

PARTNERSHIP FOR REFORM IN SCIENCE AND MATHEMATICS

Strategic Focus: The Partnership for Reform in Science and Mathematics advances Objectives 1 and 2 of the P-16 Department: To promote high school graduation, college readiness, college transition, and college success; and to promote continuous improvement in the recruitment, preparation, transition, development, and success of public school teachers, leaders, and counselors prepared by the University System of Georgia to increase P-12 student learning, development, and achievement in the public schools.



Initiative History: In January 2003, the P-16 Department, within the University System of Georgia (USG), submitted a proposal for a Comprehensive Mathematics and Science Partnership Grant to the National Science Foundation (NSF). This proposal was written through a partnership of seven University System colleges and universities and 15 public school systems in four geographical regions of the state with the University System and Georgia Department of Education. The award was announced in September 2003.

Funding: The P-16 Department serves as the coordinating unit and fiscal agent for NSF's award of \$34.6 million over 5 years (2003-2008).

Purpose: PRISM is a comprehensive research, development and implementation project designed to test key strategies to increase student learning and achievement in science and mathematics in schools and colleges, to codify what works, to use it to influence statewide change in policy and practice, and to inform the nation about successes that should be replicated to rebuild America's competitive advantage in science and mathematics. Approximately 170,000 K-12 students, 10,000 teachers and 575 University System faculty are or will be involved in PRISM over the five years of the grant.

Strategies: PRISM strategies cluster into three groups, those designed: 1) to provide all K-12 students with highly qualified and ethnically diverse science and mathematics teachers; 2) to ensure all K-12 students access to and readiness for challenging science and mathematics courses and curricula; and 3) to increase the engagement of science and mathematics higher education faculty in solving the needs of the public schools.

- **Professional Learning and Support** – Providing courses and other professional learning activities and programs for current K-12 teachers; on-going school-based, district-based, and regional P-16 learning communities; and Institutes for high school and higher education faculty.
- **K-12 Curriculum Development** – Partnering with the Georgia Department of Education to develop a standards-based curriculum in science and mathematics and supporting the Georgia Performance Standards work by providing professional learning for both K-12 and higher education faculty in standards-based teaching.
- **Public Awareness Campaign** – Conducting a campaign designed to show the need for all K-12 students to have access to, be prepared for, and succeed in challenging courses in science and mathematics.
- **Changing Working Conditions** – Providing training and online support for PRISM Lead Teachers who ensure teachers have the support and resources needed to be successful teachers of science and mathematics; piloting academic coaches; determining incentives needed to recruit and retain science and mathematics K-12 teachers; and revising the reward structure for higher education faculty to encourage involvement in improving science and mathematics teaching in K-12 schools.

Lessons Learned: It is important to have dedicated leadership personnel from the Science, Technology, Engineering, and Mathematics (STEM) faculty, the K-12 schools, and colleges of education, within each PRISM region, and from the Georgia Department of Education. Teachers have responded positively to participation in P-16 Learning Communities with time being the most discussed issue that serves as a barrier. In-depth professional learning is needed for teachers in order for them to teach the more challenging courses and curricula included in the new Georgia Performance Standards. A lesson learned through the Public Awareness Campaign is that parents are more influential than any other individual or group in influencing students to take or not to take more challenging courses in science and mathematics. The STEM faculty did not always see their direct connection to teacher preparation even though many pre-service teachers take courses from them, and needed further support. Increasing the science and mathematics content knowledge of current elementary teachers also remains a challenge. Through

PRISM, courses were developed that lead to a science and/or mathematics specialist endorsement to elementary teachers' teaching certificates. Since state policy does not require these endorsements, we found that even "if you build it, they may not come." Increased emphasis on research is needed in order to inform Georgia and the nation as to what works for which students, under what conditions, and why.

