

2022-2023 Annual Service Report



The Pennsylvania Basic Education/Higher Education Science and Technology Partnership

Executive Summary

The Science in Motion (SIM) program host institutions have been able to continually assist their local school districts in providing fundamental and impactful instruction in the sciences for the past 36 years. During the 2022-2023 academic year the SIM program provided hands-on, inquiry-based experiences to participating schools in their role as the premier high school science education outreach program for the Commonwealth. Science education specialists (mobile educators) employed at the Science in Motion Consortium's ten college and university member sites presented over 1,200 hands-on laboratory experiences to 247 different schools during the 2022-2023 school year. The program also delivered an additional 8,243 drop-off laboratory kits for short-term loans. In addition, SIM offered 13 days of professional development workshop opportunities consortium-wide for over 110 teachers. Overall, the Science in Motion Consortium provided 683 different teachers with 1,078 different labs, creating 198,659 student experiences throughout the Commonwealth during the 2022-2023 school year. Despite recent growth in demand for our services, the Science in Motion Consortium remains flatlined in the state budget and has encountered funding delays to participating higher education institutions. These delays put our valuable programs at risk of losing key personnel and falling short of our potential to serve Pennsylvania's future science workforce.

What is Science in Motion?

Most Pennsylvania high schools cannot afford the multiple sets of up-to-date, well-maintained equipment that are required 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 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 extensive 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 STEM (science, technology, engineering, and mathematics) education 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 the critical 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 the 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. 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 the STEM fields (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. A single

school purchasing these services and resources independently would cost over \$80,000 per school. The SIM approach realizes a taxpayer cost savings for each subject of nearly \$60,000 per school. The typical SIM site serves more than 10 schools, saving 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 be noted. 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 2022-2023 school year, the Science in Motion Consortium consisted of ten higher education institutions including: Commonwealth University- Bloomsburg campus, Drexel University, Elizabethtown College, Gettysburg College, Juniata College, Lehigh Carbon Community College, PennWest University- Clarion campus, Ursinus College, Westminster College, and Wilkes University. All sites were operational and offered services to participating schools this fiscal year (Appendix A). Most sites focused on equipment loans over visits due to the lack of mobile educator staff because of budgetary constraints and delays in state appropriation release, which also consistently delays all service to schools.

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 and the success of obtaining funding beyond state appropriations, which in turn influences the number of individual schools and school districts served per site.



Figure 1

Geographic locations of the Science in Motion (SIM) Consortium ten host Pennsylvania higher education Institutions: Commonwealth University-Bloomsburg campus, Drexel University, Elizabethtown College, Gettysburg College, Juniata College, PennWest University-Clarion campus, Ursinus College, Westminister College, and Wilkes University.

Service Report

During the 2022-23 school year all the SIM Consortium sites returned to in-person instruction and teachers began incorporating hands-on laboratory experiences back into the classroom, and all service record values for 2022-23 increased (Table 1). Sites that run at full capacity have had to secure alternative funding to offer the full-time program schedule. However, most host SIM programs simply do what they can until their financial resources are expended. The total student contacts in 2022-23 increased by just over 32,000 from the previous school year (Figure 2). The total number of mobile educator teaching visits almost doubled (Figure 3) and the equipment loans/delivery services were the highest they have been since 2012 (Figure 4). The SIM Consortium staff members also reported being involved and helping over 25 individual students with supplies, materials, and equipment loans for

science fairs and special science events such as PA Junior Academy of Science and various science/school club projects.

Table 1

The Science in Motion Consortium site members combined service records for school years 2012 through 2023.

