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# Contents

1. **Service-Learning and STEM** ............................................. 1  
   - The STEM Crisis .............................................................. 1  
   - Service-Learning and Workforce Development ........... 2  
   - Why Is Service-Learning Valuable for STEM Training? .................................................. 4  
   - Barriers to Service-Learning in STEM ......................... 5  
   - The Time for Service-Learning in STEM Is Now .......... 7  

2. **Engaging STEM** .......................................................... 8  
   - About This Guide ........................................................... 11  
   - Sample Service-Learning Projects from Florida Institutions ............................................... 11  

3. **Incorporating Service-Learning into Your Class** ........ 19  
   - Definitions of Service-Learning ........................................ 21  
   - Bringing Service-Learning into Your Course ............ 23  
   - Where Does Service-Learning Happen? ...................... 26  
   - Models and Motivations for Service-Learning .......... 29  
   - Benefits of Service-Learning ........................................... 31  
   - Florida Student Responses to Service-Learning ........ 34  
   - Tips for Successful Service-Learning ......................... 35  
   - Creating Effective Partnerships ................................. 37  

4. **Strategies for Assessing Service-Learning Course Outcomes** ................................................ 44  
   - Aligning Assessments with Learning Outcomes:  
     - Using an Assessment Matrix ...................................... 44  
   - Choosing Assessment Tasks ......................................... 46
Using Reflection to Achieve and Assess Student Learning Outcomes ............................................. 47
Rubrics ........................................................................................................................................ 48
Student and Community Partner Involvement .......... 48
Closing the Assessment Cycle ................................................................. 49
Conclusion .................................................................................................................................. 50

5. Sample STEM Service-Learning Course Materials ...... 51
Science ........................................................................................................................................ 51
Technology .................................................................................................................................. 53
Engineering .................................................................................................................................. 58
Mathematics ............................................................................................................................... 59

6. Service-Learning: Perspectives from Scholarship ........ 62
Defining Service-Learning ............................................................................................................ 62
Service-Learning and Course Objectives ......... 64
Service-Learning Models: Some Ideas to Consider... 66
Models of Reflection .................................................................................................................... 70
Strategies for Collaboration with Partners ............ 72

7. Service-Learning Discussion Topics .............................. 76
Using Community-Based Learning in STEM Disciplines .......................................................... 76
Defining Course Outcomes ................................................................. 76
Learning Outcomes in Community-Based Settings .. 77
Assessment in Community-Based Settings .................. 77
Creating Assessments and Assignments ................. 77
Planning STEM Activities in the Community .......... 78
Course Planning ........................................................................................................................... 78
Syllabus Construction ................................................................................................................ 78
8. Strategies for Strengthening and Sustaining Service-Learning and Community Engagement .................. 79

Bibliography ............................................................................................................................................ 86

Online Resources for Service-Learning ................................................................. 94
1

Service-Learning and STEM

*The United States is losing its competitive edge in math and science while the rest of the world soars ahead. Our knowledge capital, which fuels innovation and economic growth, is at risk.*


The STEM Crisis

Science, technology, engineering and mathematics (STEM) jobs pay 26 percent more than non-STEM jobs, according to a 2011 U.S. Department of Commerce report titled *STEM: Good Jobs Now and for the Future.*\(^1\) These highly technical positions have grown rapidly and are expected to continue to grow in demand. According to the report, “Over the past 10 years, growth in STEM jobs was three times greater than that of non-STEM jobs, and STEM jobs are expected to continue to grow at a faster rate than other jobs in the coming decade.”\(^2\)

Despite the demand for STEM graduates, industries have struggled to identify qualified candidates for many positions. The National Math + Science Initiative cites two main factors that have contributed to the problem: (1) a lack of student engagement in STEM subjects and (2) a shortage of qualified STEM teachers. A white paper from the National Action Council for Minorities in Engineering notes that “there are about 4 million unfilled jobs in this country, even though 12 million Americans are out of work. Many unemployed Americans simply do not have

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2. Ibid.
the educational background and skills to fill those jobs.”³ And, according to test-preparation company ACT Inc., only 45 percent of U.S. high-school graduates in 2011 were ready for college-level math, and only 30 percent were ready for college-level science.⁴ Meanwhile, the U.S. Department of Labor reports that, in addition to many students never making it into the STEM fields because of “inadequate preparation . . . and poor teacher quality,” many existing STEM workers are nearing retirement age, which creates an additional emerging demand.⁵

Service-Learning and Workforce Development

*What we seek to advance, what we seek to develop in all of our colleges and universities, are educated men and women who can bear the burdens of responsible citizenship.*

—John F. Kennedy, 1963

John F. Kennedy inspired a generation of Americans to engage in volunteering and service for their country. Kennedy’s calls to service also were fueled in part by economic threats from communist competitors, particularly the Soviet Union. Kennedy spoke to the nation and launched the nation’s space mission, which played a major role in fueling growth in STEM careers.

Service-learning as a teaching strategy has strong connections to both workforce readiness and civic engagement called for by Kennedy and many other American leaders. The National Service-Learning Clearinghouse defines service-learning as “a teaching and learning strategy that integrates meaningful community

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service with instruction and reflection to enrich the learning experience, teach civic responsibility, and strengthen communities.”6 This pedagogy allows students a hands-on approach to applying learning to situations that enhance their understanding of real-world workplace practices. According to a report produced for the Massachusetts Campus Compact, “workforce development and civic engagement can be complementary visions for the future of higher education.”7

Today, Americans again are concerned about the country’s standing as a source of technological innovation and economic development. International studies of science and mathematics education have revealed that American students are lagging behind other countries such as Singapore, China, Japan, Russian and South Korea.8 Educators work to encourage women and minority students, groups who have been traditionally ignored or discouraged from entering the STEM workforce, to consider STEM fields as career options. The National Science + Math Initiative cites three key factors in building a strong STEM labor force: engagement, motivation, and exposure to STEM subjects. Each of these factors can be addressed through service-learning in STEM.

Why Is Service-Learning Valuable for STEM Training?

To ‘learn from experience’ is to make a backward and forward connection between what we do to things and what we enjoy or suffer from things in consequence. Under such conditions, doing becomes a trying; an experiment with the world to find out what it is like; the undergoing becomes instruction—discovery of the connection of things.”

—John Dewey, 1916

Research reveals that quality service-learning is a teaching method that increases retention, enhances learning outcomes, and improves certain workforce skills through applied learning. Participation in service-learning helps improve students’ confidence that they will complete their degrees and provides opportunities to expand and apply their learning to real-world situations. According to a study by Eppler et al., students who participated in service-learning projects expressed greater interest in future service work in their communities, reported more interest in engaging with different cultures, actively considered service-related career paths, and positively affected their self-esteem.9 In their research on engineering projects that integrate community service, Oakes and Jamieson write that

there is also a growing sense that broadening the notion of an engineer’s core competencies to include these skills [collaboration, customer awareness, and understanding of ethics] may be critical to achieving a population of engineering professionals that is gender and ethnically di-

verse. Service-learning, which integrates community service with academic learning, has the potential to integrate many of these aspects in the curriculum.10

STEM industry groups and accrediting institutions have also begun to incorporate key learning outcomes for students in the field that service-learning is designed to help students achieve. For example, ABET, the accrediting body for engineering programs, lists as a course outcome that “all engineering graduates should understand the impact of engineering in a global and societal context.”11 Service-learning projects that connect students with the community allow for such learning to occur. Lemons et al. state that “the positive effects of [service-based learning] activities have been attributed to processing the experience through reflection, discussions, and interaction with other students and faculty.”12

Barriers to Service-Learning in STEM

We are a nation of communities . . . a brilliant diversity spread like stars, like a thousand points of light in a broad and peaceful sky.
—George H. W. Bush, 1989

Instructors cite several challenges and barriers to implementing service-learning in K–12 and college classrooms. One frequently cited challenge is the time constraints instructors face with balancing the teaching of conceptual knowledge and time spent coordinating with community partners in the field, according to


12. Ibid., 3.

5 | Faculty Guide to Service-Learning in STEM
Hou’s “Developing a Faculty Inventory Measuring Perceived Service-Learning Benefits and Barriers.” Hou also cites the lack of institutional recognition of service-learning as a challenge to implementing and gaining support for using this teaching approach. Some researchers have identified a lack of collaboration among science faculty and teacher education faculty as a potential barrier to successful STEM service-learning efforts. Another challenge cited in research on service-learning is simply the lack of study into discipline-specific approaches to service-learning as a teaching strategy. However, nationwide initiatives by industries, government agencies, and educational institutions have worked to provide support for educators seeking to provide civic engagement opportunities for their students that benefit the community and help learners “establish links between theory and reality.”

