

### **Executive Summary**

The year 2010 brought new financial challenges for Science In Motion in its role as the premier high school science education outreach program for the Commonwealth. Current economic times resulted in serious budget reductions and funding freezes that forced many of the consortium sites to reduce service areas, cut service for many months, or completely shut down for the entire year. Despite these challenges, Science In Motion weathered the storm and all sites anticipate resuming service again for the 2010-2011 school year. Furthermore, despite budget passage delays and an overall 25% budget cut, Science in Motion was still able to muster impressive service statistics. Our science education specialists from the twelve colleges and universities presented over 3,400 hands-on laboratory experiences to 291 different schools. The program also provided an additional 6,403 drop-off laboratory kits for short term loan and offered 43 days of professional development workshop opportunities for teachers. Overall, Science In Motion provided 612 different teachers with 1,059 different labs creating 188,622 student experiences during the 2009-2010 school year.

Despite an unprecedented budget deficit year for the Commonwealth, Science In Motion continued to experience high bipartisan support by members of the Pennsylvania General Assembly. Bills to codify the SIM program in state law have been unanimously supported by the House and Senate Education Committees and by the full House and Senate. A school code bill that establishes a higher education basic education science partnership has been passed and sent to the governor.

### **What is Science in Motion?**

Most Pennsylvania high schools cannot afford the modern high-tech equipment that it takes to prepare students for today's careers in science, engineering and other technical fields. High-tech science training is especially expensive as this 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 a high-tech 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, engineering, and technology in the classroom by providing the following support to schools:

- Access to hundreds of thousands of dollars worth of well maintained modern scientific equipment and supplies.
- Visiting science education specialists that go into the classroom 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 to the classroom.
- Standards aligned laboratory activities for students.

Through SIM, even the poorest rural and urban schools can provide their students with hands-on modern science and technology training. Eight out of ten teachers in the program agree that SIM makes the difference between being adequately resourced for teaching science as opposed to not being adequately resourced.

Science In Motion provides these services through a partnership between the commonwealth and 12 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. 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. For example, in 2008, SIM leveraged nearly one quarter of a million dollars in matching support.

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 statewide programs in Delaware and Alabama.

### **Why is Science In Motion important?**

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 tens of thousands of students in the commonwealth- the same technology required for today's high-tech workforce. No other program in the commonwealth delivers so much high-tech science equipment and support, to so many schools at so little cost.

### **Why Science In Motion is 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 districts for only \$200,000 per year. For a single school to purchase these services and resources independently, it would cost nearly \$79,600 per district. The SIM approach realizes a taxpayer cost savings for each subject of nearly \$59,600 per school district. 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.

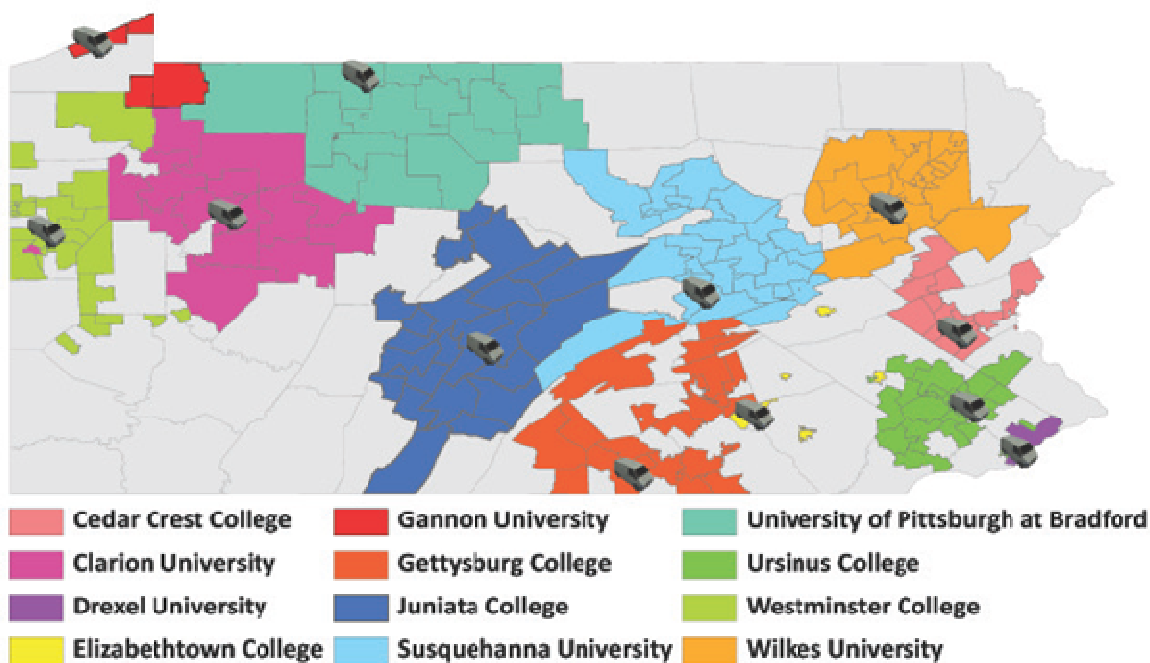
The value of services and resources not charged to the state-awarded budget and thus, not quantified, should not be overlooked. In addition, the 10% overhead allowed by the state contracts falls significantly short of the cost of infrastructure provided by these higher education institutions. This infrastructure,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

