

2019-2020 Annual Service Report



The Pennsylvania Basic Education/Higher Education Science and Technology Partnership

Executive Summary

The Science in Motion program sustained bipartisan support by members of the Pennsylvania General Assembly and was inserted back into the 2019-2020 state budget after recommendation of elimination by the Governor. Science In Motion (SIM) program host institutions are very eager to be able to provide hands-on, inquiry-based experiences to the participating schools in their 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 1,150 hands-on laboratory experiences to 194 different schools. The program also provided an additional 4,326 drop-off laboratory kits for short term loan and offered 9 days of professional development workshop opportunities consortium-wide for over 115 teachers. Overall, Science in Motion provided 436 different teachers with 532 different labs creating 151,368 student experiences during the 2019-2020 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 higher education institutions 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 institutions 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 others, as well as 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 2019-2020 school year, the Science in Motion Consortium consisted of ten higher education institutions including: Bloomsburg University, Clarion University, Drexel University, Elizabethtown College, Gettysburg College, Juniata College, Lehigh Carbon Community College, Ursinus College, Westminster College, and Wilkes University. All operational host 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, then the COVID-19 pandemic occurred, and all schools were closed by the Governor for the remainder of the school year. Subject matter varies among host 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 host institution map (Figure 1) indicates the PA location of each SIM consortium higher education institution member. Some sites have been

forced to decrease their historical service area due to consecutive and multiple funding reductions and delays. Service to school districts may change on an annual basis.

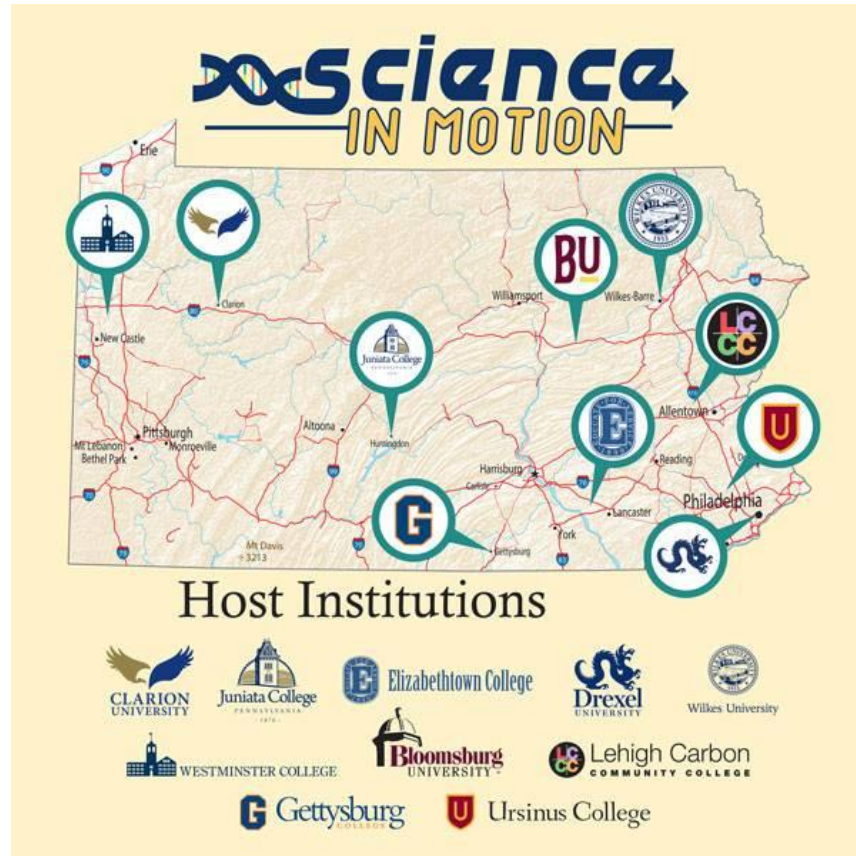


Figure 1
Geographic locations of the Science in Motion (SIM) Consortium ten host Pennsylvania higher education Institutions: Bloomsburg University, Clarion University, Drexel University, Elizabethtown College, Gettysburg College, Juniata College, Ursinus College, Westminster College, and Wilkes University.

