The Power of Partnerships: Transforming Students and Communities through Service-Learning
About Issues in Engaged Scholarship

The Colin L. Powell Center for Leadership and Service launched its Working Paper series, Issues in Engaged Scholarship in 2010 to provide a platform for disseminating knowledge about community-campus partnerships and to add to the rigor of discourse in this field. Through this series, the Center strives to build a network of community-engaged scholars and increase understanding of the processes and outcomes associated with service-learning, community-based research, and community-campus collaborations.

About the Colin L. Powell Center for Leadership and Service

The Colin L. Powell Center for Leadership and Service (formerly the Colin Powell Center for Policy Studies) at the City College of New York was established in 1997 to prepare new generations of publicly engaged leaders from populations previously underrepresented in public service and policy circles, to build a strong culture of civic engagement at City College, and to mobilize campus resources to meet pressing community needs and serve the public good. The Center focuses its efforts in areas of community and economic development, education, health care, environmental concerns, international development, and global security issues.

Colin L. Powell Center for Leadership and Service

160 Convent Avenue
Shepard Hall, Room 550
New York, NY 10031

Phone 212-650-8551
Fax 212-650-8535

Website www.ccny.cuny.edu/powell
Email cpowellctr@ccny.cuny.edu
The Power of Partnerships:Transforming Students and Communities through Service-Learning

2011 NYMAPS SYMPOSIUM

MARCH 23, 2011
COLUMBIA UNIVERSITY

WORKING PAPER SERIES | VOL 1

COLIN L. POWELL CENTER FOR LEADERSHIP & SERVICE
The City College of New York
NEW YORK METRO AREA PARTNERSHIP FOR SERVICE-LEARNING
Editors
Maura Christopher, Director of Publications, Nora Heaphy, Deputy Director, Genéa Stewart, Director of Service-Learning, Colin L. Powell Center for Leadership and Service; Anasa Scott, General Manager, Greenproofing, New York Life Leader in Residence at the Colin Powell Center (2010–2011)

Production Editor
Katherine Cho, Program Coordinator for Service-Learning, Colin L. Powell Center for Leadership and Service

Design
Amelia Costigan, Vladimir Golosy
TABLE OF CONTENTS

- **Introduction** 4–5

- **An Analysis of the Implementation of “Picture Me in College: A Portrait Project with Homeless Children and Teens”**
  BY LIZ DI GIORGIO
  DEPARTMENT OF ART AND DESIGN
  QUEENSBOROUGH COMMUNITY COLLEGE OF THE CITY UNIVERSITY OF NEW YORK 7–13

- **Utilizing Service-Learning in the Analytical Chemistry Laboratory: Soil and Water Analysis in Rochester, New York**
  BY KIMBERLY D. CHICHESTER, IRENE KIMARU, LYNN DONAHUE, MARYANN A. B. HERMAN
  DEPARTMENT OF CHEMISTRY
  SERVICE-LEARNING INITIATIVE PROGRAM
  DEPARTMENT OF BIOLOGY
  ST. JOHN FISHER COLLEGE 15–22

- **Turning Students on with High-Impact Strategies**
  BY ARLENE KEMMERER, JOSEPHINE A. PANTALEO, ROSANNE VOGEL
  BASIC SKILLS LEARNING CENTER
  DEPARTMENT OF SPEECH COMMUNICATION & THEATER
  QUEENSBOROUGH COMMUNITY COLLEGE OF THE CITY UNIVERSITY OF NEW YORK 23–27

- **Establishing a Microbiology Honors Tract to Engage Health Science Majors in Service-Learning Activities**
  JOAN PETERSEN
  DEPARTMENT OF BIOLOGICAL SCIENCES
  QUEENSBOROUGH COMMUNITY COLLEGE OF THE CITY UNIVERSITY OF NEW YORK 29–40

- **Promoting a Sustainable Lifestyle to Elementary School and College Students**
  SIMRAN KAUR
  DEPARTMENT OF BIOLOGICAL SCIENCES
  QUEENSBOROUGH COMMUNITY COLLEGE OF THE CITY UNIVERSITY OF NEW YORK 41–51
**INTRODUCTION**

_Genea Stewart, Director of Service-Learning and Civic Engagement, Colin L. Powell Center for Leadership and Service_

_Nora Heaphy, Deputy Director, Colin L. Powell Center for Leadership and Service_

_Anasa Scott, Director of Greenproofing, Colin Powell Center Leader in Residence, 2010–2011_

In 2006, with the support of the New York Campus Compact, four institutions of higher education (the City College of New York, represented by the Colin Powell Center, Marymount Manhattan College, New York University, and Wagner College) established the New York Metro Area Partnership for Service-Learning (NYMAPS) to increase the number of students in the region engaged in service-learning, to strengthen and expand faculty development in service-learning, and to deepen community-campus partnerships. Six years later, comprising more than 18 colleges, universities, and nonprofit organizations, the network continues to thrive, adding active members and expanding knowledge, connections, and opportunities in this arena.

Formed through a grant from New York Campus Compact and the Corporation for National and Community Service’s Learn and Serve America program, NYMAPS is dedicated to realizing the civic mission of higher education and to advancing service-learning and other forms of civic engagement across the New York metropolitan area. Under the direction and leadership of the Colin Powell L. Center Leadership and Service, the NYMAPS Advisory Board collaborates to generate activities for its members and to facilitate the exchange of expertise.

NYMAPS members gather five times a year for professional development, idea sharing, and support. Quarterly meetings focus on important topics in the fields of service-learning and community-campus partnership and encompass presentations and opportunities for participants to share their ideas, challenges, and resources. An annual symposium gathers campus and community stakeholders to present their activities and outcomes. This special NYMAPS edition of *Issues in Engaged Scholarship* grew out of such a symposium.

This edition considers five unique service-learning courses and their partnerships, which focused on the disciplines of art, chemistry, speech and theater arts, and biology, and well as on student development. The editors selected the contributing authors from among the cohort of presenters at the 2011 NYMAPS Symposium, “The Power of Partnerships: Transforming Students and Communities through Service-Learning.” This spring event, hosted on March 23, 2011 at Columbia University, showcases higher education faculty members, community organization representatives, service-learning program administrators, and students as they share service-learning outcomes and program models. The symposium engages practitioners at all levels of experience to increase their knowledge of service-learning in higher education.

In these articles, faculty and staff members explore the effectiveness of their service-learning coursework and evaluate learning outcomes, community impact, reflection, and assessment. We thank these first authors who walked with us to create this first network-supported edition of *Issues in Engaged Scholarship.*

To fully realize our civic mission, we must model principles of partnership both in the community and on campus.
A Word on This Year’s Theme, The Power of Partnerships

Practitioners who take up service-learning and other forms of community-engaged teaching frequently evoke concepts such as trust, open communication, shared responsibility, and long-term commitment. These principles are easy to embrace, but difficult to practice. Nevertheless, without these values embodied in our work, we would surely fail in our efforts to bridge the “town-gown” divide and to break down the gulf that separates faculty from students and faculty from one another. Community partners need to know that the campus is invested and committed to a relationship that won’t end with any given winter break or graduation. Service-learning faculty need access to like-minded peers and assurance that their efforts will be rewarded and recognized by those who have the power to grant them tenure and promotion. And students need partnerships with faculty who are deeply committed to their success and willing to take risks to make the classroom experience more meaningful and dynamic. That’s what this Issue of Engaged Scholarship is all about. It is dedicated to exploring and celebrating the meaning of the word “partnership”—a word used so frequently it risks losing its significance.

In his keynote address to the 2011 NYMAPS Symposium, Jack McGourty, Dean of the Fu Foundation School of Engineering at Columbia University, described the importance of not only partnering with the community, but also of partnering across campus to build on one another’s strengths and to provide multi-disciplinary solutions to complex societal challenges. If colleges and universities want to fully realize their civic missions, we must model these principles of partnership both in the community and on campus. Evidence of one such strong collaboration can be seen here through the four collective contributions of Queensborough Community College (QCC) of the City University of New York.

The Collection

Liz Di Giorgio’s paper on “Picture Me in College: A Portrait Project with Homeless Children and Teens,” highlights an extraordinary effective and moving collaboration between art students and homeless youth based at transitional housing operated by the nonprofit organization Homes for the Homeless. Di Giorgio describes the way this long-term, sustainable partnership evolved through mutual respect and authenticity and built each partner’s unique strengths as co-educators. The collaboration eventually developed to provide students from the Saratoga Inn and QCC with the opportunity to participate in a joint service project for a new partner, a senior living facility. In her piece, Di Giorgio shows how the course met general education objectives, enabled college students to improve their creative skills, and offered homeless teens the chance to spend time in a college environment and to consider college as an important and achievable goal.

In their paper, “Utilizing Service-Learning in the Analytical Chemistry Classroom,” Kim Chichester, Irene Kimaru, Lynn Donahue, and MaryAnn A.B. Herman describe the process through which service-learning students in the Analytical Chemistry Laboratory applied sampling procedures in a real-world context. Students collected and analyzed soil samples from two local neighborhoods, and water samples from a Rochester, New York, area river and creek. The faculty and community partner, the regional Department of Environmental Services, modeled the application of best practices for gathering data and disseminating students’ research findings to communicate sensitive information appropriately to community residents.

In “Turning Students on with High Impact Strategies,” Arlene Kemmerer, Josephine Pantaleo and Rosanne Vogel demonstrate how they leveraged a learning community linking Basic Skills Education and Speech Communication and Theatre Arts to provide health literacy education successfully to elementary school children while alleviating QCC students’ apprehensions toward public speaking. With the help of the mantra “Real, Reciprocal and Reflective,” which Jo Pantaleo coined, the partners encouraged frequent, open, and trusting communication.

Finally, Joan Petersen and Simran Kaur provided distinct looks at two very different biology courses with their respective papers, “Establishing a Microbiology Honors Tract to Engage Health Science Majors in Service-Learning Activities” and “Promoting a Sustainable Lifestyle to Elementary School and College Students.” Collaboration with P.S. 203, P.S. 46 and the Alley Pond Environmental Center led to marked outcomes for all involved.

Looking Forward

This collection is the beginning of what we believe will be an ongoing series representing a wide diversity of project models across various disciplines at a diverse array of institutions. The Colin Powell Center is committed to expanding access to real, local examples of best practices and successful implementation, and we believe Issues in Engaged Scholarship can become a key resource that will allow practitioners regionwide to explore, in depth, the ways in which others are impacting the community and educating their students. We also believe the 2012 NYMAPS Symposium, “Ethics and Service-Learning: Best Practices for Empowering Community Partners and Educating Students,” hosted at St. John’s University, provides a rich opportunity to further our goal through its focus on exploring ethical dimensions in community-based work.
An Analysis of the Implementation of “Picture Me in College: A Portrait Project with Homeless Children and Teens”

BY LIZ DI GIORGIO
QUEENSBOROUGH COMMUNITY COLLEGE
OF THE CITY UNIVERSITY OF NEW YORK
JULY 13, 2011
Abstract

The service-learning project "Picture Me in College: A Portrait Project with Homeless Children and Teens" took place at Queensborough Community College (QCC) in the fall of 2010 in collaboration with the Brownstone School and Future Link After School programs of the Saratoga Family Inn, one of four transitional housing facilities operated by the nonprofit organization Homes for the Homeless. The project was designed to expand the study of portraiture for a college drawing class, while, at the same time, using portraiture to create or reinforce a positive self-image for children who were grappling with poverty and homelessness. The Saratoga students were asked to consider choosing poses that convey confidence, thoughtfulness, intelligence, or other empowering traits. Once the portraits were drawn, the Queensborough students scanned the drawings and used Photoshop and Illustrator to add color and design elements that were personally meaningful to each Saratoga student. By doing this, the Queensborough students demonstrated in a clear and visually striking way that each child was unique with talents and interests to be acknowledged, appreciated, and nurtured. This paper analyzes how, with the guidance of Saratoga Family Inn, the project’s community partner, participants worked together to ensure that the means of implementing the project were wholly in accordance with the goal of empowering the Saratoga students. It looks at steps taken to ensure that the Saratoga students saw themselves as active contributors to the project, and notes how the Saratoga students became active contributors in their own community service projects.

The Planning

The Saratoga Family Inn, located in Jamaica, Queens, is one of four transitional housing facilities operated by the nonprofit organization Homes for the Homeless. Founded on the belief “that family homelessness is first and foremost a poverty issue that disproportionately affects children,” it adopts a child-centered approach in the services it offers to homeless families (Homes for the Homeless, Our Approach). In addition to offering basic shelter services, Homes for the Homeless provides “a full range of programs designed to meet the specific needs of children and their parents,” including literacy workshops and counseling on employment and housing for parents, as well as summer camps and after-school enrichment programs for children, such as those offered at its Saratoga Family Inn (Homes for the Homeless, Programs). According to Senior Programs Associate Dona Anderson, Homes for the Homeless has provided services to 34,000 families, including 58,000 children, since 2000.

Key words

Portrait, Art, College, Homeless, Children, Poverty, Empower

This work is adapted from a presentation of the same name given by Liz Di Giorgio at the New York Metro Area Partnership for Service-Learning (NYMAPS) Third Annual Symposium on March 23, 2011.
she thought this would have a disempowering effect. At this point, the Saratoga students were welcomed to the class and thanked for coming to help the Queensborough students, who were in need of models to improve their drawing skills. Williams stressed it was imperative for the Saratoga students to understand the mutually beneficial nature of this project.

The Need

In its 2010 report, the National Center for Education Statistics (NCES) states that, for the 2007–2008 academic year, an average of only “about 68 percent of 12th graders in high-poverty schools and 91 percent of 12th graders in low-poverty schools graduated with a diploma” (NCES Special Section 17). More disturbingly, it reports that the 68 percent graduation rate for high-poverty schools represents a drop from 86 percent in 1999–2000, while the graduation rate in low-poverty schools showed no measurable change over the same period (17). It also reports that, for the 2007–2008 academic year, an average of “about 28 percent of high school graduates from high-poverty schools attended a four-year institution after graduation, compared with 52 percent of high school graduates from low-poverty schools” (17). While there was no measurable drop in enrollment for graduates of high-poverty schools since the 1999–2000 academic year, the enrollment rate for graduates of low-poverty schools had actually increased during this same period by 8 percentage points, from 44 to 52 percent. The designation of high- and low-poverty schools was made on the basis of the percentage of students eligible for free or reduced lunch (17).

The Project

Giving the Saratoga students a positive experience in the college setting and encouraging positive interactions with college students was a primary goal of the project, given the educational disparities that affect children living in poverty. To get to know the Saratoga students and to discover what design elements to use for their portraits, the Queensborough students compiled a list of questions about favorite colors, subjects at school, flowers, and so forth. In addition to providing a wealth of information to use in the design of the portraits, these questions served as a highly effective icebreaker and enabled the Saratoga and Queensborough students to feel comfortable with one another in a relatively short time on the first day of the project.

When the Saratoga students arrived, each one was asked to choose the name of a Queensborough student out of a hat. After this one-to-one pairing, the remaining Queensborough students were allowed to team up with the pair...
of their choice. Because there were nine Saratoga students taking part in the project and 21 drawing students, there were at least two, and sometimes three, Queensborough students for every Saratoga student. The Queensborough students initiated conversations with the Saratoga students, making sure to include the questions compiled, while carefully noting the answers, which were used to personalize the design of the portraits.

To provide context for the project, books on portraiture, including one on presidential portraits (Voss) were gathered and provided to the students. Having books that featured images of thinkers and leaders seemed especially revelant to the goal of empowering the Saratoga students. Each team invited their model to consider striking a pose from one of the books that might help them feel and convey confidence, thoughtfulness, intelligence, or another positive quality. Giving the Saratoga students the autonomy to choose their own poses bolstered their sense of self-worth and importantly, helped them to understand that they were appreciated simply for being themselves. Insisting on a particular pose seemed counterproductive.

One of the younger Saratoga students, named for the purpose of this article “Nicole,” chose not to strike a deliberate pose and, instead, simply sat for a naturalistic portrait. The art student captured her sensitivity so well that the thought of a studied pose became irrelevant for her. Because Nicole’s favorite movie was the Disney film Alice in Wonderland (Burton 2010), her team decided to set her portrait into a playing card design, turning her into a kind and gentle version of the Queen of Hearts.

In some cases, the Queensborough students chose to create their own entire portraits from start to finish, including the design elements that would complement the drawn portrait. In other cases, they collaborated; one student drew the portrait while the others developed the design components. Each team scanned the pencil-drawn portraits in the computer lab and used Adobe’s Photoshop and Illustrator programs to add color and other embellishments that reflected the personal interests and preferences of the Saratoga students. This aspect of the project required some basic instruction from the computer lab technician, some trial and error, and much cooperation and collaboration among the students.