Created in 1985, Campus Compact was formed to “honor and expand the role of college students and their schools in improving their communities.” Today, the group boasts 1,100 members—university and college presidents from across the nation—who work to promote civic engagement and incorporate community-based learning into their curricula. State-based initiatives have emerged, such as the Florida Campus Compact, a coalition of fifty college and university presidents that provides professional-development services, public communication, and funding for service-learning programs. Groups like Florida Campus Compact work to leverage state and federal funding to encourage community-based research, cocurricular engagement in democratic activities, and innovative service-learning projects to help engage students in STEM disciplines, as well as to retain students who


15. Ibid.

enter STEM fields by creating connections between their work as future professionals and their lives as citizens.

The Time for Service-Learning in STEM Is Now

_We need your service, right now, at this moment in history. I’m not going to tell you what your role should be; that’s for you to discover. But I am asking you to stand up and play your part. I am asking you to help change history’s course._

—Barack Obama, 2009

With high demand for STEM careers and the recognition that American education is losing ground to other countries in math and science education, now is the time for educators to incorporate innovative teaching strategies to engage students in pursuing STEM careers. According to a 2010 report from the President’s Council of Advisors on Science and Technology,

> it is important to note that the problem is not just a lack of proficiency among American students; there is also a lack of interest in STEM fields among many students. Recent evidence suggests that many of the most proficient students, including minority students and women, have been gravitating away from science and engineering toward other professions._17_

Service-learning represents a key strategy for teachers to help students experience the joy of scientific discovery in the field, learn how to work with fellow students and other diverse populations, and understand how learning can be applied in the workplace.

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Engaging STEM

As noted in the previous section of this guide, service-learning has emerged as a major trend in STEM fields within the past few years. While innovative and engaged faculty members in science, technology, engineering, and mathematics have been making connections between their classrooms and the communities around them for many years, focused, national, interdisciplinary conversations about service-learning in STEM are a fairly recent development. In 2009, New York Campus Compact hosted Developing a Good Heart in STEM: The First Summit on Incorporating Social Justice and Service-Learning in the STEM Curriculum. Faculty members from across the country gathered at Ithaca College that summer to share course materials, present data on student learning outcomes, compare notes about classroom and community experiences, and think together about possible steps to encourage future development in this arena. Presentations featured community-based education projects addressing topics such as environmental sustainability, public health, and social justice. Some faculty members discussed service-learning as a pedagogy to increase student engagement and promote retention of knowledge. Others described the great value of projects that allow students in technology fields to apply their growing knowledge to real-world data sets and to participate in collaborative searches for solutions to global challenges. Projects ranged from small on-campus initiatives to complex international collaborations. Presenters explored connections between numeracy and social justice, described ways in which students in information-technology classes used their skills to assist community members in need, and debated together about core beliefs and emerging trends in math and science pedagogy. They described
work with local nonprofit organizations, K–12 schools, and government organizations, and at the end of the event, they committed to promoting community engagement in STEM curricula on and beyond their own campuses.

Soon the service-learning in STEM buzz was taking off across the country, and later that year Florida Campus Compact (FL|CC), in collaboration with the Corporation for National and Community Service, began its STEM initiative, which focused on the implementation of a series of day institutes and related follow-up programming on member campuses across the state with a goal of helping faculty members integrate service-learning into the teaching of STEM classes. Committed to using service-learning in STEM as a strategy to address Florida’s significant environmental, community health, and workforce development challenges, FL|CC funded a series of institutes, which not only helped STEM faculty members modify and develop their courses but also supported faculty members in other fields who wanted to make STEM-related concerns a significant topical focus in their courses. The initiative’s goals were (1) to contribute to a knowledge economy in Florida that is comprised of active, knowledgeable, and engaged citizens/STEM professionals; (2) to encourage behavior that will create a more sustainable future in terms of environmental integrity, economic viability, healthy communities, and a just society for present and future generations;¹ and (3) to contribute to the institutionalization of service-learning in STEM.

The following day institutes were funded through the initiative:

**Stetson University, Serve 2.0: Social Media for Service-Learning,**
September 18, 2009.

**Broward College, It Matters! Implementing Service-Learning,**
October 2–3, 2009.


Florida A&M University, *Building Sustainable Communities: The Environmental, Social, and Economic Pillars of Sustainability*, November 18, 2009.


Florida Atlantic University, *Exploring Civic Engagement through the Lens of STEM*, February 18, 2011.

University of North Florida, *Bridging Community-Based Learning in STEM*, February 24, 2012.


About This Guide
This manual is a direct outgrowth of these years of effort on behalf of and in collaboration with hundreds of participating faculty members across the state. It features materials that can be used by faculty members as well as campus administrators who wish to develop new service-learning programs or to enhance existing ones. The contents range from examples of excellent service-learning projects from a variety of campuses to practical tips for implementing a service-learning pedagogy, to scholarly resources for discussion with colleagues on your campus to other resources, such as exemplary course materials and a substantial bibliography. The following FL|CC STEM fellows contributed significantly to the statewide initiative:

Dr. Chris J. Brown, University of North Florida
Dr. Lisa Brown, University of South Florida
Dr. Erin Saitta, University of Central Florida
Ms. Lorraine Cross, Florida Atlantic University (Retired)

Florida Campus Compact staff members Ryan Rogers and Sam Mooneyhan also contributed to the project.

FL|CC Senior Research Fellow Dr. Melody Bowdon and staff members from the University of Central Florida Karen L. Smith Faculty Center for Teaching and Learning, including David Dadurka, Brett Morrison, Erin Saitta, and Lissa Pompos edited and assembled the manual. Dominic Campos designed the cover.

Sample Service-Learning Projects from Florida Institutions
The audience for this manual is higher-education faculty members interested in incorporating community-engagement activities into their STEM courses. Below are short descriptions of service-learning projects implemented by faculty members at institutions that participated in the day institutes. This list will give readers a sense of the types of activities that Florida students are engaging in while enrolled in courses in and beyond STEM and ideas for possible use in their own courses. These ideas are just a beginning; in the pages that follow are materials that can help
faculty members creatively develop their own service-learning STEM models that effectively address the learning goals in their courses. Briefly scanning this list reveals that there are many models and approaches to this work right here in the state of Florida.

**Science**

- Florida Gulf Coast environmental biology students created a smartphone-based interactive map of a local coastal watershed to share with the public that includes educational videos, site features, and data.
- Jacksonville University botany students collected and identified plants at a local preserve and then developed content for signs to help the public better understand and recognize local plant life.
- Students at South Florida State College enrolled in physics classes worked as greeters and facilitators for astronomy special events on their campus, helping the general public learn more about the universe beyond our planet.
- Polk State College environmental science students built small rain gardens on their campus to help capture runoff before it enters the sewer system and allow the water to filtrate into the ground, supporting aquifer recharge.
- Physics students at the University of Central Florida staged a community demonstration on the physics of a car accident, which allowed students to learn in detail about a number of complex ideas related to physics and offered valuable safety tips for community members.
- University of South Florida environmental science students conducted significant research on local environmental issues to support their work as “EcoMentors” to local high school students.
- Biology students at the University of Central Florida created videos about “hot topics” in marine biology and hosted local high school students on campus for a film festival and a coral reef protection activity.
• In a Broward College oceanography class, students collaborated on a conservation project with an international foundation committed to rehabilitation of ocean-reef ecosystems.