Service Report

Due to the COVID-19 pandemic causing all schools to close and Science in Motion program sites to either close or be forced to complete work virtually from home, the 2019-2020 service record shows a reduction of all values, including the number of teaching visits during spring 2020 (Table 1). Sites that run at full capacity (Gettysburg and Juniata) have had to secure alternative funding to offer the full-time program schedule; however, most sites simply do what they can until their financial resources are expended. The total student contacts have decreased by approximately over 30,000 from 2019 (Figure 2) which is due to the abrupt switch to remote work for all SIM programs in March 2020 and all schools transitioning to fully remote instruction for the remainder of the school year. The total number of mobile educator teaching visits has hit an all-time low for the SIM Consortium (Figure 3); four host sites made no teaching visits, two sites made 15 or less visits to the classroom, and the remaining four host sites visits ranged from 85 to 400. There was a decrease in the equipment loans/delivery services by

2,259 delivered labs from 2019 to 2020 (Figure 4). The transition of the SIM program from Susquehanna University to Bloomsburg University began this year. With delays in receiving funds, establishing the program at a new location, and COVID-19 closures, the Bloomsburg University SIM program was unable to open for the 2019-2020 school year.

Table 1

The Science in Motion Consortium site members combined service records for school years 2009 through 2020.

School Year totals	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<u>Teaching Visits</u>												
Biology	2,216	1,127	1,576	1,377	1,211	1,080	655	665	669	584	724	652
Chemistry	2,001	1,407	1,604	1,108	1,019	900	453	389	393	639	343	229
Other	1,204	896	980	593	646	498	601	686	627	369	395	276
Total teaching visits	5,421	3,430	4,160	3,078	2,886	2,478	1,709	1,740	1,689	1,592	1,462	1,157
Equipment loans	7,775	6,403	7,984	8,256	7,238	6,298	6,018	5,648	6,046	6,206	6,585	4,326
Student contacts	236,359	188,622	207,380	208,328	214,164	202,931	143,723	137,100	150,929	158,320	182,229	151,368
Schools served	324	291	294	312	244	231	270	179	221	212	282	194
Teachers served	752	612	768	713	626	624	623	443	478	470	642	436
Labs taught	1,286	1,059	1,046	1,050	925	886	858	842	612	759	751	532
Accelerated students	18,993	48,010	49,124	46,197	50,043	57,221	29,741	25,711	31,018	40,261	25,740	25,511

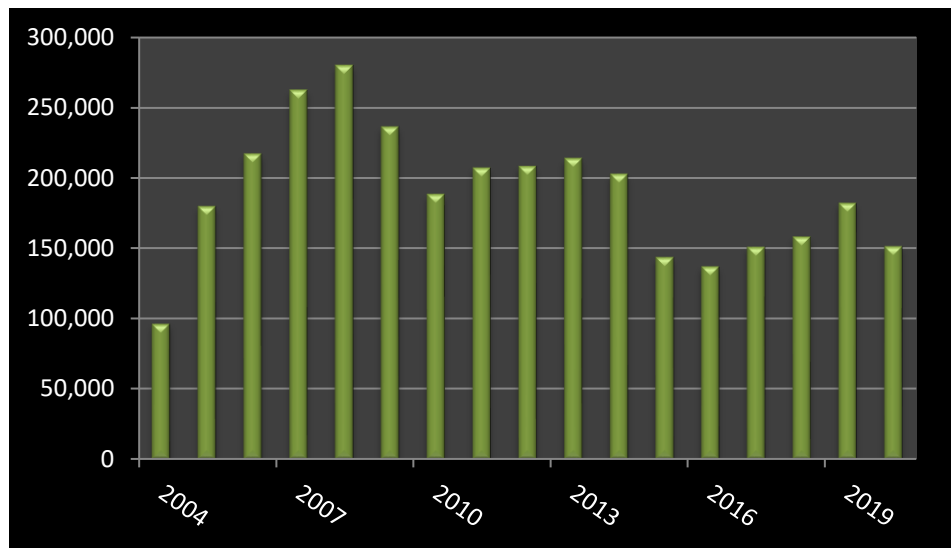


Figure 2

The total number of student contacts by the Science in Motion Consortium from school year 2004 through 2020.

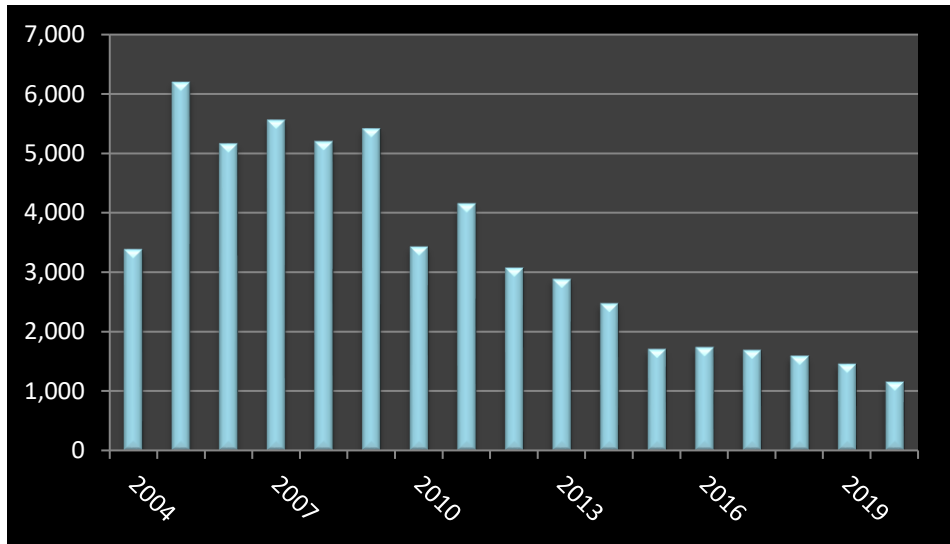


Figure 3
The total number of teaching visits by the Science in Motion Consortium from school year 2004 through 2020.

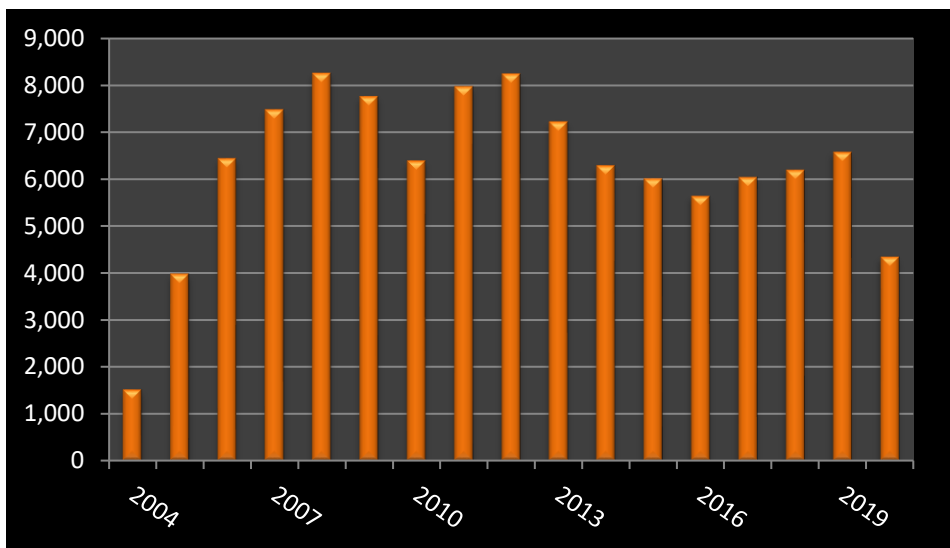


Figure 4
The total number of equipment loans by the Science in Motion Consortium from school year 2004 through 2020.

It is difficult for the SIM consortium higher education member institutions to make business decisions and adequately judge the risk involved with continuing the state partnership and hosting of the SIM program at their institutions when they are unsure of budget projections on an annual basis. It has become most difficult for even the established SIM 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 months. 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, which is less than a month away once the confirmed budget information is received. 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 nothing is ever 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 unable to hold this event spring 2020 due to the COVID-19 pandemic restrictions in place. 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 JC: the sharing workshop and the curriculum workshop. This year we decided to cancel both workshops due to COVID-19 restrictions. The SIM staff members also reported being involved and helping over 30 individual students with supplies, materials, and equipment loans for science fairs and special science events such as PA Junior Academy of Science, Agricultural Extension events, and Science Olympiad. Many staff members also served as judges for science experiment fairs.

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 can 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. The Science in Motion host institution programs are very appreciative of the funds we have been awarded each year from state appropriations; however, they are not enough to offer a whole-hearted program. Science in Motion Consortium sites receive more requests for school service than their sites can provide with the current funding allocation and if we had the chance to change that, we have the infrastructure and network of science teachers to do so.

Appendix A

School districts and individual schools served during the 2019-2020 school year by each active site of the Science in Motion Consortium (9 total in alphabetical order). The Bloomsburg University was establishing their SIM program for the 2019-2020 school year and because of delays in funds and COVID-19 restrictions their program did not open.