Actions Based on Lessons Learned:

- Provided ongoing support from both the state and regional levels for continued collaboration among partners, the offering of needs-based professional learning, development and growth of P-16 learning communities.
- Collaborated with the Georgia Department of Education to create the Georgia Performance Standards in science and mathematics and to ensure that all P-12 students take the challenging courses and curricula needed to be successful.
- Designed and implemented the Institute on the Teaching and Learning of Science and Mathematics. State and regional institutes are held annually bringing together higher education and high school science and mathematics faculty to study and improve the quality of instruction in their courses.
- Provided ongoing professional learning for the science and mathematics specialists from Regional Education Service Agencies (RESAs) and the Department of Education to improve their capabilities to deliver professional learning related to the Georgia Performance Standards for K-12 teachers in Georgia.
- Created and delivered the Georgia Performance Standards Symposium for New Teachers.
- Revised a PRISM strategy to include more professional learning in the teaching of standards-based instruction to higher education faculty who prepare new teachers.
- Awarded numerous small grants for college faculty to implement new teaching and assessment strategies designed to improve student learning.
- Developed and launched a PRISM Public Awareness Campaign to change the attitudes of Georgia's K-12 parents, students and educators as to the need for all P-12 students to have access to, to be prepared for, and to succeed in challenging science and mathematics courses.
- Created a Research Committee and Deliverables Document to make evidence-based design and outcomes information learned from PRISM available to all partners.
- Revised current policies for promotion and tenure of higher education faculty to include recognition of work in K-12 schools.
- Created six teacher incentive models to address science and mathematics teacher working conditions.
- Created 14 PRISM satellites at USG institutions to advance the work of PRISM across the state.

Impact: Since October 2003, PRISM has

- 14 publications from PRISM partners (journals and books).
- Provided over 8000 teachers of science and/or mathematics professional learning designed to improve teacher quality.
- Established over 250 P-16 Learning Communities bringing together K-12 and higher education faculty to study and learn together (another form of professional learning not counted in previous statement). As one example, a high school-based Physical Science P-16 learning community, operational since 2004, saw a net gain of 17 points; from 596.99 to 614 on the required physical science end of course test for their students. Their scores were greater than their school system and the state.
- Over 500 faculty members (K-12 and Higher Education) attended the institutes.
- Mathematics Endorsement Courses have been introduced to K-5 in-service teachers. Pre- and post-test results indicate significant improvement in teacher content knowledge: an increase of 8.5% in Numbers and Operations, 12.8% in Algebra, 7.9% in Geometry and 6.9% in Data Analysis.
- Added six semester hours of science coursework for early childhood preparation programs to ensure preparedness for teaching science in elementary school.
- Developed a common set of pre-professional courses (9 semester hours) to replace existing courses for all USG prepared teachers.
- Over 400 higher education faculty attended the two Georgia Performance Standards (GPS) Conferences in early 2005 designed to support the work of the Georgia Department of Education's work on the new curricula. This work will ensure that teachers prepared by USG are able to teach the new Georgia Performance Standards (GPS) in science and mathematics.

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- 27 higher education institutions sent teams to the Academy for Learning through Performance Standards and Assessment – Higher Education during year 3. Final session to be completed in September 2006. Teams are responsible for course redesign to ensure Georgia’s teachers are prepared to teach to the GPS.
- Over 200 beginning teachers attended the New Teacher Symposium for GPS Science and Mathematics.
- Since 2004, 259 Atlanta Public School juniors and seniors have participated in the Advanced Academy for Future Teachers. This academy was developed as a recruitment tool for students interested in science and/or mathematics teaching as a career. 99% of the participants represent minorities.
- A Lead Teacher Academy was developed and has provided training to over 350 teachers of science and mathematics as school leaders in developing and delivering science and/or mathematics professional learning, facilitating P-16 learning communities, data collection methods, and in serving as a change agent.
- A pilot Academic Coach program was implemented in January 2006. An elementary school-based Science Academic Coach taught demonstration lessons, provided professional learning in inquiry-based teaching and showcased student work to demonstrate the effectiveness of inquiry instruction by teachers. Two additional pilots began fall 2006.
- A statewide, multi-faceted awareness campaign was launched. There were 127 outdoor billboard ads, 46 bus shelter ads, 292 television spots/PSAs, 1 two-page spread in Georgia Trend Magazine, 24 articles in local newspapers from January 2006 – July 2006. In addition, parent guides were distributed to PRISM parents and teachers received posters about careers in science and mathematics for their classroom.

<i>Web Trends Snapshot</i>				
	Hits	Page Views	Unique Visitors	Avg Visitors/Wk
*MSS.ORG (since 1/30/06)	338,623	59,873	7,096	148
GAPRISM.ORG (2005)	147,018	30,535	7,630	174
GAPRISM.ORG (as of July 2006)	214,955	45,827	10,466	201
Total	700,596	136,235	25,192	

*MSS represents: www.mathsciencesuccess.org