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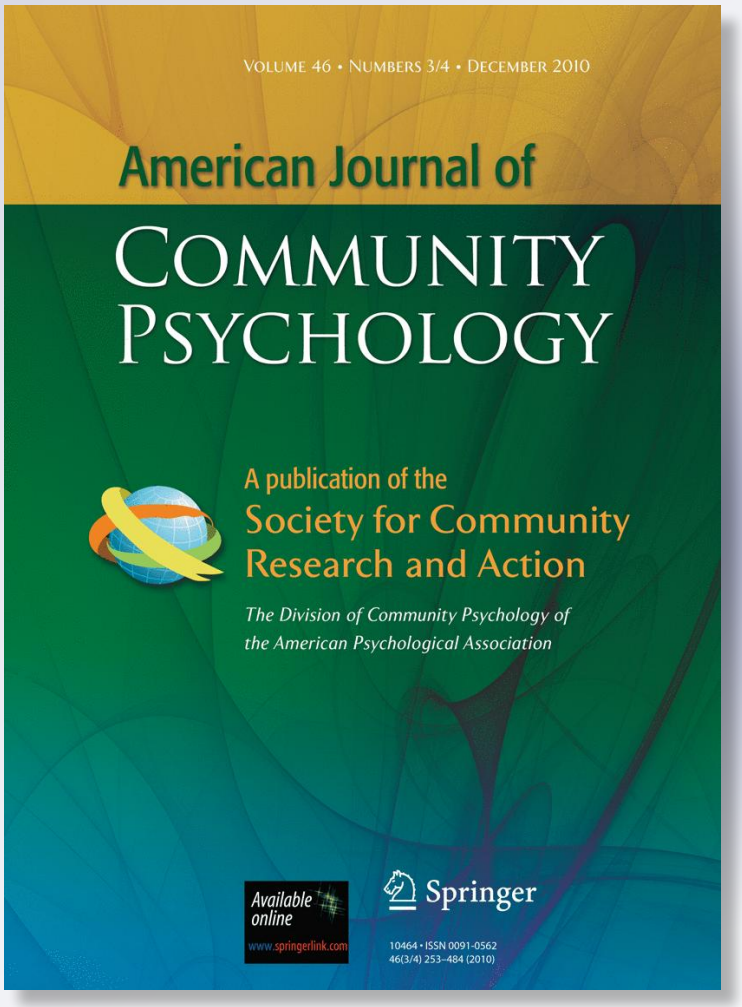
American Journal of Community Psychology

ISSN 0091-0562
Volume 46
Combined 3-4

Am J Community Psychol (2010) 46:418-427
DOI 10.1007/s10464-010-9341-x



Springer

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ORIGINAL PAPER

Pursuing Franklin's Dream: Philosophical and Historical Roots of Service-Learning

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Published online: 21 September 2010

Abstract Two decades ago service-learning as an innovation lingered on the periphery of the academy. Today, service-learning has spread across American higher education. Few educational innovations have achieved such relatively rapid success. This article describes the historical and philosophical underpinnings of service-learning. It notes some of the significant debates that have occurred among its practitioners. The authors draw from experience at their university, the University of Pennsylvania, to describe the importance of connecting service-learning to the core educational and civic missions of a college or university, as well as to provide a case study of how that connection might be made.

Keywords Service-learning · History of service-learning · Philosophy of service-learning · American higher education · Academically Based Community Service at University of Pennsylvania · Campus-community partnerships

Over two decades ago, service-learning was an innovation lingering on the periphery of the academy. Although "pioneers" were laying important conceptual (and practical) groundwork, they labored in relative obscurity (Stanton et al. 1999). In a meeting with college and university presidents in 1986, then-president of the Education Commission of the States, Frank Newman observed that during visits to numerous campuses to discuss his book, *Higher Education and the American Resurgence* (Newman 1985), he found faculty to be "remarkably resistant" to the idea that "they had a responsibility for more of their students' education than simply the development of the students' knowledge about their own discipline" (Staff 1986). A study of faculty attitudes in 1990 showed great confusion over how service-learning might meaningfully be incorporated into the curriculum and concluded, "faculty have been noticeably absent from these activities" (Stanton 1990).