• Florida Atlantic University field ecology students worked on a wide range of monitoring and conservation projects in their community dealing with topics such as invasive insect and plant species, soil and ground water issues, and meteorological impacts on the environment.

• Polk State College biology students applied their knowledge by participating in a variety of campus clean-up and improvement projects, with an emphasis on improving connections between the campus and the surrounding community.

• Florida Gulf Coast students in an environmental biology class participated in a series of projects, including plant and wildlife inventory efforts and exotic plant removal and cleanup at a nearby marsh.

• Stetson University biology students made “Science Saturday” presentations at a museum in their community and created an activity guide for use by the K–5 children who participated.

• University of Central Florida chemistry students served as virtual lab partners with middle and high school students, collaborating with them on a multidimensional research project related to local water quality.

• Oceanography students at Pensacola State College served as citizen scientists by monitoring new artificial reefs as well as recycling and beach restoration projects in their area. Through this activity, they educated community members about major environmental concerns.

• An environmental science course at Broward College wove a variety of service-learning opportunities throughout the semester, including clean-up efforts at local parks and coastal areas.
• Physics students at the University of Central Florida collaborated with a variety of university offices to identify solutions to problems related to campus traffic management and safety.

• Psychology graduate students taking a research design and analysis course at the University of North Florida conducted applied research in close collaboration with and on behalf of local community partners in need of data analysis.

• Miami Dade College students had the option of receiving extra credit in courses such as Anatomy and Physiology and Essentials of Nutrition by engaging in community service relevant to their fields of study.

• Eastern Florida State College (formerly Brevard Community College) biology students had the option of earning course credit or assignment points in their course by participating in service-learning; one option included working on projects with the campus environmental club on their SOS: Save Our Seas project. Bioethics was a critical part of the course curriculum.

TECHNOLOGY

• Students enrolled in Information Systems Senior Project courses at the University of North Florida worked collaboratively with community partners to document requirements, analyze specifications, and design customized prototypical software to meet their partners’ needs.

• Global positional system students at the University of South Florida put their growing data and mapping knowledge to work in their community by conducting infrastructure surveys about accessibility of pedestrian, bicycle, and public transit modes to promote community sustainability.

• Interactive entertainment students at the University of Central Florida researched, proposed, and produced a video game that taught players about the devastating effects of the earthquake that hit Japan in April 2011, and
provided an opportunity for them to donate to the American Red Cross at its completion.

- Students in a database systems class at the University of North Florida modeled and developed databases to help community partners solve business problems.
- Broward College students in a computer and Internet literacy course had the opportunity to earn extra credit by participating in service-learning activities that applied their technology knowledge.

**ENGINEERING**

- Engineering students at Florida Gulf Coast University worked with a county office to study connections between local business practices and sustainability. They quantified energy savings, greenhouse emissions, and cost savings associated with various current business practices and offered recommendations for continued improvements.
- University of North Florida electrical engineering students worked as consultants for nonprofit and campus organizations in their senior design capstone course. They collaborated with their “clients” to define and propose solutions to engineering problems. In the subsequent semester, they designed, constructed, and tested their solutions according to engineering specifications.
- Engineering students participating in leadership-development workshops at Florida Atlantic University worked directly with faculty members to develop materials for use in engineering classes focused on community engagement.
- Soil management students from the University of North Florida work closely with a local homeowners association to propose possible strategies for diverting rain water away from structures threatened by drainage issues.
- University of Central Florida aerospace and mechanical engineering students designed, built, installed, and tested a solar and wind energy based power system for a
rural community in South Africa. Selected students traveled there at their own expense to install the system and to train villagers to use it.

- Florida A&M University architecture students applied their technological skills in a community-wide project to build a home for a community nonprofit in collaboration with Tallahassee Community College students and youth from the community. They worked together to use charettes to collaboratively explore design solutions.

- Tallahassee Community College construction materials and methods students had the option of mentoring high school students in trade programs as they worked to build a new site for a local nonprofit organization. They learned about workforce development and saw real-world applications of their skills and knowledge.

**MATHEMATICS**

- Broward College precalculus students made fun and innovative presentations about math-related topics to fifth-grade students at a local elementary school.

- Engineering students in a Florida Atlantic University calculus class worked with community partners on a variety of environmental-preservation projects with mathematical components and presented their work as part of a campus Earth Day event.

- Students enrolled in mathematical and statistical modeling classes at Stetson University served as statistical analysts for a youth sports league and maintained a community website highlighting the results.

- Mathematics students at the University of Central Florida worked with local nonprofits to identify and propose solutions to math-oriented problems. Several groups developed public service announcements about financial literacy for a variety of audiences.

- Mathematics Education students at Eastern Florida State College (formerly Brevard Community College) partnered with elementary school teachers in their area to identify
aspects of their students’ performance in need of improvement and to develop and present engaging and informative materials related to the topics of interest.

- College Algebra students at Eastern Florida State College (formerly Brevard Community College) provided mathematics tutoring for local middle school students through a fourth credit option model.
- Statistics students at Indian River State College had the opportunity to earn extra credit by serving as peer tutors in a campus statistics lab.
- Developmental Mathematics students at Broward College could earn extra credit by working with local K–12 students as part of their course.

OTHER DISCIPLINES

- Florida Atlantic University nursing students worked with members of their community to plan and implement a health fair event tailored to the specific needs of people living in a particular neighborhood. Students in a subsequent course worked to identify a call for nursing in a community, design an action response to the call, and implement an evidence-based, culturally appropriate, collaborative response.
- Interdisciplinary graduate students at the University of Central Florida worked with the local medical community to launch a public awareness campaign about electronic health records.
- University of North Florida health education students worked with a local community center to develop a health communication program for their clients and presented their findings to organization leaders at the end of the term.
- Indian River State College students in a community dental health lab provided their services to people in need in their area.
- Students in English and Spanish classes at Indian River State College incorporated service-learning activities
with a focus on STEM content (e.g., environmental and public health issues) into written and oral assignments.

- World religion students at Eastern Florida State College (formerly Brevard Community College) explored issues of hunger and poverty through a STEM lens during their work at a local nonprofit organization.
- A college preparatory reading course at Broward College incorporated Earth Day activities and included a topical focus on sustainability and the environment.
- Education students enrolled in a special topics course on global environmental change at Florida Atlantic University applied their course content by participating in local environmental action groups, and presenting educational material to community members in a variety of settings.

This list is merely a sampling of the impressive service and learning efforts students around the state have made and continue to make to improve their communities in conjunction with the FL|CC STEM Initiative. In the pages that follow are specific suggestions and models for effective incorporation of this model.
Service-learning is a pedagogical strategy; similar to other teaching approaches, like collaborative learning or case-based learning, service-learning is particularly well suited for some courses and contexts, but not for all. Perhaps the first step in planning your course should be to think carefully about whether service-learning is a good fit for your course, your students, and you. Ask yourself: what learning objectives in this course would be learned best through experience outside the classroom? Or, what aspects the course content relate to current issues or conditions in our community? The first and most important decision you make must be to determine how the use of service-learning as a pedagogy will improve student learning in this particular course. (See more on this topic in chapter 6.) Once you’ve determined that service-learning would be a valuable addition, the next step is to identify the specific kinds of activities and settings through which to implement service-learning in your courses. In this chapter, we’ll cover some basic definitions of service-learning and explore strategies for planning your course, finding partners to work with, and helping your students understand the goals of this activity.

