A Community of Excellence: Program Evaluation

January 1997 marked the first Committee of Visitors (CoV) evaluation of PPD.[5] At that time there were approximately 20 active PPD projects. There was also a discussion at this time whether addressing 1993's Government Performance and Results Act too stringently would emphasize short-term evaluations over long-term outcomes. Overall, the CoV's review of PPD was very positive, going further to add— "We are especially impressed by the expertise, dedication, and leadership of Lawrence Scadden and (program officer) Mary Kohlerman, as evidenced by the continued improvement in the number and quality of the proposals and the thoughtful feedback provided by PPD staff on pre-1996 proposals. The quality and scope of the work done in this important area by a small staff is exemplary." (CoV, 1997, p. 2.) The committee additionally noted the success of PPD staff in bringing awareness of PPD program objectives to the general educational establishment. The review methods examined and the use of appropriate expert reviewers were also deemed appropriate.

What gets measured, gets done.
If you don't measure results, you can't tell success from failure.
If you can't recognize failure, you can't correct it.
If you can't see success, you can't reward it.
If you can't see success, you can't learn from it.

—From *Reinventing Government*
by David Osborne and Ted Gaebler (1992)

These words, reproduced from the first page of the 1999 Urban Institute report on PPD, exemplify the prevailing interest in quantified, outcome-based indicators for government-sponsored programs that characterized the late twentieth century. The Urban Institute of Washington, DC, was asked to provide this independent evaluation of PPD in partial response to the revised expectations for program performance stipulated in GPRA and the above excerpt set a clear tone for the recommendations that followed. The intent of this evaluation was to conduct a review of the program's key outcomes and, in the interest of quantifying the outcomes of PPD project activities, to conduct a pilot study on the feasibility of collecting student-outcome data from principal investigators as well as from school boards and individual students one to two years after project participation. Recommendations for the development of data-collection procedures, forecasting future project outcomes, and otherwise contributing to the knowledge base of "effective process" were also included in the Institute's reports provided to NSF in December of 1999 (Urban Institute 1999 a,b,c).

[5] Committees of Visitors are an established means of independent, third-party evaluation used by NSF.

Similarly, the change in individual student performance should be weighed more heavily than absolute performance level at the completion of project participation. "Breakout" results, summarizing outcomes beyond those stipulated by the core indicators, would also be considered valuable, with all outcomes distilled and consolidated by PPD staff prior to reporting to higher NSF management. The Urban Institute also recommended that PPD should aggregate its outcome data annually and use updated editions of this information to guide current and prospective applicants.

In its final report, the Urban Institute advised that the Division of Human Resource Development—and indeed the Directorate for Education and Human Resources—would be well served to devise a standard set of performance indicators for projects and their participants, which ideally would be charted for up to two years after the project's completion. They ceded the difficulty in doing so, given the frequent change or movement of project staff and student participants, and added the following caveats on the use of outcomes-based indicators:

1. That quantified outcomes in and of themselves do not indicate why such outcomes occur and are insensitive to factors beyond the core indicators that may improve/decrease individual performance. In this regard, the collection of breakout data and explanatory information was advocated.
2. Time and effort—perhaps significant levels of each—are required to construct or revise any data collection procedures. In this regard, project officers seemed interested in collecting more quantified data provided additional funding was offered for this purpose.
3. The use of uniform or standardized outcome data will be resisted as being too expensive to collect and too limited or insensitive in its utility. Securing permission to review school records, expecting consistent or standardized metrics from many different sources, and collecting sufficient data post-participation are major issues. Most awardees felt they lacked the resources to do so effectively.

On May 3 and 4, 2000, PPD program staff met with a second Committee of Visitors to discuss PPD activities and accomplishments for the period 1997-1999. In its report, the CoV was asked to specifically mention areas in need of more attention and to suggest avenues for the future of PPD. The committee was also asked to respond to the advisability of scaling up these programs, based upon the new knowledge that has emerged from NSF's investment. The committee found PPD's merit review procedures to be excellent. The program's use of the new NSF Merit Review criteria was also deemed successful. Reviewers had different expertise and qualifications, which, when combined, brought the overall balance needed to each review panel. Reviewers were also balanced in relation to geography, underrepresented groups, and other criteria.

While the 2000 CoV found PPD's accomplishments were excellent in comparison to NSF's financial investment, they believe that it is imperative to the national agenda that more persons with disabilities participate in programs that improve STEM education and career opportunities. The successful strategies that have emerged from PPD need to be disseminated and pursued more widely in other NSF education and human resource programs. The CoV believed that, with additional funding, this work will create opportunities to expand the impact and scale of the knowledge gained in the program. The CoV commended PPD for the challenging work it is completing in developing a framework that permits an overview of the results of the NSF investment, its impact, and areas needing further discovery.

Commendations from the 2000 PPD Committee of Visitors

- Award processes and management are exemplary.
- The program has a knowledgeable and dedicated program staff, remarkably creative and committed to program goals with extraordinary abilities to get the most "bang for the buck" in quality programs and projects.
- The research framework that is being developed for both programs to gauge progress and evaluate impact is very impressive.
- Considerable new knowledge and best practices are developing through the NSF investment.
- PPD has sufficient positive results that they are well positioned to "scale up" for wider implementation.