Once the Queensborough students had completed their overall design, they reduced the images to 4 by 6 inches, printed them out, and set them into the lids of the wooden keepsake boxes purchased for this project. When team members worked individually and produced more than one portrait of the same Saratoga student, all were included in the keepsake box, giving the Saratoga student the option to rotate the portrait on display.

Because of the instability that comes with homelessness, deciding whether to give the Saratoga students poster-size versions of their portraits provoked much thought and discussion. Remembering that these students did not have bedroom walls to call their own was an important factor in the conversation. The risk of the portraits getting creased and torn, and the symbolic implications of this, were also of great concern. Keepsake boxes were chosen because they would protect the portraits from wear and tear, and because they could function as visible symbols, albeit tiny, of a place to call one’s own. Each box also served as a place for the Saratoga students to keep small mementos, symbolic outward representations of their inner reserves and strength. This ensured that the completed objects would align with the project’s goal of encouraging the students’ sense of self-worth.

To inspire the Saratoga students, the QCC students stocked each box with a set of positive messages. In the preceding weeks, they had looked for quotations, sayings, or words of encouragement for a young person going through a very difficult time, and selected sayings that might suit their Saratoga student model. They printed these quotations and sayings in a cursive font on antique-style card stock. One student, for instance, chose a quote he knew of from a Walt Disney video, in which Christopher Robin says to Winnie the Pooh, “Remember you are braver than you believe, stronger than you seem, and smarter than you think” (Geurs, Crocker). Another student chose the following quote from famed basketball coach John Wooden: “Do not permit what you cannot do to interfere with what you can do.” (Wooden 199). Queensborough participants hoped that the Saratoga students would keep these quotations and read them from time to time when they needed encouragement.

Each team invited their model to consider striking a pose that might help them feel and convey confidence.

The Celebration

The celebratory conclusion of this project occurred on the last day of the semester before winter break, lending a particularly festive mood to the event. The drawing class began at 2:10 p.m., and the Saratoga students did not arrive until 4:30, which allowed time to prepare the room for the festivities. Class members covered the classroom bulletin board with poster-size versions of the portraits, which the Saratoga students would be seeing that day for the first time. One of the students created colorful paper decorations in the Mexican tradition of papel picado. Many other students joined in and added paper decora-
tions of their own to enliven the room. A QCC student named Alex for the purposes of this article, who was active in his community, had solicited donations of toys to give to the Saratoga students at the concluding celebration.

When the children arrived, they came bearing gifts of their own: handmade cards, drawings, and crafts. As Williams said, “It was very important to me, as well as to the staff, that the children not only participate as subjects for the art project, but also contribute a gift to show gratitude.” (Williams, e-mail, July 2011). By bringing their handmade drawings and crafts, the Saratoga students became creative participants in the project. Receiving these handmade items was one of the highlights of the project for the Queensborough students, and it gave them a chance to appreciate the artistic talents of the Saratoga students.

It was of the utmost importance that this project not mirror, in any way, the social exclusion that it was designed to counter. Given ample time, it would have been ideal to give the Saratoga students a turn to draw the Queensborough students. The Saratoga students had contributed to the project by posing, which, despite its sedentary appearance, requires significant effort and concentration; however, enabling the Saratoga students to contribute their own creative work to the project proved empowering to them.

Facilitators began the informal ceremony, calling each Saratoga student and artist team to the center of the room. The Queensborough students proudly presented their finished portraits to their Saratoga model. Ultimately, each Saratoga student also received the poster-sized version of his or her portrait, in addition to the smaller version on the keepsake boxes. Each poster was wrapped around a cardboard tube and tied with a ribbon to minimize damage, and, more important, to make it resemble a diploma. This enabled the Saratoga students to have a graduation-like experience in a college setting, perhaps prefiguring a college graduation for each one of them.

The Saratoga students were surprised and happy to receive the keepsake boxes adorned with their portraits. Facilitators explained that the boxes were intended to hold positive mementos and reminders of their dreams for the future, and that making a work of art is similar to creating a satisfying life: both usually require making a plan and carefully following the steps of that plan. Facilitators also noted that college is usually an important step in a plan to create a satisfying life.

Near the celebration’s end, the QCC students brought out the donated and wrapped toys. Nicole rushed over to ask if she could “be Mrs. Claus” and give out the presents. She seemed more interested in giving out presents than in receiving and unwrapping her own. Her transformation into a bubbly, happy child as she gave out the gifts poignantly captures the theme that emerged from the project, what Williams aptly described as “the empowerment of giving” (Williams, interview).

The celebration also allowed participants to thank the individuals who had contributed to the project’s success: Williams; the chap- erones from the Saratoga Family Inn who drove the children to and from the campus; Josephine Pantaleo, who offered advice throughout the project; and QCC’s associate dean of academic affairs, Michele Cuomo, who supported the project and made funding available for the purchase of the keepsake boxes. What began as an in-class project took on a much greater sense of community.

Reflection

This project was initially conceived for students in an advanced drawing class. Learning that a Drawing 1 class for beginners was scheduled when the Saratoga children could be on campus caused strong apprehension. When appraised of the situation, Pantaleo responded with great equanimity. Drawing on her understanding of service-learning’s power as a pedagogical tool, she expressed confidence that the beginning drawing students would succeed in their work. Therefore, despite misgivings on the part of the instructor, the project proceeded. Pantaleo’s confidence was fully justified: The Drawing 1 students rose to the occasion and produced beautiful work.

To be truly successful, a service-learning project must benefit the college student as well as the community-based organization. In the case of a studio art course, judging the success of a project relies on qualitative and occasionally subjective factors. Even if one could be absolutely sure of impartiality in assessing the finished work, the levels of drawing ability in a class can vary greatly from semester to semester, and it would be difficult to credit the service-learning project alone for an especially good outcome, despite the evidence of nine beautifully adorned keepsake boxes. However, some proof of the success of this project came unexpectedly one day around the seventh week of the semester when the class suddenly became intently quiet. It was clear that the students were carefully following the lesson and working with an unprecedented level of focus and intensity. Attributing this to the portrait project was difficult because the project was still weeks away. It just seemed unusual. Only weeks later, when the Saratoga students came to pose, was this same level of concentration apparent again. It was becoming clear that the students were highly motivated to learn because they were determined to create portraits that would please the Saratoga students.
Two distinct sets of memories of the students in that drawing class remain, one from before the service-learning project began and one from after. There were several students who had been doing relatively average work before the Saratoga students arrived, seeming to blend into the background. Once the Saratoga students arrived, these students suddenly turned enthusiastic, talkative, and full of suggestions for improving the portraits or the project as a whole. Photographs taken over the course of the project demonstrated that the class’s demeanor as a whole changed too. Although the Queensborough drawing students had been polite and pleasant, it was not until the Saratoga students walked in that they smiled beaming smiles.

Service-learning projects must also be judged on how well they meet the general education objectives of an institution. In this regard, the project met the following five (of 10) educational objectives established by Queensborough Community College:

- “Communicate effectively through reading, writing, listening and speaking.” QCC students demonstrated this skill when they interviewed the Saratoga students to discover the interests and preferences that they would incorporate into the design of the portraits.

- “Use information management and technology skills effectively for academic and lifelong learning.” Technology skills (use of Photoshop and Illustrator) were crucial for completing the design aspect of the project.

- “Integrate knowledge and skills in their program of study.” The project allowed the Queensborough students, accustomed only to drawing portraits of other young adults, to integrate knowledge and skills as they figured out where their young model fit in the range between child and adult proportions.

- “Work collaboratively in diverse groups directed at accomplishing learning objectives.” Students met this objective as the class worked in teams to produce their final portraits. In some cases, the students on each team worked independently from the same model while, in other cases, they took a truly collaborative approach. Both options required teamwork at various stages, including conversing with the Saratoga students and sharing of ideas regarding which design components would best suit a particular Saratoga student model.

- “Apply aesthetic and intellectual criteria in the evaluation or creation of works in the humanities or the arts.” Applying aesthetic criteria is essential to the process of drawing. The students also applied this criteria when they combined the drawing with the personalized design elements (Queensborough Objectives).

Most students expressed some worry or doubt about their ability to draw a portrait successfully. This apprehension was key to the project’s success because it made the students eager to learn as much as possible about portraiture before the Saratoga students came. By the sixth week of the semester, the students demonstrated a new level of comfort with and confidence in their level of skill. In the end, all of the Queensborough students were satisfied, if not pleased, with their final versions of the portraits. In an anonymous reflection essay written at the end of the project, one student wrote, “I believe that the project was a great success because the picture looks amazing in the box.” Another noted, “This class brought out artistic talent that I did not know I had.” Nearly all of the drawing students found the project to be rewarding and expressed a strong desire to work with another community-based organization in the future. When asked to comment on the project in an anonymous reflection essay, one student wrote, “I enjoyed creating a picture for a younger person because [young people] are usually not recognized as being special or important, but having their portrait drawn may make them feel that way.”

Another student echoed this sentiment, writing that she felt very pleased to help the children “feel as important as they are by having them pose for their portrait.” A third student stated emphatically, “If I had the chance, I would love doing this again. Working with community-based programs is always welcomed in my book.”

**View from Saratoga**

A longitudinal study to measure the lasting effect on the Saratoga students’ educational outcomes with regard to high school completion or higher education would undoubtedly be the best way to gauge the success of this project. Writing shortly after the project’s conclusion, Williams observed that the project was “such a benefit” to her students and that she believed there might well be a “residual impact that might not be seen for years to come” (Williams E-Mail, Feb. 2011).

Williams very quickly began noticing positive changes in the children who had taken part in the project. “In the short term, I have noticed that the children have opened up a bit more,” she says, “and the project helped them to not only bond with each other and the students who sketched them, but with the staff here as well.” Williams also noted that her program more fully “embraced the notion...
of the power of giving and actively began to seek service opportunities.” (Williams, interview). For example, when approached by AmeriCorps students who wanted to engage in service for the Saratoga students, Williams suggested, instead, that they engage in a community service project with the Saratoga students (Williams, interview).

In a recent e-mail, Williams described how this shift led to a joint project for Martin Luther King Jr. Day to benefit the residents of a local senior living facility. At first the students in her program decorated gift bags that were delivered to the seniors. A few months later, the Saratoga students decided to actually visit the seniors to do a craft project together. As Williams wrote:

The children enjoyed themselves so much and bonded so well with the seniors that they then returned the following week to teach ‘line dancing’ and make ‘low-fat snickerdoodles.’ To see students who in some cases were disruptive or angry now showing compassion to an elderly individual—perhaps they represent the grandparents that they don’t have regular access to—was something to see. To see one of our shy students chatting with one of the seniors with a smile was proof of the power of giving to someone else. I say all this to say that what began with what seemed on the surface to be a simple art project took on several arms and legs, the effects of which are still having a ripple effect (Williams, e-mail July).

Williams clearly saw a connection between empowerment generated through the project and her students’ subsequent desire to visit the senior living facility. If this was so, it was the result of a process that gained momentum over the course of the project. This project began with the goal of depicting the Saratoga students and with a simple desire to ensure that the means of implementing the project did not contradict that idea. By the end, it became clear that the means of implementing the project had a power of its own. Including the Saratoga students as valued and active participants brought to light the empowering realization that, regardless of one’s circumstances, “everyone has something to give” (Williams, interview).

It is understandable that children who endure the hardships of poverty, whose needs go continually unmet, could come to the conclusion that they must not matter very much. This mistaken conclusion might be one of the most dangerous consequences of poverty, leading to choices that can ruin a life in a matter of seconds. The ultimate goal of this project was to prove to the Saratoga students that they do matter. Evidence of this emerged in the moment that each Saratoga student sat down to pose, becoming the focus of attention. By embellishing the portraits with images that were personally meaningful to their subjects, students clearly demonstrated that each Saratoga student was unique with interests and abilities to be appreciated and nurtured. By filling these keepsake boxes with words of encouragement, the Queensborough students further offered the Saratoga students some comfort for the present and some much needed hope for the future. And as active participants in the project, the Saratoga students learned that they had much to contribute. The ultimate goal in giving the Saratoga students their keepsake portraits was to express, in a visible and tangible way, the idea that every life matters and deserves to be envisioned, planned and pursued as a unique work of art.

Works Cited


Anderson, Donna. Telephone Interview. 5 July 2011.


Williams, Tinnycua. Telephone interview. 6 July 2011.

Utilizing Service-Learning in the Analytical Chemistry Laboratory: Soil and Water Analysis in Rochester, New York

BY KIMBERLY D. CHICHESTER, IRENE KIMARU, LYNN DONAHUE, MARYANN A. B. HERMAN
ST. JOHN FISHER COLLEGE
JULY 13, 2011
Abstract

For an analytical chemistry course at St. John Fisher College, instructors designed a service-learning project on soil and water analysis to achieve the following two goals: 1) to introduce analytical chemistry students to soil- and water-testing methods by working in collaboration with surrounding neighborhood residents and government agencies and 2) to prepare written reports of the results for the designated community partners. Service-learning students conducted soil testing for lead on homes and perspective community garden sites around Rochester, NY with plans to establish planting methods to revitalize polluted soil. Four different communities contributed soil samples. The entire project was performed in connection with Lynn Donahue, St. John Fisher College's service-learning director. To analyze the lead in the soil, EPA method 3050b, including acid digestion, was utilized, followed by Flame Atomic Absorption Spectrometry (FAAS). Results showed many of the home sites contained levels of lead far above the accepted EPA guidelines of 400 ppm for areas and 1,200 ppm for non-play areas. To further assist homeowners, students provided written reports detailing the results of the four sites tested on their property and provided suggestions of ways to rid the soil of lead and protect residents from lead-containing soil. The students also conducted water testing on both Buckland Creek (before and after rain events) and the Genesee River in coordination with the Department of Environmental Services, Division of Pure Waters. Testing included pH, dissolved oxygen levels, buffering capacity, sulfide, carbon dioxide, chloride, alkalinity, water hardness, chemical oxygen demand, phosphorus, nitrates, zinc, lead and copper. Experimental methods involved the comparison of up to three techniques per analyte, utilizing titration methods, commercial kits, electrode probes, and spectrophotometric instrumentation.

Key words
Lead, Soils, Water Pollution, Chemistry, Phytoremediation

More than 12 million children are at risk of getting lead poisoning.

Chronic exposure to lead by children can lead to learning disabilities.

Scholastic Rationale

A challenge that professors undertake every day is how to spark the interest of students both in the classroom and in the laboratory. Evidence clearly suggests that the students at St. John Fisher College were interested in environmental analysis through community-based service-learning. The projects presented served both of these interests and merged them into a rewarding experience that helped the community and created a partnership between St. John Fisher and local community agencies. Additionally, students benefited from conducting environmental sampling and testing firsthand and from writing reports of the tests results for local residents. Students also felt a personal connection with the project because they live and swim in the area and use water from these sources.

Scientific Rationale

Soil Analysis
Lead poisoning is a serious health issue caused by exposure to excess amounts of lead-containing products including lead paint, lead residue from plumbing supplies, factory pollution, and leaded gasoline. The U.S. government has prohibited the use of both leaded paint and gasoline; however residues from their use are still prevalent in the soil surrounding houses and near roads. [1]

Soil’s role is often overshadowed by that of lead-based paint as a pathway of lead ingestion. Despite conclusive evidence found by national agencies, many do not regard soil as a major source of lead ingestion. Soil is, however, a significant source because it not only contains lead paint particles, but because it also contains particles from leaded gasoline and industrial emissions. As stated by Mielke, et al, “experiments on lead in soil and paint show that two to six times as much lead can be biologically extracted from soil as from paint” [2]. The Centers for Disease Control and Prevention (CDC) and the U.S. Environmental Protection Agency (EPA) have classified lead-contaminated soil as a health hazard and have implemented strict testing and accepted level policies. Health concerns are reached when lead levels exceed 400 ppm for play areas and 1,200 ppm for all other locations [3]. Lead is found naturally in soil, but well below hazardous levels. The concentration of lead in soil naturally is around 17 ppm, and does not become a serious concern until it reaches the 400 ppm level for highly used areas [4].

Inner cities report many more cases of lead poisoning compared with rural and suburban areas. Several reasons account for this. First, cities are traffic-dense areas, and therefore have higher levels of gasoline emissions in the air and ground. Studies have found a direct correlation between city size and the concentration of lead in the soil [2]. Second, most inner city homes were built during the early part of the twentieth century when leaded
paint was used of the inside and outside a high proportion of buildings. Third, residents of poorer neighborhoods often do not have the means to eradicate the lead paint or to clean up the flaked-off paint. Thus, the children in these areas are at greater risk of exposure.

