

**Pennsylvania Basic Education/Higher Education
Science and Technology Partnerships:**

**SCIENCE IN MOTION
&
ADVANCING SCIENCE**

2004-2005 PROGRAM REPORT

for regional service providers at:

**Cedar Crest College
Clarion University of
Pennsylvania
Drexel University
Gannon University
Gettysburg College
Juniata College**

**Susquehanna University
University of Pittsburgh
at Bradford
Ursinus College
Westminster College
Wilkes University**

submitted to:

**THE COMMONWEALTH OF PENNSYLVANIA
and the
PENNSYLVANIA DEPARTMENT OF EDUCATION**

September 2005

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Submitted To:

**THE COMMONWEALTH OF PENNSYLVANIA
AND THE
PENNSYLVANIA DEPARTMENT OF EDUCATION**

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EXECUTIVE SUMMARY

The Pennsylvania Basic Education/Higher Education Science and Technology Partnership Program continued to serve schools in the Commonwealth of Pennsylvania during the 2004-2005 fiscal year through a consortium of Science In Motion and Advancing Science outreach programs (SIM/AS). The consortium provided outreach support to 589 teachers in 280 public, private, and parochial schools. Eleven institutions of higher education serve as the hubs of these programs: Cedar Crest College, Clarion University of Pennsylvania, Drexel University, Gannon University, Gettysburg College, Juniata College, Susquehanna University, University of Pittsburgh at Bradford, Ursinus College, Westminster College, and Wilkes University.

Service Report and Summary

The Service Report and Summary (page 15) contains activity statistics for the statewide consortium. SIM/AS Mobile Educators supported 6,199 classes during the 2004-2005 fiscal year. Equipment loans and prepared experiments were delivered to an additional 3,986 classrooms. Altogether, 179,990 student experiences were provided through SIM/AS programs.

Financial Report and Summary

Consortium services were optimized during the 2004-2005 academic year by the prompt processing of contracts. The five-year contracting process established by the PA Department of Education in 2002, in conjunction with the timely passing of the state budget, enabled 2004-2005 contract renewals to be processed rapidly and with minimal paperwork. Staff layoffs, which had been encountered during previous years due to contract delays, were avoided. The PA Department of Education is to be commended on their willingness to facilitate this process. Despite the prompt processing of contracts, however, staff attrition continues to be a concern due to the uncertainty of funding levels until the budget is passed at the end of June.

The Financial Report and Summary (page 18) provides expenditure information for the SIM/AS consortium. All awards for the 2004-2005 fiscal year continued to be based on an 80% funding level of the \$200,000 budget required to support a single subject (chemistry or biology). Eight sites (Clarion University of Pennsylvania, Drexel University, Gannon University, Gettysburg College, University of Pittsburgh at Bradford, Ursinus College, Westminster College, and Wilkes University) received appropriations for service in one-subject area (\$160,000 allocations). Juniata College received funding for two subject areas plus a specific equipment allocation of \$50,000 (an allocation of \$370,000), and this site also continued to support consortium coordination services and activities

with this funding. Susquehanna University received an allocation of \$320,000 to support two subject areas. Cedar Crest College continued for a third year to be funded at 40% the level of a single subject, receiving only \$80,000.

Service reports showed that most sites served more than one subject area. This is possible because many of the sites that were funded to cover only one subject area have extended their services to a second subject by securing supplemental funding sources, serving smaller student populations (due to low population densities in the more rural areas), or serving larger student populations less frequently in each subject.

Individual site service reports are not provided herein because inadequate data is available to ensure an appropriate interpretation of such data with respect to individual site efficacy. The available budget information reflects only funds appropriated to each site by the Commonwealth and awarded through the Pennsylvania Department of Education; the amount of funding available at each site from other sources may vary significantly. In addition, the many issues that contribute to diversity among the schools served by the consortium impact the efficiency with which individual consortium sites are able to implement services. Differences, such as distances between schools and the individual wealth of schools served, can significantly impact both the number of visits that can be made by mobile educators in a given day and the extent of the computer support, equipment, materials and supplies that must be provided to poorer schools.

Assessment

The project wide (statewide) assessment project is to determine impact on student learning continued during the 2004-2005 academic year. The assessment goal is to compare student understanding of modern principles and applications in chemistry and biology in project schools versus control schools that are not served by the SIM/AS programs.

The specific aim of the 2004-2005 assessment activities was to refine both chemistry and biology assessment instruments using the item analysis from the 2003 pilot assessment. Questions were revised or replaced as needed using items piloted by pre-test/post-test assessments devised for specific laboratory activities at individual sites. A thorough assessment of both the chemistry and biology programs is now scheduled for 2005-2006 using the refined instruments. The assessments will use a pre-test/post-test design and include control classes of students from schools outside the consortium service areas. The assessment is being coordinated by independent third party consultants: Dr. Paul Bell, Professor Emeritus of Education from The Pennsylvania State University, and Dr. KB Boomer, Director of the Penn State Statistical Consulting Center.

