



The Pennsylvania Basic Education/Higher Education Science and Technology Partnership

2017-2018 Annual Service Report

Executive Summary

The Science In Motion program sustained bipartisan support by members of the Pennsylvania General Assembly and was inserted back into the 2017-2018 state budget after deletion by the Governor. Science In Motion (SIM) was very eager to be able to provide hands-on, inquiry-based experiences to the participating schools in its role as the premier high school science education outreach program for the Commonwealth. Financial hardship of program funding over the past several years has forced many of the SIM host sites to reduce service area size, delay service to schools for several months, or completely stop service before the end of the school year. Of the sites that had science education specialists (mobile educators) from the ten-member colleges and universities, Science In Motion staff members presented over 1,590 hands-on laboratory experiences to 212 different schools. The program also provided an additional 6,206 drop-off laboratory kits for short term loan and offered 13 days of professional development workshop opportunities consortium-wide for over 55 teachers. Overall, Science In Motion provided 470 different teachers with 759 different labs creating 158,320 student experiences during the 2017-2018 school year.

What is Science In Motion?

Most Pennsylvania high schools cannot afford the modern, well-maintained equipment that it takes to prepare students for today's modern technological careers in science, engineering and other technical fields. Modern scientific training is especially expensive as it requires multiple sets of equipment so that each student can get a hands-on, inquiry-based experience. This classroom deficiency is compounded by the added need for intensive maintenance and management of equipment and software, training to keep teachers up-to-date on advances in science and technology, and access to relevant, standards-aligned activities that utilize the technology. Additionally, even if an individual school musters the resources to provide an up-to-date lab experience, much of the equipment would sit on the shelf for most of the year as it would be used for only one topic in the breadth of curriculum that must be covered. In 1987, a team of Pennsylvania science teachers, a local college, and the National Science Foundation set out to tackle these problems. They developed a hugely successful shared-resources partnership that is now known nationally as Science In Motion.

Science In Motion (SIM) addresses the needs of science, technology, engineering, and mathematics in the classroom by providing the following support to schools:

- Access to well-maintained, modern, scientific equipment and supplies costing hundreds of thousands of dollars.
- Visiting science education specialists to team-teach high-tech science labs with the school's faculty.
- Professional development workshops to help teachers keep abreast of the latest developments in science and transfer that knowledge into classroom activities and hands-on laboratory experiments.
- Standards-aligned laboratory activities for students.

Science In Motion provides these services through a partnership between the Commonwealth and ten select colleges and universities in Pennsylvania. This shared-resources partnership has several advantages. First, high schools now have access to multiple sets of equipment that they could otherwise never afford. This equipment remains in circulation, shared by a regional cluster of schools rather than sitting on a shelf of a single school most of the time. Teachers in the program say that SIM makes a difference between being well-resourced for teaching science as opposed to not being adequately resourced. Additionally, the host colleges and universities provide not only administrative and grant support, but also modern laboratory space for preparation of experiments, chemical ordering, safety and disposal services, and work study and assistantship opportunities for pre-service teachers. Finally, with colleges and universities as partners, the door is now open for local corporate, foundation and community backing for science education.

The value of the SIM model has been proven in multiple assessments, and its success can also be seen by the spread of SIM throughout much of Pennsylvania, a backlog of requests for establishment of new sites in the Commonwealth, and the adoption of the model in other regions, including a statewide program in Alabama.

Why is Science In Motion important to Pennsylvania's economic future?

As older industries cease to be a source for jobs in the Commonwealth, it is imperative for job creation and sustained economic growth that Pennsylvania has a workforce trained for the new emerging economy in science, technology, engineering, and math. Science In Motion addresses this need by providing hands-on experiences with modern technology to hundreds of thousands of students in the Commonwealth - the same technology required for today's skilled workforce. No other program in the Commonwealth delivers so much state-of-the-art science equipment and supports so many schools at so little cost.

Why is Science In Motion cost-effective?

Through its shared-resources model and partnerships with higher education, SIM is an extremely cost-effective model. By sharing equipment, science expertise, and professional development resources, SIM provides services that no single school could individually afford. For example, a SIM site can thoroughly support one subject area (e.g., chemistry) in at least 10 schools for only \$200,000 per year. For a single school to purchase these services and resources independently, it would cost nearly \$80,000 per school. The SIM approach realizes a taxpayer cost savings for each subject of nearly \$60,000 per school. The

typical SIM center serves more than 10 schools resulting in a savings of at least \$595,820 per site to the Commonwealth compared to non-resource-sharing models.