Young children are often the most prone to developing lead poisoning because they tend to put things in their mouths and because they absorb metals more quickly into their bodies than adults do. Children under 5 years of age can absorb half of the consumed lead into their bodies [2]. Lead poisoning is a preventable condition, yet it affects a substantial portion of the children living in the Rochester, New York area and across the country. According to Meilke, et al, “10 million metric tons of lead residues resulting from gasoline and paint use” are emitted into the environment [2]. It is estimated that more than 12 million children are at risk of getting lead poisoning based on their exposure to lead in the environment [2].

Chronic exposure to lead by children can lead to learning disabilities, behavioral problems, and neurological and growth disorders. Children with elevated levels of lead in their blood have been reported to score much lower on IQ and standardized tests. It has been suggested that children in inner city or poorer neighborhoods suffer from increased exposure to lead, which could contribute to lower test scoring and increased episodes of disruptive behavior. This suggests that lead poisoning is not only a scientific and medical issue, but also a social one. Adults do not develop lead poisoning at the same rate as children do; however, they can develop conditions such as sterility, miscarriage or stillbirth, elevated blood pressure, problems with the kidneys and gastrointestinal tract, and nervous system disorders when exposed to high levels of lead [5].

Water Analysis
The Monroe County Department of Environmental Services: Division of Pure Waters conducts water testing to assess the level of contamination in and around Buckland Creek and the Genesee River. The division’s goal is to reduce levels of pollution in Irondequoit Bay, the Genesee River, areas of Lake Ontario, and other waters of Monroe County to safe and healthful levels. The division is interested in examining the impact of human activity on water quality in Buckland Creek and in the sewer system where the creek discharges into the Genesee River, to better educate residents about ways to avoid discharging pollutants such as cleaning supplies into the ground or the water system. With the help of St. John Fisher College students, the division collected data to assess the baseline levels of phosphorus, chlorides, nitrates, total suspended solids, phosphorus, zinc, lead, and copper. Knowledge of baseline levels of analytes is necessary for routine monitoring and for assessing the effects of urbanization.

Contamination from industrial waste and from the construction of new industrial and residential areas have greatly affected the waters in Rochester. Therefore, both the health of the aquatic ecosystems in the creek and river and the safety of water usage are assessed. Each type of analyte assessed has a different effect on the environment, and thus, has been assigned a specific regulatory limits based upon its toxicity. Nitrates, for example, have a limit of 10 ppm in New York State because of their negative effects on human respiration and the circulatory system. Phosphorus is only now being regulated because high levels can lead to kidney damage, stomach irritation, and impacts on the circulatory system. Heavy metal contamination can lead to intestinal issues and brain damage within the human body, and can disrupt soil ecosystems.

The Monroe County Department of Environmental Services handles the remediation of water pollution, and the students’ reports provide the department with valuable data that helps the staff identify water quality impairments in Buckland Creek and in the Genesee River and determine the implications for these waterways.

The results further help the department to educate the public on the quality of their water and to provide information on how the pollution could affect residents’ health.

Approach

Soil Analysis
Students in the analytical chemistry classes for both the 2008–2009 and 2009–2010 (Figure 1) academic years participated in the soil-testing project. In particular, the students gathered and tested soil samples for the Clara Barton, Highland Park, South Wedge and Beechwood neighborhoods in Rochester. The students collected only the top half-inch of bare or exposed soil because lead does not travel any further into the ground. Sample locations at traditional home sites included a spot close to the road, one close to the front of the house, one close to the house, and one last location in the far part of the backyard. Students also tested designated garden or playground areas and took samples next to painted garages. Students collected each sample using a plastic shovel, which they cleaned with soap and water prior to each use and stored in a plastic bag to avoid cross contamination. Collected soil samples were subjected to lead extraction procedures using acid digestion (EPA method 3050b) and analyzed using Flame Atomic Absorption Spectroscopy (FAAS). FAAS is the established and preferred method for the
Utilizing Service-Learning in the Analytical Chemistry Laboratory: Soil and Water Analysis in Rochester, New York

Detection of metals in environmental samples with detection limits well below the reported values for normal soil lead concentration. Certain plants, hyper accumulators, have been found to be effective in removing polluting metals from contaminated soil. The process, called phytoremediation, has been researched as a cost efficient and effective way to remove metals from contaminated soil [6]. This project also aimed to determine which plants are most effective at phytoremediation when lead is the contaminating metal, and to provide homeowners with a green and eye-catching alternative to soil removal. Once the levels of lead were determined, the project team gave the contaminated soil to researchers in the Biology Department to determine what plants would be effective in removing lead from the soil and which vegetables might be safe to eat from gardens containing lead. The non-contaminated soil was used as a control to mimic the soil conditions of Rochester-area homes.

**Water Analysis**

Water analysis involved students sampling Buckland Creek before and after rain events and sampling the Genesee River on a single occasion. Four sites were chosen for each waterway. Grab water samples were collected by lowering a plastic container into the creek and, for the river, over the side of bridges. The samples were stored in a cooler for transport to the laboratory, preserved and stored following EPA-recommended methods for waters and wastewater samples. Buckland Creek was analyzed for pH, dissolved oxygen levels, buffering capacity, sulfide, carbon dioxide, chloride, alkalinity, water hardness, nitrates, phosphorus, ammonia, and several heavy metals (zinc, lead, and copper) to determine the effect on the health of the creek around areas of industrial growth. The students used titrations, ion selective electrodes, ultraviolet-visible spectroscopy, FAAS, and commercial kits, which were an extension of the current course curriculum. The Genesee River was tested for phosphorus, nitrates, alkalinity, chemical oxygen demand and chlorides. As with the soil analysis, students prepared a written report of their findings and suggestions, and presented it to the Department of Environmental Services.

**Assessment**

To assess service-learning outcomes for both projects, students completed two sets of course evaluations. One was a general course evaluation. The other was an assessment of the service-learning project, which included a written reflection in the form of a report. It included guiding questions that pushed students to analyze the source and effects of each analyte, the meaning of the results relative to state or federal limits, and the merits of real-world analysis versus traditional lab experiments.

**Scientific Outcomes**

**Soil Analysis**

The soil analyses completed by the analytical chemistry classes in the 2008–2009 and 2009–2010 academic years are reported in Tables 1 and 2.

**Table 1: Lead Concentration Values for Neighborhood Samples**

<table>
<thead>
<tr>
<th>Location</th>
<th>Front-near Lead conc. (ppm)</th>
<th>Front - far Lead conc. (ppm)</th>
<th>Back - near Lead conc. (ppm)</th>
<th>Back - far Lead conc. (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clara Barton 1a</strong></td>
<td>8,260</td>
<td>625</td>
<td>2,163</td>
<td>1,688</td>
</tr>
<tr>
<td><strong>Clara Barton 4b</strong></td>
<td>4,232</td>
<td>843</td>
<td>762</td>
<td>913</td>
</tr>
<tr>
<td><strong>Clara Barton 5b</strong></td>
<td>4,449</td>
<td>546</td>
<td>1,334</td>
<td>1,055</td>
</tr>
<tr>
<td><strong>Clara Barton 7b</strong></td>
<td>634</td>
<td>418</td>
<td>1,908</td>
<td>615</td>
</tr>
<tr>
<td><strong>Highland Park 1a</strong></td>
<td>7,563</td>
<td>221</td>
<td>2,457</td>
<td>1,774</td>
</tr>
<tr>
<td><strong>Highland Park 1b</strong></td>
<td>8,486</td>
<td>404</td>
<td>2,928</td>
<td>2,725</td>
</tr>
<tr>
<td><strong>Highland Park 2b</strong></td>
<td>764</td>
<td>226</td>
<td>18,854*</td>
<td>Not detected</td>
</tr>
<tr>
<td><strong>Highland Park 3b</strong></td>
<td>3,788</td>
<td>1,072</td>
<td>1,418</td>
<td>3,918</td>
</tr>
<tr>
<td><strong>Highland Park 6 b</strong></td>
<td>2,200</td>
<td>150</td>
<td>4,820</td>
<td>410</td>
</tr>
</tbody>
</table>

*a* - beaker set-up  
**b** - round-bottom set-up  
* - averaged value

The majority of the values in Table 1 are above the EPA standard for play areas, 400 ppm, and almost half are above the EPA standard for non-play areas of the yard, 1,200 ppm. In some cases, samples with high lead levels were retested for accuracy in an attempt to avoid unnecessarily scaring homeowners. The values also show a trend indicating that in each section of the yard, both the front and the back, there is a higher concentration of lead closer to the house. Because the houses are not located on a road with heavy traffic, paint on the exterior of the house may be a contributing factor for soil contamination. The majority of values also show a trend towards higher concentrations near the front of the house. This may be because homeowners are more likely to paint the fronts of houses. If lead-based paint is used, when the layers deteriorate and flake off, this may cause more contamination in the soil in the front of the house.

The values in Table 2 support the trend...
that the majority of the soil tested contained a concentration of lead higher than the EPA standard of 400 ppm for play areas. However, there was a lower percentage of samples above the EPA standard for non-play areas, 1,200 ppm. Table 2 also presents information on five gardens at different homes. Of the five gardens, three were above the EPA standard for play areas and one was above the EPA standard for non-play areas. This result led students to worry about the safety of the food homeowners were ingesting. The planned phytoremediation study will aid homeowners in determining which types of plants grown in leaded soil are safe to eat and which are a health risk. It will also provide information on plants that can remove lead from the contaminated soil.

The students wrote reports in the fall and spring of 2009 and the spring of 2010, which Lynn Donahue forwarded to the homeowners. Students reported the results of all soil samples to homeowners in the form of a formal report and a letter with suggestions of ways to revitalize their soil. Homeowners who contacted the service-learning department were pleased with both the testing results and the professionalism of the students’ letters and suggestions. One neighborhood took their results very seriously and treated their contaminated soil, understanding that their soil would be retested afterward. Analysis of the cleaned soil demonstrated the success of their cleaning methods.

**Water Analysis**

The 2009–2010 and 2010–2011 analytical chemistry classes completed water analysis. The classes analyzed four sites along Buckland Creek during both years; the 2010–2011 classes analyzed four sites along the Genesee River. Results from Buckland Creek studies include a single day examination (Table 3) and results before and after three rain events in the fall of 2009 and 2010 (Table 4 and 5). Genesee River results are shown in Table 6.

The majority of the tested parameters were below the standard limits set by the EPA. Nitrates and phosphorus are the only two nutrients that were found to be slightly higher than expected for Buckland Creek. This is likely because this creek runs through a highly developed residential area and thus the quality of its water is directly related to human activities such as treatment of lawns and gardens with fertilizers.

All results were reported to the Department of Environmental Services: Division of Pure Waters to add to previously collected data. The class compiled a report of the health effects of all analytes to aid their understanding of the benefits of water quality assessment. The information is continually distributed to the homeowners in the affected communities along with periodic compilations of data.
Conclusion

Student Outcomes
Students provided feedback through course evaluations, class discussions, and service-learning evaluations. In all cases, students reported that the service-learning project was their favorite activity of the year. Many students noted the benefits of learning to deal with real-world sampling and learning how to communicate with local residents. Four of the students who worked on the project as independent researchers are currently in graduate or professional schools, and they have remarked that the time they spent in the lab was a great way to prepare for the rigor of independent research. Class results have been reported at several conferences by both Drs. Kimaru and Chichester and several student presenters.

Positive comments from the students about the value of the soil project prompted the instructor to expand the focus on water analysis within the curriculum. Learning to use chemistry outside of the classroom to benefit the students’ community was the driving force behind the project. Upon first meeting with Andrew Sansone and Erin McGee from the Department of Environmental Services, the students commented that they had no idea such jobs existed for students educated in chemistry techniques. Thus, the experience provided critical information to the community, taught the students chemistry techniques, and exposed them to job options. In their final report, the students commented that the project presented them with research experience and opportunities to develop problem-solving and teamwork skills, and to relate course work with real-world issues, explore career options, and help the community. The only negative aspect of the project was its weather dependent nature, which meant students had to wait for rain events and these did not always fit into students’ schedules.

Community Partner Outcomes
Lynn Donahue coordinated the soil project and was the liaison with homeowners, who handled the news of the results in a variety of ways. Some used the information as the basis to clean or treat their soil, which was then retested. These homeowners were quite happy with the improved results. Results of the current and proposed community garden sites tested (data not shown) showed no levels of detectable lead, meaning they were safe areas for residents to grow their food. On one sampling trip, many more samples were collected than there were students to analyze them, which led to some homeowners to wait several months for results. This delay in obtaining results was the only area of concern for the project from the homeowners.

Sansone and McGee of the Department of Environmental Services: Division of Pure Waters were highly impressed with the students’ level of engagement as well as with the professionalism of the students and their reports. Buckland Creek had not been previously sampled, and the data the students reported provided a quick overview of the quality of the water. Sansone and McGee were also pleased to be able to expand their message of water quality and stream stewardship to a new audience. The partnership is continuing because of the high interest of both parties and because a longer study is needed to form conclusions on how best to deal with the results.

Faculty Outcomes
The projects have been successful in the classroom and have facilitated successful independent research. The soil project has

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>NO₃ (ppm)</th>
<th>NH₃ (ppm)</th>
<th>P (ppm)</th>
<th>Cu (ppm)</th>
<th>Zn (ppm)</th>
<th>Pb (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/23/09</td>
<td>Chelmsford</td>
<td>3.6</td>
<td>0.32</td>
<td>-</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td></td>
<td>Winton</td>
<td>6.5</td>
<td>0.26</td>
<td>-</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td></td>
<td>Lac de Ville</td>
<td>6.5</td>
<td>0.41</td>
<td>-</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td></td>
<td>Elmwood</td>
<td>4.8</td>
<td>0.75</td>
<td>-</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>10/2/09</td>
<td>Chelmsford</td>
<td>8.3</td>
<td>1.8</td>
<td>0.15</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td></td>
<td>Winton</td>
<td>11.6</td>
<td>1.2</td>
<td>0.13</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td></td>
<td>Lac de Ville</td>
<td>10.2</td>
<td>0.51</td>
<td>0.08</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td></td>
<td>Elmwood</td>
<td>7.3</td>
<td>0.85</td>
<td>0.12</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>10/28/09</td>
<td>Chelmsford</td>
<td>7.6</td>
<td>0.57</td>
<td>-</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td></td>
<td>Winton</td>
<td>7.8</td>
<td>0.62</td>
<td>-</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td></td>
<td>Lac de Ville</td>
<td>9.7</td>
<td>0.33</td>
<td>-</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td></td>
<td>Elmwood</td>
<td>15</td>
<td>0.49</td>
<td>-</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>11/2/09</td>
<td>Chelmsford</td>
<td>5.2</td>
<td>0.21</td>
<td>0.06</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td></td>
<td>Winton</td>
<td>8.3</td>
<td>0.14</td>
<td>0.05</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td></td>
<td>Lac de Ville</td>
<td>12.0</td>
<td>0.24</td>
<td>0.02</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td></td>
<td>Elmwood</td>
<td>10.1</td>
<td>0.36</td>
<td>0.04</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
</tbody>
</table>

ND = not detected; - = no analysis was conducted

One neighborhood treated their contaminated soil.
Utilizing Service-Learning in the Analytical Chemistry Laboratory: Soil and Water Analysis in Rochester, New York

been the subject of three newspaper articles including a write-up in the Democrat and Chronicle, Rochester’s leading paper, and has been presented at several conferences on and off campus. Student interest has also grown with the addition of new senior level chemistry and biology majors working on the project. The analytical chemistry classes will also continue to work on the projects as part of a service-learning laboratory activity that has been well received by students the past two years. The water analysis service-learning laboratory activity was added to the curriculum because of the positive feedback from the lead soil project. Further service-learning projects will be developed due to the interest and success. The biggest area of concern for the projects is the extensive number of samples collected; there is not always ample time and resources to complete all of the analyses. Scientific research requires analyzing a sample more than once, and in some cases students are getting only one opportunity to analyze a sample, which is less than ideal. In the future, either fewer samples should be taken or more independent researchers will be required to duplicate results. On a more collegiate plane, the project has allowed four members of the Fisher academic community (Irene Kimaru, Maryann Hermann, Lynn Donahue and Kimberly Chichester) to collaborate on a long-term project.

