

D. The Greater Philadelphia Secondary Mathematics Project

The Greater Philadelphia Secondary Mathematics Project (GPSMP) is a “Local Systemic Change” program funded by the National Science Foundation. It builds upon nearly five years of work in Philadelphia implementing the Interactive Mathematics Program. Its five-year mission is to include more NSF reform curricula for both middle and high schools, and extend its service to include schools and school districts in southeastern Pennsylvania and southern New Jersey. From a total of possible 1,100 schools in both states, this project will eventually work with approximately 20 school districts that have demonstrated readiness to engage in standards-based mathematics reform. The goal is to train **600** teachers over five years in this local area to who are able to sustain the reform process after this grant ends.

GPSMP Professional Services

The Greater Philadelphia Secondary Mathematics Project provides the necessary professional development, in-classroom follow-up mentoring, and administrative technical assistance to schools that have made a commitment to align the *curriculum* and *instructional practices* of their secondary mathematics classrooms with the new mathematics standards. A school district’s professional development plan is developed in joint consultations with the GPSMP project directors and the district’s administrators and teachers. All plans have the following components:

- 1) a multi-year, intensive in-service schedule,
- 2) student-centered instructional methods,
- 3) inquiry-based, integrated curriculum,

- 3) teacher leadership development,
- 4) provisions for classroom mentoring, and
- 5) administrative technical assistance.

There is no charge to participating school districts for the following services:

1. In-service Curriculum: The professional development plan for each districts' math staff is designed to meet the needs of a range of teachers who are at different stages in their careers, who have different teaching assignments in their schools, and who have had different amounts of previous professional development. The professional in-service curriculum consists of two types of training. Each teacher will have a somewhat different mix and schedule of training depending on the particular needs of the school and the teaching assignments and experience of its teachers. The first type is centered on one of several *NSF-sponsored* middle and/or high school curricula, which have been selected. This type of training ranges from 180 to 240 hours depending on whether the curriculum spans 3 or 4 years.

2. In-service Instructional Methods: The in-service instructional methods for the above training model an inquiry-based, student-centered classroom. For example, in IMP in-service sessions, teachers are seated in groups of four, like their students. The in-service presenters guide teachers through the units as they would their own students. Teachers work on selected problems in each unit. In addition to new math content, the training also focuses on student-centered instructional strategies and various forms of assessment, including portfolios, long-term problem-based essays, and group presentations.

An integral part of training is for teachers to actually teach all levels of a full-replacement curriculum. The in-services focus on practical issues of classroom implementation. Teacher manuals, videotapes and electronic networking supplement the in-services.

3. Promoting Teacher Leadership: Teacher leaders can be important agents of systemic change are within schools (Day, Goertz, & Floden, 1995). Teacher leaders are important because they: 1) act as agents of change within their building, 2) persuade their colleagues to take risks involved with change, 3) provide programmatic stability in the face of administrative turnover, 4) persuade parents of the need for change, and 5) become better classroom teachers. We promote teacher leadership by providing teachers with the opportunity to co-present in-service sessions with more experienced presenters, including the co-directors. Teachers leading in-services encourages the development of teacher-to-teacher networking and collegial support. Therefore, one goal of this project is to train more veteran teachers and mathematics department heads to lead or co-present in-service sessions. For example, over two dozen veteran Philadelphia IMP teachers have been involved in presenting or co-presenting IMP in-service sessions to new teachers in Philadelphia, New York and Boston. Experienced teacher leaders are utilized as much as possible to help schedule and conduct in-services for newer teachers.

4. Classroom Teacher Mentoring: As a follow-up to the in-service sessions, teachers are regularly visited in their classrooms to receive one-to-one mentoring. Secondary math teachers who were traditionally schooled must not only shift their thinking about the way students learn, but must also adopt different approaches to classroom management and student assessment. At the same time, many teachers must

re-learn a large volume of mathematics content that is not usually taught in high school, such as probability, statistics, matrix algebra, and linear programming. Teachers also need to master the use of graphing calculators and must work through many unfamiliar, non-routine problems. New IMP teachers, for example, are regularly visited in their classroom, by a veteran IMP teacher-mentor or IMP director. During these visits, a mentor may team-teach part of a lesson or help lead classroom discussions. After each class, the mentor provides feedback to the math teacher.

