, which were then considered innovative; now most institutions of higher education use the Web for instruction. However, perennial and complex problems in postsecondary education continue to foster creative new solutions. FIPSE hopes to fund the best of those solutions.

Donald Fischer
FIPSE Program Officer, Since 1987
FIPSE’s flagship program is the Comprehensive Program. As FIPSE heads towards its 40th anniversary in 2012, we thought it would be interesting to look at where we have been. In this issue we present a review of the invitational funding priorities that FIPSE has used in the field of curriculum design between 1973 and 2010. Though applicants have never been obligated to address invitational priorities in their applications, and they receive no additional points from reviewers for doing so, a look at the invitational priorities over time gives a sense of the educational trends that were considered important by FIPSE staff, Department of Education officials, Congress, and the field.

**FIPSE Comprehensive Invitational Funding Priorities from 1973 to 2010**

**Category 2: Curriculum**

- **1973**: Core Requirements and General Education
- **1979**: Blending Special Purpose Programs of Industry, Business, the Military, Private Trade, and Technical Schools with the Broader Academic Programs of Colleges and Universities
- **1984**: Aligned Curriculum Between High Schools and Colleges and Between 2-and 4-Year Postsecondary Programs
- **1993**: Graduate and Professional Education
- **2001**: Curricular Reform
- **2005**: Core Requirements and General Education
- **2006**: Graduate and Professional Education
- **2008**: Graduate and Professional Education
- **2010**: Graduate and Professional Education

**SAVE THE DATE**


Faculty mentoring has contributed to a 96% retention rate in college and a 75% retention rate in engineering. By the end of the spring 2010 semester, 20 out of 30 cohort students from underrepresented groups had transferred to four-year engineering programs and several have received competitive scholarships. In the words of Yanira Gutierrez, “FIPSE has made a big difference. I knew I wanted to be an engineer, but right out of high school, I didn’t have the math skills or confidence to succeed. Engineering is really competitive. The program helped me focus my goals. I will transfer fall 2010, ready to compete with university students. Now I am self-driven, mature, and can take initiative.” We encourage you to listen to some of the program’s podcasts for more information about the program and its achievements.

Recently, the Program has expanded to offer a minor in Coastal Studies that augments the semester-long experience with additional field-intensive courses in such areas as South Florida, the Caribbean, or Coastal Maine. According to Project Director Drew Ferrier, “Our FIPSE grant was the help we needed to get the program started. We’re now an integral part of the Hood curriculum, have been able to attract additional funding, and are entering our second decade of operation!”

The University of Washington received both an initial FIPSE Comprehensive grant and a follow-on dissemination grant for their “Curriculum for Training Mentors and Mentees and Increasing Access,” which is now used by over 350 institutions throughout the world. Currently the Center for Workforce Development (CWD) at the University of Washington offers two mentoring programs. The Faculty and Graduate Mentoring Program aims to increase the recruitment and retention of graduate students from underrepresented groups, including women and individuals of color. The Nanotechnology Mentoring Program pairs students affiliated with the Center for Nanotechnology with mentors in industry or faculty positions to learn about practical applications of nanotechnology. Women in Science and Engineering (WISE), the pre-cursor to CWD, received the prestigious White House 1998 Presidential Award of Excellence in Science, Engineering and Mathematics Mentoring and the 1998 WEPAN National Women in Engineering Program Award.