<table>
<thead>
<tr>
<th>Location</th>
<th>NO3 (ppm)</th>
<th>NH3 (ppm)</th>
<th>P (ppm)</th>
<th>Cu (ppm)</th>
<th>Zn (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chelmsford</td>
<td>7.44</td>
<td>3.437</td>
<td>0.0148</td>
<td>ND</td>
<td>0.00143</td>
</tr>
<tr>
<td>Winton</td>
<td>6.35</td>
<td>3.115</td>
<td>0.01286</td>
<td>ND</td>
<td>0.01933</td>
</tr>
<tr>
<td>Lac de Ville</td>
<td>12.4</td>
<td>3.544</td>
<td>0.01297</td>
<td>ND</td>
<td>0.01613</td>
</tr>
<tr>
<td>Elmwood</td>
<td>1.94</td>
<td>2.954</td>
<td>0.01391</td>
<td>ND</td>
<td>0.00393</td>
</tr>
<tr>
<td>Chelmsford</td>
<td>-</td>
<td>8.287</td>
<td>0.0157</td>
<td>ND</td>
<td>0</td>
</tr>
<tr>
<td>Winton</td>
<td>-</td>
<td>7.5</td>
<td>0.01402</td>
<td>ND</td>
<td>0.002</td>
</tr>
<tr>
<td>Lac de Ville</td>
<td>-</td>
<td>6.342</td>
<td>0.01601</td>
<td>ND</td>
<td>0.00177</td>
</tr>
<tr>
<td>Elmwood</td>
<td>-</td>
<td>7.1296</td>
<td>0.01591</td>
<td>ND</td>
<td>0.00097</td>
</tr>
<tr>
<td>Chelmsford</td>
<td>10.33</td>
<td>1.351</td>
<td>0.01412</td>
<td>ND</td>
<td>0.0001</td>
</tr>
<tr>
<td>Winton</td>
<td>14.15</td>
<td>1.436</td>
<td>0.02745</td>
<td>ND</td>
<td>0.002633</td>
</tr>
<tr>
<td>Lac de Ville</td>
<td>4.11</td>
<td>1.978</td>
<td>-</td>
<td>ND</td>
<td>0.0022</td>
</tr>
<tr>
<td>Elmwood</td>
<td>3.84</td>
<td>0.978</td>
<td>-</td>
<td>ND</td>
<td>0.0054</td>
</tr>
</tbody>
</table>

ND = not detected; - = no analysis was conducted

Table 5: Ongoing Buckland Creek Analysis

<table>
<thead>
<tr>
<th>Location</th>
<th>nitrates (ppm)</th>
<th>Alkalinity (ppm)</th>
<th>Titration methods</th>
<th>chemical oxygen demand (mg O2/L)</th>
<th>Total Phosphorus (ppm)</th>
<th>Dissolved Phosphorus (ppm)</th>
<th>Chlorides (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jefferson</td>
<td>0.50</td>
<td>126.856</td>
<td>109</td>
<td>-</td>
<td>35.02</td>
<td>0.0450</td>
<td>129 ± 140</td>
</tr>
<tr>
<td>Road</td>
<td>± 1.143</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.512</td>
<td>-</td>
</tr>
<tr>
<td>Main Street</td>
<td>0.35</td>
<td>129.7 ± 1.2</td>
<td>132.6</td>
<td>115</td>
<td>27.2</td>
<td>0.0381</td>
<td>36.7 ± 0.1</td>
</tr>
<tr>
<td>University</td>
<td>2.90</td>
<td>123.8 ± 6.7</td>
<td>-</td>
<td>-</td>
<td>53.14</td>
<td>0.0377</td>
<td>40.8 ± 0.1</td>
</tr>
<tr>
<td>Port of Charlotte</td>
<td>1.73</td>
<td>175</td>
<td>149</td>
<td>-</td>
<td>56.90</td>
<td>0.0757</td>
<td>52.8 ± 0.1</td>
</tr>
</tbody>
</table>

I = indicator titration; P = potentiometric titration; K = commercially available kit; M = Mohr titration; E = ion selective electrode; T = titration

Students reported that the service-learning project was their favorite activity of the year.
References


Turning Students on with High-Impact Strategies

BY ARLENE KEMMERER, JOSEPHINE A. PANTALEO, ROSANNE VOGEL
QUEENSBOROUGH COMMUNITY COLLEGE
OF THE CITY UNIVERSITY OF NEW YORK

JULY 12, 2011
Abstract

High-impact learning experiences have been shown to benefit student engagement and success, and these effects appear to be most striking for students who require remediation, who come from low-income families, and who are members of underserved populations (Kuh 2008). The authors, two faculty members and the director of service-learning at a large urban community college, address the benefits of incorporating multiple innovative high-impact strategies into developmental students’ coursework. For this project, remedial students in a learning community participated in service-learning activities designed to transfer classroom theory to authentic community tasks. In addition to meeting the course objectives, the activities also aligned with general education objectives and provided the students with workplace readiness skills. The application of another of the college’s high-impact strategies—ePortfolios—enabled students to record their reflections over a sustained time period. This documentation of learning before, during, and after the service-learning project not only enhances the learning, but also provides an avenue for faculty insights into the student learning process. The project also demonstrates the importance of building and maintaining reciprocal partnerships, an integral component for successful service-learning projects.

Introduction

In the fall of 2009, Queensborough Community College (QCC) of the City University of New York (CUNY) inaugurated its Freshman Academy model as a response to its mission of ensuring success as well as access to its students. In addition to providing a rich support system for students, Freshman Academies incorporate the use of high-impact strategies. At QCC, service-learning, learning communities, writing intensive courses, ePortfolios, and cornerstone courses have been identified as high-impact strategies, and the Freshman Academy model recommends that all first-time, full-time students participate in at least two of these strategies within their first 30 credits. Research indicates that the strategies benefit both students’ engagement and their achievement of success, and these effects are most striking for students who require remediation, who come from low-income families, and who are members of underserved populations (Kuh 2008). A literature review confirms that effective developmental education programs include the use of such highly effective pedagogical techniques (Boroch 2007). The results of QCC’s experience with Freshman Academies support this premise.

QCC values collaboration and collegiality; it also values and supports partnerships. Queensborough administrators often provide “meet and greet” venues that foster conversations across disciplines and campus departments, and both across and within its local community. Two professors, one from the Department of Basic Educational Skills and the other from the Department of Speech Communication and Theatre Arts, met at such a campus conversation. Both exhibited interest in service-learning pedagogy; both were assigned Freshman Academy students, and both expressed interest in meeting their course objectives thematically. After extended discussion, they agreed to explore the possibility of forming a learning community that would incorporate a common service-learning activity, the first of many reciprocal partnerships that made this project successful.

Background

The faculty members requested a learning community comprised of developmental students enrolled in a non-credit-bearing reading course (BE122) and a credit-bearing speech communication course (SP211). The college administration enthusiastically approved. (At Queensborough, the term learning community identifies a cohort of no more than 25 students who take two or more courses together.) Participation in learning communities is known to enhance the quality of learning. According to Tinto’s studies, students in learning communities perceive themselves as having made significantly greater intellectual gains over the course of a semester than do similar students in comparison classes; they seem to learn more and see themselves as more engaged academically and socially than comparable students following a traditional curriculum, and they persist at a substantially higher rate.

QCC’s Office of Service-Learning fosters Real, Reciprocal, and Reflective as its service-learning mantra (Pantaleo 2010). Located in Queens, one of the most diverse counties in the United States, QCC’s students reflect this diversity. Both professors believed that an environmental or health issue would best engage their students, and determined that some focus on healthy lifestyles would provide an opportunity for this “real, reciprocal, and reflective” experience.

Participation in learning communities is known to enhance the quality of learning.
The faculty approached the QCC Office of Service-Learning for assistance in finding a community-based organization whose needs matched their interest. The office had been in conversation with a local public K–5 school interested in forming a partnership with a higher educational institution, believing that such a partnership would supplement its educational offerings to its students and parents. Initial conversations between the school and the Office of Service-Learning had been initiated, and with a reciprocal relationship forming, QCC's Office of Service-Learning matched the professors with the elementary school administrators. The elementary school cited its vision for nutritional enrichment activities during the children’s lunch periods, while the QCC faculty shared their goals of having their students discover the transfer of knowledge from one discipline to another and of seeing the relevance of their courses to the real world. From these goals, a project entitled “Read and Speak Up about Healthy Living” began to take shape.

Approach

Although the two professors developed two discrete syllabi, both syllabi contained a common service-learning project. The American Association of Community Colleges (AACC) defines service-learning as the combination of classroom instruction with community service, focusing on critical, reflective thinking as well as on personal and civic responsibility. Service-learning programs involve students in activities that address local, community-identified needs while developing their academic skills and commitment to their community (Gottlieb and Robinson 2006).

The project was planned, developed, and implemented with input from the QCC students, the elementary school personnel, and the faculty. The QCC Office of Service-Learning assisted the professors with the logistics: arranging dates, permissions, supplies, and the other sundry items that arise in implementing such a learning activity. Consistent and frequent phone conversations provided project updates and progress, confirmed attendance, and encouraged suggestions that nurtured a respectful and reciprocal partnership between QCC and the elementary school.

The service-learning activities were woven seamlessly within the two classes, and the developmental students gained a multi-layered learning experience. In order for the students to have accurate and current information, they attended Information Literacy lessons that the QCC library offered. Through this, the QCC students learned how to search the various library databases, how to obtain reliable sources, and how to evaluate Internet sources. While in the reading class, the BE122 students read and analyzed newspaper articles about healthy living; this information became the springboard for small group decision-making discussions in the SP211 class. While in the speech class, the students practiced and performed oral interpretation of literature from reading children’s nutrition books. The students also performed 60-second “commercials” for healthy snacks using the Monroe’s Motivated Sequence method of persuasion learned in the speech communication course. One commercial featured some students making poor choices in the school cafeteria while other classmates encouraged them to try an orange instead of chips. Of course, once the actors tried the fruit, they liked it! The elementary children especially liked these engaging commercials, which used humor to encourage healthy eating habits.

The students in this service-learning community used ePortfolios to record their reflections before, during, and after the service-learning project, thus enhancing the learning and providing faculty with insight into the student learning process. “EPortfolios are a high-impact practice; they encourage deep learning and knowledge transfer by fostering the student’s ability to make connections between his or her learning experiences in a variety of classroom, workplace, and community settings” (Chen 2010). Faculty and students used the WIKI function in the ePortfolio. Faculty posted assignments on the announcement page, and all group members responded to the questions and to one another’s contributions through it. For one assignment, data researched on the obesity crisis was posted in the WIKI, and faculty asked students to respond to questions such as: “What can you conclude from the research on obesity?” and “What are some reasons for the increase in childhood obesity?” Another WIKI assignment asked students to keep a log of what they ate for three days and to compare their entries with recommended guidelines that they had identified through their research. Then students were asked to respond to questions such as: “What can you conclude about your eating habits?” and “Are there changes you can make to your diet?”

Faculty and students also used the Group's Dropbox option in ePortfolio. This option allowed faculty and students to upload and share healthy living and lifestyle articles that would serve as common reads. Through this process, the students were meeting their reading course objectives by locating the main idea and supporting details of articles and/or by writing summaries of articles. In addition to meeting the course objectives, the students were developing their information literacy, media, and digital literacy skills.
Students created an additional WIKI where they entered their reflections at three points of the service-learning project: before, during, and after the service-learning activity. The student reflections clearly identified what the students’ skill sets were prior to the activity: how these skills sets improved with the classroom instruction, and how they were able to apply their classroom theories to the authentic community experience.

When the two faculty members compared their observations of students in the service-learning community with those enrolled in their traditional stand-alone, non-service-learning classes, the faculty noted anecdotal differences. First, they observed that the students in the service-learning community were more cohesive as a class and interacted more often with one another: for example, they studied together and communicated with one another through email and text to prepare for their class and service-learning activities. Second, the students seemed to be more comfortable relating to their professors in person and via email than were the students in traditional classrooms, who communicated minimally with the professors. Third, the students seemed to identify more closely with the QCC community and seemed to develop a greater sense of pride in their work. They appeared conscientious and eager to do a good job because they indicated that they felt they were part of something bigger than themselves. The professors also noted that by the end of the semester, many of the QCC students began coming to class with healthy salads. This evidence suggests that the QCC students transferred the learning on healthy living into their own lifestyles.

Outcomes

Early results from an IRB-approved service-learning study on the benefits of incorporating a service-learning project to support general education objectives appear promising. For example, the professors had hoped that this learning community experience would increase the students’ collaborative skills and that the students would appreciate the richness of their diversity. Table 1 reflects that survey respondents from BE122 and SP211 did use and practice cooperative learning skills as well as gain confidence with working in a diverse group (See Table 1). This pilot study also suggests that survey respondents are transferring their classroom learning, and that it is pertinent beyond the classroom walls (see Table 2). “...This service-learning participation influenced my career/college plans because now I feel like changing my major, just maybe, or getting more involved....” Finally, this study suggests that students who participated in service-learning are more likely to report that they intend to remain at Queensborough Community College when compared with students who did not participate in service-learning.

Conclusion

This project showcases the way service-learning and other high-impact strategies can be incorporated into courses that enroll developmental students. Often, these strategies are not offered to this population of students; yet, this study demonstrates that the use of such high-impact strategies may have spurred this population to exceed their own expectations for this course and to enhance their attainment of general education objectives. The authors also hope to emphasize the importance of partnerships: faculty with faculty; faculty with students; administrators with

---

Students in the service-learning community were more cohesive as a class.
often collaborative assignments are successful because the members respect each other, work at reciprocity with each other, and take responsibility for their work and actions. These characteristics tend to increase the successful completion of projects, whether the projects are in academic, workplace, or social arenas. Service-learning is an application of classroom theory to an authentic community assignment. What better way for students to learn to be competent and useful members of society than for them to work as apprentices under the guidance of their master instructors in a service-learning experience?

References
Karalazarides, S. Achieving the Potential of Community-Campus Partnerships At Service-Learning Institute, January 2011 Queensborough Community College
Pantaleo, J. A. Service Learning 101 Workshop, August 27, 2010 Opening Remarks, Queensborough Community College
Establishing a Microbiology Honors Tract to Engage Health Science Majors in Service-Learning Activities

BY JOAN PETERSEN
QUEENSBOROUGH COMMUNITY COLLEGE
OF THE CITY UNIVERSITY OF NEW YORK

JULY 15, 2011
Abstract

A dual service-learning/honors program has been established for Microbiology students at Queensborough Community College (QCC). This program allows students enrolled in any section of this multi-section four-credit course to participate in service-learning, although all course instructors are not required to be service-learning practitioners. Qualified students are selected for activities and paired with a faculty mentor based on mutual interests and availability. Activities are designed to serve the needs of a community partner while enhancing students’ learning of their course material. Community partners include middle and high school students, the local Alley Pond Environmental Center, and fellow QCC Microbiology students. To earn the service-learning and honors credit, students must fulfill 10 hours of direct service and maintain a reflective journal documenting their experiences. Under the guidance of a faculty mentor, students also prepare review materials, design workshops about the microbial world, and generate quizzes and interactive lessons. To date, all student participants have provided positive feedback. They have stated, for example, that their participation greatly enhanced their understanding of course materials and helped them to improve their writing and oral communication skills. They also noted or demonstrated personal growth, a sense of deep satisfaction from helping others, and increased self-confidence as a result of their service-learning experience. Feedback from community partners has also been positive, and all look forward to continuing this established relationship with QCC Microbiology students. In the future, the author will seek to expand service-learning activities by including opportunities for non-honors Microbiology students to participate and by establishing connections with additional community partners.

Introduction

Service-learning is an important component of the teaching and learning process at Queensborough Community College (QCC). Since 2006, QCC service-learning projects have been incorporated into a wide array of subjects, including mathematics, basic skills, foreign language, art, health, and the sciences. To date, more than 40 faculty members and more than 2,000 students have participated in service-learning activities at QCC (Ellerton, Cuomo and Tarafdar). Service-learning is aligned with the college’s mission to: “foster opportunities for meaningful collaboration, promote social and intellectual growth, and enhance the individual’s learning experience.” QCC has identified service-learning as one of eight high-impact learning experiences intended to improve retention and graduation rates. As such, it has become an integral part of the college’s Freshman Academies, which launched in Fall 2009. Freshman Academies offer comprehensive academic guidance and other support services for all full-time students. Recently, QCC has established an online Service-Learning Resource Center that provides faculty, students, and community partners with background information, curriculum ideas, and other valuable resources. In this supportive atmosphere, a growing number of faculty members are incorporating service-learning into their classes and engaging students in meaningful activities designed to enhance their learning while serving a community need.

QCC and other colleges incorporate service-learning opportunities into science courses in many different ways. Often, the service is embedded into the course curriculum, and the entire class participates in the activity; Successful completion of the project and/or the submission of a reflective journal or other material is considered as part of the student’s grade (Larios-Sanz, Simmons and Bagnall). In other instances, QCC offers service-learning activities as a way for students to earn additional college credits or extra credit within a course, or as a way to replace a poor test grade or assignment. Honors programs, meanwhile, sometimes use service-learning to challenge students and enrich their experiences (Suchman, Deines and Hurd).