School Year totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
<u>Teaching Visits</u>												
Biology	1,377	1,211	1,080	655	665	669	584	724	652	51	334	432
Chemistry	1,108	1,019	900	453	389	393	639	343	229	74	98	154
Other	593	646	498	601	686	627	369	395	276	12	233	623
Total teaching visits	3,078	2,886	2,478	1,709	1,740	1,689	1,592	1,462	1,157	186	665	1,209
Equipment loans	8,256	7,238	6,298	6,018	5,648	6,046	6,206	6,585	4,326	4,698	6,557	8,243
Student contacts	208,328	214,164	202,931	143,723	137,100	150,929	158,320	182,229	151,368	73,931	166,528	198,659
Schools served	312	244	231	270	179	221	212	282	194	156	215	247
Teachers served	713	626	624	623	443	478	470	642	436	387	527	683
Labs taught	1,050	925	886	858	842	612	759	751	532	742	824	1,078
Accelerated students	46,197	50,043	57,221	29,741	25,711	31,018	40,261	25,740	25,511	10,597	43,898	50,965

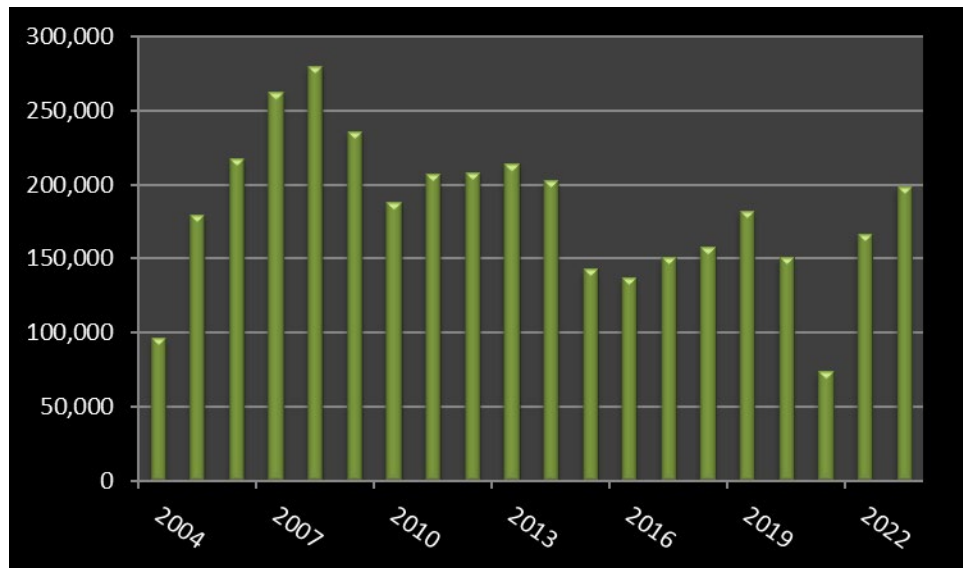


Figure 2

The total number of student contacts by the Science in Motion Consortium from visit and loans for the school year 2004 through 2023.

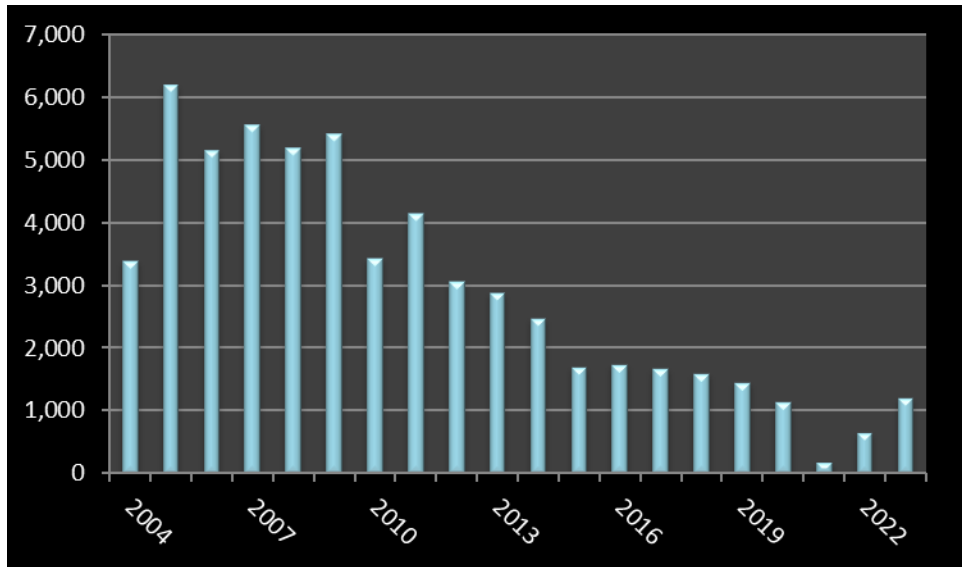


Figure 3
The total number of teaching visits by the Science in Motion Consortium Mobile educators for the school year 2004 through 2023.