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

- Office and laboratory 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 preparation area equipment including chemical hoods, autoclaves, and dishwashers
- Van parking (at most sites)
- Approved gas tank storage areas
- General clerical and accounting support

It is this infrastructure and the access to higher education science and education faculty expertise that helps make the Pennsylvania Basic Education/Higher Education Science and Technology Partnerships cost-efficient. However, what makes these partnerships most effective in keeping Pennsylvania science curricula current is the constant infusion of new concepts and related activities into high school classrooms through the close relationships formed between teachers at the secondary level and their college/university counterparts who are actively engaged in cutting edge research.

Science In Motion Service Areas

During the 2017-2018 school year, 10 colleges and universities participated in the Science In Motion consortium including; Clarion University, Drexel University, Elizabethtown College, Gettysburg College, Juniata College, Lehigh Carbon Community College, Susquehanna University, Ursinus College, Westminster College, and Wilkes University. All operational sites offered service to participating schools this fiscal year. Most sites were only able to deliver equipment and did not employ mobile educators due to the budgetary constraints. Gettysburg College and Juniata College were the only institutions that had full time Mobile Educators visiting schools the entire school year; however, Susquehanna, Ursinus, Clarion, Lehigh Carbon Community College and Wilkes all had nominal educator visits into the classroom. Subject matter varies among sites and includes, but is not limited to, high school Chemistry, Biology, Physics, and middle school integrated science curricula. Demographics near each site dictate the size of the service area as well as success of obtaining funding beyond state appropriations, which in turn influences the number of individual schools and school districts served per site (Appendix A). The map (Figure 1) highlights the school districts served by each SIM consortium member site; however, not every school in each school district is served. Some sites have been forced to decrease their historical service area depicted, due to consecutive and multiple funding reductions and delays.

Service Report

The SIM Consortium service record for the 2018 school year reveals a six percent decrease in teaching visits respectively (Table 1). Due to the extreme delay in funds received, many sites were unable to open for the school year or permitted to send equipment/mobile educators out to the classrooms either prior to or after receiving initial state appropriation check. Sites that run at full capacity (Gettysburg and Juniata) have had to secure alternative funding to offer the basic program; however, most sites simply do what they can until their financial resources are expended. The total student contacts have increased by approximately five percent from 2017 (Figure 2) which is due to an increase in equipment loans. The total number of mobile educator teaching visits has hit an all-time low for the SIM Consortium (Figure 3), three host sites made no teaching visits, three sites made 20 or less visits to the classroom, two sites averaged about 104 visits per school year and the remaining two host sites averaged 674 visits. There was a slight increase in the delivery services from 2017 to 2018 with the lab kits and equipment by 160 drop-off labs (Figure 4). This past year the state administration has not been a very good partner to the SIM Consortium higher education host institutions; we've experienced major budget delays (received funds after the fiscal was complete), the SIM program being completely removed from the budget, and funds allocated to our program being placed into budgetary reserve and unable to be accessed. It has been increasingly more difficult for the higher education member institutions in the SIM consortium to make business decisions and adequately judge the risk involved with continuing the state partnership and hosting the SIM program at their institutions.