The initiatives highlighted in this special issue and the proliferation of service-learning on campuses across the country underscore the degree to which times have changed. For example, Campus Compact, a national coalition of college and university presidents and a leading proponent of service-learning, has grown from 3 institutions in 1985 to over 1,100 in 2009, approximately a quarter of all colleges and universities in the United States. According to the most-recent full report on the organization's annual survey, which was conducted in the fall of 2006, 28% of its member institutions offered between 1 and 10 service-learning courses, 45% between 11 and 50, 12% between 51 and 99, and 7% more than 100 service-learning courses during the previous academic year. In all, 12,577 faculty members at Campus Compact institutions taught a service-learning course within the past year (12% of the total number of full-time faculty at these institutions) (Staff 2006). A recent national survey of 32,840 faculty found that fully one in five had taught a service-learning course within the past 2 years (Lindholm et al. 2002). What other educational innovation has achieved so widespread a foothold in such a relatively brief period of time?

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The passion that fueled service-learning's growth in the early years came from a conviction among its proponents that the practice could link the core work of colleges and universities with higher purposes—transformative learning, education for democracy, and research to better understand and improve the world. But service-learning has also succeeded for more limited, more immediate pragmatic reasons—its effectiveness as a powerful pedagogy that effectively provides contextual learning and the real-world application of theory. This appeal of service-learning as serving both idealistic and practical goals has perhaps helped to make it more readily adaptable than other educational innovations to a variety of institutional settings. A public land grant university serving the needs of its state and a small, private faith-based institution hoping to foster in students an ethic of social justice may both support service-learning, though rationales for that support will differ in keeping with their unique historic missions (Hartley et al. 2005; Ostrander 2004; Ward 1996).

A central goal of this article is to examine the historical and philosophical foundations of service-learning. In the first section, we discuss why the practice emerged and note the debates that ensued regarding this pedagogy. In the second section, we draw on our experience at the University of Pennsylvania to describe how service-learning became woven into the fabric of an institution of higher learning. We conclude that institutionalization is best achieved if service-learning functions as a means for fulfilling the primary missions of the institution.

Penn is a private, research university located in Philadelphia, the sixth largest city in the United States. The University's engagement with its geographic community of West Philadelphia has endured over the last 25 years, at least in part, because it has been linked to the institution's core civic and educational purposes A powerful example of this integrative approach in practice is Penn's development if its own form of service-learning, Academically Based Community Service (ABCS). ABCS has engaged a continuously expanding group of committed faculty since it is perceived as advancing faculty scholarship and teaching, as well as student learning, and as a means for Penn to better realize its historic teaching, research, learning, and service missions. Finally, in the third section, we focus on one particular initiative that highlights the potential impact of ABCS and underscores how service-learning helps Penn to accomplish these multiple, interrelated goals.

The Historical and Philosophical Foundations of Service-Learning

Service-learning's roots can be traced to the historical commitment of American colleges and universities to prepare leaders for their local communities, states, and the nation. Benjamin Franklin envisioned Penn as an institution dedicated to promoting civic involvement. In 1749 he published a pamphlet entitled, "Relating to the Education of Youth in Pensylvinia [sic]." Describing the educational goals of the Academy of Philadelphia, the college he had founded in 1740 (later named the University of Pennsylvania), he wrote:

> The idea of what is *true merit*, should also be often presented to youth, explain'd and impress'd on their minds, as consisting in an *Inclination* join'd with an *Ability* to serve mankind, one's country, Friends and Family…which Ability should be the great *Aim* and + *End* of all Learning. [emphasis in the original.]

That blend of pragmatic idealism that Franklin described was echoed in the founding documents of hundreds of private colleges after the War of Independence (Rudolph 1962). It found expression in the next century in the Morrill Act of 1862, which established land-grant colleges and universities (Cornell, Penn State, and UC, Berkeley are examples) in order to advance the mechanical and agricultural sciences, expand access to higher education, and encourage citizenship. In 1873, the trustees of the Ohio Agricultural and Mechanical College (now Ohio State) said—and this is typical—that they intended not just to educate students as "farmers or mechanics, but as men, fitted by education and attainments for the greater usefulness and higher duties of citizenship." The Wisconsin Idea, which began in earnest in 1903, demonstrated the capacity of these ideas to spur societal change. When Charles Van Hise became president of the University of Wisconsin, he and his former classmate, Governor Robert La Follette, resolved to make "the boundaries of the university…the boundaries of the state." Asked what spurred the great progressive reforms that spread across the Midwest early in the twentieth century, Charles McCarthy, the first legislative librarian of the United States responded "a combination of soil and seminar"—universities dedicated to working to solve significant, practical problems that deeply affected the lives of farmers and other citizens across the state.