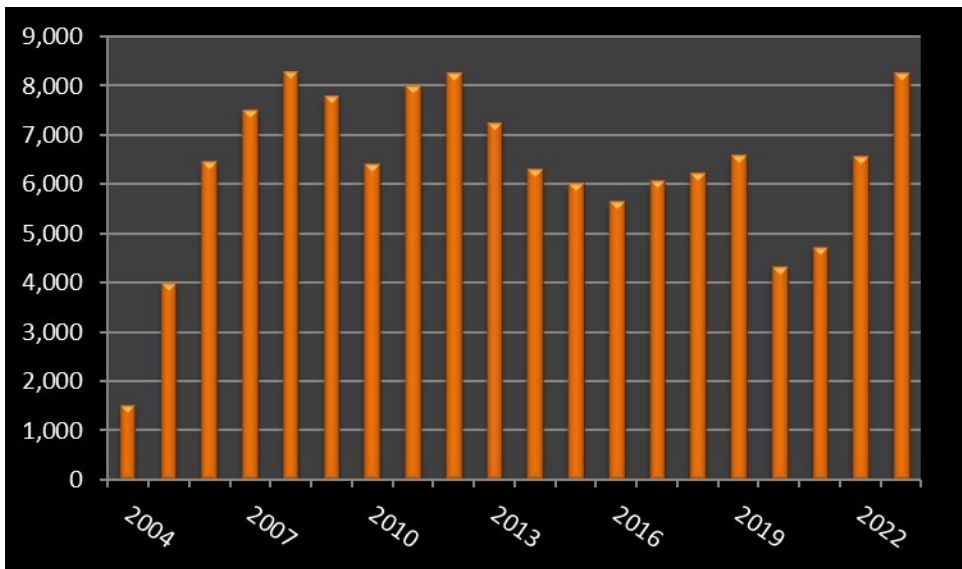


Figure 4
The total number of equipment loans by the Science in Motion Consortium for the school year 2004 through 2023.

It has been 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 the SIM program at their institutions when they are unsure of budget allocations each year. Annual funding uncertainties also make it difficult for even the established SIM sites to keep their outstanding and

experienced employees from accepting other sources of employment that can assure them of continuing employment.

The SIM Consortium has begun a collaborative advocacy effort for state funding by working with local Senators and Representatives to support a STEM Day in their districts. This year the annual SIM Consortium Capital Day event was replaced by the Discover STEM: A Day for Families event sponsored by State Senator Judy Ward and the Senate Republican caucus services, which showcased the SIM Consortium sites at the Juniata College campus in Huntingdon, PA. This event, and others to come like it, demonstrates to state leaders the importance of science in education and, more specifically, the importance of the Science in Motion program in their constituents' school districts. It also provides the opportunity to showcase state-of-the-art science equipment and different hands-on laboratories. This event was spectacular! The SIM Consortium was praised for their professionalism and engaging hands-on activities. This event will continue at another SIM host institution next school year sponsored by another supporting senator.

Conclusion

Science in Motion is a unique program doing fantastic work that is cherished and needed by the school systems, teachers, and students that participate in the program. We look towards a future of keeping teachers and high school/middle school courses up to date with the latest discoveries and techniques in science. The Science in Motion Consortium outreach staff has been able to successfully maintain a consistent level of service to its participating schools. At some host higher-education institutions the Educational Improvement Tax Credit (EITC) program, peripheral grants, gifts, and donations have allowed them to enhance the program beyond the level supported by the state allocation. The Science in Motion program has been supporting STEM efforts in Pennsylvania classrooms for the past **36** years!