Today, students, as well as their parents, are eager to see the applied value of what they learn in our classes. Employers want to interview and hire students who already have experience communicating effectively with others in written and spoken language, handling the constraints of a workplace including meeting deadlines and fulfilling commitments, and applying the material they learn about in classes in a professional setting. Employers
also want to see students who understand the importance of corporate citizenship and who recognize that civic commitment is critical for the future. Service-learning can help students gain and showcase learning in these areas.

According to the National and Community Service Trust Act of 1993, service-learning has several key elements, as depicted in the pyramid below.

![Elements of service-learning](image)

**Figure 1:** Elements of service-learning

Effective service-learning starts with clear and appropriate course objectives. Before any faculty member begins to incorporate service-learning into a course, it’s critical to review the objectives for your course, not only as a stand-alone class, but also as a component of a particular academic program, and ultimately as a component of each student’s degree. As with any of the teaching strategies mentioned above, it’s important to make clear connections between your approach and specific student learning goals. Admittedly, faculty members teaching typical college courses don’t always consider goals related to growing as a citizen to be central to our basic course objectives; we’re more worried, instead, about facilitating students’ understanding of core concepts from our fields than about helping them to be better people. But often when we scratch the surface of our course goals, we realize that (a) they do contain elements that connect
with students’ lives as citizens and (b) some of our goals might best be addressed by having students apply core concepts in the “real-world,” which service-learning can help them do.

Definitions of Service-Learning

Many definitions of service-learning circulate in higher education, and though they share several core elements, they do include some differences, particularly in terms of the elements of the pedagogy that they emphasize. Below is an extensive list of sample definitions that may be useful to review as you think about service-learning in your own course or on your own campus more generally. Find out if your college has a local definition of service-learning and, if so, consider it alongside these to help deepen your understanding of campus or disciplinary values.

- **American Association for Higher Education.** Service-learning is a method under which students learn and develop through thoughtfully organized service that (a) is conducted in and meets the needs of a community and is coordinated with an institution of higher education and with the community; (b) helps foster civic responsibility; (c) is integrated into and enhances the academic curriculum of the students enrolled; and (d) includes structured time for students to reflect on the service experience.¹

- **American Psychological Association.** Service-learning is a course-based, credit-bearing educational experience that allows students to (a) participate in an organized service activity that meets identified community needs and (b) reflect on the service activity in such a way as to gain further understanding of course content, a broader appreciation of the discipline, and an enhanced sense of civic responsibility.²

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². Ibid.
• **Campus Compact.** Service-learning incorporates community work into the curriculum, giving students real-world learning experiences that enhance their academic learning while providing a tangible benefit for the community.³

• **Council for the Advancement of Standards in Higher Education.** Service-learning is a form of experiential education in which students engage in activities that address human and community needs together with structured opportunities intentionally designed to promote student learning and development.⁴

• **International Partnership for Service-Learning and Leadership.** Service-learning is the pedagogy that links academic study with the practical experience of volunteer community service. It aims to develop in students a lifelong commitment to service and leadership, and it promotes understanding of local issues as well as recognition of the interrelatedness of communities and societies across the world. Service-learning unites academic study and volunteer community service in mutually reinforcing ways: the service makes the study immediate, applicable, and relevant; whereas, the study, through knowledge, analysis, and reflection, informs the service.⁵

• **National and Community Service Act of 1990.** Service-learning (a) is a method of encouraging student learning and development through active participation in thoughtfully organized service that is conducted in, and

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meets the needs of a community; (b) involves an elementary school, secondary school, institution of higher education, or community service program, along with the community; (c) helps foster civic responsibility; (d) is integrated into, and enhances, the academic curriculum or the educational components of the community service program in which the participants are enrolled; and (e) provides structured time for students or participants to reflect on the service experience.6

- **National Youth Leadership Council.** Service-learning is a method of teaching that enriches learning by engaging students in meaningful service to their schools and communities, and integrating that service with established curricula or learning objectives.7

### Bringing Service-Learning into Your Course

As you can see from the variety of definitions featured above, service-learning may be understood in many ways depending on your institution or field of study. Given this range of definitions, activities in service-learning classes can also look quite different from one class to another.

Service-learning can be used in a variety of course models:

- **Existing course with service-learning supplement.** In this case, a faculty member might take a current course, identify an objective that could better be met through “real-world” experience or civic engagement, and implement service-learning components to meet that objective. Some faculty members choose to replace an existing assignment, such as a class presentation, with a service-learning assignment, such as a presentation on a similar topic to a community audience, like children at a K–12 school, a local homeowner’s association, or a student

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23 | Faculty Guide to Service-Learning in STEM
group on campus. Others may replace an activity or assignment with a service-learning project—for example, changing a library-based research paper to a field-based research paper that draws on students’ experience working with members of the community. Others might completely revamp a current course to focus on service-learning by retooling all of their current assignments to focus on a theme like poverty or domestic violence as they relate to course content. For example, biology students on one Florida campus created informational videos about endangered species for local K–12 students, rather than simply presenting traditional reports to their classmates. This project yielded materials that could be used by a wide range of audiences and promoted environmental awareness and activism.

• **New traditional course with major service-learning focus.** In this scenario, a team of faculty members may determine that their program of study could be improved with an optional or a required course that focuses on community engagement. A course like this could make the service-learning field experience its main focus, asking students to spend most of the time they would normally spend in the classroom out in the community. This class could include a major reflective paper, weekly journal entries, or other traditional assignments, but maintain a focus primarily on the accomplishment of a fairly robust set of community-service goals. For example, on one Florida campus, engineering faculty members developed a leadership course that focused entirely on having students work with faculty to increase community engagement in the degree program.

• **Project-based course with service-learning applications.** Many existing courses lend themselves effectively to service-learning because they already are built around a project-based model. In a situation like this, a class like Engineering Senior Design, which typically requires students to complete applied projects with corporations,
might shift its focus slightly and instead have students undertake projects for local nonprofit organizations or public schools. Here, students still experience all of the project phases, including aspects like feasibility, needs analysis, and so forth, but they also have the opportunity to understand the unique constraints of nonprofit-sector entities and to recognize the civic value of their growing professional skills.

- **Traditional course with optional service-learning (extra credit, final exam).** Many faculty members who implement service-learning into their courses decide that the best way to do so is to include it as an option for students who wish to receive extra credit or to make it an alternative to another more traditional assignment. This approach can be particularly appealing to faculty members who are just getting started with service-learning classes. A statistics faculty member at one Florida college allows students to serve as peer tutors in their campus lab as a service option.

- **Stand-alone course containing only service-learning (individual or group).** On some campuses, a popular service-learning model requires that students complete stand-alone service-learning courses, in which they find a faculty mentor, select a site where they can spend some time completing service activities, and complete a final assignment about their service-learning work. In this model, students often choose their own projects with placement assistance from a campus service-learning office. This model can be seen on one Florida college campus where dental hygiene students work in a community clinic as a primary class assignment.

- **“Fourth-credit” option.** Some campuses allow students who want to complete a service-learning project to enroll in an optional extra student credit hour. Students who do this complete service-learning and other related activities but otherwise take the same traditional course as their classmates. In a STEM class, this model might be
comparable to an optional lab, in which students have the opportunity to apply their learning directly in the world beyond the classroom.

Where Does Service-Learning Happen?
Service-learning can take place in a number of sites and settings:

- **Nonprofit agency.** Most communities are home to a number of organizations that address a wide range of social, economic, environmental, public health, and other issues. Many campuses have strong relationships with such organizations based on previous service-learning and cocurricular activities and can help faculty members identify those organizations that address the issues they are interested in, as well as those that are effective at hosting university students. Often, organizations have a volunteer coordinator who can help faculty members find the right kinds of activities for their students to complete. It is important, of course, to distinguish service-learning from volunteering, and, while many nonprofits evince a strong desire to serve as co-educators of students, faculty members may need to work with nonprofit staff members to help them understand the importance of tying the service activities to course objectives.