Benefits to the Community

PPD and its awardees continue to change research and education in the following areas—

Facilitation Awards for Scientists and Engineers with Disabilities—In FY 1992 alone, before even receiving its own program budget, PPD fully or partially funded eight facilitation awards for scientists and engineers with disabilities, representing over a 100 percent increase in NSF funds allocated to these awards. PPD has remained the central point of contact for NSF's facilitation awards ever since.

Effective Outreach and Information Dissemination—As early as FY 1994, PPD support led to the distribution of more than 3,500 *Barrier Free in Brief* booklets and 1,500 each for the *Find Your Future* and *You're in Charge* career booklets produced by the American Association for the Advancement of Science. The University of

Washington distributed quarterly copies of the *DO-IT News* to 1,400 members on its mailing list while countless others received electronic copies through Internet discussion lists. A random census of 13 FY 1998 PPD projects identified the combined participation of 5,200 students and teachers, 250 counselors and administrators, 150 parents, 3,400 conference attendees, and 156 special-education teaching students.

Leadership in Standards-Based Education—Following the lead of Texas and California, 29 states now have or are considering pending legislation mandating that all instructional materials purchased by public schools must be usable by students with disabilities. To address this, WGBH's National Center on Accessible Media (NCAM, #9623958) has produced "Making Educational Software Accessible: Design Guidelines Including Math and Science Solutions." The guidelines provide curriculum developers and publishers assistance in making software-based materials accessible (for example, captioning for deaf students, audio tracks for the blind, or alternate/enhanced operation via both keyboard or mouse). National associations of publishers and librarians have encouraged members to use the NCAM guidelines. Interest in the guidelines has been strong and the Center has distributed them to the Association of American Publishers schools division, the Department of Education's technology projects meeting, and numerous universities, museums, and software companies. Elsewhere, working with the National Science Teachers Association (NSTA), the Education Development Center (EDC, #9800287) has completed a series of contributions to NSTA's *Pathways to the Science Standards* publications. The additional sections intend to provide educators with guidelines for including elementary, middle, and high-school students with disabilities in activities and assessments. Two FY 2000 PPD awards to TERC, Inc. (#0090070, #0095392) will help apply the NCTM standards-based curricula to students with disabilities and will develop the SigningAvatar™ to enhance distance-learning programs.

Assistive and Augmentative Technologies—PPD-supported principal investigators have made significant gains in the way persons with disabilities can interact with STEM education materials. These successes include improvements to touch tablets by the City University of New York (#9450166); a force-feedback mouse developed by Automated Functions, Inc. (#9906143); and three-dimensional models to enhance the study and comprehension of chemistry, biochemistry, and the life sciences (Arizona State University # 9610289; San Francisco State University #9800281). Oregon State University and ViewPlus Technologies (#9452881, 9800041, 9976548) developed the Accessible Graphing Calculator, Dots Plus Braille code, and the Tiger Advantage Tactile Graphics and Braille Embosser, which provides blind students with a tactile representation of any graphic developed on a computer. This is the first instance of a tactile graphics printer and was co-winner of the B.F. Goodrich university invention of the year in 1996.

Improved Educational Tools—PPD awards have also led to the publication of four mathematics and science books prepared with Dots Plus symbiology as developed at Oregon State University (#9452881). Project staff at the University of Northern Iowa have produced two volumes on *Science Teaching in Inclusive Classrooms* of use to anyone trying to address issues of parity and equity in diverse classrooms (#9988729). PPD awards to Reading for the Blind, Inc., helped to develop new technology to integrate computer files with digital voice recording, ultimately leading to new mathematics and science texts for students with print disabilities (#9610308). PPD awards have also helped to adapt the presentation of calculus to visually impaired students (#9906115).

Improved Access to STEM Education—PPD activities have done much to introduce hundreds of students with disabilities to STEM in supportive and engaging environments, including summer science camps (#9550003, 9550064, 9732913, 9800324*)* and undergraduate curricula such as Purdue University's model program for engineers with hearing impairments (#9353824). For informal science centers benefiting students and the public at large, the Association of Science-Technology Centers (#9906095) is using PPD support to develop science-center exhibits that are more appealing, accessible, and rewarding for all persons with disabilities.

Mentoring and Role Modeling—A multi-year effort by the New Jersey Department of Education (#9906123) has developed a distance-learning project to increase the interest in science and science aptitude for deaf and hard of hearing students in kindergarten through twelfth grade. Duke University (#9800201) is working on a system of tiered mentoring is impacting students through the entirety of the supply pipeline, grade school through graduate study. At Temple University, the "Daughters with Disabilities" project (#9906079) has also succeeded in using role models, mentors, and family support to retain the interest of girls and young women in STEM courses. New Mexico State University's "RASEM Squared" project (#0124198)—also PPD's first Regional Alliance award—is currently supporting more than 20 students with disabilities majoring in STEM disciplines. Each mentor is required to have a minimum of three weekly consultations with their mentee—younger students with disabilities (either in high school or lower division undergraduates) who have been recommended by science or mathematics faculty as having particular interest and ability in STEM fields. Befitting the expectations of the PPD Regional Alliance model, RASEM² involves commitments from 17 two-year community colleges, 6 four-year colleges and universities, and 9 school district regional center cooperatives in New Mexico; and 2 universities and 2 educational service centers representing school districts in West Texas. The alliance also involves two national laboratories, the statewide agencies serving people with disabilities, and a national organization for the advancement of science.