5. Administrative Technical Assistance: The project directors provide technical assistance to principals, mathematics department heads, roster persons and other administrative personnel concerning:

- 1) Budgeting support for program implementation in their school;
- 2) Classroom materials, book, and calculator requisitions;
- 3) Teacher and student recruitment and classroom rostering issues;
- 4) Student transfer, absentee, retention and readiness issues;
- 5) Intra and inter-school and grade articulation issues;
- 6) Student test performance and program evaluation;
- 7) School-based implementation issues, such as ESL, special education inclusion, college admissions, NCAA, and AP Calculus and AP Statistic courses.

Program Logistics

1. Schedule: One half of the training takes place during the months of June, July and August, and occurs in 5-day blocks, 6 hours a day. (Lunch is an additional 45

minutes). Approximately 10 weeks is available for summer training. The academic-year training typically occurs on Saturdays or on other in-service days for 6 hours each day. Approximately twenty-two (22) Saturdays per academic year are available for training. (In-service sessions may run concurrently during the same summer week and on Saturdays.) All training dates are scheduled at the most convenient times for teachers. Teachers are also permitted to attend in-service training scheduled at other times with other participating school districts.

2. Location: Depending on the number of teachers per course, the training occurs either at La Salle University, or on-site in a school district, or another nearby school district. We strive for a class size of about 20 participants. A calendar of the dates, times and locations of summer and academic year training is distributed to all teachers by the end of the month of March preceding the in-services.

3. Classroom Mentoring: Teachers who have undergone training during the summer are provided with classroom mentoring during the following academic year. Teachers are visited an average of 8 times during the first year of their training; 4 times during the second year and 2 times during the third year. Each mentor has a set of teachers and schools as his/her responsibility. It is expected that each mentor will visit three different teachers per day, usually within the same school. Each visit entails a pre- and post-conference with the teacher. Each mentor submits a brief report of every visit. Periodically the mentors meet to discuss the progress of their teachers.

4. Administrative Technical Assistance: The co-directors and other project specialists will provide the technical assistance to schools. The average number of project days per year devoted to providing technical assistance for schools is

approximately 8 director-days per school district, which includes meetings and telephone conferences. The number of consulting days diminishes each year until there is sufficient implementation expertise at each school site.

Criterion for GPSMP Participation

All participating GPSMP schools are selected based on three criteria:

1. Administrative Support: The administrative staff of a school district--superintendent, curriculum supervisors, school principals, roster chairs and mathematics department heads--have to be willing and prepared to commit school-based and district resources to support sustained multi-year teacher enhancement. In particular, they have to commit to a local cost share in the form of books, classroom materials, audiovisual equipment, graphics calculators and adequate classroom space, including desks for students to work in groups.

Principals must be visible supporters of change in their schools. This means teachers must have stable teaching assignments as they undergo extensive staff development over time. Teachers-in-training must also be provided the time during the school day to plan the use of new curriculum materials and discuss their classroom experiences with other teachers. For example, in Philadelphia high schools, IMP teachers-in-training have typically received a reduced course load or compensation for an extra preparation period while in training.

2) School District Policy: Perhaps the greatest single challenge to institutionalizing local systemic reform is maintaining the continuity of the reform process in the context of administrative personnel changes. For this reason, it is

important that school districts adopt policies and practices, which will continue the change process with different administrators. The following policy indicators are used to select schools:

- a) Adoption of standards-based curriculum and assessment frameworks;
- b) Previous professional development on the *NCTM Standards*;
- c) Willingness to align other professional development resources with this project (such as Title 1, Eisenhower, and Goals 2000 fund);
- d) Adoption of administrative policies to support classroom reform, such as ensuring teachers have stable classroom and building assignments from one year to the next;
- e) Provision for all students from diverse racial and economic backgrounds to have equal access to an inquiry-based, student-centered classroom;
- f) Development of parent and community relations outreach and information program;
- g) Alignment of new math teacher hiring criteria with the *NCTM Teaching Standards*.

3) Teacher Readiness: Many math teachers are simply not ready to undertake change. As of 1993, according to the National Science Board's *Science and Engineering Indicators* report (1996), 44% of high school math teachers and 72% of middle school math teachers were **not** "well aware" of the *NCTM Curriculum and Evaluation Standards*. An even greater percentage were **not** "well aware" of *NCTM's Professional Teaching Standards*. And, 44% of high school math teachers surveyed had 6 or less hours of in-service per year.