Clarion University	
School Districts and Private School Systems (8)	Individual Schools (9)
Allegheny-Clarion Valley Area School District	A-C Valley Junior/Senior High School
Armstrong Area School District	Armstrong Jr/Sr High School
	West Shamokin High School
Diocese of Erie	Venango Catholic High School
Forest Area School District	East Forest Jr/Sr High School
Keystone School District	Keystone Jr/Sr High School
North Clarion Area School District	North Clarion Junior/Senior High School
Oil City School District	Oil City Jr/Sr High School
Valley Grove School District	Rocky Grove Jr/Sr High School

Drexel University	
School Districts and Private School Systems (1)	Individual Schools (8)
School District of Philadelphia	Frankford High School
	George Washington High School
	Kohelet Yeshiva High School
	Northeast High School
	Parkway Northwest High School
	Philadelphia Military Academy at Elverson
	Samuel Fels High School
	West Philadelphia High School

Elizabethtown College	
School Districts & Private School Systems (29)	Individual Schools (32)
Muhlenberg School District	Muhlenberg Middle School
Big Spring School District	Big Spring High School
Carlisle Area School District	Carlisle High School
Central Dauphin School District	Central Dauphin East High School
Cocalico School District	Cocalico High School
Conestoga Valley School District	Conestoga Valley High
Cumberland Valley School District	Cumberland Valley High School
Dover Area School District	Dover Area High School
East Pennsboro School District	East Pennsboro High School
Eastern Lebanon County School District	ELCO High School
Elizabethtown Area School District	Elizabethtown High school
	Elizabethtown Middle School

Ephrata School District	Ephrata High School
Hanover Public School District	Hanover Senior High School
Harrisburg School District	William Penn Senior High School
Hempfield School District	Hempfield High School
Kennard Dale School District	Kennard Dale High School
School District of Lancaster	J.P McCaskey High School
	Lincoln Middle School
Northern York School District	Northern High School
Middletown Area School District	Middletown Area High School
Muhlenberg School District	Muhlenberg Middle School
	Muhlenberg High School
Palmyra Area School District	Palmyra Area High School
Penn Manor School District:	Penn Manor High School
Red Lion Area School District	Red Lion High School
Solanco School District	Solanco High School
South Western School District	South Western High School
Southern York County School District	Susquehannock High School
Spring Grove Area School District	Spring Grove Area High School
West York Area School District	West York Area High School
York Suburban School District	York Suburban High School

Gettysburg College	
School Districts and Private School Systems (21)	Individual Schools (37)
Bermudian Springs School District	Bermudian Springs High School
Camp Hill School District	Camp Hill High School
	Eisenhower Elementary School
Chambersburg Area School District	Chambersburg Area Middle School North
	Chambersburg Area Middle School South
	Chambersburg Area Senior High School
Conewago Valley School District	Conewago Valley Intermediate School
	New Oxford Middle School
	New Oxford High School
Diocese of Harrisburg	Delone Catholic High School
	St. Francis Xavier School
	St Theresa of Calcutta
Fairfield School District	Fairfield Area Middle School
Gettysburg Area School District	Gettysburg Area High School
	Gettysburg Area Middle School
	James Getty Elementary School
	Lincoln Elementary School
Greencastle-Antrim School District	Greencastle-Antrim High School
	Greencastle-Antrim Middle School
Greenwood SD	Greenwood High School
Hanover Public School District	Hanover High School

Littlestown Area School District	Hanover Middle School
Mechanicsburg Area School District	Alloway Creek Intermediate School
Northern York County School District	Mechanicsburg Area Middle School
Private	Northern High School
	Harrisburg Christian School
	Harrisburg Christian Academy
Shippensburg Area School District	Grace B Luhrs Elementary School
	Shippensburg Intermediate School
	Shippensburg Middle School
Spring Grove Area School District	Spring Grove Area Middle School
Susquehanna Twp School District	Susquehanna Twp. High School
Upper Adams School District	Ardentsville Elementary School
	Upper Adams Middle School
Upper Dauphin School District	Upper Dauphin High School
York City School District	Phineas Davis Elementary School
York Suburban School District	York Suburban High School