Information Dissemination and Joint Consortium Activities

The Pennsylvania Basic Education/Higher Education Partnership portal at www.scienceinmotion.org continues to provide links to each of the eleven programs around the state. Each higher ed partner in the consortium continues to maintain and update individual websites to support their activities. Teachers are able to use these websites to find out what laboratory equipment and activities are available to them through the consortium and access lesson plans for these activities.

Clarion Mobile Educator, Karen Spuck, presented information on activities by the PA consortium at the national meeting of science outreach programs held annually at North Carolina State University.

All consortium members hold regular regional teacher workshops and make presentations at professional meetings including the Pennsylvania Science Teachers Association.

Conclusions and Legislative Recommendations

Requests continue to be received from schools around the state that are not currently within the service area of current consortium programs. The list of higher education institutions, willing to establish programs to serve additional schools, continues to grow. Requests that have come to the attention of the consortium include; Duquesne University, Elizabethtown College, Pennsylvania Technical College, St. Vincent's College and Waynesburg College. They have shown interest in establishing programs under the Science In Motion model.

The General Assembly once again initiated legislation to better ensure sustainability of the PA Basic Education/Higher Education Science and Technology Partnerships by making them part of the Pennsylvania School Code. Passage of this legislation would significantly contribute to stability and cost-efficacy of the consortium by making annual funding more predictable, thereby reducing mobile educator attrition and turn-over. The Pennsylvania Department of Education is encouraged to consider including statewide implementation of the Science In Motion model in the 2006-2007 budget.

The following bills represent pending Pennsylvania legislative initiatives that support the permanent establishment and statewide implementation of the Pennsylvania Basic Education/Higher Education Partnership Program:

SB414 – A Senate education bill providing \$400,000 grants per institution for secondary science outreach services in the state

HB1512 – A House education bill providing \$400,000 grants per institution for secondary science outreach services in the state

SCHOOL DISTRICTS & SCHOOLS SERVED in 2004-2005

(Listed by HIGHER EDUCATION SERVICE PROVIDER)

1. Cedar Crest College

School Districts Served

Allentown SD
Bangor SD
Bethlehem SD
Catssauqua SD
East Penn SD
Easton SD
Jim Thorpe SD
Lehigh Co. Vo-Tech
Lehighon SD
Northern Lehigh SD
Northwestern Lehigh SD
Palmerton SD
Panther Valley SD
Parkland SD
Salisbury SD
Southern Lehigh SD
Whitehall-Copley SD

Other Schools Served

Carbon County Vo-Tech

2. Clarion University

School Districts Served

Allegheny-Clarion Valley SD
Armstrong Area SD
Brockway SD
Brookville SD
Clarion SD
Clarion-Limestone SD
Cranberry SD
DuBois SD
East Forest SD
Elderton SD
Franklin SD
Keystone SD
North Clarion SD
Oil City SD
Punxsutawney SD
Redbank SD
Rocky Grove SD
Titusville SD
Union SD
West Forest SD

Other Schools Served

Venango Christian HS
SS Cosmas & Damian School

3. Drexel University

School Districts Served

Philadelphia City SD

Other Schools Served

Archbishop Ryan HS
Bishop McDevitt HS
Center City Academy
Hope Church School
St. Hubert HS
West Catholic HS

4. Gannon University

School Districts Served

Corry SD
Erie SD
Fairview SD
Fort LeBoeuf SD
Girard SD
Harbor Creek SD
Iroquois SD
McDowell SD
Mercyhurst Prep
North East SD
Northwestern SD
Seneca SD
Union City SD

Other Schools Served

Cathedral Prep
Villa Maria Academy

5. Gettysburg College

School Districts Served

Bermudian Springs SD
Big Spring SD
Camp Hill SD
Central Dauphin SD
Central York SD
Chambersburg Area SD
Conewago Valley SD
Cumberland Valley SD
East Pennsboro SD
Fairfield Area SD
Gettysburg Area SD
Greenwood SD
Halifax Area SD
Hanover Public SD
Harrisburg City SD
Littlestown Area SD
Lower Dauphin Area SD
Mechanicsburg Area SD
Millersburg Area SD
Northern York County SD
Shippensburg Area SD
South Middleton SD
Southern York County SD
Southwestern SD
Spring Grove Area SD
Steelton-Highspire SD
Susquehanna Township SD
Susquenita SD
Tuscarora SD
Upper Adams SD
Upper Dauphin Area SD
Waynesboro Area SD
West Perry SD
West Shore SD
York Suburban SD