If the inclination to link education with civic aims was one impetus for service-learning, its philosophical underpinnings owe much to the work of John Dewey (Benson et al. 2007). Dewey insisted on the "intimate and necessary relation between the processes of actual experience and education" (Dewey 1938, p. 20). He believed that the most powerful learning occurs when significant problems are examined, reflected, and acted upon in their rich contextual complexity. As Benson and Harkavy observe, genuine learning, for Dewey, occurs "when human beings focus their attention, energies, and abilities on solving genuine dilemmas and perplexities—and when they reflect on their

experience and, therefore, increase their capacity for future intelligent thought and action" (Harkavy and Benson 1998, p. 16). Of particular importance is Dewey's insistence on the proper locus of that learning and the civic implications of that choice, "There is no substitute for the vitality and depth of close and direct intercourse and attachment… Democracy must begin at home, and its home is the neighborly community" (Dewey 1954).

Service-learning drew inspiration from other sources as well, such as participatory action research. This methodology, embraced by a number of academic disciplines and fields, including community psychology, underscores the importance of working with and among others to gain new knowledge. The writings of Kurt Lewin with their emphasis on "actionable theory," which is constructed, applied, tested, and revised in "particular situations of practice," were particularly influential (Schon 1995, p. 31). Here again, the emphasis is squarely on expanding knowledge by working to solve real-world problems.

The Rise of Service-Learning

The term service learning was first used in 1966 by Oak Ridge Associated Universities for a project on tributary development. The consortium had been formed in 1946 to promote collaborative scientific research in partnership with businesses and governmental agencies. However, service-learning did not begin to gain currency until the 1980s (Stanton et al. 1999). In 1987, the National Society for Internships and Experiential Education (later renamed National Society for Experiential Education, NSEE) decided to focus attention on service-learning. In 1989, it consulted with more than 70 organizations and associations and hosted a meeting at the Wingspread Conference Center in Racine, WI which yielded "the Principle of Good Practice in Service-learning," and provided important definitional guidance about the term. Under the editorial leadership of Jane Kendall, NSEE went on to publish a seminal text on the practice in 1990 (Kendall 1990). That same year, the National and Community Service Act of 1990 (the precursor to the National Service Trust Act of 1993, which established the Corporation for National Service) began providing grants to promote service-learning. Federal support lent considerable legitimacy to the nascent practice. Service-learning was encouraged throughout the 1990s by a wide range of association initiatives (Hollander and Hartley 2000). For example, Campus Compact's Integrating Service with Academic Study program sponsored a series of summer workshops over several years, which helped teams from more than 160 institutions develop service-learning curricula. The American Association for Higher Education promoted the pedagogy through its conferences and in 1994 made a commitment to support the development of a monograph series on service-learning from the perspective of various academic disciplines under the editorial leadership of Edward Zlotkowski. That same year, the *Michigan Journal of Community Service and Learning* was established, providing a critically important outlet for research in this area.

Contested Terrain: Disputes over the Purposes of Service-Learning

Innovations typically are met with a measure of uncertainty, even skepticism (Rogers 1995) within the academy where the traditions and norms of the professoriate are resistant to being challenged (Birnbaum 1988). This was certainly true of service-learning. In the early 1990s, many service-learning practitioners found themselves increasingly constrained by the "ancient Customs and Habitudes" that Franklin had pointed to in 1789 when explaining why Penn's trustees were resistant to reforms, particularly to instruction in English instead of Greek and Latin as was the practice at the time (Best 1962, p. 173). Critics questioned service-learning's academic rigor. They confused service-learning with extra-curricular volunteerism, failing to understand that in these courses the community experiences constitute powerful and instructional "texts." It was not until the 1990s that empirical research began to convincingly demonstrate what practitioners knew from first-hand experience, that service-learning can be an extraordinarily effective instructional strategy (Astin and Sax 1998; Eyler and Giles 1999).

The idea of value neutrality was also a potent inhibiting force. The German university model and its ethos of "value freedom" heavily influenced academic norms and deemphasized higher education's role in shaping students' moral values (Reuben 1996). Today, that position is reflected in arguments that the university is ill-suited to advancing students' commitment to social responsibility and that the rightful (and utilitarian) focus of higher education is conveying knowledge and skills—enhancing written and oral communication, sharpening analytical reasoning, and developing familiarity with the precepts of a particular discipline (Fish 2003). What students choose to do with the knowledge they gain (if anything) is their own affair. Such sentiments are at odds with the aims of a significant subset of service-learning proponents who see education as a means of promoting an ethic of social justice and encouraging students to become active contributing democratic citizens. (For an insightful perspective on the various service-learning "camps" during the early years of this movement, we direct the readers' attention to chapter 2 in Stanton, T. K., Giles, D. E., Jr., & Cruz, N. I. (1999). *Service Learning: A Movement's Pioneers Reflect on Its Origins, Practice and Future*. San Francisco, CA: Jossey-Bass, written by Seth Pollack.)