Juniata College	
School Districts and Private School Systems (16)	Individual Schools (23)
Bellefonte Area School District	Bellefonte Area Middle School
	Bellefonte Area High School
Belleville Mennonite School	Belleville Mennonite School
Diocese of Altoona-Johnstown	Bishop Guilfoyle Catholic High School
Calvary Christian Academy	Calvary Christian Academy
Claysburg-Kimmel School District	Claysburg-Kimmel High School
Forbes Road School District	Forbes Road Jr/Sr High School
Grier School	Grier School
Hollidaysburg Area School District	Hollidaysburg Area Senior High School
	Hollidaysburg Area Junior High School
Huntingdon Area School District	Huntingdon Area High School
	Huntingdon Area Middle School
Juniata Valley School District	Juniata Valley Jr/Sr High School
Mifflin County School District	Mifflin County High School
	Mifflin County Junior High School
	Mifflin County Middle School
Mount Union Area School District	Mount Union Area Jr/Sr High School
Northern Bedford County School District	Northern Bedford County High School
Southern Huntingdon County School District	Southern Huntingdon High/Middle School
Spring Cove School District	Central High School
	Spring Cove Middle School
Tyrone Area School District	Tyrone Area High School
	Tyrone Area Middle School

Lehigh Carbon Community College	
School Districts and Private School Systems (13)	Individual Schools (19)
Allentown School District	Dieruff High School
Catasauqua School District	Catasauqua High School
	Catasauqua Middle School
	Sheckler Elementary School
East Penn School District	Lower Macungie Middle School
	Emmaus High School
Jim Thorpe School District	Penn-Kidder Campus
	LB Morris Elementary
Nazareth School District	Lehigh Learning Center
Northwestern Lehigh School District	Northwestern High School
Palmerton School District	Palmerton High School
Panther Valley School District	Panther Valley High School
Parkland School District	Parkland High School
	Springhouse Middle School
Salisbury School District	Salisbury High School
Tamaqua School District	Tamaqua High School
Tri-Valley School District	Tri-Valley High School
Whitehall-Coplay School District	Whitehall-Coplay Middle School
	Whitehall-Coplay High School

Ursinus College	
School Districts and Private School Systems (13)	Individual Schools (21)
Archdiocese of Philadelphia	Cardinal O'Hara High School
	Pope John Paul II High School
Boyertown Area School District	Boyertown Area Senior High School
	Boyertown Area Middle School
Colonial School District	Plymouth Whitemarsh High School
	Colonial Middle School
Downingtown Area School District	Downingtown High School East
	Downingtown Middle School
Great Valley School District	Great Valley High School
Methacton Area School District	Methacton High School
Norristown Area School District	Norristown Area High School
	Roosevelt High School
North Penn School District	North Penn High School
Owen J. Roberts School District	Owen J. Roberts High School
Perkiomen Valley School District	Perkiomen Valley High School
	Perkiomen Valley Middle School East
Spring-Ford Area School District	Spring-Ford 7th Grade Center
	Spring-Ford 8th Grade Center
	Spring-Ford Senior High School

Twin Valley School District
Upper Dublin School District

Twin Valley High School
Upper Dublin High School

Westminster College

School Districts and Private School Systems (23)

Individual Schools (36)

Butler School District	Butler Jr/Sr High School Center Township Elementary School
Erie Diocese	Kennedy Catholic High School
Farrell Area School District	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
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 (29)	Individual Schools (36)
Blue Ridge School District	Blue Ridge Middle/High School
Central Columbia School District	Central Columbia High School
Crestwood School District	Fairview Elementary
	Crestwood Secondary Campus
Dallas School District	Dallas High School
Danville Area School District	Danville Area High School
Diocese of Scranton	Holy Cross High School
	Holy Family Academy
	Holy Redeemer High School
Dunmore School District	Dunmore High School
Forest City Regional School District	Forest City Regional High School
Hamburg Area School District	Hamburg Area High School
Hanover Area School District	Hanover Area Jr. Sr. High School
Hazleton Area School District	Hazleton Area High School
	Hazleton Area Academy of Sciences
	Valley Middle/Elementary 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 Jr. Sr. High School
Northwest Area School District	Northwest Area Middle/High School
Old Forge School District	Old Forge Jr.-Sr. High School
Pittston Area School District	Pittston Area High School
Pocono Mountain School District	Pocono Mountain East High School
Riverside School District	Riverside Jr./Sr. High School
Towanda Area School District	Towanda Area Jr/Sr High School
Tri-Valley School District	Tri-Valley Jr/Sr High School
Tunkhannock Area School District	Tunkhannock Area High School
Wallenpaupack Area School District	Wallenpaupack Area High School
Wayne Highlands School District	Honesdale High School
Weatherly Area School District	Weatherly Area Middle School
Western Wayne School District	Western Wayne High School
Wilkes-Barre Area School District	Coughlin High School
	Meyers Jr./Sr. High School
Wyoming Area School District	Wyoming Area Secondary Center
Wyoming Valley West School District	Wyoming Valley West High School
	Wyoming Valley West Middle School