- **Public school.** A public K–12 school can be a great site for service-learning, especially in the STEM disciplines. As noted in the introduction to this guide, our society needs to see improvement in STEM education at all levels, starting with preschool and elementary students. College students who are working hard to master challenging math or science content may find that teaching someone else about these difficult topics is a particularly effective way to synthesize their learning. Though there are certainly some important parameters affecting collaboration with schools, they are generally a great place to start for faculty members who know that they want their students to connect with the world beyond their own classroom but
who also want to keep students focused on the subject matter of their course. Few STEM topics do not have fundamental elements that can and should be taught at K–12 levels, and service-learning is a great vehicle for that activity. (For more on this topic, see the last section of this chapter, which features a model service-learning partnership.)

- **Government agency.** Agencies connected with local, state, or federal governments can also be great sites for service-learning. These organizations deal with everything from environmental concerns to public-health issues and are often in great need of assistance from students with some relevant educational background. Often, organizations like these have existing activities to involve citizen volunteers and are willing to modify them as needed to fit service-learning course objectives.

- **Grassroots organization.** Some courses and student interests may lend themselves more readily to working with entities that are less formally organized than those listed above. Local issues, in particular, may be best addressed through collaborations with groups not necessarily organized into agencies, like neighborhood associations, community development groups, advocacy groups, and member organizations. Sometimes students may even decide to form their own grassroots organizations to address a critical need on campus or in the surrounding community. Such situations will call for faculty members to think through their campus and course requirements for service-learning, but can yield excellent results.

- **Social entrepreneurship programs.** Social entrepreneurship, a field of study devoted to the creation of innovative solutions to pressing social problems, shares with service-learning a common goal of engaging students in work to achieve a public good, as well as a desire to link education to addressing social problems and needs. Such
work can occur across nonprofit, business, or government sectors, so long as it is committed to social change and focused on providing innovative solutions to social problems. A course with a social-entrepreneurial focus can provide an effective framework for service-learning and community-engagement activities. Likewise, faculty members whose courses have such a focus may find that a service-learning project can help students develop social-entrepreneurial competencies and skills and can cultivate in students a commitment to ongoing development work.

- **Campus organization.** Service-learning can involve a number of logistical challenges, including concerns about transportation and scheduling. Choosing a campus group as a partner for a service-learning project can sometimes help alleviate such concerns. If you work with a campus entity, be sure that it has a service emphasis, such as promoting environmental improvement or conservation or raising awareness among students about a public-health issue. The key is to keep the emphasis on addressing a need in the community, and if students define their community as their local campus, this kind of project can be very meaningful. This could also include a grassroots effort, such as evaluating and improving a recycling program or addressing a traffic problem that affects the community surrounding the campus.

- **Business with philanthropic commitments.** While the basic idea of service-learning is that students should use their time and energy to learn about the community by serving in it, some very valuable service-learning projects can take place in corporate environments within some well-defined parameters. As with campus-based projects, corporate activities should emphasize a philanthropic approach. This could include anything from working with a local engineering firm to raise community awareness about safety concerns in the area to partner-
ing with a small business with a community focus to promote citizen-scientist efforts. The key is to make sure that the students’ activities are designed not to generate profit for the company but to address a need in the community.

Models and Motivations for Service-Learning

Just as there are many sites for service-learning activities and ways to link them to course objectives, there are also a range of motivations and models for this pedagogical approach. These choices hinge largely on the goals that faculty and students have for the course, as well as the kinds of skills and knowledge that they hope to promote. The figure below highlights a few approaches to service-learning that might be useful in STEM courses. These approaches vary widely both in the levels of community contact and in the levels of course revision that they require for their inclusion. These models overlap in many ways, but the following model may help faculty members think through some kinds of activities that might enhance their students’ learning.

- Practice-oriented approaches frame students as pre- or paraprofessionals, allowing them to engage in work similar to what they will do as professionals when they graduate, but in a supervised environment. This kind of approach is especially valuable for STEM educators and health-care professionals.

- Research-based projects allow students to deepen their understanding of core concepts in the field and their application outside the classroom. This kind of project is useful in a course that addresses complicated subject matter with real-world relevance. One example might be a math class in which students learn about the abstract concepts related to financial issues and translate that information into public-service announcements, brochures, and other formats for use by members of the public.
- Field-based or concept application activities ask students to take the specific topics they are learning about in class and apply them in a direct way in the community. An example of this might be challenging computer science students to develop a mobile app for a local nonprofit organization. The students engage in the same basic steps that they would take to create a hypothetical app for a course assignment, but they do so for a community group with a need.

- Inquiry-based service-learning starts with a question, often one chosen and defined by students. Students might, for example, express a concern about an issue related to local water quality. Working together with a community partner, such as science students at a local middle school, they might collect water samples, conduct tests on them,
and collect data that they can share collaboratively with members of the community.

- Collaboration-oriented service-learning is a good fit for a capstone course, in which students are challenged to synthesize the skills and knowledge that they have acquired throughout their program of study. In this kind of scenario, students would meet with representatives of the community to discuss their needs and desires and work with them to create a plan for implementing their shared goals. In an environmental or civil engineering course, they might meet with community members to discuss a design for a new park.

Benefits of Service-Learning

One of the greatest barriers identified by faculty members to including service-learning in their courses is their concern about the increased workload. In times like these, when most faculty members are teaching more students with fewer resources than in the past, some worry that they simply will not be able to make service-learning a part of their teaching approach. But when making that calculation, it is important to carefully weigh the benefits of service-learning with its challenges. Many of these benefits have particular resonance in the STEM fields.

- **Better academic outcomes.** Students in service-learning may find it easier to grasp theories and concepts in an applied environment rather than through more abstract methods. Acquisition and retention of course content is enriched by seeing it in action. Also, a common approach to service-learning in STEM fields is to engage students in tutoring others in academic concepts, thus improving their own understanding while engaging others in STEM material.

- **Real-world experience for students.** Service-learning students who engage in substantive projects can gain important experience related to their course content, which simply cannot be gained through traditional instruction.
methods. The positive effect of service-learning on student retention seems to include a positive effect on their career selection and helps them stay in a STEM field. Students who succeed in this course format can include their accomplishments in their résumés upon graduation and can draw on their experiences in future job interviews.

- **Opportunity to field test knowledge in a supervised context.** Participating in service-learning can give students a realistic sense of their skills, abilities, and interests that can allow them to grow as professionals before they are in the workplace. In a service-learning course, students are not primarily responsible for a project, but they have the chance to take on incremental responsibility and see where their skills are strong and where they need improvement.

- **Community connections.** Students who participate in service-learning also have the opportunity to make connections with their local communities. This can be a valuable outcome for students who are living in their college community on a temporary basis and want to feel more connected during their time there, or for those who have lived there for some time and want to better integrate their personal lives with their work as students. Service-learning can serve as a valuable bridge between the various elements of a student’s world.

- **Encouragement of civic commitments.** Service-learning helps students see how what they are learning in school pertains to their world around them, and can help them grow into responsible and committed citizens. When a computer science student sees that by spending just a few hours of her time, she can save a local organization hundreds of dollars in technical-support costs and allow them to offer more services in the community, or when an engineering student sees that the decisions he will make in his future building projects may have a direct impact on the environmental quality of his own community, the importance of civic commitments becomes clear.
• **Positive image for campus.** Service-learning projects that provide value for and honor the community, and that promote collaboration between the institution and the city in which it is located, can promote supportive relationships and present the institution in a positive light among its citizens. This kind of positive connection can help to promote future collaborations, improve town-gown relationships, or lead to shared funding as well.

• **Teachers learn, too.** Service-learning projects are also of great value to instructors. When we let go of our standard classroom expectations and plans, work with community members as co-teachers, and join our students in their diverse service work in the community, faculty members can learn a great deal not only about our local neighborhoods and cities but also about our own academic fields and interests. Many faculty find their service-learning teaching leads to new research questions and opportunities. Seeing familiar topics through new lenses and in new contexts, and seeing our students make a difference in the world, can invigorate and inspire faculty members.