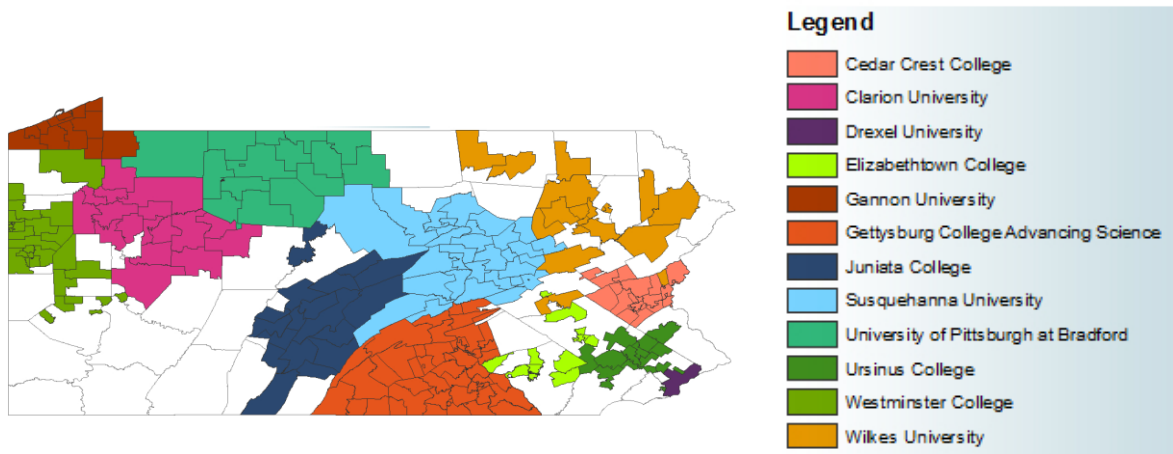


Figure 1

Historic school district service area in the Commonwealth by the Science In Motion (SIM) Consortium color-coded by site. Gannon University and University of Pittsburgh at Bradford no longer host the SIM program. Lehigh Carbon Community College is now hosting the SIM program in the Lehigh region. Not every school in each school district highlighted participates in the SIM program.

Table 1

The Science In Motion Consortium site members combined service records for school years 2008 through 2018.

School Year ending	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Bio teaching visits	2,090	2,216	1,127	1,576	1,377	1,211	1,080	655	665	669	584
Chem teaching visits	1,830	2,001	1,407	1,604	1,108	1,019	900	453	389	393	639
Other teaching visits	1,283	1,204	896	980	593	646	498	601	686	627	369
Total teaching visits	5,203	5,421	3,430	4,160	3,078	2,886	2,478	1,709	1,740	1,689	1,592
Total equipment loans	8,271	7,775	6,403	7,984	8,256	7,238	6,298	6,018	5,648	6,046	6,206
Total student contacts	280,224	236,359	188,622	207,380	208,328	214,164	202,931	143,723	137,100	150,929	158,320
Different schools served	337	324	291	294	312	244	231	270	179	221	212
Different teachers served	715	752	612	768	713	626	624	623	443	478	470
Different labs taught	1,143	1,286	1,059	1,046	1,050	925	886	858	842	612	759
Total accelerated students	72,298	18,993	48,010	49,124	46,197	50,043	57,221	29,741	25,711	31,018	40,261

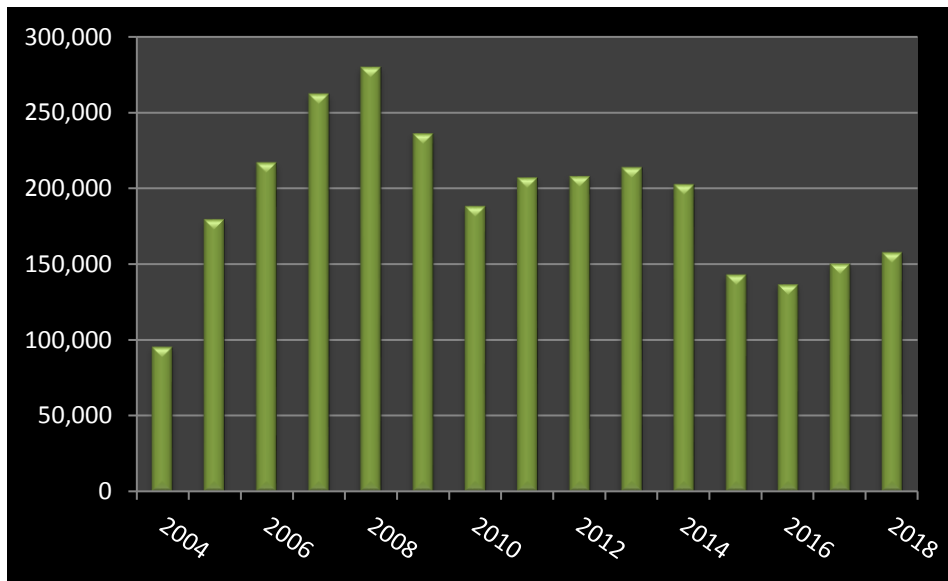


Figure 2

The total number of student contacts by the Science in Motion Consortium from school years 2004 through 2018.

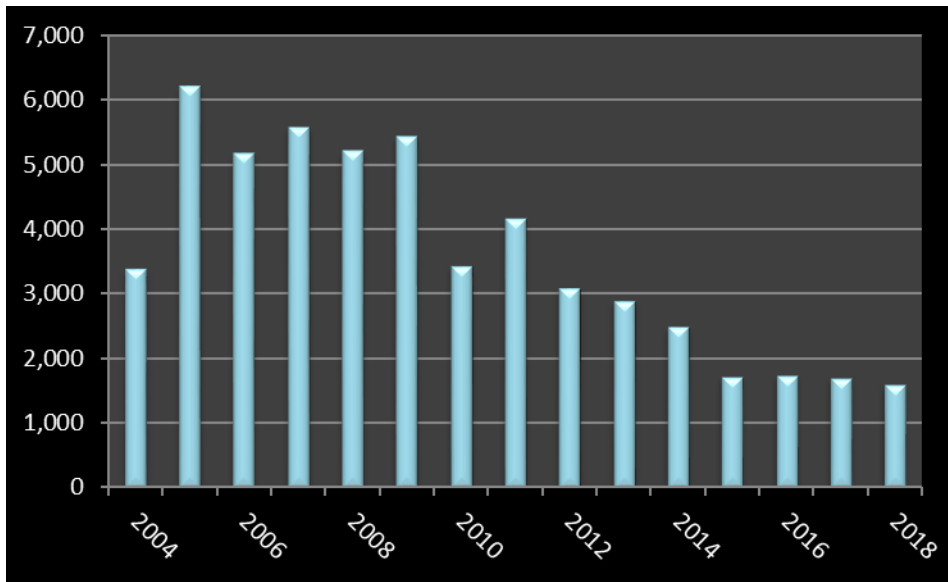


Figure 3

The total number of teaching visits by the Science in Motion Consortium from school years 2004 through 2018.

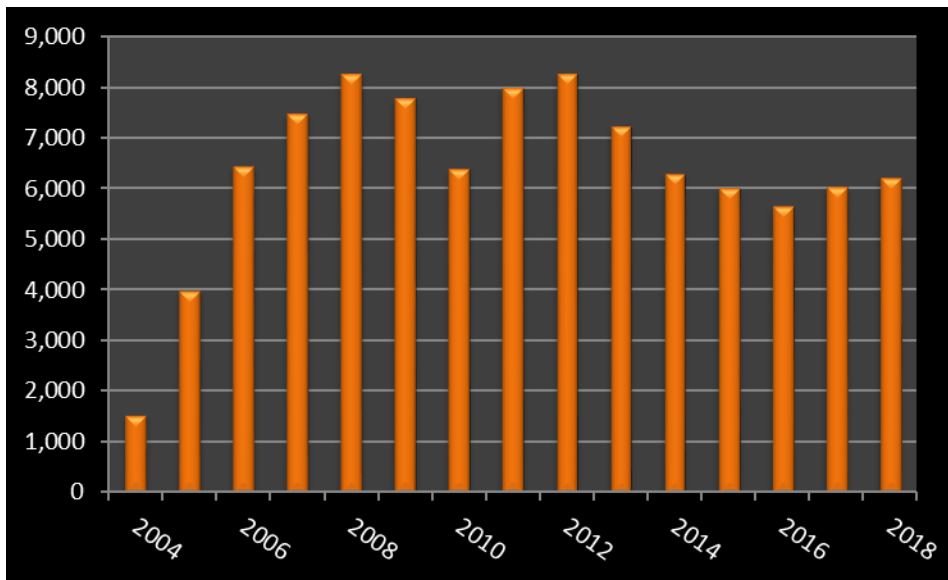


Figure 4

The total number of equipment loans by the Science in Motion Consortium from school years 2004 through 2018.

It has become increasingly difficult for even the established sites to keep their outstanding and experienced mobile educators from accepting other sources of employment due to annual funding uncertainties. Overall, the member institutions would be able to develop a plan and serve more teachers and students if state funding could be reliably anticipated and processed with each funding year. Discovering how much is allocated to the program after a state budget has been passed each year takes almost one month or more. This makes it difficult as a business partner to determine how to budget and staff our service programs and somewhat impossible to begin service to the school at the beginning of the school year. All sites have struggled to maintain a high level of service to their schools despite funding reductions and delays. 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 and not guaranteed.