Other Schools Served

Adams County Christian Academy
Bishop McDevitt HS
Cathedral School
Covenant Christian Academy
Cumberland Valley Christian Academy

Dauphin County Technical School
Delone Catholic HS
Hershey Christian School
Immaculate Conception School
Littlestown Christian Academy
Montessori Academy of Chambersburg
Saint Francis Xavier School
Saint Theresa School
Shalom Christian Academy
York Catholic HS

6. Juniata College

School Districts Served

Altoona Area SD
Bald Eagle Area SD
Bellefonte Area SD
Bellwood-Antis SD
Claysburg-Kimmel SD
Everett Area SD
Forbes Road SD
Glendale SD
Hollidaysburg Area SD
Huntingdon Area SD
Juniata Valley SD
Mount Union SD
Northern Bedford County SD
Penns Valley SD
Phillipsburg-Osceola SD
Southern Huntingdon SD
Spring Cove SD
State College Area SD
Tussey Mountain SD
Tyrone Area SD
West Branch SD
Williamsburg Community SD

Other Schools Served

Belleville Mennonite
Bishop-Guilfoyle
Calvary Christian
Grier School
Mifflin County Christian

7. Susquehanna University

School Districts Served

Benton SD
Berwick SD
Bloomsburg SD
Central Columbia SD
Danville SD
East Juniata SD
Jersey Shore SD
Juniata SD
Lewisburg SD
Line Mountain SD
Midwest Area SD
Milton Area SD
Montoursville SD
Mt. Carmel Area SD
Muncy SD
Selinsgrove SD
Shamokin SD
Shikellamy SD
South Williamsport SD
Southern Columbia SD
Tri-Valley SD
Warrior Run SD
Williamsport Area SD

Other Schools Served

Bishop Neumann
Columbia Montour Vo-Tech
Lourdes Catholic
Northwest Academy Juvenile Detention Facility
SUN Alternative

8. University of Pittsburgh at Bradford

School Districts Served

Austin SD
Bradford SD
Cameron County SD
Coudersport SD
Galeton SD
Johnsonburg SD
Kane Area SD
Northern Potter SD
Oswayo Valley SD
Otto-Eldred SD
Port Allegany SD
Ridgway SD
Smethport SD
St. Marys SD
Warren County SD

9. Ursinus College

School Districts Served

Abington SD
Boyertown Area SD
Coatesville Area SD
Downingtown Area SD
Methacton SD
Norristown Area SD
North Penn SD
Perkiomen Valley SD
Phoenixville Area SD
Radnor Township SD
Souderton Area SD
Spring-Ford SD
Tredyffrin-Easttown SD
Unionville-Chadds Ford SD
Upper Merion SD
Upper Moreland SD
William Penn SD
Wissahickon SD

Other Schools Served

Montgomery County Youth Detention Center Schools

10. Westminster College

School Districts Served

Elwood City SD
Farrell SD
Grove City SD
Hermitage SD
Highlands SD
Jamestown SD
Lakeview SD
Laurel SD
Mercer SD
Mohawk SD
Moon Area SD
Neshannock SD
New Castle SD
Penn Crest SD
Pine-Richland SD
Reynolds SD
Seneca Valley SD
Sharon SD
Sharpsville SD
Shennago SD
Slippery Rock SD
Wilmington SD

Other Schools Served

Evangel Heights Christian Academy
Grove City Christian Academy
Kennedy Catholic
New Castle Christian Academy

11. Wilkes University

School Districts Served

Abington Heights SD
Carbondale SD
Crestwood SD
Dallas SD
Dunmore SD
Greater Nanticoke SD
Hanover SD
Hazleton SD
Lackawanna Trail SD
Lakeland SD
Lake-Lehman SD
Mid Valley SD
North Pocono SD
Northwest Area SD
Old Forge SD
Pittston SD
Pocono Mountain SD
Riverside SD
Scranton SD
Tunkhannock SD
Valley View SD
Wilkes-Barre Area SD
Wyoming Area SD
Wyoming Valley West SD

Other Schools Served

Bishop Hoban High School
Bishop Hannon High School
Bishop O'Reilly
Scranton Prep
Seton Catholic

SERVICE REPORT AND SUMMARY

The following page provides a summary of the services provided by the Pennsylvania Basic Education/Higher Education Science and Technology Partnership Programs. The summary service report shows that SIM/AS Mobile Educators visited and taught 6,199 classes. Equipment loans accompanied by prepared experiments were delivered to an additional 3,986 classrooms. Altogether, there were 179,990 student experiences using the resources provided by the SIM/AS programs. A student experience is defined as one 45-60 minute class period.