• **Effective fulcrum for interdisciplinary courses.** Faculty members on many campuses are under increasing pressure to teach courses in a multidisciplinary fashion, as old areas of study evolve in light of new questions and challenges. Service-learning is an excellent tool for helping students make connections across disciplines. If students are enrolled in linked writing and physics classes, for example, a service-learning project that focuses on communicating with members of the community about the collective benefits of a new program of research can serve to bring the separate courses together in a meaningful and socially valuable way.
Florida Student Responses to Service-Learning

In 2010, service-learning students across the state of Florida were surveyed about their attitudes toward the experience. Below are some sample findings from that survey, sponsored by FL|CC:

- 85.3 percent of respondents said that they would be either likely or very likely to take another service-learning course if it fit into their program of study.
- 90.9 percent of respondents either agreed or strongly agreed that their service-learning experiences added to the value of their degrees.
- 79.5 percent of respondents either agreed or strongly agreed that they learned more in their service-learning classes than they believe they would have in comparable courses without service-learning.
- 89.4 percent of respondents either agreed or strongly agreed that their service-learning activities will be relevant to their future careers.
- 88.5 percent of respondents either agreed or strongly agreed that service-learning helped them to understand how what they are learning in school applies to the real world.
- 96.4 percent of respondents either agreed or strongly agreed that contributing to their communities through service-learning was rewarding.
- 83.6 percent of respondents either agreed or strongly agreed that participation in service-learning made them want to learn more about the subjects they were studying.
- 82.6 percent of respondents either agreed or strongly agreed that they understood the complexities of a social or political problem in their communities better than they did before completing their service-learning.
Tips for Successful Service-Learning

As positive as the responses to service-learning noted above are, the pedagogy also brings with it challenges. The suggestions below can help faculty promote meaningful student learning and avoid problems.

- **Identify clear course objectives and find activities that help accomplish them.** As noted above, there are many, many ways to bring service-learning into your courses. Think carefully about how you want to approach it and do your best to tie the method you use to the objectives of your course. Not all service-learning projects have to involve direct service to clients of an organization—think about ways your students can be of service by applying their knowledge on behalf of the community. Challenge your students to come up with creative approaches to these efforts. Explain to your students before, during, and after the service-learning project how this work fits into the foundational goals of your class.

- **Build in time for debriefing.** When you send students out into the community (or campus), the experience will be very powerful for many of them. Though it may take a considerable chunk of precious class time, build in time for them to debrief their field experiences together. Invite them to talk through their experiences, share their stories, and compare them to those of their classmates. You may find it helpful to move some reflection to a secure online site, so even students who are nervous about talking in class can share their experiences and reflections, and so you can minimize the amount of time spent on this activity in class.

- **Always require a written response.** Naturally, not every service-learning course is a writing course, but a great deal of educational research suggests that students process information more effectively when asked to write about it. Ask students to write descriptions of their ser-
service-learning experiences in discipline-appropriate formats, such as field journals or trip reports. Ask them to reflect formally on their experiences, placing particular emphasis on questions about how their service-learning experiences connect with what they are learning in the rest of the course and how their service-learning experience is shaping their ideas about what it means to be a citizen and a professional in their field.

- **Choose activities that won’t require a long drive for students.** Try to offer at least some project options that do not require significant travel-related challenges for students. Choose opportunities on or near campus, or work with partners to create projects that will allow students to conduct meaningful service without traveling to remote sites. Some campuses allow students to conduct service in virtual formats, such as using web-based teleconferencing tools to make presentations to local communities. Keep in mind the carbon footprint associated with your class project, too, and encourage students to think critically about this issue as they plan their activities.

- **Start small.** Keep in mind that a successful service-learning project does not have to be huge and time-consuming. If you are new to this approach and concerned about how to make it work in your course and with your students, consider starting with a small project with minimal grade implications. Some faculty members make service-learning optional for the first semester or include just one small service-related assignment to begin. Check with the service-learning office on your campus to find out details about minimal requirements for being an official service-learning class, if your institution offers that designation.

- **Let the students do the footwork.** A great deal of the work associated with service-learning is clerical and logistical. If you have a relatively large class and you are
worried about how you will help them find places to complete their projects or how you will keep track of the paperwork associated with scheduling and documenting the hours they serve, work with colleagues on campus to place as many of those responsibilities as possible on the students. Doing so will provide students with valuable experience and will allow you as the faculty member to concentrate on teaching the subject matter in which you are an expert. Also rely on resources on your campus for assistance with these activities whenever possible.

Creating Effective Partnerships

Service-learning is a form of community engagement, which is a critical role for colleges and universities. The Carnegie Foundation for the Advancement of Teaching defines community engagement in this way:

Community engagement describes collaboration between institutions of higher education and their larger communities (local, regional/state, national, global) for the mutually beneficial exchange of knowledge and resources in a context of partnership and reciprocity.

The purpose of community engagement is the partnership of college and university knowledge and resources with those of the public and private sectors to enrich scholarship, research, and creative activity; enhance curriculum, teaching and learning; prepare educated, engaged citizens; strengthen democratic values and civic responsibility; address critical societal issues; and contribute to the public good.8

While this chapter introduces service-learning as a teaching approach, suggesting its strong tie with faculty activities, excellent

service-learning is a dynamic partnership involving several parties, including students and faculty, of course, but also the greater institution and, most importantly, the community served. A previous section of this chapter reviewed some of the sites where service-learning can happen and explained that these sites serve as community partners in a service-learning project. The partner, then, is the organization or entity in collaboration with whom the service-learning is conducted. But just as important to the service-learning equation—if not more so—are those served by the organization. In many cases, the direct recipients of service are people, but often the apparent direct recipients are also animals—or even plants. Of course, taking care of the world around us yields significant benefits to the humans in the community, too. The point here is that students and faculty members must be consistently mindful about the ways in which their service-learning efforts matter to those they serve. Below are some tips for creating effective, respectful, and reciprocal partnerships. (Chapter 6 includes additional information on this topic.)

Considerations regarding students and partnerships:

- Clarify the meaning of the term “partnership.” Help students understand that when they conduct service-learning, they are working with the community. The experience should be as reciprocal as possible, with close attention to mutual benefits for all parties. A partnership model relies on starting by determining what the community partner needs and what students need to learn and on building a project based on both of those elements.

- Avoid an attitude of noblesse oblige. Depending on their prior experiences with both needing and providing service in the community, some students may understand service-learning as an opportunity to offer pity and assistance to those less fortunate than themselves. This kind of attitude creates an unproductive power dynamic that can often result in students’ missing out on the most valuable learning opportunities associated with service-
learning and providing less-than-ideal service. Help students understand the partnership relationship as reciprocal and mutually beneficial—the students have the opportunity to learn through experience and, as part of the larger community served by the community partner, they reap the benefit of their own efforts.

- Avoid the “seduction of empathy.” While we definitely want students to see themselves as part of the community when they participate in service-learning, and one goal held by many service-learning faculty members is to provide students with some insight into the experiences of people in circumstances different from their own, it is important to help students understand that spending a relatively small amount of time helping people who are facing difficulties does not equate with facing those difficulties themselves. Encourage students to avoid thinking that once they’ve worked with a particular population in particular circumstances that they “know how it feels” to be hungry or to face poverty, for example. Keep students focused on action rather than on feelings as they complete their service-learning projects to help them understand the importance of engaged citizenship.

Considerations regarding community partners and partnership:

In 2005, Campus Compact published a book called *The Promise of Partnerships: Tapping into the College as a Community Asset*, by Jim Scheibel, Erin M. Bowley, and Steven Jones. This book makes a number of recommendations about working with community partners. They point out the following areas that require particular attention:

- **Financial cost.** Remember that working with students can be a great deal of work for community partners, many of whom may be already resourced challenged. As you plan your service-learning project, keep in mind the

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costs associated with training, supervising, and evaluating students.