Capitol Day is the annual SIM Consortium event to demonstrate to state leaders the importance of science in education and, more specifically, the importance of the Science In Motion program; and provides the opportunity to showcase state-of-the-art science equipment and different hands-on laboratories in the Capitol Rotunda. We were pleased to have funds to visit our state Capitol building and display our program's structure and function to the state legislators and general public during the event this year. We had 6 out of 10 host sites attend and Dave Bauman spent most of the morning visiting with the SIM participants. We had a number of representatives stop by and the tone this year seemed to be more positive this year than in past years. The SIM Consortium is contractually obligated through PDE to offer and coordinate employee educator workshops throughout each fiscal year. Traditionally, there have been two workshops hosted by Juniata College: the sharing workshop (fall semester) and the curriculum workshop (spring semester). For the past nine years, a sharing workshop has not been possible due to the tardiness of state funds; however, this year we had enough funds to host a Sharing workshop. We had four sites participate in the 2018 Sharing workshop. We had speakers and information sharing on 1) Why teachers use SIM?- Karen Spuck (Clarion SIM) Ph.D. dissertation, 2) PA Standards and Anchors-Dave Bauman, PDE Science advisor, and 3) Assessment- Phil Dunwoody, Director of Assessment, Juniata College. We hope to develop a new assessment plan in the next school year since our current assessment data is 10 years past.

Science In Motion Consortium sites receive more requests for school service than their sites are able to provide with the current funding allocation. The Science In Motion programs hosted by the higher education institutional sites have struggled financially, and although we are very appreciative of the funds we have been awarded each year from state appropriations, they are not enough to offer a whole-hearted program. Science in Motion services are greatly cherished and needed by the school systems, teachers, and students that participate in the program. Many school participants have seen their service diminish and, in some cases, end over the past five years. We are a unique and valued program, which cost-shares modern scientific equipment and expertise effectively among the schools we are able to serve. No other program in the Commonwealth delivers so much state-of-the-art science equipment and supports so many schools at so little cost.

Appendix A

School Districts and individual schools served during the 2017-2018 school year by each active site of the Science In Motion Consortium (10 total in alphabetical order).

Clarion University	
School Districts and Private School Systems (10)	Individual Schools (13)
Armstrong Area School District	Armstrong Jr/Sr High School West Shamokin High School
Clarion Area School District	Clarion Area Jr/Sr High School
Cranberry Area School District	Cranberry Jr/Sr High School
Diocese of Erie	Venango Catholic High School DuBois Catholic High School
Dubois Area School District	DuBois Area High School
Forest Area School District	East Forest Jr/Sr High School
Franklin Area School District	Franklin Middle School
Keystone School District	Keystone Jr/Sr High School
Punxsutawney Area School District	Punxsutawney Area High School
Valley Grove School District	Rocky Grove Jr/Sr High School Valley Grove Elementary School

Drexel University	
School Districts and Private School Systems (2)	Individual Schools (9)
Archdiocese of Philadelphia	Archbishop Ryan High School
School District of Philadelphia	Aspira Charter School at Onley George Washington High School Julia R. Masterman High School Kohelet Yeshiva High School Overbrook High School Parkway Center City High School Roberto Clemente Middle School William W. Bodine High School

Elizabethtown College	
School Districts & Private School Systems (13)	Individual Schools (17)
Cornwall-Lebanon School District	Cedar Crest H/M School
Diocese of Harrisburg	St. Anne School Lancaster Catholic
Donegal School District	Donegal Junior High School
Harrisburg School District	Sci-Tech High
Hempfield Area School District	Hempfield High School
Elizabethtown College continued on next page	

Elizabethtown College continued

Lancaster Mennonite	Lancaster Campus Middle School
Lancaster School District	J.P. McCaskey High School
	Lincoln Middle School
	Wheatland MS
Manheim Township School District	Manheim Township High School
	Manheim Township Middle school
Muhlenburg School District	Muhlenburg Middle School
Northern Lebanon School District	Northern Lebanon Middle School
Penn Manor School District	Penn Manor High School
Solanco School District	Solanco High School
Veritas	Veritas Private School

Gettysburg College**School Districts and Private School Systems (19)****Individual Schools (36)**