Science in Motion Consortium services are of significant value to:

- 1) the Governor's office- because no other program in the Commonwealth delivers so much state-of-the-art science equipment and supports so many schools at so little cost,
- 2) the Pennsylvania Department of Education- for providing access to advanced STEM/laboratory equipment and resources to rural and inner city school districts that could not otherwise afford to purchase and maintain the components of these science labs/equipment, and
- 3) Teachers' efforts in the classroom- to offer students opportunities to engage in hands-on experiences in the classroom which translate to a better future Pennsylvania workforce.

The Science in Motion Consortium host sites receive more requests for school service than their sites can provide with the current funding allocation and our goal is to change that, because we have the infrastructure, knowledge, and a network of science teachers to do so. Investing in the SIM program is investing in the future because no other program in the commonwealth delivers so much STEM equipment and supports so many schoolteachers at so little cost.

Appendix A

School Districts and individual schools served during the 2022-2023 school year by each active site of the Science in Motion Consortium (10 total in alphabetical order).

Commonwealth University- Bloomsburg Campus	
School Districts and Private School Systems (16)	Individual Schools (18)
Bloomsburg Area School District	Bloomsburg High School Bloomsburg Memorial Elementary School
Bloomsburg Christian School	Bloomsburg Christian School
Central Columbia School District	Central Columbia Middle School
Columbia County Christian School	Columbia County Christian School
Columbia-Montour Vocational Technology School	Columbia-Montour Vocational Technology School
Danville Area School District	Danville Area High School
Greenwood School District	Greenwood High School
Juniata County School District	East Juniata High School Juniata High School
Line Mountain School District	Line Mountain High School
Loyalsock Township School District	Loyalsock High School
Mifflinburg School District	Mifflinburg High School
Milton Area School District	Milton High School
Selinsgrove Area School District	Selinsgrove High School
Shikellamy School District	Shikellamy High School
Tri Valley School District	Tri Valley Jr/Sr High School
Warrior Run School District	Warrior Run Jr/Sr High School

Drexel University	
School Districts and Private School Systems (1)	Individual Schools (12)
School District of Philadelphia	Building 21 Philadelphia High School George Washington High School Jules E. Mastbaum High School Julia R. Masterman Laboratory and Demonstration High School Murrell Dobbins High School Northeast High School Parkway Northwest High School Philadelphia Learning Academy North Strawberry Mansion High School Swenson Arts & Technology High School The Philadelphia High School for Creative and Performing Arts West Philadelphia High School

Elizabethtown College	
School Districts & Private School Systems (20)	Individual Schools (24)
Cornwall-Lebanon School District	Cedar Crest Middle School
Cumberland Valley School District	Cumberland Valley High School
Diocese of Harrisburg	St. John Neuman
	St. Margaret Mary
Elizabethtown Area School District	Elizabethtown Area Middle School
Harrisburg Academy	Harrisburg Academy Upper School
Hempfield School District	Hempfield High School
	Landisville Middle School
Lampeter Strasburg School District	Lampeter Elementary (Upper Grades)
Lancaster Country Day School	Lancaster Country Day High School
Lititz Christian School	Lititz Christian High School
Manheim Christian Day School	Manheim Christian Day Middle School
Manheim Township School District	Manheim Township High School
	Manheim Township Intermediate School
Muhlenberg School District	Muhlenberg High School
Mt. Calvary Christian School	Mt. Calvary Middle School
Palmyra Area School District	Palmyra Area High School
Penn Manor School District:	Penn Manor High School
Pequea Valley School District	Pequea Valley Intermediate School
Schuylkill Valley School District	Schuylkill Valley High School
Solanco School District	Solanco High School
	Smith Middle School
The Janus School	The Janus School Upper Division
The Stone Independent School	The Stone Independent High 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
	Camp Hill Middle School
	Eisenhower Elementary School
Chambersburg Area School District	Chambersburg Area Senior High
	Chambersburg Area Middle School North
	Chambersburg Montessori School
Conewago Valley School District	Conewago Valley Intermediate School
	New Oxford Middle School
Diocese of Harrisburg	Bishop McDevitt High School
	Corpus Christi School (Chambersburg)
	St. Francis Xavier
	St. Teresa of Calcutta Catholic School