- **The academic calendar.** As natural as the semester model of life may seem to many of us in higher education, the world outside does not operate in consistently aligned fifteen- or sixteen-week chunks, which can create challenges for working with community partners. Figure this aspect of planning into choosing and designing service-learning projects and into creating your syllabus.

- **Power differentials.** Remember that the campus-community partnership should be a reciprocal one. Work hard to minimize the impacts of power differentials between you and your students as representatives of the campus and the organization and those it serves.

- **Language.** Keep in mind that community organizations, just like college campuses and individual disciplines, have their own specialized languages. Avoid using academic jargon when working with community partners or those they serve, and remind students to do so as well. Do your best to learn the community partner’s language to maximize collaboration and student learning.

- **Values and priorities.** While students and even faculty may be strongly focused on completing the class project as a primary goal, remember that it is critical for faculty and students to understand the mission, goals, expectations, rules, policies, and priorities of the organizations served. Students should have the opportunity to learn as much as possible about their partner organizations and what they stand for before and throughout the service-learning experience.

**Partnering with K–12 Schools: A Special Circumstance**

The suggestions above make clear that mutual respect is the key to effective partnerships. This is crucial to partnering with K–12 schools, which can be a great fit for STEM service-learning classes, but can also be challenging because of elements like scheduling, background checks, and working around standardized test
preparation and implementation dates. For that reason, the final portion of this chapter will highlight one successful STEM service-learning project that involves a partnership between secondary and college students and has received international attention.

An Inquiry into the Water Around Us: University of Central Florida

One of the first activities to be funded by Florida Campus Compact’s STEM initiative was an initially small project undertaken by faculty members from the University of Central Florida (UCF) in fall of 2009. The project began with the idea of using web conferencing tools to support a virtual lab partner relationship between UCF chemistry students and chemistry students at a local high school. The project started with just a couple of online interactions and one technologically challenging synchronous lab experiment, involving small groups of university and high school students completing a lab simultaneously on their separate campuses and engaging with each other via Adobe Connect. The project grew to involve more robust partnerships with a series of local middle schools and high schools, including field trips to campus and semester-long correspondence between university and secondary students. The lead STEM faculty member working on the project, Erin Saitta, incorporated inquiry-based learning into the course as well. An essay by the faculty members involved in this effort and the award-winning inquiry-based instruction course model are featured in the August, 30, 2013, issue of Science, which can be accessed at this URL: http://www.sciencemag.org/content/341/6149/971.full. Full lesson plans for a chemistry unit that combines inquiry-based learning and service-learning are available in PDF form at this URL: http://www.sciencemag.org/content/341/6149/971/suppl/DC1. Below is an excerpt from those supplemental materials that offers suggestions for working with K–12 partners.

Finding a K–12 Partner

There are many approaches to finding a K–12 partner. One of the simplest is to reach out to campus resource centers. Whether in a center for experiential learning, faculty center for teaching and learning, or office of service-learning, there is a good chance that there are people on your campus who have connections to local schools. Checking with the college of education is another option since the service-learning provided in your class may complement another initiative already in place.

If you have a specific group of students or demographic in mind, you can contact a school directly. Contact information can typically be found on the school website. Most secondary schools (grades 6–12) have a science chair or director who can act as a point person for reaching science teachers.

It is best to have a basic idea of what you are willing to provide and for what you are looking in a participating teacher when you contact a K–12 partner. Information regarding the amount of time necessary in and out of the classroom for both the students and the teacher helps to define the best match for the project. Other logistical issues like the time of the year, method and frequency of communication needed, and projected benefits for the K–12 students are good to address when contacting a suitable partner. Our most productive partnerships have been with teachers who demonstrated strong classroom management, positive student-teacher rapport, and effective communication.

Working with a K–12 Partner

Approaching the partnership as a mutually beneficial relationship is the key to a successful service-learning project. Although it is smart to go into initial meetings with clarity about your class goals and objectives and a general idea of what can realistically be accomplished within the limitations of your course schedule and your students’ skill sets, listening to the partner’s needs and getting a true sense of what would be helpful to them will enhance the project and the partnership. It is best to work with the K–12 partner to determine and document common goals around which to base the project as well as to define individual roles and
responsibilities. Developing a timeline of events and outlining expectations in writing is critical for establishing effective ongoing communication.

If you are new to working with K–12 schools, there are a few things to consider. Depending on your state’s policies, it is possible that entire periods of time and/or groups of students may be unavailable due to standardized testing, particularly in public schools. It is also helpful to remember that teachers are often overworked and may not want to take on additional responsibilities. By working around the K–12 school schedule, organizing as much as possible in advance, and being patient and flexible, you can improve the university-partner relationship and better accomplish the project goals. By developing a project that directly addresses a key learning goal of the secondary students, this project can actually relieve pressure on the partnering teacher, particularly if you choose a topic that she or he finds particularly difficult to teach.

Creating effective partnerships is definitely crucial to successful service-learning. In the next chapter, we will explore how to assess the outcomes of your service-learning course project.
Once you have determined that service-learning is a good fit for your course and developed your general ideas for how to approach it, it’s important to develop a model for assessing its value. There are a number of reasons for service-learning assessment, including to measure student learning outcomes, to evaluate the overall effectiveness of the course, to contribute to institutional statistics on campus-wide civic engagement activities, and to determine a project or group of projects’ impact on the community. This chapter will focus primarily on assessment of student learning in a course.

The assessment of student learning in a service-learning course is not unlike the assessment of student learning in any other course. As with any type of instruction, service-learning assessments should correspond to course-specific learning outcomes and are made up of tasks that authentically measure student progress in reaching those outcomes. This approach is particularly effective in a course when assessments are integrated throughout the service-learning project and allow for multiple opportunities to demonstrate learning.

Aligning Assessments with Learning Outcomes: Using an Assessment Matrix

The foundation for authentic assessment begins with learning outcomes that identify what students should be able to know or do after participating in the service-learning activities. Practitioners use a variety of approaches to ensure that assessments are aligned with learning outcomes, including the use of planning
tools like an assessment matrix. An assessment matrix is designed to assist in achieving balance between learning outcomes and assessments. It enables gaps to be identified and highlights areas of overassessment. The matrix can also aid in determining how much each assignment or task will be worth, as it allows the faculty member to see how each assessment correlates outcomes. For example, it would make sense to have a portfolio assignment that measures multiple learning outcomes be worth more points than a quiz or paper that addresses only one outcome.

To use the matrix, insert learning outcomes in the rows and list the assessment activities in the columns. Place a check mark in each box that describes an assessment of a course outcome. Once you have done this, it is possible to get a visual of the relative balance in your course. There may be some assessments that do not meet any outcomes, or there may be outcomes that are not being assessed. If you find that you are continually trying to assess a concept or skill that is not connected to an outcome, you may need to reevaluate your list of outcomes make adjustments as necessary. Aim to have some check marks in every row and some in every column, but do not try to have a checkmark in every box.