Although all sites now have at least four years of experience, the service levels for 2004-2005 were almost twice the levels of the 2003-2004. This was possible without additional funding due both to the timely processing of contracts by the PA Department of Education and increased teacher demands as some of the newer sites now approach full scheduling capacity.

Service records are not provided for individual sites herein because the differing funding levels and the varied challenges to educational equity at each location make such comparisons inappropriate. For example, rural sites serve areas with lower population densities and must meet the challenges of larger travel distances between schools while other sites meet the challenges of traffic, parking, student crowding, and lack of facilities in larger urban districts. All sites address, to varying degrees depending on the cumulative wealth of the area, the challenge of poorly-equipped science classrooms. Large variations in resources are encountered among schools found within each of the individual service areas. In addition, the total operating budgets vary at every site. Budget information contained in this report reflects only funds appropriated to each site by the Commonwealth and awarded through the Pennsylvania Department of Education.

Overall, the sites would be able to serve more teachers and students if funding and contracts could be reliably anticipated. Due to historical delays in the receipt of funds, many of the higher education partners are unable to allow programs to begin until the annual passage and signing of the budget enables contracts to be renewed. It is becoming increasingly difficult for even the established sites to keep their outstanding and experienced Mobile Educators from looking for and accepting other sources of employment due to annual funding uncertainties.

**Basic Education/Higher Education Science and Technology Partnership
Service Summary, FY 2004-05
Consortium Report**

Date program started: 1-Jul-04

OVERVIEW:

Total # teaching visits made*	<u>6,199</u>	# different schools served	<u>280</u>
Biology:	<u>2,432</u>	# different teachers served	<u>589</u>
Chemistry:	<u>2,676</u>	# different labs taught	<u>724</u>
Other:	<u>1,091</u>		
Total # equipment loans**	<u>3,986</u>	# students in accelerated or elective classes****	
Total # student contacts***	<u>179,990</u>	All subjects:	<u>31,289</u>
Teaching visits	<u>98,264</u>		
Equipment:	<u>81,726</u>		

CONSORTIUM SUPPORT:

1 statewide mobile educator sharing workshop and 2 consortium planning meetings

TEACHER SUPPORT:

Workshop/Seminars: Dates, comments
48 workshops, seminars, and consultations

STUDENT SUPPORT: Science Fairs, Special Projects: Dates, comments

26 science fairs and special projects

OTHER SERVICE: Special Events, Presentations, etc.: Dates, comments

40 demonstrations and activities at miscellaneous community events

***Teaching visits:**

Count one visit for each separate class/period/new set of kids that you teach.
--If more than one lab is taught in any class, count the additional lab(s) as a separate/additional visit.

****Equipment loans:**

Count one loan for each separate class that uses the equipment.
--An "item" of equipment is defined as whatever it takes to conduct a lab, whether it's 2 GCs, 6 microscopes, or 1 DNA "kit" containing a stirrer, dishes, etc.

*****Number of students:**

-- For teaching visits, exact number of kids in each separate class you teach.
--For equipment loans, exact number of kids in each class that uses the equipment.

******Advanced/Elective classes:**

Count any class at the junior or senior level

FINANCIAL REPORT AND SUMMARY

The summary financial report on the next page shows how the \$2,050,000 state appropriation for 2004-2005 was expended by the Pennsylvania Basic Education/Higher Education Science and Technology Partnership Programs. These funds were allocated to individual sites as shown in Table 1.

Table 1: Allocation of 2004-2005 Pennsylvania Basic Education/Higher Education Science and Technology Partnership Appropriation.

INSTITUTION	ALLOCATION
Cedar Crest College	\$80,000
Clarion University of Pennsylvania	\$160,000
Drexel University	\$160,000
Gannon University	\$160,000
Gettysburg College	\$160,000
Juniata College	\$370,000
Susquehanna University	\$320,000
University of Pittsburgh at Bradford	\$160,000
Ursinus College	\$160,000
Westminster College	\$160,000
Wilkes University	\$160,000
TOTAL	\$2,050,000

The value of services and resources not charged to these state-awarded budgets and, therefore, not quantified by these reports should not be overlooked. In addition, the 10% overhead allowed by the state contracts falls significantly short of the cost of infrastructure provided by these higher education institutions. This infrastructure, which is provided at the cost of the participating higher education institutions, includes:

- office and lab space;
- access to advanced chemistry and biology research equipment not yet purchased by the outreach program;
- electric, gas, and water utilities;
- deionized/distilled water sources;
- chemical safety, storage and disposal services;
- shared prep area equipment including chemical hoods, autoclaves, and dishwashers;
- approved gas tank storage areas;
- van parking; and
- general clerical and accounting support.

It is this infrastructure and the access to higher education science and education faculty expertise that makes the Pennsylvania Basic Education/Higher Education Science and Technology Partnerships effective and cost efficient.