In the examples listed above, instructors typically produce their own syllabus and have the autonomy to decide how to integrate service-learning into their course curriculum. However for faculty who are interested in becoming service-learning practitioners, many challenges exist, including:

- How to handle multi-section courses that do not have service-learning embedded into the course curriculum. In such instances, all instructors often follow a common syllabus, and they are not permitted to offer extra credit or grade replacement in only one or a few section(s).
• The question of creating a separate course section for students who are interested in participating in service-learning (or earning honors credit), since it is unlikely that there would be a sufficient number of students who are interested and who meet the criteria to fill an entire course section.

• The fact that QCC students often have several external obligations, and their schedules may prohibit them from registering for a specific course section. As a community college, QCC’s student body consists entirely of commuters and largely of non-traditional students: Approximately 40% of Queensborough’s students attend part time, and about 35% have full-time employment off campus (Queensborough Community College Annual Report). Establishing a separate course section for service-learning or honors work that would meet the needs of such a diverse population of students would be extremely difficult.

To overcome these challenges, QCC’s Dr. Sharon Ellerton, an associate professor of biological sciences and geology, developed a model that offers service-learning activities within multi-section courses for Anatomy and Physiology (BI-301) students (Ellerton, Sehmi and Chintamani). In this program, students participate in service-learning projects to gain honors credit through individual contracts rather than by participating as an entire class. This dual service-learning/honors option builds upon the honors program already in place at QCC, in which students may participate in honors classes or complete an approved honors tract: Those who complete 12 honors credits receive honors recognition when they graduate. The dual service-learning/honors program for BI-301 students began in Spring 2009. As course coordinator of Microbiology, the author developed and implemented the service-learning/honors (SLH) program described in this paper in the fall of 2009. The Microbiology SLH tract builds upon Dr. Ellerton’s successful model and expands SLH offerings within the QCC Biology Department.

Pairing service-learning with honors work gives students the opportunity to earn honors credit and service-learning recognition simultaneously. Through service-learning participation, students become more involved in the learning process, take ownership of their work, and greatly improve their communication and leadership skills (Astin, Vogelgesang and Ikeda; Eyler, Giles and Braxton; Prentice and Robinson). Participating in service-learning activities also helps students meet several of QCC’s general education goals for students: to “communicate effectively through reading, writing, listening and speaking,” “integrate knowledge and skills in their program of study,” and “work collaboratively in diverse groups directed at accomplishing learning objectives.”

The Microbiology SLH program includes activities that serve other QCC Microbiology students, middle and high school students from area schools, children residing in a homeless shelter, and a local environmental center. To date, 24 students have completed this program, and all have expressed positive outcomes from the experience. Community partners also expressed overwhelmingly satisfaction with the service provided, and many partners shared their interest in continuing to work with QCC’s Microbiology SLH students. Overall, the program has succeeded in helping student participants strengthen their knowledge of Microbiology while providing valuable service to community partners.

Fulfilling the honors contract enables students to complete both service-learning and honors work without having to register for a particular course section. This model can be used for other multi-section science courses as a way for individual instructors to involve students in service-learning activities without embedding it into the course curriculum. The diversity of community partners also makes the program more accessible to students with family and work commitments.

**Project Details**

**Course Description**

BI-311 (Microbiology) is a four-credit course, that the Department of Biological Sciences and Geology at Queensborough Community College offers each semester. Approximately 250 students, primarily those majoring in nursing and other health sciences, enroll in the course. Enrolled students attend three lecture hours and three laboratory hours each week. The lecture and laboratory sections of the course are not linked: Therefore, students often do not have the same instructor for both components of the course. Lecture grades are based on examinations and comprise 60% of the course grade. The remaining 40% of the course grade is derived from the laboratory component, which includes quizzes, two practical exams, and laboratory performance. Students must pass both lecture and lab components to receive a passing grade in the course.

Students usually take Microbiology after they have completed a full year of Anatomy and Physiology or General Biology. The course involves the study of the bacteria, viruses, fungi, protozoa and helminthes, with an emphasis on infectious disease. The course also covers bacterial genetics, metabolism, immunology, antibiotics, and specific pathogenic diseases. Laboratory work focuses on microbiological techniques and procedures related to identification and control of microorganisms.
Establishing a Microbiology Honors Tract to Engage Health Science Majors in Service-Learning Activities

Requirements for the Service-Learning Honors Tract

All qualified students make take part in service-learning/honors (SLH) projects, regardless of a student’s course section. This provision ensures that any eligible student can participate in service-learning even if his or her instructor is not a service-learning practitioner. The requirements for participation are a minimum overall GPA of 3.4 and a grade of B or better in Anatomy and Physiology II or General Biology II. All students enrolled in Microbiology learn about this opportunity within the first two weeks of the semester via e-mail and flyers posted throughout the department. The course coordinator contacts all faculty teaching the class and encourages them to discuss the opportunity with their students and to consider becoming a faculty mentor. (See Tables 1 and 2 for a list of the roles of course coordinator and faculty mentors, respectively.) The coordinator also sets up an information session so interested students can find out more about the opportunities and requirements. An honors syllabus describes the service-learning/honors programs, clearly defines the objectives and expected outcomes, and details the requirements for the reflective journal. The syllabus also lists the service-learning opportunities available for the current semester. The course coordinator explains these activities at the information session so students can make informed choices. All activities are designed to enrich the learning of microbiology for participating students. Students then choose the service-learning activities of interest to them and list their availability and contact information. SLH students are given their first choice of activities whenever possible, and they are paired with an appropriate faculty mentor. Faculty mentoring occurs on a volunteer basis; typically three or four full-time biology faculty members participate each semester. Some faculty members choose to mentor students in laboratory research rather than service-learning activities. Students who participate in this option may receive honors credit, but not service-learning recognition.

Microbiology students who wish to participate in the SLH program must sign a contract with their faculty mentor. This contract emphasizes the importance of behaving responsibly and fulfilling all commitments required to complete the program. Students who do not complete their assigned work do not receive honors or service-learning recognition; however this does not affect their course grade. SLH students are graded the same way as non-participants are.

Community Partners Activities

The QCC Microbiology SLH Project has partners on the QCC campus as well as throughout the New York City community. Service-learning activities in Microbiology have been offered each semester since the fall of 2009, and have included peer tutoring for lecture topics, peer tutoring for lab, workshops for local high school students, workshops for children residing in a homeless shelter, and community activities at a local environmental center, the Alley Pond Environmental Center. Each of these projects is described below.

Peer Tutoring for Lecture Topics: SLH students read and thoroughly study materials related to specific topics in Microbiology (typically bacterial genetics and metabolism). Students usually choose topics that they have the greatest amount of difficulty understanding. After reviewing the material on their own, students meet with their faculty mentor for an in-depth review of these topics to ensure that
they have mastered the material. This prepares them to offer review sessions to their peers in the period leading up to their lecture exams. Students also prepare review material that is made available to all students at the review sessions as well as on the Microbiology course Blackboard site. Review sessions are given within the Biology Department and are announced by e-mail as well as a posting on the course Blackboard site. Qualified students who have participated in the appropriate training (10 hours of shadowing another tutor) may also serve as tutors in QCC’s Learning Center.

**Peer Tutoring for Laboratory Topics:**

Many Microbiology students are adept at understanding concepts, but struggle with the “hands-on” laboratory portion of the course. Students take two major exams in the laboratory section: a midterm practical and a final practical. SLH students offer “open lab” to help their peers prepare for these exams. On the midterm exam, students are given two “unknown” bacterial cultures. They are required to prepare slides of these bacteria, apply three different staining techniques, and identify the bacteria based on their morphology, arrangement, and staining results. Many students have great difficulty mastering the use of the microscope in the amount of time allotted in their normal laboratory period. Other students struggle with the interpretation of results; while they can locate the bacterial cells under the microscope, they cannot apply what they see to the identification of the species. With this in mind, midterm open lab hours allow students extra time in the laboratory to practice many of the procedures they will be asked to perform on their midterm exam. Students have the opportunity to practice using the microscope, to study and review slides that they have prepared in their laboratory class, and to ask questions about the midterm procedures. SLH students oversee the open lab hours each semester once they have been trained by a faculty mentor to ensure that they have mastered the laboratory skills needed to teach others. The faculty mentor is available during open lab hours to solve any management issues or to answer any questions that the student cannot. Midterm open lab hours are conducted for two weeks leading up to the midterm exam. Two SLH students work together during open lab hours when possible.

The laboratory final practical exam consists of 25 practical stations and covers lab activities from the entire semester. Students are asked to identify microbial pathogens on prepared slides, interpret metabolic tests, and recall several types of media used throughout the semester. Since the exam is cumulative and covers a broad range of topics, students benefit from having open lab sessions to cover this material. SLH students host open lab hours for two to three weeks leading up to the final exam. In addition, each SLH student is assigned a topic for which he or she prepares review material in the form of a PowerPoint presentation. These review materials include an overview of the topic covered (often including photos of prepared slides and media) as well as a self-test section. After review and revision by the faculty mentor, these materials are posted on the course Blackboard site, and are used by SLH students during open lab sessions. To date, review material has been prepared for about 70% of the topics covered in lab. Open lab hours for both the midterm and final take place in the Biology Department: The scheduled hours vary with room availability and SLH student and mentor schedules.

**Workshops for Middle and High School Students:**

Queensborough Community College houses two pre-collegiate programs on campus: Project PRIZE and STEP. Both are funded by the New York State Education Department. The author is co-director of Queensborough’s STEP (Science and Technology Entry Program- QCC-STEP) with Dr. Simran Kaur, who is also a member of the Biology Department and involved in the SLH program. QCC-STEP offers science workshops and mathematics tutoring sessions to historically underrepresented or economically disadvantaged middle and high school students. The goal is to improve student scores on science and math Regents exams, expose them to college life and research opportunities, and

<table>
<thead>
<tr>
<th>Table 2: Roles of Faculty Mentors in Implementing Service-learning/ Honors Activities in a Multi-section Biology Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting with SLH students on a regular basis to guide them through their service-learning activity.</td>
</tr>
<tr>
<td>Observing student(s) assigned to them during activity: evaluate and assist as needed.</td>
</tr>
<tr>
<td>Preparing a written contract with SLH students describing activities that are to be conducted.</td>
</tr>
<tr>
<td>Communicating with community partners to schedule meeting dates and get feedback about the effectiveness of service.</td>
</tr>
<tr>
<td>Periodically reviewing reflection journals to make sure they are being done correctly.</td>
</tr>
<tr>
<td>Monitoring SLH student grades to ensure that they are succeeding in the class.</td>
</tr>
<tr>
<td>Communicating with course coordinator about any problems/issues that arise during the semester.</td>
</tr>
<tr>
<td>Assuring that students complete all requirements to fulfill the SLH contract.</td>
</tr>
<tr>
<td>Assisting in student preparation for presentations and recognition events.</td>
</tr>
<tr>
<td>Distributing and collecting questionnaires and other feedback from SLH students and community partners.</td>
</tr>
</tbody>
</table>

**Microbiology students who wish to participate must sign a contract.**
motivate them to pursue post-secondary education in a STEM (Science Technology Engineering or Math) field. STEP also offers review sessions for statewide exams, SAT preparation, and college advisement. Students enrolled in the Biology workshops (based on the science class they are taking in school) can take part in the Microbiology SLH workshops. QCC-STEP students also work with BI-302 (Anatomy and Physiology II) students, who teach them about human body systems.

The Liberty Partnerships Program/Project PRIZE offers academic support, counseling, college and workforce preparation, and other services for at-risk middle and high school students. Activities take place at participating schools in the afternoon and on the QCC campus on Saturdays. Project Prize and QCC-STEP have collaborated extensively for the past five years. As a community partner for the SLH Microbiology tract, Project PRIZE identifies students who are interested in science and invites them to attend the Biology workshops organized by the QCC SLH students.

SLH students prepare two hands-on workshops that cover topics such as control of infectious disease, diversity of cell types, and environmental microbiology. Activities have included a hand-washing experiment, culturing live microorganisms from the environment, interactive quizzes to test student knowledge of the spread of infectious disease, and an examination of different cell types (plant cell, live protozoa, human cheek cells, and bacteria) under the microscope. SLH students are responsible for preparing all workshop materials, including a pre- and post-test to assess student learning. Faculty mentors oversee the activities and troubleshoot when necessary. The Department of Biological Sciences provides the facilities and equipment necessary for the pre-collegiate program workshops.

Microbiology Workshops for Homeless Children: Saratoga Family Inn is one of four family inns operated by Homes for the Homeless. The organization's mission is to provide homeless families with the opportunities and support necessary to enable them to move out of the shelter and live independently. The Inn was opened in Queens in 1987 in a former hotel, and typically houses 255 families with approximately 375 children (Source: http://www.hfhnyc.org). QCC SLH students meet with children from the Saratoga Inn on the QCC campus. SLH students prepare and implement activities similar to the activities developed for Project Prize and STEP participants. The goal is to teach homeless youth about the microbial world and motivate them to attend college and pursue science education in the future. Typically five or six students between the ages of 9 and 14 attend two or three workshops each year with the SLH students.

Community Event at Alley Pond Environmental Center: Alley Pond Environmental Center (APEC) is an environmental education organization that educates the community about protecting and preserving nature in an urban setting and that promotes sustainable environmental practices (Source: http://www.alleypond.com). Each fall, the center hosts the Little Neck Bay Festival (Estuaries Day). This event is designed to educate the public about the importance of preserving our natural environment, with an emphasis on preserving water quality. The author and other QCC faculty members have participated in this event each year since 2006. For the past two years, QCC SLH students have worked in pairs designing and implementing an activity that relates to the roles (both positive and negative) of microorganisms in natural bodies of water. APEC provides a display area as well as a microscope and laptop computer for projecting microscopic images. (QCC's 2009–2012 American Association of Community College's national initiative “Broadening Horizons through Service-learning” funded this purchase. The Corporation for National and Community Service funded the initiative.) SLH students prepare an informative tri-fold poster and manage the display area set up for this event. Community participants, including school groups and families, have the opportunity to prepare their own microscope slides of pond water samples and view the live microorganisms projected onto the laptop computer screen. The SLH students explain to participants what types of organisms they are observing and their importance in nature. Pictures of common types of pond microorganisms (cyanobacteria, algae, protozoa and zooplankton) are displayed to help community participants identify the ones they are viewing. SLH students also prepare crossword puzzles and other activities to engage participants in learning about the microbial world. The community members who attend this event learn about the important roles that microbes play in the natural world, including in decomposition and nutrient recycling. The students also emphasize the importance of having clean water for drinking and for recreation.

Fulfillment of the Service-Learning/Honors Contract
To fulfill the service-learning/honors contract, students are required to:

- Complete a Library Research Workshop required of all QCC Honors students. The workshop helps students enhance their library skills and evaluate reliable Web resources for research purposes.

- Complete at least 10 hours of direct service.
This does not include time spent preparing review materials, workshop materials, or quizzes. Often activities are paired so students have enough contact hours (for example, the same students who conduct workshops for STEP and “Project Prize” students may also participate in an event for the Alley Pond Environment Center).

- Receive a grade of B or better in Microbiology.
- Submit a reflection journal to their faculty mentor (see details below).
- Present at the QCC Honors conference offered each spring. Students also have the option to present at a local conference, such as the NYMAPS (New York Metro Area Partnership for Service-learning) Symposium. Some students discuss their SLH work at QCC’s Service-learning Recognition Day, which is held at the end of each semester.

The Reflection Journal
Reflection journal guidelines are distributed to students at the beginning of the semester as part of the service-learning/honors syllabus. Students are required to log a journal entry each time they work on their project, including when they have a planning meeting with their faculty mentor, carry out independent work, meet with their SLH partner(s), and participate in direct service with their community partner. Each journal entry must have three components: 1) description, which explains the activity performed; 2) analysis, which connects their service-learning work to their coursework; and 3) reflection, in which students evaluate the success of the service-learning activity, share their thoughts and feelings about the experience, and express what improvements they feel could be made. Reflection journals are submitted electronically to faculty mentors before the end of the semester. Although reflection journals are not graded, students do not receive honors credit if they do not submit their journals to their mentors. In addition, faculty mentors meet with students to discuss their service-learning/honors activities. This provides additional information about the experience and the students’ reaction to their activities.

Outcomes
Through their service-learning/honors experience, QCC SLH students strengthen their own understanding of microbiology by providing instruction to others. Students have the opportunity to experience meaningful interactions with their peers, faculty mentors, and community partners. They also strengthen their own written and oral communication skills, develop a sense of civic responsibility and leadership, and broaden their understanding of the importance of effective teaching.