- Office and 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
- Approved gas tank storage areas
- Van parking
- 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 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**

There are currently 12 colleges and universities integrated in the Science In Motion consortium including; Cedar Crest College, Clarion University, Drexel University, Elizabethtown College, Gannon University, Gettysburg College, Juniata College, Susquehanna University, University of Pittsburgh at Bradford, Ursinus College, Westminster College, and Wilkes University. The subject matter (i.e., biology, chemistry, physics) varies among sites along with the size of the service area (Figure 1.) and individual schools served per site (Appendix A). The map represents historic service areas. Some sites have experienced shrinkage in their service area due to funding reductions.



**Figure 1.**

Science In Motion Consortium sites color coded by and their historical service area in the Commonwealth.

**Is Science In Motion Effective?**

Science In Motion has consistently demonstrated its effectiveness to improve classroom science test scores, averaging over the years a 13% improvement in biology scores, and a 17% improvement in chemistry scores compared to students in control schools. These findings are consistent with those of sister science van programs in other states.

In 2008, SIM initiated pilot pre/post testing for individual labs both to measure student learning as well as improve curriculum quality. Students across the commonwealth participating in the SIM program in 2008 demonstrated an average 67% improvement in the pre/post test results for laboratory modules. In 2009, the initial budget delay and the mid-year SIM complete budget line cut forced many sites, to shut down for a period or completely close for the remainder of the year. Hence, very little assessment was completed and the majority of the sites did not complete any pre/post testing for individual labs.

**Service Report**

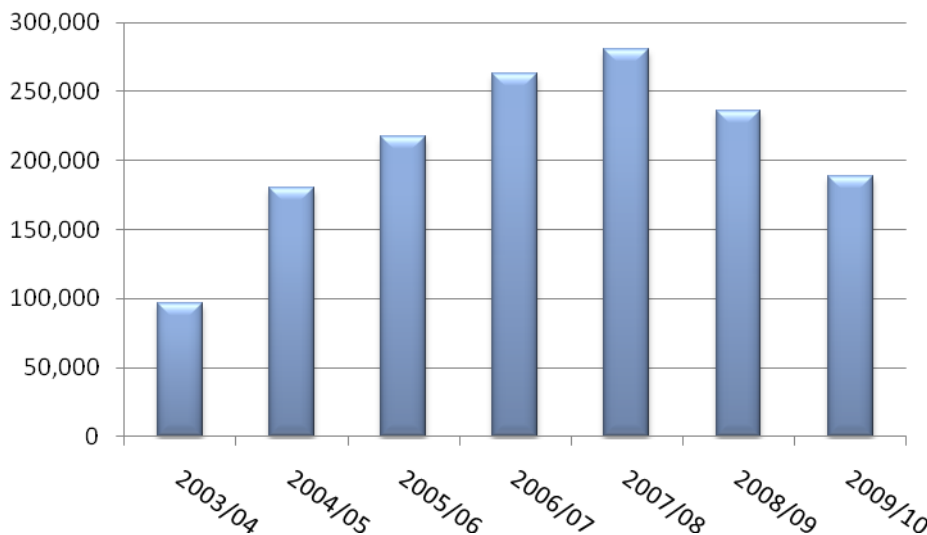
The SIM Consortium service record for both the 2008/2009 and 2009/2010 school years reflect decreased service (Table 1.) due to the decreased funding. Current service levels are constrained by inadequate funding. There was a plateau in total student contacts (Figure 2.) and total equipment loans (Figure3.) that mirrored funding in the 2007/2008 school year and declined subsequent years due to decreased funding.

Now more than ever, due to the 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 processed. It has become 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. Overall, the sites would be able to serve more teachers and students if state funding and contracts could be reliably anticipated.

**Table 1.**

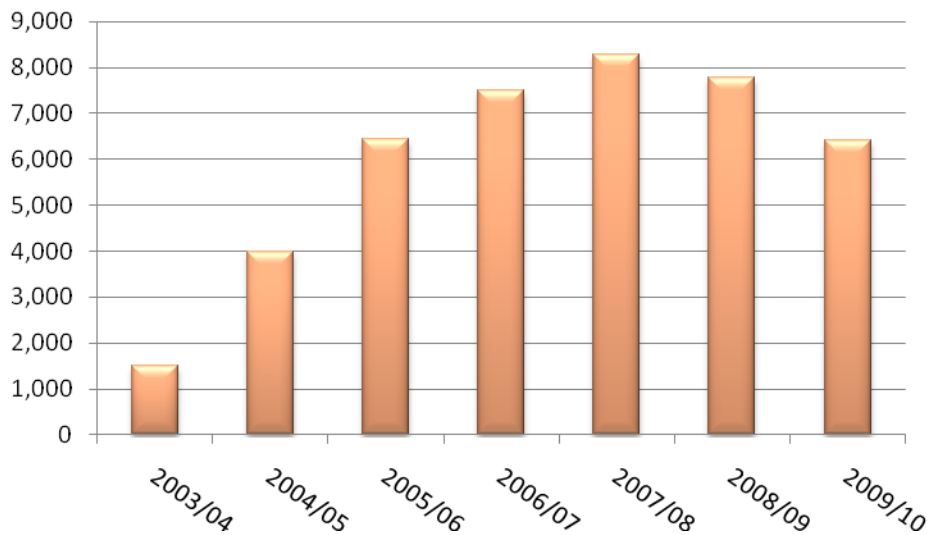
The Science in Motion Consortium combined service record for school years 2003/04 to 2009/10.

School Year	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
<b>Biology teaching visits</b>	958	2,432	2,184	2,372	2,090	2,216	1,127
<b>Chemistry teaching visits</b>	1,261	2,676	1,961	2,247	1,830	2,001	1,407
<b>Other teaching visits</b>	1,171	1,091	1,020	948	1,283	1,204	896
<b>Total teaching visits made</b>	3,390	6,199	5,165	5,567	5,203	5,421	3,430
<b>Total equipment loans</b>	1,517	3,986	6,447	7,492	8,271	7,775	6,403
<b>Total student contacts</b>	96,235	179,990	217,366	262,566	280,224	236,359	188,622
<b>Total different schools served</b>	235	280	307	331	337	324	291
<b>Total different teachers served</b>	449	589	698	776	715	752	612
<b>Total different labs taught</b>	565	724	986	1,050	1,143	1,286	1,059
<b>Total in accelerated classes</b>	19,083	31,289	48,819	69,366	72,298	18,993	48,010



**Figure 2.**

Total student contacts by the Science in Motion Consortium from school years 2003/04-2009/10.



**Figure 3.**

Total equipment loans by the Science in Motion Consortium from school years 2003/04-2009/10.

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 at all sites. All sites receive more requests for school visits than the Mobile Educators are able to service.

### **National Recognition of Science In Motion**

The Science In Motion program was awarded a certificate from the Center for Excellence in Education (CEE) for being an exemplary model for excellence in science education and received gratitude for its contribution to STEM learning. The CEE mission is to nurture young scholars to careers of excellence and leaderships in science, technology, engineering and mathematics (STEM), and to encourage international collaboration among leaders in the global community. At the CEE National Lab Skills Symposium, in Washington D.C. in April 2010, focus groups called attention to exemplary efforts by programs to help high school teachers and students involved in science and technology education. Science In Motion was a program chosen that exemplifies several of the criteria which will be used by CEE as it makes available programming to different states.

## Appendix A

Schools served in 2009-2010 by each site of the Science In Motion Consortium.

### 1. Cedar Crest College

Agora Cyber Charter School  
Catasauqua High School  
Emmaus High School  
Freedom High School  
Jefferson Elementary  
Liberty High School  
Muhlenberg Elementary  
Parkland High School  
Pleasant Valley High School  
Shafer Elementary  
Whitehall High School  
William Allen High School

### 2. Clarion University

Allegheny -Clarion Valley Junior/Senior High School  
Brockway Junior/Senior High School  
Brookville Junior/Senior High School  
Clarion Area Junior/Senior High School  
Clarion -Limestone Junior/Senior High School  
Clarion County Career Center  
Cranberry Junior/Senior High School  
DuBois Middle School  
DuBois High School  
DuBois Christian School  
East Forest School  
West Forest School  
Elderton Middle School  
Ford City Junior/Senior High School  
Franklin Middle School  
Franklin High School  
Keystone Junior/Senior High School  
Kittanning Middle School  
Kittanning High School  
North Clarion Junior/Senior High School  
Oil City Middle School  
Oil City High School  
Punxsutawney Middle School  
Punxsutawney High School

Punxsutawney Christian School  
Redbank Valley Junior/Senior High School  
Rocky Grove Junior/Senior High School  
Saint Patrick's Catholic School  
Titusville Middle School  
Titusville High School  
Union Junior/Senior High School  
West Shamokin Junior/Senior High School  
Venango Christian High School

**3. Drexel University**

Agora Cyber Charter School  
Bartram High School  
Ben Franklin High School  
Beulah Baptist Christian School  
Bodine High School  
Central High School  
Franklin Learning Center  
George Washington High School  
Girls High School  
Lamberton High School  
Masterman High School  
Mennonite High School  
New Media Technology Charter Middle School  
PA Clinical Junior/Senior High School  
Parkway-Northwest High School  
Philadelphia Military Academy at Elverson  
Samuel Fels High School  
Science Leadership Academy  
West Philadelphia High School  
West Philadelphia High School Academy of Automotive and Mechanical Engineering

**4. Elizabethtown College**

Elizabethtown Area High School  
Hempfield High School  
J.P. McCaskey High School  
Lebanon High School  
McCaskey East High School  
Mt. Calvary Christian School  
Pequea Valley High School  
Pottsville Area High School  
Reading High School



5. **Gannon University**

Cathedral Preparatory  
Central Tech  
Central Transitional  
Corry High School  
East High School  
Fairview High School  
Fort Leboeuf High School  
General McLane High School  
Girard High School  
Harbor Creek High School  
Iroquois High School  
Maritime School of Excellence  
McDowell Intermediate High School  
McDowell Senior High School  
McKean Elementary  
Mercyhurst Preparatory High School  
North East High School  
Northwest Collegiate Academy Charter School  
Northwestern High School  
Roosevelt Middle School  
Seneca High School  
Strong Vincent  
Union City High School  
Union City Middle School  
Villa Maria Academy

6. **Gettysburg College** (Advancing Science)

Adams County Christian Academy  
Arendtsville Elementary School  
Bishop McDevitt High School  
Camp Hill High School  
Cedar Cliff High School  
Central York High School  
Chambersburg Area Middle School  
Chambersburg Area Senior High School  
Crabbs/Littlestown Christian Academy  
Cumberland Valley Christian Academy  
Delone Catholic High School  
Fairfield Area Middle School  
Fairview Elementary School  
Gettysburg Area High School

Good Shepherd School  
Greencastle-Antrim H.S.  
Hanover High School  
Hanover Middle School  
Hershey Christian School  
Immaculate Conception School  
Littlestown Christian Academy  
Mechanicsburg Middle School  
Montessori Academy of Chambersburg  
New Oxford High School  
Northern High School  
Paxtonia Elementary School  
Shalom Christian Academy  
Shippensburg Area Middle School  
Spring Grove Area High School  
Spring Grove Area Middle School  
St. Andrew Catholic School  
St. Francis Xavier School  
Upper Adams Middle School  
Upper Dauphin Area High School  
Upper Dauphin Area Middle School  
West Perry High School  
William Penn High School  
York Suburban High School  
York Suburban Middle School

**7. Juniata College**

Altoona Area Junior High School  
Bishop Guilfoyle High School  
Calvary Christian Academy  
Central High School  
Grier School  
Hollidaysburg Area High School  
Hollidaysburg Catholic Middle School  
Hollidaysburg Junior High School  
Huntingdon Area High School  
Huntingdon Area Middle School  
Indian Valley Area High School  
Indian Valley Middle School  
Juniata Valley Junior/Senior High School  
Lewistown Area High School  
Lewistown Middle School

Mount Union Area Junior/Senior High School  
Southern Huntingdon County Junior/Senior High School  
Spring Cove Middle School  
St. John's Evangelist Middle School  
St. Rose Lima Middle School  
State College Area High School  
Strodes Mills Middle School  
Tussey Mountain Junior/Senior High School  
Tyrone Area Junior/Senior High School  
Williamsburg Community Junior/Senior High School

**8. Susquehanna University**

Berwick Area High School  
Bloomsburg Christian School  
Bloomsburg High School  
Central Columbia High School  
Central Columbia Middle School  
Central Dauphin High School  
Danville Area High School  
Greenwood High School  
Hughesville High School  
Jersey Shore High School  
Juniata High School  
Lewisburg Area High School  
Line Mountain High School  
Loyalsock Township High School  
Meadowview Christian Academy  
Millville Area High School  
Milton Area Senior High School  
Montoursville High School  
Mt. Carmel Area Junior/Senior High School  
North Schuylkill Junior/Senior High School  
Selinsgrove Area High School  
Shamokin Area Junior/Senior High School  
Shikellamy High School  
South Williamsport Area High School  
Sunbury Christian Academy  
Tri-Valley Junior/Senior High School  
Williamsport Area High School

**9. University of Pittsburgh at Bradford**

Austin Area Elementary and Middle School

Austin Area High School  
Beacon Light  
Bradford Area Christian Academy  
Bradford Area High School  
Cameron County High School  
Chestnut Street Elementary  
Coudersport Area Junior and Senior High School  
Eisenhower Middle School and High School  
Elk County Catholic  
Floyd C. Fretz Middle School  
Galeton Area Junior and Senior High School  
Johnsonburg Junior and Senior High School  
Kane Area High School  
Kane Area Middle School  
Mt. Jewett Elementary  
Northern Potter Junior and Senior High School  
Oswayo Valley Junior and Senior High School  
Otto-Eldred Elementary  
Otto-Eldred Junior and Senior High School  
Port Allegany Elementary  
Port Allegany Junior and Senior High School  
Ridgway Middle School  
Ridgway High School  
School Street Elementary  
Sheffield Middle School and High School  
Smethport Elementary  
Smethport Junior and Senior High School  
St. Bernard Elementary & Middle School  
St. Marys Middle School  
St. Marys High School  
The Learning Center  
Warren High School  
Youngsville Middle School/High School

**10. Ursinus College**

Arcola Middle School  
Boyertown High School  
Downingtown East High School  
Downingtown West High School  
Downingtown Middle School  
Esperanza Academy High School  
Methacton High School

North Penn High School  
Owen J. Roberts High School  
Owen J. Roberts Middle School  
Pennridge High School  
Penn Woods High School  
Perkiomen Valley High School  
Perkiomen Valley Middle School  
Phoenixville High School  
Plymouth Whitemarsh High School  
Souderton High School  
Spring-Ford High School  
Spring-Ford 9th Grade Center  
Spring-Ford 7th Grade Center  
Twin Valley High School  
Upper Marion High School  
Wyomissing High School

**11. Westminster College**

Center Elementary  
C.M. Musser Elementary  
Cochranton Elementary School  
Dassa McKinney School  
East Side Elementary  
East Lawrence Elementary  
Northside Elementary School  
Grove City Christian Academy  
Grove City College  
Grove City High School  
Hermitage Elementary School  
Hermitage Middle School  
Hickory High School  
Hillview Intermediate School  
Jamestown Elementary School  
Jamestown High School  
Kennedy Catholic High School  
Lakeview Area High School  
Laurel Elementary  
Laurel High School  
Lincoln High School  
Maplewood High School  
Mercer Elementary School  
Mercer High School

Mohawk Elementary School  
Mohawk High School  
Neshannock Elementary School  
Neshannock High School  
New Castle High School  
Notre Dame  
Oakview Elementary  
Perry Traditional Academy  
Pine Richland High School  
Pulaski Elementary  
Portersville Christian School  
Reynolds Elementary School  
Reynolds High School  
Saegertown High School  
Seneca Valley Intermediate School  
Seneca Valley High School  
Sharon High School  
Sharpsville High School  
Shenango Elementary  
Slippery Rock Elementary School  
Slippery Rock High School  
South Butler Elementary School  
Sto Rox Elementary School  
Union Elementary School  
West Middlesex Elementary School  
Westminster College Preschool  
Wilmington Area Elementary  
Wilmington Area Middle School  
Wilmington Area High School

**12. Wilkes University**

Blue Mountain High School  
Coughlin High School  
Crestwood Middle School  
Dallas High School  
Elk Lake High School  
Grand Army of the Republic High School  
Hanover High School  
Hazelton High School  
Holy Redeemer High School  
Lakeland High School  
Lehighon High School

Meyers High School  
Northwest High School  
Pen Argyl High School  
Pittston Area High School  
Pocono Mountain East High School  
Pocono Mountain West High School  
Towanda High School  
Troy High School  
Tunkhannock High School  
Wallenpaupack High School  
Western Wayne High School  
Wyoming Valley West-Middle School  
Wyoming Valley West- High School