Bermudian Springs School District	Bermudian Springs High School
Camp Hill School District	Camp Hill High School
Chambersburg Area School District	Chambersburg Area Middle School North
	Chambersburg Area Middle School South
	Chambersburg Area Senior High School
	Lurgan Elementary
Conewago Valley School District	Conewago Valley Intermediate School
	New Oxford Middle School
Diocese of Harrisburg	Delone Catholic High School
	St. Francis Xavier School
	St Theresa of Calcutta
	St Rose of Lima
Fairfield Area School District	Fairfield Area Middle School
Gettysburg Area School District	Franklin Township Elementary School
	Gettysburg Area High School
	Gettysburg Area Middle School
	James Getty Elementary School
	Lincoln Elementary School
Greencastle-Antrim School District	Greencastle-Antrim High School
Hanover Public School District	Hanover High School
	Hanover Middle School
Northern York School District	Northern High School
Private	Adams County Christian Academy
	Lancaster Mennonite School – Hershey Campus
	KDO Academy
Shippensburg Area School District	Shippensburg Area Middle School
Spring Grove Area School District	Spring Grove Area Middle School

Gettysburg College continued on next page

Gettysburg College continued

Susquehanna Twp. School District
 Upper Adams School District

Susquehanna Twp. Middle School
 Arendtsville Elementary School
 Bendersville Elementary
 Biglerville High School
 Upper Adams Middle School
 Upper Dauphin Area High School
 Waynesboro High School
 Edgar Fahs STEAM Academy K-8
 York Suburban High School

Upper Dauphin Area School District
 Waynesboro School District
 York City School District
 York Suburban School District

Juniata College**School Districts and Private School Systems (17)****Individual Schools (25)**

Bellefonte Area School District
 Belleville Mennonite School
 Calvary Christian Academy
 Diocese of Altoona-Johnstown
 Forbes Road School District
 Grier School
 Hollidaysburg Area School District
 Huntingdon Area School District
 Juniata Valley School District
 Mifflin County School District
 Mount Union Area School District
 New Day Charter School
 Northern Bedford County School District
 Southern Huntingdon County School District
 Spring Cove School District
 Tyrone Area School District
 Williamsburg Community School District

Bellefonte Area Middle School
 Bellefonte Area High School
 Belleville Mennonite School
 Calvary Christian Academy
 Bishop Guilfoyle Catholic High School
 Forbes Road Jr/Sr High School
 Grier School
 Hollidaysburg Area Senior High School
 Hollidaysburg Area Junior High School
 Huntingdon Area High School
 Huntingdon Area Middle School
 Juniata Valley Jr/Sr High School
 Mifflin County High School
 Mifflin County Junior High School
 Mifflin County Middle School
 Mount Union Area Jr/Sr High School
 Main Huntingdon Campus
 Satellite Mifflintown Campus
 Northern Bedford County High School
 Southern Huntingdon High/Middle School
 Central High School
 Spring Cove Middle School
 Tyrone Area High School
 Tyrone Area Middle School
 Williamsburg Jr/Sr High School

Lehigh Carbon Community College	
School Districts and Private School Systems (7)	Individual Schools (8)
Allentown School District	Dieruff High School
Panther Valley School District	Panther Valley High School
Parkland School District	Parkland High School
	Orefield Middle School
Salisbury School District	Salisbury High School
The King's Academy	The King's Academy High School
Tri-Valley School District	Tri-Valley High School
Whitehall-Coplay School District	Whitehall-Coplay High School

Susquehanna University	
School Districts and Private School Systems (22)	Individual Schools (26)
Bloomsburg Christian School	Bloomsburg Christian School
Central Columbia School District	Central Columbia Middle School
	Central Columbia High School
Danville Area School District	Danville Middle School
	Danville High School
East Lycoming School District	Hughesville High School
Greenwood School District	Greenwood High School
Greenwood Friends School	Greenwood Friends School
Juniata County School District	East Juniata High School
	Juniata High School
Keystone Central School District	Central Mountain High School
Line Mountain School District	Line Mountain High School
Loyalsock Township School District	Loyalsock Township High School
Midd-West School District	Midd-West High School
Milton Area School District	Milton High School
Montoursville Area School District	Montoursville Area High School
North Schuylkill School District	North Schuylkill High School
Northumberland Christian School	Northumberland Christian School
Selinsgrove Area School District	Selinsgrove Area High School
Shamokin Area School District	Shamokin High School
Shikellamy School District	Shikellamy Middle School
	Shikellamy High School
Sunbury Christian Academy	Sunbury Christian Academy
Tri-Valley School District	Tri-Valley High School
Warrior Run School District	Warrior Run High School
Williamsport Area School District	Williamsport Area High School