Faculty measure student learning outcomes through an evaluation of the student’s service-learning activities and his or her reflective journal. To date, all students who have participated have described their service-learning as positive experiences that helped them better understand their course material. Based on reflection journal entries, participants believe that their involvement helped them develop better analytical and critical thinking skills, appreciate the role of the teacher, gain a better understanding of their community, improve their communication skills, and develop more self-confidence in their ability to share their knowledge with others. Some students who were involved in peer tutoring expressed their interest in becoming teachers, based on their experience tutoring. They noted that they realized that teaching requires patience, creativity, and strong oral communication skills. Those who conducted workshops for younger students expressed the satisfaction in sharing their knowledge of microbiology with others. Many commented on the enthusiasm of the young students and how much they enjoyed working with them. Many students further expressed their gratitude for the chance to work more closely with faculty mentors. These students gained valuable insight into the role of the educator and learned to appreciate their mentor’s enthusiasm for their chosen field. Some specific comments from reflection journals are listed in Table 3. Beginning in the Fall 2011 semester, assessment of student outcomes will include the analysis of questionnaires given before and after service activities are completed.

QCC’s Microbiology community partners benefit from their relationship with SLH students in various ways. Peer tutoring offers QCC students the opportunity to improve their knowledge of course material through the assistance of their fellow students. Members of the general public increase their awareness of the microbial world around them and gain an appreciation of the roles of microbes in nature. Local middle and high school students and economically disadvantaged children increase their knowledge of microbiology and have the opportunity to interact with college students who can help motivate them to pursue a college education.

Feedback from community partners has been consistently positive. SLH students, for example, present an activity at the Little Neck Bay Festival that is very popular and well-received. Children and adults are fascinated to learn about the microbial world, and they enjoy preparing their own microscope slides.
Establishing a Microbiology Honors Tract to Engage Health Science Majors in Service-Learning Activities

and identifying the organisms they see. Festival organizers have told the faculty mentors who oversee this project how beneficial this activity has been to the success of the event.

STEP and Project Prize participants are also enthusiastic about working with the service-learning/honors students. Most were very interested in learning about the microorganisms that are all around them, and they were excited to use scientific equipment that is more advanced than what is typically available in their schools. Participation in these workshops gave the middle and high school students an opportunity to work in a small-group setting and receive much more one-to-one instruction than they would have in their regular classroom. Analysis of pre- and post-tests given to QCC-STEP students showed that participants did increase their understanding and knowledge: Their scores increased by an average of 18 points, demonstrating that SLH students were effective at teaching the material.

Since its inception in the fall of 2009, open lab hours that the SLH students host have drawn large numbers of students, and as many as 27 students have attended individual review sessions. These students expressed gratitude for the extra time in the lab and appreciation for the help that SLH students provided (see comments from reflection journals in Table 3). Open lab sessions also allowed students to interact as a group with other students and SLH students: Research has shown that group study sessions often benefit student performance (Springer, Stanne and Donovan). In addition to attending review sessions on campus, about 90% of enrolled Microbiology students accessed the review material prepared by SLH students on Blackboard each semester (based on Spring 2011 and Summer 2011 course statistics). Beginning in the Fall 2011 semester, feedback questionnaires will be used to assess community partner satisfaction with the program as well as to evaluate SLH student performance.

Student presentations at conferences have been an immensely successful part of the Microbiology SLH program. SLH students have presented their work at the QCC Honors conference, the CUNY Pipeline Conference, Barnard College Symposium, and NYMAPS Symposium. In addition, several SLH students have spoken about their experiences at the Queensborough College Service-learning Recognition Day at the end of every semester. Although not all SLH students have had the opportunity to present, those who have are overwhelmingly positive about the value of this experience. They said they felt it helped them to strengthen their speaking skills and deepen their appreciation of the work they had accomplished. Even those student presenters who were initially quite

Table 3: selected quotes from reflection journals written by QCC’s Service Learning/Honors students

<table>
<thead>
<tr>
<th>Quote</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Besides [gaining] personal gratification... helping those students has had a profound effect on me in terms of academia. For the first time I felt how gratifying it must be to be a teacher.”</td>
<td>Student from STEP program</td>
</tr>
<tr>
<td>“We had a really busy time, but we really enjoy it because we share our knowledge with our classmates and we learn so many things from it.”</td>
<td>Student from STEP program</td>
</tr>
<tr>
<td>“I was all about the room helping those that needed help with microscopy and/or identification skills. I felt as though I knew the bacteria a lot better due to the extra exposure during open lab. I think many students benefited from the practice lab as well.”</td>
<td>Student from STEP program</td>
</tr>
<tr>
<td>“I should say this honor program experience is very useful and beneficial. First of all, this enhances my responsibility. For example, I should go to the open lab on time since I am in charge that day. Secondly, it fosters my kind of leadership. During the open lab, other students look me as a teacher. I was expected to behave like a teacher and give them instructions. Thirdly, I am very shy, however, this helps me talk in front of others and I become confident. Fourthly, I like this opportunity because service-learning is not only good for others but also for my own course. Through learning with other students, I understand the course materials well and learn some new study methods, which are very useful in my study. In one word, I am very happy to be a service-learning student.”</td>
<td>Student from STEP program</td>
</tr>
<tr>
<td>“I get a feeling of accomplishment when I can answer a student’s question and they understand my explanation. I feel more motivated because as I give information I gain information. This tutoring experience built up my confidence in communicating with my fellow students, and as a nurse I will be able to communicate with my patients, like talking about aseptic techniques, how to take antibiotics, and [providing] more information on their health.”</td>
<td>Student from STEP program</td>
</tr>
<tr>
<td>“This experience introduced me to the rewarding challenge of assisting students in need, and it allowed me to exercise and improve my personal interaction skills. Also, I found it beneficial to me in that I understood the subject more when I explained it to other students.”</td>
<td>Student from STEP program</td>
</tr>
<tr>
<td>“Some students said the open lab helped them a lot, which made me more committed and confident. I was glad to hear that the open lab was really helping students. It was a rewarding experience.”</td>
<td>Student from STEP program</td>
</tr>
<tr>
<td>“I am glad to participate in this program because the interaction with others students and professors enrich your acknowledge and understanding of the subject.”</td>
<td>Student from STEP program</td>
</tr>
<tr>
<td>“Appreciation for our teachers and mentor: teaching is not easy!”</td>
<td>Student from STEP program</td>
</tr>
<tr>
<td>“Doing these workshops was definitely the height of the whole service-learning experience. The kids’ energy and seeing when they learned stuff and understood was priceless honestly. They were cute, and sharing knowledge with them was well worth all the effort putting together the lesson plans and such.”</td>
<td>Student from STEP program</td>
</tr>
<tr>
<td>“Assisting the students in Open Lab was incredibly rewarding and also reinforced my understanding of the material. Another study technique often suggested is to try to explain in your own words, concepts, and materials. I found sharing my techniques or tricks for memorization and understanding with students was met with much gratefulness from many students.”</td>
<td>Student from STEP program</td>
</tr>
<tr>
<td>“I really enjoyed working with our mentors, Dr. Petersen and Dr. Tawde. It was infectious to see their enthusiasm for Microbiology. It also provided a student-teacher interaction that I often find is missing in a commuter college experience. They were incredibly receptive to teaching and guiding us through the course materials, especially during parts where we were preparing materials advanced of our curriculum.”</td>
<td>Student from STEP program</td>
</tr>
<tr>
<td>“Participating in the Honors program is an incredibly rewarding experience. It not only is a plus for your transcript, but it definitely strengthens and reinforces your passion for Nursing.”</td>
<td>Student from STEP program</td>
</tr>
</tbody>
</table>
nervous and apprehensive about speaking at a conference felt a great deal of pride and self-confidence afterwards. Several have expressed interest in presenting again in the future.

Lessons Learned

Although the Microbiology SLH program has worked quite successfully at QCC, the following challenges are outlined here with possible solutions:

1. Students unprepared for activities: Students were selected based on their meeting the minimum GPA and grade criteria. However, some students were greatly underprepared for the peer tutoring sessions. They either had not prepared in advance of the meeting, or they were unable to master the difficult material on their own. At preparation meetings with their faculty mentor, they had a difficult time answering questions and did not explain the material clearly. Reviving the SLH students thus became a very time-consuming endeavor, and as a result, faculty mentors assigned to lecture review them often expressed dissatisfaction with this experience. To alleviate this problem, once it became clear that most SLH students were not adept at offering peer tutoring on lecture topics, this activity was discontinued after two semesters. However, the SLH program offers the flexibility to revive this option if a qualified student is available during a particular semester. Also, the minimum GPA to participate was raised from 3.2 to 3.4. Although this puts a stricter limitation on the number of students who qualify to participate; it also increases the likelihood that participants will possess the academic skills required to master difficult material and teach it to others.

Some students struggled with management issues as well: For example, some did not know what to do when too many students packed into the laboratory or how to handle a disruptive student. Although faculty mentors were asked to monitor review sessions, they were not expected to be in the room the entire time. In fact, faculty presence in the room was detrimental to the SLH activity because students attending the review sessions tended to ask questions of “the expert” rather than work with the SLH student.

2. Students not fulfilling all requirements: During the four semesters that Microbiology SLH was offered, five students did not complete the requirements to receive honors credit or SL recognition: Two did not meet the minimum grade requirement; one did not complete the full number of hours required of direct service; and two dropped out voluntarily due to other responsibilities. Students dropping out mid-semester could be detrimental to the relationships with community partners if commitments are not fulfilled. In some cases, students who were supposed to work with a partner had to complete the assigned tasks on their own, or required a greater amount of assistance from their faculty mentor. This placed an additional burden on the faculty mentor to ensure that the community partner’s needs were met. Great care has to be taken to ensure that there is sufficient coverage for all activities to ensure that community partners remain satisfied with the partnership.

3. Lack of self-confidence among SLH students: Many students do extremely well studying on their own, but do not possess the skills to teach difficult material to others. In many cases, they either lack the self-confidence or their language or communication skills are inadequate. Many reflection journal entries express the students’ nervousness about speaking to a group of their peers or even to younger students. At times, the faculty mentor or course coordinator was required to intervene during open lab hours and other activities to remind the SLH students that they needed to speak clearly and confidently to their peers to have a successful review session. Despite this difficulty, SLH students eventually learned how to communicate effectively and became much more confident in their work. Many expressed their opinion that the program had helped them to advance their communication skills. As course coordinator and mentor, the author observed tremendous improvement in SLH student self-confidence and effective communication and teaching skills while conducting open lab sessions. Even the SLH students who barely spoke during their first review session were able to get all students to ask and answer questions by the end of the semester. Reflection journal entries expressed SLH students’ joy in being able to overcome their shyness and offer quality review sessions to their peers. SLH students also felt rewarded for their hard work when their peers expressed gratitude for their efforts. In the future, having additional preparation time with the faculty mentor and practice review sessions will ensure that students are more confident for their first review session.

4. Lack of student availability: Despite the options for service and flexibility in scheduling, many qualified students choose not to participate in the program. There are a number of reasons for this, but many students expressed their concern that the option would be too time-consuming or would not fit into their schedule. For example, some students who were initially interested in working with the middle and high school students did not join the SLH
program because they had other obligations on Saturdays. Also, many of the strongest health sciences students academically are accepted into the nursing program and begin this rigorous program while taking Microbiology. These students often feel too overwhelmed with coursework to take on another obligation.

As course coordinator for Microbiology, the author has found that having students work in pairs works best for most activities. However, sometimes only one student is available for a particular activity, and the faculty mentor often ends up acting as the “partner.” Getting more students involved is a definite way to maintain a manageable workload for all faculty and student participants. This may require more aggressive recruitment (ex: classroom visits) to convince reluctant students that their involvement in SLH will improve their comprehension of their coursework as well as help them develop skills necessary for their future careers.

5. Lack of faculty mentor availability: SLH student mentoring is done on a strictly volunteer basis: As such, enlisting faculty members to mentor students can be difficult. Community college professors are busy with heavy teaching loads and other obligations. Thus, some are reluctant to devote time to yet another project. In addition, each semester as many as five or six sections of Microbiology are taught by adjunct instructors. These instructors often have other full-time obligations that prohibit them from participating in the SLH program. Naturally, fewer faculty mentors mean more work for those who do participate in the program. Fortunately, some faculty members see service-learning as a worthwhile effort and volunteer their time to help students achieve their goals. Faculty who are involved appreciate the effort of their students and enjoy the one-on-one and small group interaction that the program facilitates. Also, there is a growing awareness among QCC faculty that service-learning provides opportunities to obtain grant funding, engage in pedagogical research, and publish, thereby helping them to advance in their careers.

6. Scheduling difficulties: Students who are preparing for their midterm exams need to practice microscopy using the same microscopes they will use during their exam. However, the main QCC microbiology lab runs about 16 laboratory sections each week and often is not available for open lab hours. This limits the number of hours that can be offered for midterm review. Demonstration scopes like the ones used in the main laboratory could be made available in other rooms to help alleviate this problem.

Final exam review sessions are given in other classrooms and utilize projected images, rather than microscope slides, so finding an available space is usually not a problem. However, some students who attend final open lab sessions have commented that they would prefer to look at microscope slides directly because that is how they will be tested. In the future, more images of prepared slides and demonstration microscopes will be offered for viewing the slides directly.

Another challenge with the SLH open lab hours is the lack of evening, weekend, and summer open lab and review sessions. A lack of faculty mentor availability, of SLH student availability, and of space to hold midterm open lab hours all contribute to this. Fortunately, the department has been able to incorporate some weekend hours for student midterm review, and using the Blackboard review site allows students to gain remote access to study materials at any time.

Conclusion

Beginning in the Fall 2011 semester, the QCC SLH program will include more detailed quantitative assessments. Questionnaires will be distributed to SLH students, faculty mentors, and community partners to better assess satisfaction with the program and to identify areas that need improvement. This information will help guide program procedures for future semesters.

In the future, faculty would like to expand the QCC SLH program to include additional community partners. One possible way to do this is to have students develop lesson plans for middle/high school students or other community members that would teach them about infectious disease prevention, proper use of antibiotics, or some other relevant topic. These lessons could be used as part of their health curriculum or as enrichment in an after-school program. Community events that educate the public about the roles of microbes in everyday life could be offered at the college or elsewhere. Graduate students in the University of Wisconsin–Madison's Biology Outreach Club have successfully implemented this type of approach (Vrentas, Zinnen and Lima).

Service-learning has been shown to enhance student educational experiences in many ways, including fostering civic responsibility, connecting students with their community, improving written and oral communication skills, enhancing critical thinking, and improving academic performance (Astin, Vogelgesang and Ikeda; Eyler, Giles and Braxton; Prentice and Robinson). As such, faculty strongly believe service-learning opportunities in QCC’s Microbiology course should be expanded to include a larger number of students. At present, only students who...
Establishing a Microbiology Honors Tract to Engage Health Science Majors in Service-Learning Activities

In the future more preparation time should be used to ensure student confidence.

Appendix

Personal Reflection

When I first became aware of service-learning as a teaching strategy, I was very interested in getting involved, but struggled with how to implement it in the multi-section Microbiology course. Eventually I was able to adapt my colleague’s model of combining service-learning with an honors tract to make this possible. Establishing and running the SLH tract in Microbiology has required quite a large amount of work, which at times has been frustrating. Convincing other faculty to get involved when they already have so many other obligations has been particularly daunting. I have also been in uncomfortable situations with students who have joined the program, but were not up to completing the tasks assigned to them. Other faculty mentors have faced similar situations. The options were to spend hours preparing the students for review sessions, canceling the review sessions, or conducting them ourselves. Frequently students who appeared to be ready to conduct review sessions primarily reviewed the material themselves; they had to be reminded that they, not the faculty mentor, were in charge of the classroom.

Many SLH students also contended with shyness and lack of self-confidence. As a formerly shy and nervous student, I was able to relate to these students, and I shared my own experiences as a student and what I did to overcome these issues. I assured them that they would be fine as long as they were properly prepared. Such encouragement from a faculty mentor showed SLH students that they were not alone and that others have had to overcome this same obstacle. As a result, the SLH students’ communication skills improved, and they began to feel much more confident in their abilities. A few students thrived on interaction with other students and became completely engrossed in planning the lesson. Some of these students demonstrated great potential as teachers, and a few are now considering a career in teaching as a result of their SLH experience. At the very least, all Microbiology SLH students gained a deeper understanding of and appreciation for the role of the teacher.