**Basic Education/Higher Education Science and Technology Partnership
Budget Summary, FY 2004-05
Consortium Combined**

Administrative Salaries

Project Administration		
Director(s), academic year and summer	195,090	
Office Staff		
Secretarial/Project Management/Budget	112,511	

Educational Services Salaries

Mobile Educator: 1st subject area		
Classroom and professional development services	357,122	
Mobile Educator: 2nd subject area		
Classroom and professional development services	224,564	
Equipment Manager(s)		
Equipment delivery oversight and summer maintenance	53,643	
College Faculty: Subject Area/Education Advisors		
Content, Continuing Ed, and Assessment	11,893	
Area Teachers: Content Lead Teachers	8,700	
Student Assistants		
Assists in lab prep, materials, summer workshops	45,673	

Total salaries and wages

1,009,198

Fringe Benefits

263,049

Consortium Support:

1,268

Operating Expenses: to provide Project services

Science vehicles	43,260	
Van Expense		
Vehicle fuel, upkeep	39,980	
Instructional Supplies		
Instruments; expendable materials	350,362	
Instructional Equipment	55,485	
Science instrument repair and maintenance	12,000	
Project Office expense		
Telephone, photocopies, postage	36,897	
Travel support		
Staff travel expense; Lead Teacher mileage	29,687	
Miscellaneous Expense		
Professional fees, licensing, etc.	11,244	578,915

Teacher Support: new technology and content

Teacher conference support	455	
Science Fair support	616	1,071
Summer Workshop (professional development)		
Planning and module development	2,152	
Attendee stipends	58,189	
Housing and meals	12,528	
Facilities, activities, materials expense	9,715	82,584

Administrative Overhead

100,863

Total ESTIMATED expenditures, FY 05*

2,043,079

* Total 2004-2005 allocation was \$2,050,000. One site failed to expend the full site allocation due to an accounting error.

FUNDING HISTORY AND LEGISLATION IN PENNSYLVANIA

The PA Basic Education/Higher Education Science and Technology Partnership was funded by the Pennsylvania legislature for the first time in 1997-1998. This first year appropriation was for the founding site at Juniata College.

An additional eight higher education sites (Clarion University of Pennsylvania, Drexel University, Gannon University, Gettysburg College, University of Pittsburgh at Bradford, Ursinus College, Westminster College, and Wilkes University) were funded as service providers in 1999-2000. Each new site was provided with a \$200,000 allocation to begin serving one subject area or to expand existing services.

Two additional sites (Cedar Crest College and Susquehanna University) were added in 2001-2002 to make the total number of higher education partners equal the current eleven members. The total original appropriation for 2001-2002 was \$2,500,000, which was allocated as follows: Juniata College and Susquehanna University at \$400,000 each; Clarion University of Pennsylvania, Drexel University, Gannon University, Gettysburg College, University of Pittsburgh at Bradford, Ursinus College, Westminster College, and Wilkes University at \$200,000 each; and Cedar Crest College at \$100,000. During the same year, however, statewide 20% across-the-board budget reductions reduced these amounts to \$320,000, \$160,000, and \$80,000 respectively. These funding levels have remained flat at the reduced level for 7 years. Table 2 below provides the awarded funding history.

Table 2: Pennsylvania Basic Education/Higher Education Science and Technology Partnership Appropriation History

Fiscal Year	Total Allocation	Site(s)
1997-1998	\$ 350,000	Juniata only
1998-1999	\$ 400,000	Juniata only
1999-2000	\$ 2,000,000	Original nine consortium sites*
2000-2001	\$ 2,000,000	Original nine consortium sites*
2001-2002	\$ 2,000,000	Original nine sites plus Cedar Crest & Susquehanna**
2002-2003	\$ 2,000,000	Continuing eleven consortium sites
2003-2004	\$ 2,000,000	Continuing eleven consortium sites
2004-2005	\$ 2,050,000	Continuing eleven consortium sites
2005-2006	\$ 2,000,000	Continuing eleven consortium sites (contracts pending)

*The original consortium members include Clarion University of Pennsylvania, Drexel University, Gannon University, Gettysburg College, Juniata College, University of Pittsburgh at Bradford, Ursinus College, Westminster College, and Wilkes University.

**\$2,500,000 was initially appropriated; all eleven sites shared in a 20% reduction with the statewide budget reduction measure

All sites have struggled to maintain a high level of service despite flat funding and individual funding reductions during the past six years. [Note: \$50,000 of the 2004-2005 was for a specific item of equipment and did not represent a general appropriation increase.] Other sources of grants, gifts and donations have allowed some sites to significantly enhance programs beyond the level supported by the state allocation; however, such support is transient at all sites. All sites receive more requests for school visits than the Mobile Educators are able to service.

PENNSYLVANIA LEGISLATION

Legislation making the Pennsylvania Basic Education/Higher Education Partnership Program part of the Pennsylvania School Code is desperately needed to provide maximum efficiency and efficacy of services in the state. Without codification of the program, Mobile Educators have little job security. This leads to the loss of well-trained staff members and delays in service startups at the beginning of each new academic year. Various bills have been introduced by both the House and Senate over the years. Many have progressed through the necessary committees in one chamber or the other, but none have made it into law.

Appendix B of this report provides copies of the following current bills that represent pending Pennsylvania legislative initiatives supporting the permanent establishment and implementation of the Pennsylvania Basic Education/Higher Education Partnership Program:

- SB414 – A Senate education bill providing \$400,000 grants/institution services in the state
- HB1512 – A House education bill providing \$400,000 grants/institution services in the state

THIRD PARTY ASSESSMENT

A third party, independent assessment of program impact on student learning continues under the direction of Dr. Paul Bell, Professor Emeritus of Science Education, The Pennsylvania State University. The goal of the assessment is to detect growth in student learning by testing students in schools served by partnership programs at the beginning of science courses and at the end, and by comparing increases in performance in program schools to the increases in performance of students in control schools currently not served by the project.

All partnership faculty, both directors and mobile educators, have devoted significant effort since the 2002-2003 academic year when assessment instruments were first developed. The instruments were piloted in Spring 2003 by administration to high school students in one chemistry and one biology class in each higher education service area. Release of the final report of these assessments was significantly delayed due to problems encountered in scanning answer sheets and limited funding to support these efforts. The final report is now provided as Appendix A. **Importantly, this preliminary assessment shows a positive significant impact of the Pennsylvania Basic Ed/Higher Ed Partnership on student performance on tests of knowledge of biology and chemistry.**

Funding uncertainties and limitations during the 2003-2004 academic year prevented the continued implementation of the statewide assessment instruments that were piloted in 2002-2003. However, the 2003-2004 academic year was used to refine and develop additional questions that may be used to improve these assessment instruments. As part of this effort, each site began to design and implement assessments for individual laboratory activities. Five-question multiple choice quizzes were developed for individual laboratories and were used as pre-post assessments.

A thorough statewide assessment of three chemistry classes and three biology classes is now planned for the 2005-2006 academic year.

CITATIONS, AWARDS AND RECOMMENDATIONS

Recognition of the benefits of the Science In Motion model for Basic Education/Higher Education Science and Technology Partnerships began in 1994 with a Senate Select Committee on the Structure and Financing of Public Education in the Commonwealth. Since this time, the partnership has received numerous citations, awards and other forms of recognition, suggesting the need to make these programs an integral part of the Commonwealth's educational system.

SENATE SELECT COMMITTEE TO STUDY THE STRUCTURE AND FINANCING OF PUBLIC EDUCATION IN THE COMMONWEALTH (1994)

Under "Policy Implication 3 – Resource-Based Education Funding," Juniata College's *Chemistry In Motion* (the predecessor of "Science In Motion") was cited as a resource-based cost-effective model for science education. The section on "Fostering Cooperative Agreements" also cited *Chemistry in Motion* as a model for improving educational opportunities for school children through basic education/higher education partnerships.

KEYSTONE COMMISSION ON EDUCATION FOR EMPLOYMENT IN THE 21st CENTURY (2001)

The Pennsylvania House of Representatives formed a bipartisan commission to study workforce preparation in the state. Recommendation #24 of the December 1, 2001 report states: "The commission recommends that the Commonwealth provide full and permanent funding of the Science In Motion partnership between institutions of higher education and school districts that provide advanced learning opportunities for students and professional development for teachers; and, that the Commonwealth provide incentives for institutions of higher education to establish partnerships with school districts on a regional basis."

COUNCIL OF STATE GOVERNMENTS 2003 INNOVATION AWARD (2003)

The Pennsylvania Basic Education/Higher Education Science and Technology Partnership consortium received national recognition as one of eight winners of the national 2003 Innovation Awards presented by the Council of State Governments (CSG). These awards are presented to recognize successful, cost-effective programs funded by state government. A presentation was made to the national judging panel in New York City on September 11, 2003. The award was received October 24, 2003 at the CSG national meeting in Pittsburgh, PA. More information on this prestigious award program is available at www.csq.org.

PENNSYLVANIA HOUSE OF REPRESENTATIVES' COMMISSION ON RURAL EDUCATION RECOMMENDATION (2003)

The Pennsylvania House of Representatives formed a 25-member bipartisan Pennsylvania Commission on Rural Education (CORE) with the passing of House Resolution 8 on February 11, 2003. The resolution established the CORE to “examine and study the status of rural education in this Commonwealth and make recommendation for enhancing the quality of education in rural communities.”