Below you will find an empty assessment matrix as well as a sample completed matrix for a general chemistry service-learning project. Notice in the sample that without the reflection or survey assignment, the objective to “relate the course material to real life” would have gone underassessed. Adding the two assessments was a simple and effective way to get feedback from the students while bringing awareness to the objective.
Assessment Matrix

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Outcome 1</th>
<th>Outcome 2</th>
<th>Outcome 3</th>
<th>Outcome 4</th>
<th>Outcome 5</th>
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</table>

Example Assessment Matrix for Chemistry Laboratory Module

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Prepare solutions</th>
<th>Develop critical-thinking skills</th>
<th>Communicate lab terminology (written &amp; oral)</th>
<th>Analyze data (algebra &amp; graphs)</th>
<th>Relate course to real life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-lab quiz</td>
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<td>×</td>
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<td>×</td>
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<tr>
<td>Lab artifacts</td>
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<tr>
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<tr>
<td>Reflection</td>
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<tr>
<td>Survey</td>
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</table>

Choosing Assessment Tasks

Selecting the best assessment tools depends on the learning outcome being measured. For some outcomes, quizzes and tests are a suitable way to determine the level of student understanding, while in other cases, creative projects or reflections are more appropriate. Service-learning as a teaching method combines cognitive tasks, skills, and emotional responses that require a variety of assessment methods. Authentic assessments that prompt students to create something as a way to demonstrate their learning provide an opportunity to evaluate student progress over time as well as their ability to use course content in context. As opposed to planning all of the assessment at the end of the project as a way to summarize learning, integrating formative assessments throughout the project will build feedback loops into the assessment process, increase student engagement, and support student learning.
Ideas for assessment tasks include the following:

- Daily journal entries
- Online topic forums
- Video and photography projects
- Essay writing
- Surveys
- One-minute papers

Using Reflection to Achieve and Assess Student Learning Outcomes

Reflection is a key component of service-learning that assists students in connecting their service to their course material. Reflection is also an opportunity to address outcomes, like increasing your sense of civic engagement, that are integral to service-learning but difficult to measure with traditional assessments. Structured reflection prompts aid in soliciting quality responses that encourage students to bring awareness to connections, feelings, and ideas that may otherwise have gone unnoticed or unacknowledged. Examples of reflection prompts based on the University of North Florida’s Four Community-Based Transformational Learning Outcomes are provided below.

**Inter- and Intrapersonal Learning.** How did you initiate interaction with the community partner or the partner’s clients—or both—while working on this project? What insight did you take away from this interaction? How did this inform your project and influence your final product?

**Ethical Character Learning.** How do the ethical practices of your discipline align (or not) with the core beliefs of the community you are working with? What obligations and responsibilities do you have as an individual working with the community partner, and how are these claims to be weighed against your other obligations and responsibilities?

**Democratic/Effective Citizenship Learning.** Given your service-learning experience, what connections do you make between your chosen field or discipline and its role in the larger society?
**Integrated Connective Learning.** How did this experience influence your learning? What, if any, complications or successes changed the way you engaged in the course material or field of study?

**Rubrics**
Evaluating student work like creative assignments and reflections with a consistent standard can be made easier through the use of a rubric. Composed of a list of criteria with various levels of competency, a rubric is designed to communicate expectations to students, provide consistency in grading, and add specific guidelines to an assignment that may otherwise appear subjective to students. You can customize a rubric for a specific assignment by designing one from scratch or by modifying an existing form. Previously created and standardized rubrics can be found through a variety of education resources. For example, the website of the Association of American Colleges and Universities (AAC&U) features a set of rubrics that can assist in measuring student learning related to specific learning outcomes http://www.aacu.org/value/rubrics/pdf/All_Rubrics.pdf.

**Student and Community Partner Involvement**
In some service-learning projects, evaluation rubrics are designed by the student groups. This is an example of creating opportunities for students, as well as community partners, to contribute to the assessment process. Giving students the ability to take part in designing an assessment can lead to greater engagement, while involving the community partner in the assessment process can create stronger partnerships and improve the quality of service-learning outcomes. Both student-led design and partner-led design should stay focused on learning outcomes and partner needs. In fact, partner needs can lead and inform the development of learning outcomes that are worthwhile for students. A more in-depth example of how the community partner can be engaged in the assessment process can be found in Jacoby and Mutascio’s *Gauging Community Impact in the Community*, which describes the following:
1. **Community Partner Survey**: Intended to describe community partners’ perspectives, motivations, concerns, and attitudes on issues related to their experience with students through the service-learning experience.

2. **Community Partner Interview**: A one-on-one conversation with the community partner to explore their perspectives on the experience of working with the institution.

3. **Community Observation**: To describe the character and content of interactions between students and faculty and the community partner; to capture the dynamics of the community service experience; to document student learning in the community; to gather data on services rendered to the community; and to provide descriptive documentation of the partnership.

4. **Community Focus Group**: To understand the impact of the partnership and to collect feedback, positive and negative, that will assist the institution in improving partnership activities in the future.

**Closing the Assessment Cycle**

After each implementation, it is important to look back at the original goals and outcomes and make revisions to the project. The questions below can aid in improving the assessment plan.

- Did the course accomplish what you thought it would accomplish?
- Did the students think that goals were met? Did the community partner?
- Did the students value the service-learning experience?
- Were the community partner(s) and students recognized for their work (e.g., certificates, transcript notation, symposium of work, some type of culminating activity within the course to celebrate success)?
Conclusion

In an effort to implement quality service to the community while maintaining high standards regarding course content and student performance, it is important to incorporate strategic and deliberate assessment of learning outcomes. To do this well, assessment should be integrated into the course design and should be balanced with the course-specific outcomes in a thoughtful manner. Choosing a variety of assessment tasks can better encompass the diverse concepts, skills, and attitudes emphasized by the service-learning project. Bringing student and community partner voices into the assessment process can help solidify connections between the campus and the community and maximize the learning impact of a project.
Participants in FL/CC STEM service-learning day institutes around the state created dozens of excellent syllabi and other course materials that demonstrate effective strategies for incorporating this pedagogy into courses. This chapter contains a small sampling of those materials taken from just a few of the courses developed through the initiative. Below you will find sample course policies, assignments, and other information that may inspire you as you develop your own STEM service-learning course. To demonstrate the breadth of the projects, these materials are divided into science, technology, engineering, and mathematics categories, but many of the ideas and approaches could be adapted for use in many disciplines. If you directly quote these excerpts in your own course materials, please cite the original faculty sources.

Science

University of Central Florida
Discipline: Chemistry
Faculty Member: Erin Saitta
Category: Sample Course Objectives

Course Goals and Objectives
Since the module was designed as part of the general chemistry laboratory for science majors, the learning goals are to:

- Understand chemistry concepts and their relevance to the environment
- Engage in laboratory analysis techniques
• Experience the process of scientific inquiry in a safe and inquisitive learning environment
• Learn about civic engagement and community responsibility
• Explore various ways scientists communicate, including written and oral communication to non-scientific audiences.

Each lesson/experiment contains specific and measurable learning objectives that have been combined into the list below.

At the end of the module, students should be able to:

• Design a procedure to answer a key question including the control of variables
• Utilize glassware and equipment in alignment with their intended function, specifically including a burette and spectrometer
• Use laboratory terminology/vocabulary in written and oral communication
• Analyze data through algebraic calculations and graphical analysis
• State a claim based on experimental evidence
• Identify how the laboratory experiments relate to environmental issues
• Communicate to a secondary science student about environmental chemistry issues

Goals for the secondary students are determined on a case-by-case basis but often include:

• Experience a university science course
• Reflect on their potential future participation in higher education
• Learn about science concepts and their relevance to everyday life
• Understand the process of scientific inquiry in a safe and inquisitive learning environment
Pensacola State College  
*Discipline: Oceanography*  
*Faculty Member: Charlene Mauro*  
*Category: Sample Course Goals*

Service learning component: You will be involved in research monitoring the new artificial reefs, local monofilament recycling project, and beach restoration projects. As citizen scientists, you will educate children, adults, and other students about these environmental issues in our area. The goals of the service-learning component of this course are as follows:

- deepen understanding of science practice and concepts
- collect, analyze, interpret and share data
- use data to demonstrate problem and show impact
- provide a service for a real audience
- consider lasting impact

Technology

University of North Florida  
*Discipline: Information Systems*  
*Faculty Member: Karthikeyan Umapathy*  
*Category: Sample Project Overview and Agreement*

**Service-Learning**

This is a Community-Based Transformational Learning course. This class utilizes service-learning based instruction in which students will achieve course objectives through community-based projects. Throughout this semester, students will have adequate opportunity to interact with community partner and reflect on their learning and service. As part of this course, students will offer information systems development service to a non-profit community partner from North East Florida region. