

Worcester Pipeline Collaborative: The First Decade

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The University of Massachusetts Medical School (UMMS) teamed with local education, community, and business partners in 1996 to establish the Worcester Pipeline Collaborative. Founding and continuing partners are the Worcester Public Schools; Quinsigamond Community College; Plumley Village, a low-income housing complex; Abbott Bioresearch Center (ABC); UMass Memorial Health Care System, Inc; and UMMS. With a mission to “encourage, educate, and challenge minority and/or economically disadvantaged students for success in health care and science-related professions,” the Worcester Pipeline Collaborative’s activities involve over 6,000 K–12 students in eight elementary schools, Worcester East Middle School, Worcester Vocational High School, and North High School. The collaborative offers numerous opportunities in a “seamless pipeline” focused on health, science, and mathematics curricula in the north quadrant of the city.

To increase the number of students from disadvantaged backgrounds entering the health care and science-related professions in Massachusetts, more disadvantaged students must participate in rigorous K–12 mathematics and science programs and develop the language skills needed to enter competitive collegiate programs.

The UMMS made a conscious commitment to get directly involved in cultivating the students and institutions it depends on for students for its academic programs. The UMMS took an unprecedented step of committing a portion of its limited institutional resources to work directly with K–12

education and colleges and universities in the Commonwealth. As the largest employer in Central Massachusetts, the UMMS uses its position to influence, cajole, and challenge other businesses to invest in developing the future workforce.

The Health Science Academy at North High School, which began in 1981, affiliated with the Worcester Pipeline Collaborative in 1996. Since 1995, mean SAT scores for the entire school have remained stable. While more students in the Health Science Academy have taken the SAT and National Assessment of Educational Progress (NAEP), scores have steadily improved (see Table 1). The NAEP is administered every other year through the “High Schools That Work” initiative.

In a retrospective study,¹ researchers found that Health Science Academy graduates entered four-year higher education institutions at a greater rate (58.8%) than other North High School graduates (48.5%), felt well informed about higher education and career options and better prepared for future careers than did nonacademy alumni, and reported they were working in occupations related to their high school education at a greater frequency (42.9%) than did nonacademy alumni (25.5%).

Worcester Pipeline Collaborative’s partners encourage K–16 students to enter health care and science-related professions. Faculty, staff, and older students of partner institutions served as mentors and role models. The collaborative provided a wide variety of opportunities to younger students. The Health Science Academy now takes place through Roosevelt Elementary School (grades K–6), Worcester East Middle School (grades 7 and 8), Worcester Vocational High School, and North High School (grades 9–12).

Building Pipeline Partnerships

The Worcester Pipeline Collaborative’s Executive Committee meets quarterly, and the Steering Committee meets monthly. They oversee the collaborative’s

programs, and both are chaired by Deborah Harmon Hines, PhD. Representatives from all partners serve on the Executive Committee, and representatives from UMMS, the Worcester Public Schools, Worcester Vocational High School, Worcester East Middle School, UMass Memorial Health Care System, Inc., Abbott Bioresearch Center, and Plumley Village serve on the Steering Committee. Dr. Hines and Robert E. Layne are chief executive officer and chief operations officer, respectively, of the collaborative. Attendance at committee meetings is better than 95%.

From 1996 through 2001, the collaborative’s partners contributed \$70,000 annually for the program, which was matched by the Robert Wood Johnson Foundation’s funding of the Health Professions Partnership Initiative (HPPI), directed by the Association of American Medical Colleges. These funds were used to support the annual budget for the collaborative’s core staff salaries (the coordinator, secretary, laboratory coordinator) as well as programs and supplies. UMass Memorial Health Care, an inner-city ambulatory care facility that serves a primarily Latino and Southeast Asian population, provides an entire floor for the collaborative that includes offices, wet laboratory space, computer labs, and distance learning labs (4,200 square feet valued at \$55,000/year, including utilities, heating, ventilation, and air conditioning). The collaborative received a one-time gift of \$50,000 from Bank/Boston to establish distance learning capabilities linking the collaborative site with North High School and UMMS.