The final report of the commission was released June, 2004 and contains 32 final recommendations. Recommendation #11 of Section C: Meeting the Challenges of “*No Child Left Behind*” reads:

11. *The Commission recommends that the General Assembly should enact legislation establishing a basic education-higher education science technology partnership, such as the Science In Motion Program, in order to expose rural students to the world of science. (adopted 21-0)*

INFORMATION DISSEMINATION AND JOINT CONSORTIUM ACTIVITIES

WEBSITE

The Basic Education/Higher Education Science and Technology Partnership consortium continues to maintain the www.scienceinmotion.org website domain. This homepage provides links to consortium member websites as well as to similar programs and resources around the country. This year, the portal page was updated to provide electronic access to the annual report.

2004 PSTA CONFERENCE

Members of the Pennsylvania Basic Education/Higher Education Science and Technology Partnership Program have an annual presence at the Pennsylvania Science Teachers Association (PSTA) in Hershey, PA. Dr. Bruce Smith arranged for a consortium demonstration session featuring demonstrations of resources available at the consortium sites. Mobile educators from several sites conducted individual hands-on workshops for teachers who attended the meeting as PSTA members.

2004 WVSTA CONFERENCE

The Pennsylvania Basic Education/Higher Education Science and Technology Partnership Program was highlighted in an invited presentation, "Science in Motion: Removing the Barriers to Good Science Education" by Karen Spuck, Clarion University, at the 2004 West Virginia Science Teachers Association (WVSTA) annual conference in Morgantown, WV. Science education leaders in West Virginia are now taking steps to model this exemplary PA program in West Virginia.

SHARING WORKSHOP

Mobile Educators from the eleven higher education sites established the first sharing workshop in June of 2003. A two-day workshop was held September 8 and 9, 2004. The participating mobile educators rated the workshop as highly valuable for sharing laboratory activities among the sites of the statewide consortium. The third annual workshop is now planned for September 7 and 8, 2005.

CONFERENCE ON K-12 SCIENCE OUTREACH FROM UNIVERSITY SCIENCE DEPARTMENTS (2004-2005)

The Pennsylvania Basic Education/Higher Education Science and Technology Partnership Program was highlighted in an invited presentation and panelist discussion, by Karen Spuck, Clarion University, at the 2005 Conference on K-12 Outreach from University Science Departments sponsored by the Burrows Wellcome Fund at North Carolina State University. The presentation, "Successful

teacher implementation of the Pennsylvania Science in Motion Program: Exploring the impact of the PA Science in Motion Program in the Clarion University Service Area” as well as transcripts of the panelist discussion will be published in the conference proceedings at www.science-house.org. The 2004 presentation by Lorraine Mulfinger can be found at the website under the title, “What Is Good Science Education, and Whose Job Is It to Support It?”

APPENDIX A

PA BASIC ED / HIGHER ED SCIENCE & TECHNOLOGY PARTNERSHIP 2002-2003 Program Assessment

EXECUTIVE SUMMARY

Paul E. Bell
June 2004

ASSESSMENT PLANNING

Site directors and mobile educators from the Pennsylvania Basic Ed / Higher Education Science and Technology Partnerships (*Science In Motion* and *Advancing Science*) met in the spring of 2002 to plan a statewide program assessment under the direction of an independent evaluator, Paul Bell. The group met several times to develop separate biology and chemistry assessment instruments consisting of 40 multiple choice questions. Both assessment instruments were ready for pilot testing during the spring of the 2002-2003 academic year.

Piloting of the chemistry and biology assessments was planned with the following expectations and limitations:

- the first administration of the assessment would be used primarily for item analysis to evaluate the quality and validity of the questions in each instrument,
- variation in the types and frequency of laboratory activity usage among the eleven program sites was expected to underestimate student performance at individual sites and thereby underestimate average student performance among program sites statewide,
- varying lengths of program longevity among the eleven sites in the Commonwealth as well as delayed annual startups due to discontinuous funding was expected to minimize the overall differences in performance between students in schools served by the eleven program sites and students in schools not served, and
- no pre-test data would be available.

RESULTS

Student Performance

Despite the limitations of the test instrument and conditions for program implementation during the 2002 – 2003 academic year, students in program schools (schools served by *Science In Motion* or *Advancing Science*) were able to correctly answer an average of 20% more questions when compared to students in schools not having access to the program. These results are summarized in Figure 1. The differences in performance were significant at the 95% confidence level. In biology, the average numbers of questions answered correctly were 12.8 in control schools and 15.3 in program schools. In chemistry, the average numbers of questions answered correctly were 14.1 in control schools and 17.0 in program schools.