As course coordinator for Microbiology, I plan to continue the Microbiology service-learning program at QCC and hope to expand it. As stated above, getting students involved in meaningful service to their community has numerous benefits. However, service-learning has much to offer the educator as well. As a service-learning practitioner, I have the opportunity to meet and work with a small group of dedicated and motivated students. Their innovative approaches to lesson planning and instructional activities also exposes me to new ideas and teaching methods. I have had the privilege of observing many of these students evolve within a four-month period from nervous, shy, and insecure individuals to confident, self-assured teachers. I have observed students from highly diverse cultural and ethnic backgrounds work as a team to develop review materials or prepare a poster for an upcoming conference. In addition, I am witness to the development of much-improved written and oral communication skills and the emergence of leadership qualities in students who will undoubtedly benefit in their future careers from developing these skills. As an educator, I am deeply grateful for the opportunity to work with service-learning students, and I am looking forward to expanding the program to reach more students and involving more faculty mentors in the future.

qualify for honors work can participate. One way to make this opportunity available to non-honors students would be to incorporate service-learning into the course syllabus as either an extra credit assignment or as a replacement for a low test grade. This would require the involvement of more faculty mentors to oversee a larger number of students as well as the addition of community partners who would benefit from the service-learning experience. Another option would be to include student research as a service-learning activity, possibly by having students present their work to community members. For example, student research projects related to human health and wellness (infectious disease prevention, diagnosis and treatment) could be considered as service-learning experience if students were given a venue in which to educate community partners about their findings. This could be accomplished by having students either give oral presentations or prepare informative displays or educational brochures for the public (Larios-Sanz, Simmons and Bagnall).
Establishing a Microbiology Honors Tract to Engage Health Science Majors in Service-Learning Activities

References


Promoting a Sustainable Lifestyle to Elementary School and College Students Through Service-Learning

BY SIMRAN KAUR
QUEENSBOROUGH COMMUNITY COLLEGE
OF THE CITY UNIVERSITY OF NEW YORK

JULY 13, 2011
Abstract

The goal of the following service-learning initiative is to bring serious environmental awareness to the students of a non-majors biology course and through them, to the Queensborough Community College population and to students of local elementary schools. This is achieved by linking the writing intensive (WI) requirement to a tangible service-learning activity through Principles of Biology (Bio-140), an introductory biology course for non-majors students. Students described here were enrolled in a laboratory class linked to WI objectives during the fall semester (WI-Lab) and lecture students (L-SP) enrolled in the course for the following spring semester. Writing intensive topics assigned, to date, have been: 1. Carbon footprint—Fall 2008, 2. Green rooftops—Fall 2009, and 3. Water footprint—Fall 2010. The WI-Lab students’ writing assignments were compiled into one informational report that describes in detail the salient features of the selected environmental theme. The L-SP instructor shares the report with L-SP students (Spring 2009, 2010, and 2011). They then use this report as a guideline to compile an informational brochure on the topic and to participate in advocacy as they distribute their brochures at QCC Earth Day celebrations to the college community and to students from area elementary schools. The implementation of this service-learning activity and its impact on community partners, participating students, and the instructor are discussed in detail.

Introduction

Advocacy and indirect service-learning (SL) initiatives are incorporated into a non-majors biology course (Bio 140) as a teaching strategy to engage students in active learning to enhance their overall educational experience and to inculcate civic responsibility. The author, who is also the coordinator/instructor for the course, successfully designed an effective service-learning project that linked an indirect SL activity performed in the fall semester with an advocacy project the following spring semester. To begin the project, the author assigned the topic “carbon footprint” as the writing-intensive topic for students in a Fall 2008 Writing Intensive (WI) laboratory section. Students began the project with a limited understanding of the issue. For instance, when asked, “what is a human’s carbon footprint,” one student answered “the black-inked baby footprint usually taken at birth.” Using this as a starting point, service-learning became a part of the course.

Topics on environmental science are part of Biology 140. Having taught this course since 2003, the author is aware of the students’ lack of knowledge about environmental concerns and consequently of the ecological benefits of a sustainable lifestyle. Past experience has also shown the author the challenge of generating student interest in biology among non-majors within the structure of a typically taught content-based curriculum. Because the laboratory course is also one of the college’s WI courses, the instructor is able to assign current topics related to universal environmental issues, which expand students’ research techniques while deepening their understanding of existing global environmental concerns. What began as a simple pedagogical strategy to introduce students to global environmental issues in an interesting way through research and writing evolved within a few weeks to an effective service-learning strategy that incorporated indirect SL action, research, and advocacy.

The project includes identifying an environmental concern and presenting it to the students. They became familiar with the issue through classroom discussions and information available from library and online resources. Through a series of written reports, the designing of an informational product, and direct interaction with members of the target group, the students communicate the environmental issue to the community, thereby completing the cycle of learning and service. The outcomes include enhanced learning, greater communication between students and the instructor, the promotion of self-exploration, environmental awareness, and the necessity of spreading the message. Service-learning brings clarity to course content for the students, enables the instructor to teach topics not taken into account in a non service-learning classroom, and promotes the advocacy of environmental issues. During this process, students learn course material and how to conduct Internet research, enhance their writing skills, become familiar with Microsoft Publisher, and to some extent, develop an interest in the field of biology. The interaction with members of the target community is an eye-opening experience for some students, and some have voiced their intentions to participate in such interactive service activities again.

A few service-learners expressed their enthusiasm at being given the chance to share

Key words
Advocacy; Indirect Service; Writing Intensive; Non-Majors Biology; Sustainability, Community.
their experience with other educators and innovators in the field through presentations and workshops. Though the target groups have not yet been surveyed directly, their continuous participation in receiving SL services for the past three years is an indication of their appreciation, which they have also voiced to the instructors and QCC students.

Background

A. Service-Learning at QCC

Service-learning began as a grassroots movement at Queensborough Community College (QCC) during the 2006–2007 academic year. Since its inception, 40 faculty members have introduced service-learning activities in their courses, 2,000 students have benefited from such activities, 28 community partners have established successful collaborations, and 50 staff members have assisted in service-learning projects (Ellerton, Cuomo and Tarafdar). Since institutionalizing service-learning, the college has used it as a high-impact strategy for increasing student participation, retention, and graduation rates. The Service-Learning Resource Center provides faculty support by offering service-learning seminars organized by the Center of Excellence in Teaching and Learning (CETL) at QCC and also provides regular workshops during which community partners share the needs of their organization with faculty, enabling them to design service-learning projects for their courses. The college encourages faculty to design service-learning courses, celebrates their accomplishments, and acknowledges their efforts in decisions about tenure and promotion.

B. General Education Objectives

“Queensborough Community College is committed to fostering a collaborative, learning-centered community.” (http://www.qcc.cuny.edu/Assessment/mission.asp) “The College is also dedicated to academic excellence and to the development of the whole individual in an environment that promotes intellectual inquiry, global awareness, and lifelong active learning. The College provides its students with a variety of opportunities to enrich themselves intellectually and socially and to develop the knowledge and skills necessary for success.” (http://www.qcc.cuny.edu/Assessment/mission.asp) Service-learning activities, as experienced by the author, fulfill this mission by providing unique opportunities for students to apply themselves. Over time, the SL project that introduces students to environmental concerns has now evolved into a purposeful process of self-motivation and applied learning. The SL initiative in Bio 140 also complies with the general education objectives of QCC, which include, but are not limited to, the following goals (http://www.qcc.cuny.edu/Assessment/edObjs.asp):

- Communicate effectively through reading, writing and public speaking. Service-learning projects provide students with the opportunity to strengthen their reading and writing skills and to communicate their learning by interacting directly with members of the target groups.

- Employ concepts and methods of natural and physical science to make informed judgments. In a classroom normally dedicated to traditional learning, service-learning projects allow students to extend their level of learning through application. The projects also allow students to realize the impact of scientific research on society and the environment.

- Work collaboratively in diverse groups directed at accomplishing learning objectives. Group collaboration is part of the direct service activities in preparing the informational products and interacting with the members of the community.

C. The Course: Bio-140

Principles of Biology, also known as Bio-140, is a non-majors biology course that Queensborough Community College offers students to fulfill their laboratory science requirement for the college’s associate in arts degree. The course curriculum includes an introduction to the world of biology through the teaching of topics that cover classic themes such as cells, genetics, reproduction, evolution and ecology; as well as contemporary subject matter that covers molecular biology, biotechnology, and bio-engineering. The laboratory experience includes hands-on activities that provide a practical understanding of topics covered in the lectures and also the dissection of selected vertebrates. It is a multi-section course taught by multiple instructors. The main objective is to help students develop a general understanding of the natural world through evidence and reasoning. The course is four credits and includes three lecture hours and three laboratory hours. The prerequisite for enrollment is a satisfactory score on the English placement test or basic skills courses in English and composition.

Course enrollees are very diverse in terms of educational background, interests, and career choices. They belong to various programs of study at QCC. Many students take Bio 140 during their graduating semester, though a few are freshmen. Experience in a laboratory science course is minimal, and many come to the course without a basic background in biology. There are 25 to 35 students in an average lecture class and not
more than 24 students in the lab section.

**Writing Intensive (WI) Graduation Requirement of Bio-140**

Bio 140 is also one of the college’s Writing Intensive (WI) courses. All freshmen and transfer students who enroll in degree programs at QCC are required to successfully complete assignments to grow as writers while they learn the course material. The students are expected to complete a series of short papers as part of the course requirements. They are also encouraged to submit drafts of their writing and receive feedback to make revisions. Of Bio 140’s five or six laboratory sessions, one is linked to a WI requirement. The author has been the instructor for the WI lab in the fall semester since Fall 2008. Twenty students are enrolled in this class and 25% of their lab grade depends upon the WI assignments designed by their lab instructor.

**Service-Learning Initiative in Bio-140**

Since topics on environmental science and ecology are part of the curriculum, this course offers the best opportunity for the author to incorporate service-learning as part of Bio 140’s class requirement. Using the WI lab class as a starting point, the instructor introduced the concept of service-learning while enhancing the students’ analytical, communication, and presentation skills. This strategy helped to combat challenges such as student disinterest and apathy toward environmental issues, and a content-heavy curriculum. The aim is to enable students to write about a topic that fulfills their WI requirement and to learn certain concepts in biology, which, due to time constraints, can get overlooked.

“Most important to the concept of service-learning, these opportunities represent not distractions from other requirements, but enhancements to existing curricula” (Whitlow). Service-learning has allowed the author to bring added focus to the course objectives, and to cover more content compared with a non-service-learning course. (The author introduced service-learning in 2008, but has been teaching the course since 2003.) As an example, while writing about the carbon footprint, students are required to research green house gases, deforestation, carbon cycle, carbon sources, carbon sinks, etc. and when writing about the topic of “green rooftop,” background information on urban heat island effect, perennial and annual plants, native and non-native species is essential. Gathering information on the water footprint allows students to learn about water, its life-saving properties, the water cycle, the importance of photosynthesis and evapo-transpiration, ground water, surface water, fresh water, and above all, water availability. These topics are difficult to teach in their entirety within the traditional teaching format. The author has also observed that most students lack any knowledge about a sustainable lifestyle. They are unfamiliar with the need to minimize water usage and carbon footprint, and the need to construct green rooftops. The author, assuming that a significant proportion of the student body may have limited knowledge of these issues, was motivated to extend the information to all QCC students on Earth Day. The service-learning component of the course, thus, came into focus and branched out to local schools to impact the citizens of tomorrow.

**Project Details**

**A. Indirect Service-Learning Action: Writing Intensive Lab, Fall Group:**

Since the fall of 2008, the WI lab taught in the fall semester has been linked to the lecture class taught the following semester. An environmental topic is chosen and assigned to the WI group (WI-Lab). Students submit three written reports at periodic intervals (Table 1). Twenty minutes of each lab session are devoted to discussion of the topic, which also includes providing students with important online resources, journal articles, or other related information. Students are given deadlines and are expected to submit the reports on the due date via email or in person. Each assignment mandates specific guidelines and topics for research and writing. The instructor communicates the necessary information about the topics and guidelines during the first two weeks of the semester (Table 2). Reports 1 and 2 include details built on information gathered about the environmental issue under discussion. Report 3 is a compilation of Reports 1 and 2. Reports 1 and 2 are reviewed, graded, and returned to the students with revisions. They use this feedback to compile their final Report 3, which could be in the form of a comprehensive essay or a booklet. Report 3 contains all of the necessary information on the environmental topic. Students compile 12 weeks of online research, text book consultation, their study of articles that the instructor provided, and the synthesis of numerous open discussions during lab hours.

The instructor then selects well-written thoughts, facts, images, and vital information and compiles them into one final report. This final report is then used to provide information on that particular topic to students in the following semester’s lecture class (L-SP). So far, this final report has taken the following forms: a comprehensive written essay (Fall 2008); an information booklet, (Fall 2009); and a PowerPoint presentation, (Fall 2010). WI-Lab group participates in indirect service learning as they gather findings and analyze...
information, which is then made available for future students. They are not involved in doing any field work and do not come in contact with members of the target group. They provide the data and research reports to students enrolled in the lecture class of the following semester. This activity allows students to fulfill their WI requirement, and also enables them to contribute indirectly to the advocacy of environmental concerns.

B. Advocacy: L-SP (Lecture class, Spring Semester)
The students in the Bio 140 lecture class participate in an advocacy-related service-learning activity the following spring semester (Table 3). Students directly interact with members of the target group during Earth Day activities organized by the QCC SL coordinators. They are assigned the same topic (as the previous fall semester) and asked to submit a short report in a Q&A format. This allows students to become familiar with the topic on their own. The instructor then shares last semester’s final report with the L-SP group, which they read thoroughly and use as a guide to construct an informational brochure on the global environmental theme under discussion. The class is divided into groups of four (students make their own groups). Each group selects two “art directors” and two “content managers,” who have various responsibilities with respect to the design and factual content of the brochure (Table 4). Optimally, students use class time to prepare the informational brochures, as all the groups and the instructors meet through four consecutive Fridays (during regular class meeting time; 50 minutes) in the basic skills computer lab. Students use Microsoft Publisher to design the brochure. Many of the students have no prior experience with this program, so a service-learning research associate provides technical support. The students are required after every meeting to email their updated brochures to the instructor, who reviews their work and emails it back with revisions. All of these activities are time-sensitive because the brochures have to be ready by end of March for QCC’s Earth Day celebrations (second week of April).

The instructor selects the best brochure in terms of design, graphics, and content. In some instances, a few brochures are merged into one since the entire class generates six or seven different brochures depending on the class size. A large number of brochures are printed for distribution (courtesy National Grid grant, QCC Service Learning Department and Science and Technology Entry Program-STEP at QCC).

C. Earth Day Activities
L-SP students have an opportunity to present their brochures at the Earth Day celebrations, which the office of Service Learning at QCC organizes. Students from area elementary schools and the general student body, faculty, and staff of Queensborough Community College participate in and benefit from Earth Day activities. Besides presenting their brochures, students are instructed to plan activities for Earth Day participants. The activities may include an interactive quiz, a “fun facts” information sheet on the environmental topic under discussion, and the use of laptops to calculate on-the-spot ecological footprints. Service-learners can choose various time slots during their regular class meeting time to ensure participation. Many students volunteer more hours than they are scheduled for and also offer their services to the Earth Day organizers for various other activities. Services offered for the past three Earth Day celebrations (2009, 2010, & 2011) are: 1) interactive session on global environmental issues; 2) assistance in flower planting at Public School (PS) 46; 3) assistance in touch tank activities; 4) assistance in tree planting organized by QCC Student Union on campus, and 5) distribution of the prepared informational brochure.

L-SP students display information and materials and work at a table for a minimum of three or four hours. Elementary school students come with their teachers and chaperones in groups of 20 to 25. Two or three L-SP students interact with three or four elementary school children; the L-SP students explain and distribute the prepared brochure, deliver an interactive quiz, and calculate ecological footprints on the spot as they provide the youngsters with information on the environmental topic in question. Typically each session lasts about 20 minutes and the service-learners offer an average five or six such sessions. Tree/flower planting activities are normally done at the elementary school itself, and a few L-SP students volunteer to assist the QCC service-learning organizers.

D. Community Partners
The community partners who have benefited from these activities include students from four elementary schools (PS 206, PS 46, PS 203, and Holy Martyr’s Armenian Day School) and the general student body of Queensborough Community College.

E. Student Reflections
At the beginning of each semester, students who take part in the service-learning courses are provided with a guideline for submitting reflections on the service-learning activity, along with details of the service-learning project. Reflection reports take the form of an essay and are not graded, but submission of an essay is mandatory to earn a grade in the course. Students are asked to submit the

Students in the lecture class participate in service-learning the following semester.
Promoting a Sustainable Lifestyle to Elementary School and College Students Through Service-Learning

Conclusion

A. Impact on Student Learning
Themes chosen thus far have been 1) carbon footprint, 2) green rooftops, and 3) water footprint. Bio 140 is an elaborate course, and instructors find that covering all general biology topics can be a challenge. Students with minimal scientific backgrounds struggle to comprehend the content, and they also perform poorly on the exams. Instructors plan to teach the topics of cell biology, genetics, energy transformations, evolution, ecology, but a few broad topics remain uncovered. While writing and researching the environmental themes, students learn about ecosystems, photosynthesis, respiration, greenhouse gases, carbon emissions, deforestation, carbon sinks, carbon sources, global warming, ozone layer, geo-chemical cycles, watershed, water reservoir, ground water, surface water and various other topics interactively. Students also use Microsoft Publisher, which further builds their skills. Students’ reflections essays point to the real impact on the students’ learning. (Table 6 lists some of the students’ comments from their reflections essays.)