**SELECTED WEB SITES REFERENCED IN THIS ARTICLE:**

- Association for Women in Science  
  http://www.awis.org/
- Center for Workforce Development  
  http://www.engr.washington.edu/cwd/CWDHome.html
- Hood Coastal Studies Program  
  http://www.hood.edu/academics/resources.cfm?pid=resources_coastal.html
- Latinas in Computing  
  http://anitaborg.org/initiatives/systers/lic/
- MentorNet  
  http://www.mentornet.net/
- Science, Engineering, and Mathematics (SEM), Montgomery College – Rockville  
  http://cms.montgomerycollege.edu/edu/department2.aspx?id=4957
- WEPAN  
  http://www.wepan.org/
In the past six years the new Math Teaching and Learning Center (Math TLC) program at the University of Wisconsin (UW) – Stout has served over 4,000 students and achieved a 52 percent reduction in failure/withdrawal rates in Beginning (remedial) Algebra and a 39 percent reduction in failure/withdrawal rates in Intermediate Algebra compared to the four previous years. The Math TLC program has resulted in nearly 600 more students passing introductory algebra courses than would have passed given historical success rates, potentially increasing overall university retention by as much as 3.5 percentage points over this period. The program has also been successful in reducing the minority achievement gap in remedial math by more than 80 percent. Consequently, more students are now able to choose science, technology, engineering, and math (STEM) or business majors.

The most recent annual Course Redesign Workshop funded by a 2006 FIPSE Comprehensive Program grant was held at the University of Wisconsin (UW) – Stout campus in June 2009. The three FIPSE-funded workshops hosted a total of 45 participants from 12 states representing 29 postsecondary institutions and one high school. Participants reported that the workshops provided them with highly valuable content and materials, and that the time spent at the workshop was definitely worthwhile in terms of usefulness for their immediate and future hybrid course development and delivery. Outcome evaluations have been completed on fall-semester implementation of 24 redesigned courses by 2007, 2008, and 2009 workshop participants. Despite the technical challenges associated with implementing a computer-assisted learning environment, analysis showed that these first-iteration redesigns have resulted in statistically significant decreases in failure/withdrawal rates in 38 percent of implemented courses compared to higher rates in only 8 percent of these courses.

The redesign workshop results have been disseminated, via workshops, to 32 postsecondary institutions and two high schools. All materials and resources from the course redesign workshops have been posted on a public access Web site. This link will take you to a white paper published by Pearson-Prentice Hall which features six schools across the United States that are using the MyMathLab course software in innovative and successful ways. The University of Wisconsin – Stout’s four-year progress report is also available online. Interested persons may also explore the online software used in the Math TLC courses.

WEB SITES REFERENCED IN THIS ARTICLE:


Math TLC Home http://mathtlc.uwstout.edu/index.html

Math TLC Online Software Demo http://mathtlc.uwstout.edu/Visit%20Course%20Web%20Site.html

Course Redesign Workshop Information http://mathtlc.uwstout.edu/FIPSE_WorkshopInfo.html

continued on page 6
One of the oldest FIPSE-funded STEM mentoring projects targeting underserved populations in the sciences is MentorNet, an independent award-winning e-mentoring network for diversity in engineering and science. According to former FIPSE Program Officer Joan Straumanis, “MentorNet was a hard sell at FIPSE (in 1998) because it was independent and new – not associated with any university or other existing organization (although it was originally housed at San Jose State University). In that respect it … [carried] forward the old FIPSE spirit of the 1970s, when all kinds of new organizations and enterprises were founded with FIPSE support.” MentorNet received a FIPSE Comprehensive grant in 1998 to support the fledgling mentoring network being developed with help from WEPAN, the Women in Engineering Programs & Advocates Network. The MentorNet site received another FIPSE Congressional Priorities Project grant in 1999 entitled “MentorNet 3C: An Electronic Mentoring Program to Encourage Community College Women to Enter Careers in Technology and Business.” 

Since FIPSE funding ended in 2003, MentorNet has continued to expand. Currently 719 companies, including IBM, AT&T, and Texas Instruments, have staff signed on as mentors. There are 167 mentors available to be matched and 1,229 mentors currently matched. Approximately 45 percent of the mentors are female, and mentors cover a range of occupations including engineers, scientists, programmers, and CEOs. The site provides a list of the colleges and universities which currently participate in MentorNet. The most recent demographics for protégés of the network show that:

- 2% of the protégés are American Indian or Alaskan Native,
- 35% are Asian / Asian American,
- 14% are Black / African American,
- 9% are Hispanic or Latina / o,
- 1% are Native Hawaiian or Pacific Islander, and
- 45% identify as White.