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Fairfield School District	Fairfield Area Middle School
Gettysburg Area School District	Gettysburg Area High School
	Gettysburg Area Middle School
	Franklin Twp Elementary School
	James Getty Elementary School
	Lincoln Elementary School
	Vida Charter School
Greencastle-Antrim School District	Greencastle-Antrim High School
Hanover Public School District	Hanover Middle School
Littlestown Area School District	Alloway Creek Elementary School
Northern York County School District	Northern York High School
Private	West Shore Christian Academy
Shippensburg Area School District	Grace B Luhrs University Elementary School
	Shippensburg Area Intermediate School
Spring Grove Area School District	Spring Grove Area Middle School
Susquehanna Twp School District	Susquehanna Twp High School
	Susquehanna Twp Middle School
Upper Adams School District	Biglerville Elementary
	Biglerville High School
	Upper Adams Intermediate School
Upper Dauphin School District	Upper Dauphin High School
Waynesboro School District	Waynesboro Middle School
York City School District	Phineas Davis Elementary School (PreK-8)

Juniata College	
School Districts and Private School Systems (18)	Individual Schools (26)
Bellefonte Area School District	Bellefonte Area High School
	Bellefonte Area Middle School
Bellwood-Antis School District	Bellwood-Antis High School
Claysburg-Kimmel School District	Claysburg-Kimmel Jr/Sr High School
Diocese of Altoona-Johnstown	Bishop Guilfoyle Catholic Jr/Sr High School
Forbes Road School District	Forbes Road Jr/Sr High School
Glendale School District	Glendale Jr/Sr High School
Grier School	Grier School
Hollidaysburg Area School District	Hollidaysburg Area Junior High School
	Hollidaysburg Area Senior High School
Huntingdon Area School District	Huntingdon Area High School
	Huntingdon Area Middle School
Juniata Valley School District	Juniata Valley Jr/Sr High School
New Day Charter School	Huntingdon Campus
	Mifflintown Campus
Mifflin County School District	Mifflin County High School
	Mifflin County Junior High School

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Mount Union Area School District	Mifflin County Middle School
Northern Bedford County School District	Mount Union Area Jr/Sr High School
Penns Valley Area School District	Northern Bedford County High School
Southern Huntingdon County School District	Penns Valley Area Jr/Sr High School
Spring Cove School District	Southern Huntingdon High/Middle School
Tyrone Area School District	Central High School
	Spring Cove Middle School
	Tyrone Area High School
	Tyrone Area Middle School

Lehigh Carbon Community College	
School Districts and Private School Systems (18)	Individual Schools (22)
Allentown School District	Dieruff High School
	Lincoln Leadership Academy
	South Mountain Middle School
	William Penn High School
Bethlehem School District	Freedom High School
Catasauqua School District	Catasauqua High School
East Penn School District	Emmaus High School
Easton School District	Career Institute of Technology
Hamburg School District	Hamburg High School
Lehighton School District	Lehighton High School
Nazareth School District	Lehigh Learning Academy School
Northern Lehigh School District	Northern Lehigh High School
Northwestern Lehigh School District	Northwestern Lehigh Middle School
Palmerton School District	Palmerton High School
Panther Valley School District	Panther Valley High School
Parkland School District	Parkland High School
Reading Area School District	Reading High 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 High School
	Whitehall-Coplay Middle School

PennWest University - Clarion Campus	
School Districts and Private School Systems (17)	Individual Schools (20)
Allegheny-Valley Area School District	Allegheny-Valley Area Jr/Sr High School
Armstrong Area School District	Armstrong Jr/Sr High School
	West Shamokin Jr/Sr High School
Christian Life Academy	Christian Life Academy
Clarion Area School District	Clarion Area Jr/Sr High School