Worcester Collaborative Pipeline students from Worcester East Middle School, North High School, Worcester Vocational High School, and Quinsigamond Community College receive preferential status in subsequent UMMS outreach programs and employment opportunities.

Partnership Activities

The program activities include mentoring, job shadowing, clinical and

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Table 1

Quantitative Indicators of Success of the North High School/Worcester Pipeline Collaborative for Three Academic Years, 1995-96, 2001-02, 2004-05

Indicator	Academic year		
	1995-96	2001-02	2004-05
Health Science Academy enrollment	158	366	419
North High School enrollment	899	1,042	1,250
Health Science Academy participants as a percentage of North High School enrollment	18%	35%	34%
SAT data			
SAT number tested	81	124	236
SAT Verbal average score	429	426	423
SAT Mathematics average score	424	412	436
National Assessment of Educational Progress scores			
Reading	235.5	290	N/A*
Mathematics	248.6	309	N/A*
Science	250.1	308	N/A*

* North High School did not participate in NAEP in this year.

research internships, touring and laboratory opportunities, after-school science programs, visiting scientist programs, summer science camps, and the speakers' bureau (see Table 2). Parent involvement workshops for families and professional development workshops for teachers are also provided.

Environmentally-based Health Science Academy

In 1997, the Roosevelt Elementary School, which houses the K-6 Environmentally-based Health Science Academy, opened. The collaborative initiated several science outreach programs with college partners at Roosevelt Elementary School. Roosevelt Elementary School provided classrooms, a wet laboratory, computer laboratory, and library.

National Science Foundation/After-School Centers for Exploration and New Discovery

Additional funding from the National Science Foundation provided opportunities for the collaborative to expand its efforts both after school and during the summer from 2001 to 2004. The After-School Centers for Exploration and New Discovery (ASCEND) for high school students had two components. One component was an internship that ran after school during the academic year (eight to ten hours per week) and full-time during the summer (30 hours per week). Participants were placed in research laboratories or clinical areas and received stipends. The second component

was the After-School Science Clubs at Worcester East Middle School, Worcester Vocational High School, North High School, and Plumley Village Homework Center.

Guidance Counselors at North High School and Worcester Vocational High School recruited participants for Academic Year and Summer Internship Programs at UMMS and UMass Memorial Health Care System, Inc. Internship sites included vascular surgery, animal research, Neurodiagnostic Center, Sleep Disorder Center, clinical engineering, blood donors, operating room, central processing laboratory, and orthopedic clinic. In academic year 2002-03, all 13 senior ASCEND participants were accepted into two-year and four-year higher education institutions.

Worcester Pipeline Collaborative Summer Science Camp Odyssey (1996-2004)

The Summer Science Camp Odyssey was also funded by the National Science Foundation (2001-04) and consisted of two, two-week sessions of summer science experiences held at Worcester East Middle School each summer from 2001 to 2004. Two days a week, sessions were held from 8:00 AM to 12:00 PM. Two days were for field trips with extended days of 8:00 AM to 3:30 PM, usually planned for Tuesdays and Thursdays. Participants completed a total of 80 hours of programming. Breakfast and lunch were served. Participants were recruited

from rising seventh graders at the feeder elementary schools in the Worcester Public Schools' north quadrant and rising eighth graders at Worcester East Middle School. Ninety-five percent of the participants were from disadvantaged backgrounds. The curriculum was based on the Massachusetts State Curriculum Frameworks for grades six through eight covering life science, physical science, earth science, and technology.

Worcester Pipeline Collaborative Plumley Village Homework Center

Plumley Village is a 430-unit (roughly 1,500 residents, including 1,000 children), federally subsidized family housing development located in the north quadrant of Worcester. Over 90% of the families who live in Plumley Village receive a Section 8 housing subsidy. Latinos are the dominant ethnic group (65%), with the remaining households distributed among Southeast Asian (15%), African-American (10%), and white (10%) groups. The Worcester Pipeline Collaborative provides science and mathematics resources for the Plumley Village Homework Center. Plumley Village staff help recruit children for the collaborative, and collaborative staff have worked with a group of Homework Center participants to compete in the Science Olympiad offered at Assumption College. In 1999, Plumley Village Homework Center students were the first Worcester entity to participate in the Olympiad, and received first prize in their division. In 2000, student from the Homework Center were joined by the Worcester East Middle School Science Club at the Olympiad. Plumley Village Homework Center took second prize.

Clark University's Worcester Educational Partnership

The Worcester Educational Partnership is a community-wide effort to foster youth development and educational achievement in grades nine through twelve. Partnership members include Worcester Public School teachers, administrators, students, and parents; youth service agencies; civic, cultural, and faith-based organizations; and local colleges and universities. The Worcester Educational Partnership was formed based on an invitation from the Carnegie Corporation Foundation to Clark University and the WPS to participate in

Table 2

The Worcester Pipeline Collaborative (WPC) Programs and Activities, University of Massachusetts Medical School

Programs and activities	Target students	Activity description
North High School's Health Science Academy. Serves 400 students annually, 1996–2006	9 th –12 th grades, teachers, and families	Provides students with tutoring, mentoring, internships, laboratory experiences, after-school science clubs, and summer research opportunities. Provides parent involvement information sessions and professional development workshops.
Worcester Vocational High School's Health Assistant Program. Serves 70 students annually, 1996–2006	9 th –12 th grades, teachers, and families	Provides tutoring, mentoring, internships, laboratory experiences, after-school science clubs, and summer research opportunities. Provides parent involvement information sessions and professional development workshops.
Worcester East Middle School Health Science Academy. Serves 15 students annually, 1996–2006	7 th –8 th grades, teachers, and families	Provides tutoring, mentoring, internships, laboratory experiences, and summer science camp experiences. Provides parent involvement information sessions, sponsors parent math and science nights, and professional development workshops for teachers.
Eight North Quadrant Elementary Schools. Numbers vary annually, 1996–2006	K–6 th grades teachers, and families	Provides mentoring and tutoring on a limited basis, parent math and science workshops, hosts family science and math discovery nights, and pork heart dissections trainings for teachers and parents.
Plumley Village Homework Center Served 25–30 students annually, 1997–2003	4 th –8 th grades	Provided three-day, weekly after-school Science Club. science, computer technology, and health educations were the three emphasized subjects.
Summer Science Camp Odyssey. Served 40 students annually, 1996–2004	7 th –8 th grades	Three science teachers and two student aids provided science activities to middle school students in a variety of settings (ASCEND funded 2001–2004).
After School Center for Exploration and New Discovery (ASCEND). Served 14 students annually, 2001–2004	7 th –12 th grades	Allowed the WPC to expand several program offerings including: middle and high school science clubs and middle school summer camp programs. Established additional paid high school research opportunities for after school and summers.
Abbott Biotech Center. Serves 125 students annually, 1996–2006	7 th –8 th grades	Abbott scientists provide opportunities for middle school students to tour and job-shadow.
Assumption College. Served 55–70 students annually, 1998–2003	5 th –6 th grades	Two biology professors and 20 college students visited Roosevelt School bi-weekly to conduct science experiments. Three college students taught the after school and summer science programs.
Graduate School of Biomedical Sciences (GSBS). Serves 60 students annually, 1996–2006	5 th –6 th grades	GSBS student coordinators provide leadership for the Visiting Scientist and Kids to College Programs established at Lakeview.
Quinsigamond Community College (QCC). Numbers vary annually, 1996–2006	K–6 th grades	QCC students enrolled in their Radiology Technology and Dental Hygiene programs participate in Family Science Discovery Nights at Grafton Elementary School. Provide high school students the opportunity to intern in the Dental Clinic.
University of Massachusetts Medical School (UMMS). Serves average of 4,500 students annually, 1996–2006	K–20 th grades	Host science nights, career awareness workshops, and school tours. Provides college students from partner institutions participating in WPC outreach activities opportunities to be mentored by UMMS professionals and/or select intern sites within UMMS for their practicums.
UMass Memorial-Health Care, Inc. 1996–2006	7 th –16 th grades	Provides clinical settings for students' internships the University and Memorial campuses and 4,212 sq. ft. program space at City Campus for WPC offices and laboratories.
UMMS Graduate School of Nursing (GSN). 2002–2006	9–11 th grades for summer program and K–12 for community service project	GSN Staff serve on the WPC Board. Established one-week Summer Nursing Program modeled after the pipeline to introduce students to the different opportunities available in nursing. Graduate nursing students are paired with the first-year medical students to learn about demographics and provide community service to the public school students.
Worcester Public School Principal and Vice Principal Selection Committees. 1998–2006		Chair of the WPC Board of Directors and/or WPC Coordinator are participants on Selection Committees for key leadership positions.
School Site Councils and Advisory Board positions. 1996–2006		WPC coordinator sits on Site Councils at the elementary, middle, and high school levels and the Worcester Vocational High School Allied Health Advisory Board at Worcester Vocational High School.

its “Schools for a New Society” national urban high school reform grant competition. The invitation was made because of the strong record of collaboration between Worcester Public Schools and the Worcester Pipeline Collaborative and an innovative model of teacher preparation and development at Clark University’s University Park Campus School, a model small school.

Using the Worcester Pipeline Collaborative model, the Worcester Educational Partnership, with Clark University’s University Hiatt Center for Urban Education acting as facilitator, subsequently earned a \$250,000 planning grant from the Carnegie Corporation Foundation in 2000. In 2001, the Worcester Educational Partnership was awarded an \$8 million, five-year implementation grant from Carnegie. The partnership, of which the collaborative was a member, developed a comprehensive and multidimensional model framed based on the collaboration and “best practice” research. From 2001 to 2006, the collaboration received \$20,000 a year from the Worcester Educational Partnership.

Central Massachusetts Area Health Education Center

The mission of the Central Massachusetts Area Health Education Center (AHEC), founded in 1982 and located in Worcester, is to enhance access to quality health care, promote workforce development, and eliminate health disparities. The Central Massachusetts AHEC provides multilingual interpreter and translation services, medical interpreter training programs,

community health worker training programs, community-based training for UMMS medical students and residents, health careers recruitment programs aimed at underserved multilingual and multicultural communities, and support for local community-based coalitions advocating for appropriate health service delivery systems. The AHEC has also provided financial assistance to support the activities of the Worcester Pipeline Collaborative and assisted in community outreach and recruitment for UMMS outreach programs.

Lessons Learned

Continuity of leadership at the top of all partner institutions is crucial to the success of a pipeline collaborative. Maintenance of good governance at both Executive and Steering Committee levels and regularly scheduled monthly meetings at partner institutions keep the lines of communication open and information flowing. Effective collaboration that benefits program participants is equally important. Recognition of administrative and management differences at partner institutions is also vital.

It is important to adhere to the program goals and objectives while keeping strategies flexible in order to respond and adapt to changes. Be aware of educational and political issues within your school district. These issues affect the manner in which the HPPI conducts business. It is vital to look for new partners that can enhance the program and/or, in some cases, replace original partners whose time commitment has ended.

Tracking program participants is difficult, time-consuming, and costly. Additional staff is required to track participants due to the high mobility rate of the targeted population.

Institutionalizing the Project

In 2001 when the Robert Wood Johnson Foundation ceased funding the Worcester Pipeline Collaborative, Aaron Lazare, MD, chancellor/dean of the Medical School (the largest contributor), issued a challenge to the other collaborative partners to “institutionalize” the collaborative by doubling their financial commitments to the project. All partners but one agreed to this approach of continuing the collaborative. The Howard Hughes Medical Institute and the National Science Foundation supported initiatives and new program expansions.

Through the combined efforts of the Worcester Public Schools, UMMS, and the Worcester Pipeline Collaborative, funding was secured for a new, state-of-the-art North High School. The completion date is fall, 2008. Space in the new school has been identified for the collaborative’s activities, including offices, wet labs, a classroom, a conference room, and storage area. The collaborative will be located on the first floor and the Health Science Academy will occupy space on the third floor.

Reference

- 1 Retrospective study of North High School graduates conducted by the Massachusetts Institute for Social and Economic Research (MISER), University of Massachusetts, Amherst, June, 2000.