B. Participation in Conferences
Every semester, students have the opportunity to present at the QCC end-of-semester service-learning celebrations and to talk about their service-learning experience. The students get five to 10 minutes to describe their projects and share personal learning outcomes with the audience (QCC students, staff and faculty, and community partners). Every semester three or four students volunteer to speak at this event; they have continued to highlight the importance of service-learning activities as part of the course. The QCC service-learning staff provides all service-learners with acknowledgment and participation certificates along with a small gift.

During the spring of the 2011 semester, L-SP students received the opportunity to present at Columbia University for the NYMAPS annual symposium. Two students were selected to accompany the author to this symposium. They described their involvement in the service-learning activity and presented their opinions on their learning experience. They overwhelmingly expressed their satisfaction with the project and also described their positive feeling about their learning experience.

C. Impact on Instructor
For some time, the author has wanted to encourage service-learning and reflection as an alternative to traditional assessment techniques such as multiple-choice exams. The author has sought a more effective way to spark students’ interest and open a dialogue in the classroom on global environmental concerns. The service-learning activity enhanced class participation, enthusiasm, and understanding of the course material, and led students to have valuable conversations on global issues and to reflect on their own “un-environmentally friendly habits.” The students also conducted a great deal of current research on contemporary topics. For the instructor, learning about these topics from student-led discussions and their written work proved to be a great learning experience. The entire service-learning process contributed to an atmosphere of positive learning. Overall the experience provided a refreshing and invigorating perspective on the learning process.

D. Impact on Community Partners
The project achieved the following outcomes: 1) Participating schools have expressed their satisfaction and continue to be part of QCC Earth Day activities. 2) Teachers and chaperones who accompany the children have continued to show interest in the day’s activities and have voiced their satisfaction with the program. 3) Elementary school students show keen interest in what the service-learning students communicate to them. In most cases, they have been very attentive and take particular interest in calculating their ecological footprints. 4) The principal of PS 46, when interviewed, commented on the positive effect that interaction with college students has had on her school children and expressed interest in participating in similar activities.

E. Conclusion
“In the culture of a medium-sized public university, where students often perceive their roles as that of a consumer rather than contributor, service-learning opportunities can encourage students to see beyond themselves and to learn from hands-on experience” (Leege). Students come into the course with a “non-majors” attitude and a feeling of “not being comfortable” with biology. They also think in terms of what services will be offered to them to support their learning, never imagining that they are in a position to offer services to the community. What began as
a pedagogical strategy to enhance student interest in their WI assignments evolved into a service-learning project, which is something the author had not anticipated. Students themselves reflected on their role as part of the global community through their research and writing, so participation in writing about ecological concerns had this positive outcome. The topics chosen have universal appeal, are biology-based though general, and help to tap the curiosity of students who have other academic interests (mathematics, law, business, computer technology, engineering etc.). Lecturing introduces students to the content; involving them in an activity outside their classroom transforms the learning experience into something highly enriching and rewarding. Converting the WI curriculum to an indirect service enables the author to use the data and information that students gather and apply it in an activity that directly impacts the community. The indirect service-learning model “expands the repertoire of service-learning models available to teachers” (Connor-Linton). “Faculty who might not employ direct service learning in their teaching, but who wish to serve the community and reap the pedagogical benefits of real-life contextualization and practical applications of the course concepts and skills may find the indirect model attractive” (Connor-Linton). Data gathered by the WI students is not directly shared with the community by the students themselves, but serves to broaden their research techniques and writing skills, and introduces them to the idea that they can impact the world around them even when they are not directly involved. Advocacy combined with direct community interaction and indirect service proved to be an ideal strategy to effectively use the data gathered during writing WI reports.

F. Lessons Learned: Students’ Perspective

The following are a selection of students’ suggestions for ways to improve service-learning activities. These were culled from their reflection essays.

1. Spread out advocacy activities throughout the semester and not just focus on Earth Day.
2. Make students present on separate topics instead of on one environmental issue.
3. Prepare PowerPoint presentation and actually use it to teach kids.
4. Arrange for lab space or a classroom for advocacy activities.
5. Make students choose their own environmental topic to write about.
6. Allow students to design hand-on activities on the topic for Earth Day.
7. Involve WI students in presenting the topic to their peers in other classrooms.
8. Prepare students more fully for what to expect during Earth Day celebrations.
9. Increase responsibility of art directors in designing the brochure. Content managers feel overwhelmed.

Instructor Perspective

The author agrees with many of the students’ comments and suggestions. The following are student suggestions for ways to improve service-learning activities.

Table 1: WI/SL Program Description

<table>
<thead>
<tr>
<th>Program Description:</th>
<th>Service Learning/Writing Intensive Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>• This program integrates the writing intensive requirement with service learning objectives.</td>
<td>• Complete and submit all writing assignments on or before the due date</td>
</tr>
<tr>
<td>• Participants will not only be guided towards better writing skills, but will also be given a chance to reflect on what it means to be a responsible member of society. The WI assignment will help the participant to learn actively through writing and participating in meaningful service. You will be writing a comprehensive essay, creating a product that will address a genuine environmental need. You will be recognized for your efforts.</td>
<td>• There will be three writing assignments in all (1st, 2nd, and the final report).</td>
</tr>
<tr>
<td>• Grading Policy:</td>
<td>• The first two reports will be corrected, graded and returned to the students.</td>
</tr>
<tr>
<td>• SL/WI activity will contribute 25% to your overall laboratory grade.</td>
<td>• The last assignment (final report) will be in the form of a booklet /comprehensive essay (directions will follow).</td>
</tr>
<tr>
<td>• The activity itself will be graded out 100.</td>
<td>• You are required to submit all previous reports along with the final submission.</td>
</tr>
<tr>
<td>• The 1st report will contribute 15% to your SL/WI grade.</td>
<td>• You are required to submit a Reflections Assignment</td>
</tr>
<tr>
<td>• The 2nd report will contribute 30% to your SL/WI grade.</td>
<td>• You are also required to meet with me twice during the semester to discuss your progress and experience (mandatory).</td>
</tr>
<tr>
<td>• The final report will contribute 55% to your SL/WI grade.</td>
<td>• Meeting me will benefit you, as I will provide you with material that you can use to write your assignment. You will meet me during my office hours.</td>
</tr>
<tr>
<td>• Reflective writing will not be graded but is a requirement for you to earn a grade in this course.</td>
<td></td>
</tr>
<tr>
<td>• Lack of submission of any of the above will lead to a grade of incomplete.</td>
<td></td>
</tr>
</tbody>
</table>

SL/WI Learning Objectives

• Communicate knowledge about a current topic effectively through writing.
• Understand the need for civic responsibility while enhancing course work.
• Attain greater understanding of course material.
• Enhance knowledge about the importance of natural resources, negative effects of carbon dioxide emissions, and steps that can be taken towards sustainable living.
• Think critically and make informed decisions about issues that affect humanity and the environment.
• Enhance personal skills and develop awareness about global issues.
• Communicate environmental awareness to others.
suggestions, and is particularly concerned about the organization of advocacy action day. Since the students’ presentations are conducted at a table in a busy hallway where the target groups gather, this set up can be distracting. In the future, a classroom or lab space will be arranged in which students can interact with elementary school kids. The author would also like to introduce the writing of a reflection essay in the middle of the semester to identify problems earlier and to provide time to incorporate suggestions. A survey of the community partner is also of prime importance. Within IRB regulations, the author would also design survey questionnaires to assess the satisfaction of target groups. Since the existing service-learning model is related to a WI class, only the instructor of that group has initiated the activities. Being the course coordinator, the author is now in the planning stages of expanding this service-learning model to other sections beyond Bio 140.

“\texttt{In the end, I forgot I was doing this for a grade.}”
—s-l student

\section*{References}


*Sehmi is Dr. Kaur (the author.)
Table 2: Sample Assignment (Bio 140/WI Lab)

WRITING INTENSIVE/SERVICE-LEARNING ASSIGNMENT
GREEN ROOFTOPS: A WORLDWIDE MOVEMENT FOR A GREENER AND HEALTHIER PLANET

<table>
<thead>
<tr>
<th>Report 1</th>
<th>Report 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GREEN ROOFTOPS (60 points)</strong></td>
<td><strong>GREEN LIVING (50 points)</strong></td>
</tr>
<tr>
<td>• What is a Green Rooftop?</td>
<td>• What is the role of plants in ecosystems?</td>
</tr>
<tr>
<td>• Why is it important to have green rooftops?</td>
<td>• What do you understand from the term “Carbon sinks.”</td>
</tr>
<tr>
<td>• What are the benefits of constructing green rooftops?</td>
<td>• What is the meaning of the term “MY CARBON FOOTPRINT?”</td>
</tr>
<tr>
<td>• What are the possible sites for constructing green rooftops? (Where can you construct green rooftops?)</td>
<td>• What contributes to your carbon footprint?</td>
</tr>
<tr>
<td>• What type of construction material do you need to construct green rooftops?</td>
<td>• How can you reduce your carbon footprint?</td>
</tr>
</tbody>
</table>

**GLOBAL WARMING (40 points)**

• What is global warming? And what causes global warming?
• What are the effects of global warming?
• What is deforestation and what is its purpose?
• Is deforestation responsible for global warming?
• Can global warming be controlled? Identify your responsibility.

**GREEN ROOFTOPS (50 points)**

• What types of plants qualify to be planted on the roof to make green rooftops? (Description of the kind of plant).
• Provide a list of plants.
• What is the meaning of native and non-native plants?
• Can construction of green rooftops reduce your carbon footprint?
• What is “Sustainable living”?

Advocacy combined with direct community interaction and indirect service proved to be an ideal strategy.

“Teaching what we learned made a bigger impact than we could have imagined.”
—s-l student
Table 3: Grading and Course Schedule

<table>
<thead>
<tr>
<th>Exams (70% of Lecture Grade)</th>
<th>Quizzes (10% of Lecture Grade)</th>
<th>Informational Brochure. A group project (4 students/group), 20% of Lecture grade</th>
<th>Reflections on the Service Learning experience: (Not graded)</th>
</tr>
</thead>
<tbody>
<tr>
<td>There will be five exams in all. Each exam will be 50 multiple-choice questions and worth 100 points each.</td>
<td>There will be 5 quizzes during the semester. Each quiz will have 10 multiple-choice questions and will be worth 2 points.</td>
<td>First draft (2 pages write up on the topic): (Individual work. Not a group submission) Submit group names (4 /group): on due date work will be assigned to every member. We will meet in the computer lab to design our brochure. These meeting times would be during regular class period (Friday) Rough design of brochure Due date... (Includes submission of assigned work by each member of the group) Final Submission: Last week of March Presentation: 2nd week of April</td>
<td>You will submit a piece of reflective writing in which you will share your personal experiences while making the brochure. Detailed Instructions will follow. Reflective writing will not be graded but is a requirement to receive a grade for the course.</td>
</tr>
</tbody>
</table>

Table 4: Instructions for Making Brochures

<table>
<thead>
<tr>
<th>Provide Names by Due Date</th>
<th>Dates and Info about Meetings in Basic Skills Computer Lab</th>
<th>Responsibilities of Content Managers</th>
<th>Responsibilities of Art Director</th>
</tr>
</thead>
<tbody>
<tr>
<td>ART DIRECTORS (2)</td>
<td>CONTENT MANAGERS (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide Names by Due Date</td>
<td>Dates and Info about Meetings in Basic Skills Computer Lab</td>
<td>Responsibilities of Content Managers</td>
<td>Responsibilities of Art Director</td>
</tr>
<tr>
<td>ART DIRECTORS (2)</td>
<td>CONTENT MANAGERS (2)</td>
<td>• Each group will assign 2 students as the CONTENT MANAGERS and 2 students as the ART DIRECTORS. • The group will submit the names to Dr. Kaur on or before Due Date via email. • The content managers are responsible for the written material that will appear on the brochure. • The art directors are responsible for the pictures and graphics that will support the content. • All students will meet in the BSCL (Room# H-239) for 4 consecutive Friday’s Attendance is mandatory. • The brochure should be complete by first week of April, in time for Earth Day celebrations. All completed brochures should be uploaded on the USB port provided to the manager in the Learning Center. • Each group will also simultaneously work on designing an interactive quiz, fact sheets or plan other activities for the target groups</td>
<td>• The information provided is interesting and important • The information is reliable and factual • The information is to the point and not out of topic • Use of own words in the material being presented • The body of the brochure contains supportive detail about the title • Use of standard grammar</td>
</tr>
</tbody>
</table>
This has been a very informative experience. It is especially important for our future generations (elementary school kids) to be aware of this information because they will need the information themselves. I think the most important part of this project was interaction with the kids. I have not seen such curious children in a long time. I was glad and learnt a lot in teaching younger children. It was a good experience making the brochure and teaching others. Being able to expand my knowledge on Earth day was truly amazing. Talking to children and giving them the information that I learned made me feel as if I was making a small difference in the world because they can start being more conscious as a result. I appreciate having this service learning included in my course because it helped me learn as well as the children. After doing this service learning experience I intend to involve myself in more community service of any kind. Knowing I can help in any small way is a great feeling. If I were to choose one word to describe the water footprint brochure project, it would most definitely be “enlightening”. By doing the service learning activity, I felt this project couldn’t have had a better ending. By teaching what we had learned in the previous weeks, it made a bigger impact than we could imagine. It wasn’t until I started teaching it and explaining it to others that I developed a better understanding of the material. This is something I will remember all my life. My experience and my outlook on making the brochure itself for Earth Day, was entertaining and most importantly was a very educational and learning experience. Learning is much more than just sitting in for lectures and preparing for exams. Learning is about becoming aware. Biology is not my major. The things that I learned in completing this project were very fascinating. One of the most memorable experience was interacting with elementary school students. Once the service ended, great ideas came to my mind to make the kids experience far better. I will definitely do this again if I have the chance in another class. Its one thing to put the information in a pamphlet and distribute it, but it’s another thing to educate others and talk about it and bring the information to life. This assignment as a whole gave me the chance to “do” Biology, instead of just reading about it. I hope this course will continue doing this project with future classes. Knowing that the whole class got together to make a change was indeed an experience I will remember for a long time. In the end, I forgot I was doing this for a grade and just thought I was doing this for the sake of our environment. From the making of the brochure to presenting our work on Earth Day, was a worthwhile journey, never to be forgotten. It was very invigorating to get out of the classroom and make a change in the community. Overall an AMAZING experience. I learnt a lot and actually enjoyed learning.
CALL FOR PAPERS 2012!


**DEADLINE**

- Proposals for the 2012 themed edition on ethics in engaged scholarship: July 15, 2012
- Proposals under other themes accepted on a rolling basis.

**TO SUBMIT**

E-mail an article proposal of 300 to 750 words outlining the title of the paper, the focus of the investigation, the rational, and the approach to mchristopher@ccny.cuny.edu

**About the Series**

The working paper series, *Issues in Engaged Scholarship*, features rigorous research and critical analysis involving the theory, implementation, and outcomes of engaged scholarship. For *Issues in Engaged Scholarship*, the Colin Powell Center invites works that extend knowledge in the field and that move beyond description to encompass lessons, application, insights, or recommendations. Research highlighted in the series must reflect careful design, methodology, and analysis. Subject matter may encompass the following aspects of engaged scholarship:

- service-learning, including questions of student-learning outcomes, community impact, and leadership development;
- community-based research, collaborative research through which faculty and community organizations jointly address a specific community problem or policy dilemma or share knowledge and expertise with community and public audiences;
- campus-community collaborations between campus individuals or entities and community entities, including a wide range of reciprocal relationships such as internships, fieldwork, sharing of faculty expertise, community development initiatives, college-access programs, and others.

**Goals of Issues in Engaged Scholarship**

- To increase understanding of processes, practices, and outcomes associated with service-learning pedagogy, community-based research, and community-campus collaborations;
- To disseminate high-quality research and analysis related to engaged scholarship;
- To build a community of engaged scholars;
- To document how service-learning, community-based research, and community-campus collaborations are addressing issues within the Colin Powell Center’s outcome areas: community and economic development, education, the environment, health care, and international development and global security;
- To fulfill a part of the Colin Powell Center’s mission to build a strong culture of civic engagement and to mobilize campus resources to meet pressing community needs and serve the common good.

Thank you,
The Editors