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Clarion-Limestone Area School District	Clarion-Limestone Jr/Sr High School
Cranberry Area School District	Cranberry Area Jr/Sr High School
Diocese of Erie	Venango Catholic High School
DuBois Area School District	DuBois Area High School
	DuBois Area Middle School
DuBois Christian School	DuBois Christian School
Forest Area School District	East Forest Area Jr/Sr High School
Franklin Area School District	Franklin Area Middle School
Keystone Area School District	Keystone Area Jr/Sr High School
Oil City Area School District	Oil City Area High School
	Oil City Area Middle School
Punxsutawney Area School District	Punxsutawney High School
Redbank Valley Area School District	Redbank Valley Jr/Sr High School
Titusville Area School District	Titusville Middle School
Valley Grove Area School District	Rocky Grove Jr/Sr High School

Ursinus College	
School Districts and Private School Systems (19)	Individual Schools (25)
Archdiocese of Philadelphia	Cardinal O'Hara High School
Boyertown Area School District	Boyertown Senior High School
Colonial School District	Plymouth-Whitemarsh High School
Coventry Christian School	Coventry Christian School
Downingtown Area School District	Downingtown High School East
	Downingtown High School West
	Downingtown Middle School
	Lionville Middle School
Marple-Newtown School District	Marple-Newtown High School
Mater Letitiae Academy	Mater Letitiae Academy
Methacton School District	Methacton High School
Norristown Area School District	East Norriton Middle School
	Steward Middle School
	Roosevelt School
North Penn School District	North Penn High School
Owen J Roberts School District	Owen J Roberts High School
Pennsylvania Leadership Charter School	Pennsylvania Leadership Charter School
Perkiomen Valley School District	Perkiomen Valley High School
	Perkiomen Valley Middle School East
Salem Christian	Salem Christian
Spring-Ford School District	Spring-Ford 7th Grade Center
Twin Valley School District	Twin Valley High School
Upper Dublin School District	Upper Dublin High School
William Penn School District	Penn Woods High School
Wilson School District	Wilson 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
Greenville Area School District	Hempfield Elementary 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
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 (34)	Individual Schools (45)
Abington Heights School District	Abington Heights High School
Blue Mountain School District	Blue Mountain Middle School

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Carbondale Area School District	Carbondale Area High School
Central Columbia School District	Central Columbia High School
Dallas School District	Dallas High School
	Dallas Intermediate School
Danville Area School District	Danville Area High School
Diocese of Scranton	Holy Cross High School
	Holy Rosary Middle School
Dunmore School District	Dunmore High School
Forest City Regional School District	Forest City Regional High School
Greater Nanticoke Area School District	Greater Nanticoke Area Senior High School
Hanover Area School District	Hanover Area Jr/Sr High School
Hazleton Area School District	Hazleton Area Academy of Sciences
	Hazleton Area High School
Honesdale School District	Honesdale 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 High School
Northwest Area School District	Northwest Area High School
Old Forge School District	Old Forge Jr/Sr High School
Palmerton Area School District	Palmerton Area High School
Panther Valley School District	Panther Valley High School
Pen Argyl Area School District	Pen Argyl Area High School
Pittston Area School District	Pittston Area High School
Pocono Mountain School District	Pocono Mountain East High School
	Pocono Mountain West High School
Scranton School District	West Scranton High School
	West Scranton Intermediate School
Tamaqua Area School District	Tamaqua Area 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
Western Wayne School District	Western Wayne High School
Wilkes-Barre Area School District	Dan Flood Elementary School
	Dr. David W. Kistler Elementary School
	Heights Murray Elementary School
	Solomon Plains Elementary School
	Solomon Plains Middle School
	Wilkes-Barre Area High School
Wyoming Area School District	Wyoming Area Secondary Center
Wyoming Seminary Private School	Wyoming Seminary Lower School
Wyoming Valley West School District	Wyoming Valley West High School
	Wyoming Valley West Middle School