Certainly, this transformational project is not embraced by all service-learning practitioners. Nadinne Cruz, a prominent service-learning "pioneer," recounted that in an association meeting she was shocked to find herself having to defend including social justice as a possible outcome of service-learning (Stanton et al. 1999). Some have argued that the surest route to broad-based acceptance is emphasizing service-learning's benefits as a pedagogy aligned with the needs of academic disciplines. As Edward Zlotkowski argued in 1995:

> Until very recently the service-learning movement has had an "ideological" bias; i.e., it has tended to prioritize moral and/or civic questions related to the service experience. Such a focus reflects well on the movement's past but will not guarantee its future. What is needed now is a broad-based adjustment that invests far more intellectual energy in specifically academic concerns. Only by paying careful attention to the needs of individual disciplines and by allying itself with other academic interest groups will the service-learning movement succeed in becoming an established feature of American higher education (Zlotkowski 1995).

There are other debates as well. Some see the fortunes of the university and its surrounding community as inextricably connected with mutually beneficial, democratic partnerships as the means for spurring meaningful change (Harkavy 1996), while others see community impact as a secondary, even subsidiary consideration, a hoped-for byproduct (Liu 1996).

What these divergent views underscore is that service-learning is not a neutral act. Various rationales can be (and are) attached to the practice. However, the persuasive argument that carries the day at one institution may rest quite uneasily at another. The successful adoption of service-learning in a particular institutional context requires proponents to be mindful of the unique constellation of values and norms of that academic and local community.

Institutionalizing Service-Learning at Penn

Two decades ago, Penn's relationship with West Philadelphia was troubled. Philadelphia, like many other cities, had experienced significant economic decline during the 1960s and 1970s (Bunce and Neal 1984). During an urban revitalization effort in the 1950s and 1960s, Penn purchased surrounding residential areas by eminent domain. The action displaced hundreds of families and provided a focal point for lingering community resentment towards the university (Harkavy and Puckett 1991).

Amidst these challenges, one of us (Harkavy) along with Lee Benson, a distinguished professor of history, developed an undergraduate Honors Seminar entitled "Urban University-Community Relationships: Penn-West Philadelphia, Past, Present, and Future, As a Case Study," that encouraged students to imagine how Penn might participate in responding to the challenges facing West Philadelphia. In the spring of 1985, the president of the university, Sheldon Hackney, co-taught the seminar. Four of the undergraduates enrolled in the course began exploring the feasibility of creating a summer job training corps for neighborhood youth. The project, named the West Philadelphia Improvement Corps (WEPIC), began that summer and became a school-day and after-school program at a local elementary school during the school year. Over the next 5 years, WEPIC was expanded to other schools. But the partnership with the John P. Turner Middle School blossomed into a true school-community-university partnership and a university-assisted community school.

The university-assisted community school model, which Penn has worked with others to develop in West Philadelphia, is predicated on the idea that schools can educate and serve *all* members of the local community. Public schools are ideally suited to be hubs around which collaborative efforts can be developed because they "belong" to all member of the community. They are an ideal decentralized, local, site for identifying and forming democratic, inclusive beneficial partnerships.

In discussions with Turner's principal and its teachers, it became apparent that the surest way to sustain efforts at Turner was by grappling with a significant, real world problem—one that called on the effort and knowledge of all participants to resolve. A key issue identified by the teaching staff and the community was poor nutrition, which compromised the health of children and impeded their learning. Professor Francis Johnston, chair of the Anthropology Department and a renowned expert on nutritional anthropology, redesigned a course, Anthropology 210, to address this problem. It became the prototype for Academically Based Community Service courses. Over the next few years, Penn faculty and students worked with Turner teachers and students to understand the nutritional practices of the middle school students and their families. It also sought to address the problem through a series of projects aimed at encouraging better nutrition, including an educational program, a garden, an in-school market that provided healthy snacks, and a nutritional outreach program for the community. Anthropology 210's success not only influenced the anthropology department (which went on to develop an academic track on Public Interest Anthropology) but it also inspired other Penn departments and schools to become involved (Johnston and Harkavy

2009; Benson et al. 2007). This type of problem solving service-learning invites faculty, students, and community members to work jointly on significant issues (such as poverty, unequal healthcare, substandard housing, and hunger.) Such courses exemplify Dewey's pedagogical ideal: "Thinking," he wrote, "begins in…a *forked road* situation, a situation which is ambiguous, which presents a dilemma, which poses alternatives" (Dewey 1990, p. 11). Focusing on the local manifestations of universal problems, in our judgment, is the best way to apply Dewey's brilliant proposition in practice. It also places the emphasis on resolving problems and improving the community, as well as on advancing the learning and development of public school and university students.