Fifty-six percent of the protégés are female and more than half of the protégés are in Bachelors programs. On April 10, 2008, the Association for Women in Science (AWIS) announced that they were partnering with Latinas in Computing (LiC) “to expand mentoring opportunities to Latina students and professional women in computing via the e-mentoring network MentorNet.” MentorNet has won numerous awards including the 2006 Anita Borg Social Impact Award and the 2001 Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring.
What are FIPSE Grantees Working On?

FIPSE holds several competitive grant competitions and manages non-competitive Congressionally-directed grants (earmarks). FIPSE initially classifies each project according to its main subject area(s). Grantees are able to modify this classification to include other major subject areas that their work seeks to address.

A note about the two charts: (See page 12 for chart two.)
1. Grants can cover several subjects, so percentages do not total 100%, and
2. Awards vary greatly in size, so you can draw no conclusions about dollars spent from these charts.

Congressionally-directed Grants, FY 2006 – FY 2009
(N= 662 grants. Grants may cover multiple subject areas; therefore, the chart does not total 100%. Subjects covered by fewer than 5% of grantees are not included.)

Please help us be a resource for you!

FIPSE would like to make the FIPSE database more useful for people working in the field of postsecondary education. If you look at the University of Wisconsin – Stout’s current Comprehensive Program grant abstract page you will see the information we currently post for a typical grant. If you go to our Advanced Search page you can see our current search options. So thinking about our database as a resource for information about funded projects,

• What additional information do you need to foster change at your institution?
• What search tools would you like to better locate the information you want?
• If you think we should re-package the information to make it more useful, tell us how, or send us a link to a Web site that you like as a model.

Send us your simple ideas and your complicated ones to susan.lehmann@ed.gov.
International Teams in Engineering Industrial Projects: A Cooperative Manufacturing and Production Engineering Program

Project Director: Dr. Robert Young
Professor: Edward P. Fitts
Department of Industrial Engineering,
North Carolina State University


Project Description: The manufacturing and production engineering consortium created teams of U.S. and Brazilian engineering students to solve engineering design problems in manufacturing and production at companies in the United States and Brazil. The project gave universities in both countries the opportunity to participate in the exchange of engineering students and helped students learn how to work in multinational engineering design teams. It also enhanced the language skills of the students and their ability to understand different social and technical cultures. Among the many things that students rated highly about the experience was that they gained recognition that there are different ways to achieve goals. They also reported that they gained confidence in being assigned to work in an emerging industrialized country. Eighteen U.S. students and 23 Brazilian students participated in the exchange.

Profile: Kate Hensley, who earned her Bachelor’s Degree in Science and Industrial Engineering at North Carolina State University, was part of the group of students who first participated in this project in the spring of 2004. During the seven-month exchange Kate lived in a women’s residence hall that doubled as a nunnery. Kate’s coursework was primarily in Portuguese, which she did have difficulty adjusting to at first, though she does credit her peers with helping her adjust to her work in the program.

As a result of her participation in the project, Kate changed her major to Industrial Engineering. When she graduated, she was hired by Sikorsky Aircraft Corporation in Connecticut and made responsible for procurement for Sikorsky’s subcontractors in Brazil. Kate credits her being chosen as a partner-manager for a helicopter platform to her participation in the program. Later on, Kate decided to pursue her Master’s in Management Operations at Rensselaer Polytechnic Institute with the aid of Sikorsky. She has now moved up and is on loan to United Technologies setting up maintenance and repair facilities in Abu Dhabi in the United Arab Emirates.

After participating in the U.S.-Brazil Higher Education Consortia Program and living in a different culture, Kate has learned how to appreciate the smaller things in her own culture, such as southern cooking and considerate people. The exchange also taught Kate to be more perceptive of the world around her rather than just focusing on her personal life on a day-to-day basis. Kate’s most memorable learning experience was learning how to adjust to a different environment and realizing that she could go anywhere in the world and be able to survive. Kate’s favorite parts of the program were the friendly people she met and the beaches.

Kate advises any faculty members who are considering FIPSE study abroad programs that the programs are going to be valuable in the long run to the American workforce as companies begin to grow and globalize. Her advice to any students considering the program: “Don’t worry so much about finishing school so early. Use time in college to acquire skills that will get you where you want to go, and if you have the opportunity to travel abroad, take it!”

Profile written by Ricardo Howard, FIPSE’s summer intern. Ricardo is a sophomore at Georgia State University majoring in accounting.
Professional Puzzle: Veterans in the Classroom

Each newsletter we will pose a few questions about a topic relating to institutional change, faculty development, or student learning. Please e-mail your responses or ideas for future issues to the editor and put the words “Professional Puzzle” in the subject line.

Veterans in the Classroom

Are there comprehensive sources of information about educational services which cater to veterans?

Are there innovative programs out there that are designed to provide educational resources or services to veterans seeking to pursue postsecondary education?

Are there programs to assist in the successful educational advancement and reintegration of disabled veterans through the development of physical, academic, social, and career skills that provide opportunities for the pursuit and attainment of a postsecondary degree and job placement?

Are there any fast-track programs designed specifically to build on military training and help veterans re-tool for a civilian career?

Are there sources of information and assistance in gaining transfer credit for competencies acquired and documented in the military?

Are veterans different from the typical adult student, and if so, what academic skill-building, career, and education planning resources do they need?

FIPSE Project Directors willing to answer e-mail about their experience with integrating veterans into the classroom should contact susan.lehmann@ed.gov.

Responses to the May Professional Puzzle on ePortfolios may be found on the FIPSE Update Web page. Please feel free to send in additional links to ePortfolio resources or comments based on your experience with ePortfolios. If we receive additional information, we will update the posting.

We did decide that in the interest of space we would re-route you to our Web site for the reflective material generated by the May issue’s Professional Puzzle. Thank you to several FIPSE project directors for taking the time to be interviewed by me for the follow-up on ePortfolios. Also in the interest of space you will notice that this issue’s cover story doubles as our Nurturing Innovation: Profiles of Former FIPSE Projects That Grew.

Please feel free to send us your suggestions and requests for items that would interest you as a former or current FIPSE grantee, former FIPSE employee, or interested reader from the higher education community. Please also feel free to forward this newsletter to colleagues.

Best,
Dr. Susan Lehmann, Education Research Analyst, FIPSE
susan.lehmann@ed.gov

The definition of “veteran” provided by the Office of General Counsel, U.S. Department of Education, and taken from section 480 (c)(1) of the Higher Education Act of 1965, which applies to Federal Student Aid programs, is as follows: A veteran is an individual who “has engaged in the active duty in the United States Army, Navy, Air Force, Marines, or Coast Guard” and “was released under a condition other than dishonorable.”
FIPSE Logos

Project directors for competitive FIPSE grant programs are aware that we want project Web sites to both acknowledge FIPSE funding and sport one of our logos. By putting a logo on your project you make it much easier for FIPSE staff and supporters to locate you and learn from your experience. (One project director compared it to tagging sharks to track their habits and we like that idea.)

Logos can be searched using an image search. A FIPSE image search, as opposed to a typical Internet keyword search, weeds out all the federal documents that cite FIPSE. What remain are primarily links to FIPSE-funded projects. If you are a FIPSE project director, past or present, and you maintain a project Web site, please contact susan.lehmann@ed.gov for information about how to download a high-resolution logo.

In the meantime, FIPSE would like to applaud the creativity of the Pratt Center for Sustainable Design Studies for their unique take on the FIPSE logo seen here. We invite you to check out their Web site and click on the “projects” tab to find out what they are up to.

JUST THE FAQs

How does FIPSE evaluate its applications?

1. FIPSE’s competitive grant review process changed substantially in 2007. Today FIPSE grants are reviewed by field readers in a one-stage process. FIPSE staff continue to provide consultation with applicants, but are no longer involved in the actual review and evaluation of proposals.

2. Each application is typically assigned to three readers. None of the readers can be from the applicant’s institution or state. FIPSE staff strives to assign proposals to a team of readers who among them possess topic expertise, field expertise, and general knowledge of higher education. This means two things:
   • applicants should take care to write accurate project abstracts because abstracts are the tool that FIPSE staff use to assign a proposal to reviewers, and
   • applicants should take care to write for non-experts because one or two of the three field readers will likely not be an expert on the proposal topic.

3. It is also very important for applicants to read grant application instructions, which indicate how many points applicants may earn by addressing specified selection criteria. Reviewers score applications with reference to the total points allotted to each of several criteria. FIPSE works closely with reviewers each year to make sure that reviewers don’t merely check off selection criteria as “present” without regard to the substance of ideas discussed in each section.

   A common mistake that applicants make is to spend too much of their limited space describing a national problem at length. It would be wiser to quickly set the stage for your idea and devote more space to explaining the details of your innovative plan. Another common mistake that applicants make is to write in a vacuum with no reference to research or findings that are already known. An ideal FIPSE grant should build on the work of others, not reinvent it.

4. The total points awarded by three reviewers is used to rank grant applications. Once the review process is complete, a “slate” is created with projects ranked from high to low. ■

An ideal FIPSE grant should build on the work of others, not reinvent it.
RESOURCES THAT CAUGHT OUR EYE

Web Sites

www.ehow.com
This is a Web site with advice about how do almost anything. It is free and contains thousands of videos. There are almost 20,000 posts on college and higher education, over 10,000 posts on vocational education topics, and almost 30,000 posts on K-12 education. Posts are rated by readers making it easy to find higher quality ones.

www.readability.com
Readability is a free, downloadable tool that makes reading on the Web more enjoyable by removing the ads and clutter surrounding the text you are reading. You can personalize it with your own font and margin size preferences. It works with Safari, Firefox, and Chrome, but not Internet Explorer.

Books


Articles


What Percentage of FIPSE Competitive Grants are in STEM Fields?
FY 2006 – FY 2009
(N= 329 Competitive Grants)

![Chart showing percentage of FIPSE Competitive Grants in STEM and Non-STEM fields]

Non-STEM 44%
STEM 56%
## Comprehensive Grants by Subject, FY 2006 – 2009

(N= 75 grants. Grants may cover multiple subject areas; therefore, the chart does not total 100%. Subjects covered by fewer than 10% of grantees are not included.)

### FIPSE’s Mission

The Fund for the Improvement of Postsecondary Education (FIPSE) is a unit of the Higher Education Programs located within the Office of Postsecondary Education, U.S. Department of Education. **FIPSE’s mandate** is to “improve postsecondary educational opportunities” across a broad range of concerns. Although a small program, FIPSE has established a record of promoting meaningful and lasting solutions to various, often newly emerging, problems and of promoting the highest quality education for all learners. Through its primary vehicle, the Comprehensive Program grant competition, FIPSE seeks to support the implementation of innovative educational reform ideas, to evaluate how well they work, and to share the lessons learned with the larger education community.

FIPSE defines postsecondary education broadly. Its applicants include a wide variety of nonprofit agencies and institutions offering education after high school, such as colleges and universities (public and private, two or four year, undergraduate and graduate), technical and business schools, testing agencies, professional associations, employers and unions, state and local education agencies, student organizations, cultural institutions, and community groups. FIPSE supports new as well as established organizations, but it cannot award grants to for-profits or unaffiliated individuals.

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**Fund for the Improvement of Postsecondary Education**

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