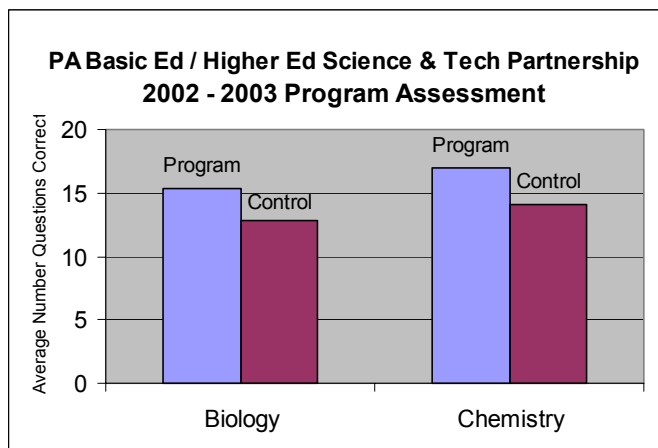


Figure 1: Program Schools (served by either *Science In Motion* or *Advancing Science*) out-performed Control Schools (outside the program service areas) by 20%. These differences are significant at the 95% confidence level.

Instrument Evaluation

The 40 individual questions included in the chemistry and biology assessment instruments were evaluated. In the biology instrument, none of the items were too easy; five were too difficult, and eleven items had some problem in discriminating between high and low scoring students as determined by low correlations with the total test. In the chemistry instrument, none of the items were too easy; four were too difficult, and eleven had some problem in discriminating between high and low scoring students as determined by low correlations with the total test. Some of these problematic items may still be legitimate to use in individual quizzes or future tests, but only after they are examined for agreement with the program's high-tech objectives, correct key choices, confusing stems (such as negative stems), and semantic problems with distracter choices. Changes in laboratory usage across sites may also increase the rating of certain items in the future.

Conclusions

1. These data show that both the biology and chemistry tests were sensitive to *Science In Motion/Advancing Science* instruction and that these program classes performed significantly (at least at the 0.95 level) better than the control classes. This is a remarkable result in that there were so many differences among classes across the eleven sites in availability of equipment, actual class time for use of equipment, the focus of lab objectives and individual teaching styles. Therefore, it may be claimed that *Science In Motion* and *Advancing Science* lab instruction is a powerful approach for teaching lab-based problem solving and inquiry.
2. Because the mean scores failed to come close to the mastery level, the concepts examined by the tests should accommodate considerably more intensive instruction in the areas covered. The test items probably would be sensitive to instruction of students in second year or advance placement courses.
3. Because the classes that were tested represented such a variety of district wealth, student sophistication, and school size, it may be claimed that the *Science In Motion/Advancing Science* approach might be a powerful equalizer for students lacking access to district owned high tech science laboratory equipment.

STATISTICAL ANALYSIS

Biology

The analysis of biology test data that compare the *Science In Motion/Advancing Science* instruction classes with the control classes are shown in Tables 1 and 2. Table 3 shows the internal reliability of the test.

Table 1: Spring 2003 SIM v. Control Biology Means

Group Statistics

Group	N	Mean	Standard Deviation	Standard Error of the Mean
SIM	166	15.2892	5.15935	0.40044
Control	126	12.7937	4.10330	0.36555

Table 2: Independent Samples Test

	Levene's Test for Equality of Variances	
	F	Significance
Equal Variances Assumed	8.232	0.004
Equal Variances Not Assumed		

Table 3: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based On Standardized Items	Number of Items
0.657	0.637	40

Chemistry

The revised analysis of chemistry test data that compare the *Science In Motion/Advancing Science* instruction classes with the control classes are shown in Tables 4 and 5. Table 6 shows the internal reliability of the test.

Table 4: Spring 2003 SIM v. Control Chemistry Means

Group Statistics

Group	N	Mean	Standard Deviation	Standard Error Of the Mean
SIM	223	17.0359	5.17431	0.34650
Control	134	14.0746	4.22066	0.36461

Table 5: Independent Samples Test

	Levene's Test for Equality of Variances	
	F	Significance
Equal Variances Assumed	3.809	0.052
Equal Variances Not Assumed		

Table 6: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based On Standardized Items	Number of Items
0.679	0.661	40

APPENDIX B

PENDING PENNSYLVANIA LEGISLATION

This appendix contains copies of the following bills:

SB414 – A Senate education bill providing \$400,000 grants/institution services in the state

HB1512 – A House education bill providing \$400,000 grants/institution services in the state

**Pennsylvania Basic Education/Higher Education
Science and Technology Partnerships**

2004-2005 Regional Service Providers:

Cedar Crest College
Clarion University of Pennsylvania
Drexel University
Gannon University
Gettysburg College
Juniata College
Susquehanna University
University of Pittsburgh at Bradford
Ursinus College
Westminster College
Wilkes University