The Founding of the Center for Community Partnerships and the Emergence of Academically-based Community Service

These early experiences illustrated the powerful potential of these partnerships to fulfill Penn's academic mission, and in 1992 President Sheldon Hackney, toward the end of his tenure, founded the Center for Community Partnerships (CCP). CCP was designed as the university-wide structure for engaging and coordinating students and faculty, as well as other institutional resources, with West Philadelphia. Having the term "partnerships" in the Center's name was meant to convey Penn's recognition of its interdependence as one institutional citizen among many collaborating to help improve the civic life of West Philadelphia. The creation of a community advisory board provided an important mechanism for ensuring community participation in the oversight of these efforts. Within the university community, a center dedicated to community partnerships reflected a presidential commitment to working more closely with its neighbors. CCP embodied three core propositions:

1. Penn's future and the future of West Philadelphia/Philadelphia are intertwined.
2. Penn can make a significant contribution to improving the quality of life in West Philadelphia/Philadelphia.
3. Penn can enhance its overall mission of advancing and transmitting knowledge by helping to improve the quality of life in West Philadelphia/Philadelphia.

Although CCP (since renamed the Netter Center for Community Partnerships) plays an active role in promoting volunteer community service and community development, the centerpiece of its work has been Academically Based Community Service (ABCS). ABCS is service rooted in and intrinsically connected to teaching, research, and learning. Encompassing both service-learning and problem-based research was vitally important to its adoption at Penn given its status as a research university. The university-assisted community school partnerships and ABCS helped demonstrate the benefits of reciprocal partnerships and enabled Penn, through CCP, to establish relationships with many community leaders and organizations. This laid important groundwork for institutional engagement efforts.

Restructuring the University for Engagement

In 1994, the Board of Trustees selected Judith Rodin to succeed President Hackney. Rodin had grown up in West Philadelphia and attended Penn as an undergraduate. She had enjoyed a distinguished academic career and was serving as provost of Yale University. The Board was particularly impressed by Rodin's commitment to rejuvenating undergraduate education and engaging with West Philadelphia. Rodin began making important structural changes. She formed the Provost's Council on Undergraduate Education and charged it with designing a "model undergraduate experience for the 21st century" and emphasized the use of action-oriented research in order to promote "engagement with the material, ethical, and moral concerns of society and community defined broadly, globally, and also locally within Philadelphia." The tragic murder of a university research associate a few blocks from campus, a shocking reminder of the street violence that plagued much of West Philadelphia and increasingly Penn, further galvanized the university community. Roy Vagelos, chair of Penn's Board of Trustees, and Rodin promoted the establishment of a new standing committee of the Board on Neighborhood Initiatives with the chair serving on the Board's influential Executive Committee. The position of Vice President for Government, Public and Community Affairs was created with the Director of CCP reporting both to the Vice President and the Dean of the College of Arts and Sciences along with a dotted line reporting relationship to the Provost, an arrangement that allowed CCP to bridge the world of administrative and academic affairs.

Penn also launched an aggressive economic revitalization program, which was informed by a planning process undertaken by CCP. The university began to actively support local vendors rather than simply seeking the lowest cost provider. By 2006, Penn had purchased $544.8 million in goods and service from local suppliers. The university sought to boost home ownership through a mortgage program for all Penn employees (including hourly workers), which by 2004 had resulted in the purchasing of 386 homes, 75% of which had mortgages of less than $150,000. Penn also purchased 20 abandoned homes, refurbished them and sold them at or below cost to ensure that local families could afford them. These presidential-led initiatives demonstrated to the Penn community and to community partners particularly in neighborhoods proximate to

the university that meaningful engagement was an institutional priority.

In 2004, having been president for a decade and significantly increased Penn's involvement with its local community, Judith Rodin retired. She was succeeded by Amy Gutmann, a highly distinguished political philosopher from Princeton whose scholarly work has explored the role universities play in advancing democracy and democratic societies. In her inaugural address on October 15, 2004, President Gutmann unveiled the three-fold "Penn Compact," the third element of which is local and global engagement:

> The third principle of the Penn Compact is to engage locally and globally. No one mistakes Penn for an ivory tower. And no one ever will. Through our collaborative engagement with communities all over the world, Penn is poised to advance the central values of democracy: life, liberty, opportunity, and mutual respect. Effective engagement begins right here at home. We cherish our relationships with our neighbors, relationships that have strengthened Penn academically while increasing the vitality of West Philadelphia.