One major outcome of NSF's support for urban and statewide systemic change efforts has been to increase teachers' familiarity with the *NCTM Standards* and their implications for changes in their own classroom practice regarding curriculum, instruction and assessment. Nevertheless, teachers vary in respect to their own readiness to change. We look for schools with a sufficient critical mass of the school's teaching staff willing to participate in intensive, sustained professional development necessary to implement standards-based change.

Partnership Development Process

The process of forming a partnership between the GPSMP and a participating school district usually involves the following steps:

- 1) An initial invitation to participate or a request from the school district for an initial discussion,
- 2) Meetings between the project co-directors and key administrative personnel
- 3) Meetings with the mathematics supervisor or department head and teacher leaders,
- 4) A 2 to 3 hour presentation before the mathematics teaching staff,
- 5) Teacher visits to other schools,
- 6) Four days (24 hours) of in-service featuring two replacement units teachers can use,
- 7) A series of meetings to plan the types of professional development in-services and to work out logistical and funding details,
- 8) Presentation and/or approval from the school board,

- 9) A letter-of-commitment from the school superintendent,
- 10) Further meeting to plan in-services and classroom implementation.

School District Obligations: Each school district is responsible for:

- 1) Providing incentives for teachers to attend the in-services,
- 2) Providing extra time for lesson planning during the academic year,
- 3) Purchasing books, graphics calculators, overhead projectors, overhead graphics calculator, computer software, and classroom durable and consumable materials.

Costs: The typical *first* year per teacher costs of these items is:

1) Teacher in-service stipends (or graduate credit)	\$1,000
2) Graphics calculators (1 classroom set = 35)	2,870
3) Books (2 classrooms sets)	2,520
4) Classroom materials	300
<u>5) Audio Visual Equipment</u>	
<u>700</u>	
	\$7,390

Project Management

1. Project Directors: Mr. Joseph Merlino, Dr. Edward Wolff, and Dr. Alice Jordan are the directors and co-principal investigators of the project.

F. Joseph Merlino, M.A., Education, is the PI/PD for the Greater Philadelphia Secondary Mathematics Project and provides technical assistance to schools, supervisors all the mentors and presenters.

Edward Wolff, Ph.D., Mathematics, is a co-pi for the Greater Philadelphia Secondary Mathematics Project and has been a co-director of Philadelphia Regional IMP Center. He is also Chair of Mathematics and Computer Science Department at Arcadia University. Dr. Wolff provides training in IMP Level 4 training, Harvard Reform and Statistics in-services, mentors teachers and conducts statistical analyses of student outcomes.

Alice Jordan, Ed.D., Mathematics Education, has been a co-director of Philadelphia Regional IMP Center at La Salle University for 6 years while also being a Department Head at Strawberry Mansion High School where she taught IMP for three years. Now retired from high school teaching, Dr. Jordan constructs the in-service calendar and mentors teachers.

2. Additional Key Staff: Assisting the project directors are an experienced cadre of other in-service presenters and in-classroom teacher mentors familiar with IMP and Core-Plus and various NSF middle school curricula. Approximately 95 other teachers and university faculty are involved with providing in-services and mentoring to schoolteachers. A sample of these personnel are listed.

Barbara Stankus, an IMP 4 teacher on special assignment from Strath Haven High School in Wallingford/Swarthmore School District.

Anthony Campione is a recently retired IMP teacher from Furness High School. He has taught two levels of IMP and has co-presented numerous IMP workshops and has mentored dozens of new IMP teachers.

Richard Clancy is a recently retired IMP 3 teacher from Girls High school in Philadelphia. He has taught three levels of IMP, has co-presented numerous IMP workshops and has mentored dozens of new IMP teachers

3. Institutional Involvement: *La Salle University* is the fiscal agent for this project. Project partners include the *Pennsylvania Department of Education Mathematics Office* and the *New Standards Project in Education-University of Pennsylvania*. Fifteen schools from Delaware county, Montgomery county and Bucks county and the Center for a Greater Philadelphia have joined together to form the *Southeastern Pennsylvania Standards Consortium*. This consortium is based on the work of the *New Standards Project* at the University of Pittsburgh.