Ursinus College	
School Districts and Private School Systems (13)	Individual Schools (19)
Boyertown Area School District	Boyertown Area Senior High School
Colonial School District	Plymouth Whitemarsh High School
	Colonial Middle School
Downingtown Area School District	Downingtown High School East
	Pickering Valley Elementary School
Methacton Area School District	Methacton High School
North Penn School District	North Penn High School
Owen J. Roberts School District	Owen J. Roberts High School
	Owen J. Roberts Middle School
Pennridge School District	Pennridge High School
Perkiomen Valley School District	Perkiomen Valley High School
	Perkiomen Valley Middle School East
Phoenixville Area School District	Phoenixville Area High School
Souderton Area School District	Indian Valley Middle School
Spring-Ford Area School District	Spring-Ford 7th Grade Center
	Spring-Ford 9th Grade Center
	Spring-Ford Senior High School
Tredyffrin/Easttown School District	Conestoga High School
Upper Dublin School District	Upper Dublin High School

Westminster College	
School Districts and Private School Systems (23)	Individual Schools (37)
Butler School District	Butler Jr/Sr High School
	Center Township Elementary School
Erie Diocese	Kennedy Catholic High School
Farrell Area School District	Farrell Elementary School
	Farrell High School
Grove City Area School District	Grove City Senior High School
	Hillview Intermediate Center
Grove City Christian Academy	Grove City Christian Academy
Hermitage School District	Delahunty Middle School
	Hickory High School
Jamestown Area School District	Jamestown Elementary School
	Jamestown Jr/Sr High School
Lakeview School District	Lakeview High School
Laurel School District	Laurel Jr/Sr High School
Mercer Area School District	Mercer Middle-High School
Mohawk Area School District	Mohawk Elementary School
	Mohawk High School
Westminster College continued on next page	

Westminster College continued

Neshannock Township School District	Memorial Elementary School
	Neshannock Jr/Sr High School
New Castle Christian Academy	New Castle Christian Academy
New Castle Area School District	New Castle Jr/ Sr High School
Penncrest School District	Maplewood Middle-High School
Pine Richland School District	Pine Richland High School
Reynolds School District	Reynolds Jr/Sr High School
	Reynolds Elementary School
Seneca Valley School District	Seneca Valley Intermediate High School
	Seneca Valley Senior High School
Sharon School District	Sharon High School
	Case Elementary
	Musser Elementary
Slippery Rock Area School District	Slippery Rock High School
Union Area School District	Union Memorial Elementary School
West Middlesex Area School District	Oakview Elementary School
Wilmington Area School District	Pulaski Elementary
	New Wilmington Area Elementary
	Wilmington Area High School
	Wilmington Area Middle School

Wilkes University

School Districts and Private School Systems (24)

Individual Schools (28)

Blue Mountain School District	Blue Mountain High School
Carbondale School District	Carbondale Area Jr/Sr High School
Dallas School District	Dallas High School
Diocese of Scranton	Holy Cross High School
Elk Lake School District	Elk Lake Jr/Sr High School
Forest City School District	Forest City Regional High School
Hanover Area School District	Hanover Area Jr/Sr High School
Hazleton Area School District	Academy of Sciences
	Hazleton Area High School
Lake-Lehman School District	Lake-Lehman Jr/Sr High School
Lakeland School District	Lakeland Jr/Sr High School
Mid Valley School District	Mid Valley Secondary Center
Northwest Area School District	Northwest Area Jr/Sr High School
Pittston Area School District	Pittston Area High School
Pocono Mountain School District	Pocono Mountain East High School
Summit school of the Poconos- Private	Summit School of the Poconos
Towanda Area School District	Towanda Jr/Sr High School
Tri-Valley School District	Tri-Valley Jr/Sr High School

Wilkes University continued on next page

Wilkes University continued

Tunkhannock Area School District

Wallenpaupack Area School District

Wayne Highlands School District

Western Wayne School District

Wilkes-Barre Area School District

Wyoming Area School District

Wyoming Valley West School District

Tunkhannock High School

Wallenpaupack High School

Honesdale High School

Western Wayne High School

Coughlin High School

Mackin School

Meyers Jr /Sr High School

Wyoming Area Secondary Center

Wyoming Valley West High School

Wyoming Valley West Middle School-Chester St