Such commitment to local engagement has greatly encouraged work with West Philadelphia partners. In 1991–1992, three faculty members taught four ABCS courses to approximately 100 students. By 2003–2004, Gutmann's first year in office, 54 ABCS courses were being offered by 43 faculty to 1,400 Penn students and these numbers have continued to grow. In the 2006–2007 academic year, 57 ABCS courses were taught by 49 faculty from 8 schools and 21 departments and involved approximately 1,600 Penn undergraduate and graduate students. Gutmann also supported the creation of the cross-university interschool and interdepartmental "Seminar on Democratically Overcoming Poverty, Racism and Crime in West Philadelphia/Philadelphia: What More Should Penn Do?" This course brought 34 faculty from 7 schools and 16 departments together with a group of undergraduates to grapple with the most pressing problems facing Penn, West Philadelphia, and the city. Students' research findings and recommendations from the seminar were provided to President Gutmann to help inform Penn's work with the community. In October 2007, CCP became the Netter Center for Community Partnerships in recognition of an extraordinarily generous endowment gift from Barbara and Edward Netter. Moreover, at the 2008 ServiceNation Summit, in which both major Presidential candidates participated, Gutmann pledged that Penn will fund an additional 400 community service opportunities over the next 4-year period.

During the years of Rodin's and Gutmann's presidencies, CCP had been expanding and refining its university-assisted community school model. In 1993, CCP was partnering with four teachers at two schools. By 2006, programs supported by CCP involved the collaboration of 65 teachers in five schools on a range of programs including literacy, mathematics, science, health and nutrition, career guidance and after school enrichment. Approximately 6,000 students are involved in these programs annually. The status of these partnerships is continually being assessed. Data certainly suggest that the partnerships are beneficial to the schools with which CCP/Netter Center has been working (see Table 1).

The sustained efforts over the past decade also resulted in a marked shift in institutional norms. The value of community-based teaching and research has become widely embraced. One senior faculty member recently remarked to one of us, "A decade ago if you said you were involved in West Philadelphia people would scratch their heads. Today, even if many faculty members continue to do more-traditional research, there's an acceptance of faculty who are involved."

Moelis Access Science: Realizing Penn's Mission Through Reciprocal, Democratic Partnering

At the heart of the Netter Center's efforts are its partnerships. The Moelis Access Science project exemplifies the reciprocal, democratic partnerships that Penn is striving to promote in the context of the university-assisted community school model. Moelis Access Science (MAS) began as a collaboration between Penn faculty and West Philadelphia teachers and school administrators. It currently involves approximately 30 teachers annually and in six partner schools in West Philadelphia. The tasks undertaken by the collaborative include:

- Providing content-based professional development for teachers.
- Offering assistance to teachers in the development of quality hands-on activities consonant with the school district's curricular goals.
- Offering classroom implementation assistance to teachers implementing quality hands-on activities consonant with the school district's curricular goals.
- Providing materials and supplies for quality hands-on activities consonant with the school district's curricular goals.

Background of the Project

MAS's focus is on improving STEM (Science, Technology, Engineering, and Math) education among K-12 students in West Philadelphia and undergraduate and graduate

Table 1 School partner data

Drew elementary school
Pennsylvania state testing: When CCP began working with Drew Elementary in 1996, they were performing at the lowest possible level on the Pennsylvania System of School Assessment (PSSA) reading and math exams. In 1998–1999, Drew demonstrated the most dramatic PSSA increases of any school in PA for Grades 5 & 8 (Snyder 1999)
Literacy: The 75 Drew students who participated in the Individualized Reading Program with Penn mentors all showed improvement in standardized reading scores, approaching the national averages. There has also been a 50% improvement in the number of proficient readers in the 3rd grade from 2003 to 2006 (Netter Center 2008)
Shaw middle school
Pennsylvania state testing: At Shaw Middle School, the number of 8th graders performing at below basic levels in math & reading has gone from 80% in 2002, when CCP's partnership rekindled under new principal leadership, down to 40% in 2006
Attendance: From 2002 to 2006, student attendance at Shaw has risen from 82 to 89% and number of annual suspensions decreased from 464 to 163 (SDOP 2007)
University city high school (UCHS)
Attendance: University City High School's (UCHS) school-wide average daily attendance rate increased to 79% by 2002–2003 (city-wide average 65%). The school-within-a-school at UCHS most closely partnered with CCP reached 87% (Community Schools Online 2006)
Health and Nutrition: UCHS Grade 12 students, with 4 years of Urban Nutrition Initiative (UNI) programming, consumed twice as many daily servings of fruits and vegetables than Grade 9 students (Community Schools Online 2006)
Sayre high school
College and Career Guidance: Of the 19 seniors who participated in the Netter Center's College and Career Program 2007–2008, 95% graduated on time; 68.4% enrolled in a 2-year or 4-year college; and 15.7% had secured a full-time job upon graduation (Netter Center 2008)

STEM students at Penn. The program is jointly administered by The Netter Center and the Math Department and involves faculty members from the School of Arts and Sciences (including Biology, Chemistry, and Physics) and the School of Engineering and Applied Sciences. Dennis DeTurck, Professor of Math and Dean of the College serves as Principal Investigator of the project.

MAS engages Penn students either as Fellows or through Academically Based Community Service classes. MAS relies on a cohort of graduate and undergraduate Fellows. (Between 5 and 10 graduate and 20–35 undergraduate Fellows have typically participated.) Penn funds these positions in part through grants and also through the Federal Work Study Program. In addition, several of the graduate and undergraduate students volunteer to participate in the program. Fellows perform a range of tasks. They conduct inventories of school labs. They identify inquiry-based activities that can be conducted with the school's existing facilities and that address defined curricular objectives. The activities are not "add-ons," they are designed to draw on what students already know and help them develop new skills. Fellows test the activities and identify any modifications that might be necessary. They provide direct classroom support or even lead activities and afterwards document activities that have been successfully. Professional development is an important means of ensuring that teachers have the requisite familiarity with STEM topics to oversee the delivery of the Access Science curriculum. Each month, Penn coordinators provide professional development sessions on content material most relevant to their teacher partners' work. These sessions also discuss strategies for meeting the requirements of the School District High School Biology Curriculum as well as explore possible complementary activities. Periodically, graduate Fellows are invited to give talks on their current research. This allows teachers to learn about emerging research in STEM fields, and also gives them a sampling of speakers whom they may invite into their classroom to speak to their students about pursuing STEM interests. Finally, Fellows are responsible for working with faculty to foster the development of ABCS courses in various disciplines so more Penn students become involved in the schools. Thus, ABCS courses are strategically rather than opportunistically developed.

In response to these efforts, approximately a dozen new ABCS courses in science, mathematics, and engineering have been offered and half a dozen Access Science ABCS courses are offered annually (see Table 2).

Taking Stock of the Benefits of Moelis Access Science

How has Moelis Access Science (MAS) advanced Penn's educational and civic mission? Evaluating university-community partnerships, especially those tackling complex real-world problems, is challenging. Since August 2008, the Netter Center, thanks to its endowment gift, has a full-time evaluator on staff who is leading an ongoing, comprehensive evaluation of the impact of the Center's impacts. From 1999–2007, however, program coordinators for MAS consistently solicited feedback from Fellows, teachers, and students about the program and structure

Table 2 Examples of access science ABCS courses

Community Math Teaching Project (Geometry): Penn students teach a series of hands-on activities to students in geometry classes at University City High School. This course partners with all geometry teachers at this school, and regular school wide meetings among the teacher partners are conducted as a means of professional development and aligning to the school district's geometry curriculum
Bioengineering in the world. At University City High School, Penn students implement a series of labs and activities pertaining to college-level bioengineering concepts to senior high school engineering students. The Penn students are required to do more in-depth research on particular bioengineering topics as well
Community algebra initiative. Penn students teach a series of hands-on activities based in real-world contexts to students in algebra classes at Sayre High School
Crime/science/instruction. CSI and Science in High School: This course introduces the forensic science aspect of selected crimes investigations to High School students. Penn students in the course develop and deliver appropriate teaching plans to high school students. The high school students are introduced to the science of DNA and forensic toxicology via an established chemistry class at Sayre High School

opportunities for group reflection. In addition, each year a graduate Fellow served as an Evaluation Coordinator. With guidance from a faculty member who is a noted expert in program evaluation (and a member of the MAS Steering Committee), the Fellow employed a mixture of quantitative and qualitative methods in order to evaluate the experiences of all participants and the efficacy of the program. This intensive evaluation of MAS programming was supported by funds provided through a grant from the Graduate Teaching Fellows in K-12 Education (GK-12) initiative of the National Science Foundation. The evaluation was conducted in two phases: an operations and impact assessment of the Teacher/Fellow Partnerships and the Science, Technology, Engineering and Mathematics (STEM) Academically Based Community Service (ABCS) courses between Fall 1999—Spring 2003; and an overall summative evaluation of the program with a qualitative case study focused on STEM ABCS Faculty and teaching assistants between Fall 2003—Spring 2006. A final evaluation report was released in 2007 (Access Science Steering Committee 2007).

The Impact on Fellows and Penn students

The attitudes, experiences, and behaviors of MAS Fellows were assessed through the use of anonymous questionnaires (administered each semester), focus groups, observations, and interviews administered by program coordinators, evaluation Fellows (doctoral students) and faculty from Penn's Graduate School of Education. The use of anonymous participant codes enabled Fellows' responses to questionnaires to be tracked over time to detect changes over the course of their involvement with the program.

Penn students enrolled in Moelis Access Science ABCS courses were assessed through anonymous questionnaires, observations, and document analysis. ABCS students complete questionnaires at the beginning and the end of each semester. Further, pre and post questionnaires were also administered to students in identified comparison courses (those covering substantially similar content but without the experiential component).

Penn students also felt that they had benefited significantly from participating in the program. Nearly all of the Fellows surveyed during the course of the program indicated that their communication skills, facility in presenting science and math concepts to non-academicians and ability to work with children and adolescences had improved. Most Fellows believed that their experience had helped them to better understand the process of learning science and math (86%). A majority felt the program had helped them become more proficient in public speaking (77%) and almost half (45%) of new Fellows indicated that their experience with MAS would be influential in their thinking about their career, opening up the possibility of teaching or entering the field of education. The program has also deepened Penn students' understanding of the challenges facing urban public schools. As one observed: "Working within the Philadelphia school system, you see the overworked teachers, the sparseness of functioning computers to learn on, and the lack of modern textbooks and tools that are necessary for a good education… Teachers don't always have the time to do certain activities, and I was able to help (my teacher partner) by doing research and organizing lessons on a subject she was assigned to teach and yet had never been formerly trained in, Bioengineering."

The Impact on Teachers and Classroom

Teachers partnering in this effort were interviewed each year by the evaluation Fellows and time was also allocated in MAS planning meetings to critique and reflect on the program. The teacher interviews also focused on the use of inquiry-based learning strategy both with and without the presence of Fellows. Teachers completed anonymous questionnaires after each professional development session for the program.

The NSF-supported evaluation indicated that MAS has had a notable impact on the classrooms. First, it has exposed students to a wide range of topics in science and math, ones where the teachers do not necessarily have expertise. However, through the planning process, teachers have retained control over the content that is offered in their classes. Second, the program provides additional adult role models in the classroom who are excited and knowledgeable about STEM. Penn students help provide greater individualized attention for the students. Their presence provides more opportunities for students to ask questions or participate in discussions. The hands-on nature of the lessons gives students the freedom to explore new ideas. As one high school student observed: "[Lab time] was useful because instead of plugging in numbers for a given equation I came up with my own equation." Third, the program has altered students' perceptions of what is possible for them. As one put it, "I have learned that math is easier than I imagine. If I just put my mind to it and apply my self I can achieve the highest goal of all and which will make my mother very proud." A Penn Fellow observed:

> Many of the students have asked me questions about what it is like to study science in college and do research and fieldwork. I've had some good conversations with the students just about how exciting it is to do science as a career and what college and grad school are actually like. Undoubtedly their teacher would be more than willing to talk to them about the same things, but they seem to feel more comfortable asking me such questions.

Fourth, importantly, the presence of Penn students has given teachers the opportunity to periodically step away from actively leading instruction for a time so they can focus on planning or other responsibilities. Overall the program has generated considerable excitement about STEM. The program has increased the regularity (and the priority) of science lessons in partner classrooms and teachers report significant decreases in classroom disruptions and increased student engagement during MAS activities.

Conclusions

The MAS program not only illustrates the promise of Academically Based Community Service and the university-assisted community school idea, but it also provides a concrete example as to how service-learning can help advance a university's core academic and civic missions. In the MAS approach to service-learning sustained, democratic partnerships serve the community and the university by intentionally linking the needs and interests of all partners through joint planning and management. ABCS courses have been developed that introduce West Philadelphia students to new content areas and the programs support the curricular goals of the school district. Penn undergraduates develop a deeper level of understanding about STEM concepts by teaching them. Penn graduate students are able to share their areas of expertise through professional development workshops with teachers and, in a number of instances, students in ABCS courses have produced published research (Gifford et al. 2004; Schu et al. 2005).

Programs such as MAS have also changed Penn. The program has drawn together faculty from various disciplines and schools (e.g. Biology, the Graduate School of Education, Materials Sciences, NanoBio Center). ABCS courses have been created not simply to serve the pedagogical ends of Penn faculty but to also meet the learning goals of school partners. This ethic of collaboration has extended to other areas as well. For example, Penn is exploring innovative ways to fulfill NSF and NIH requirements that research results in "broader impacts" and increased community participation and inclusion in research. More generally, the emphasis on real-world problem solving through ABCS courses and the development of university-assisted community schools are helping Penn to increase its contributions to the advancement of learning (preK-20) and realize Franklin's dream for Penn of providing an education for citizenship in which students develop "an *Inclination* join'd with an *Ability* to serve."

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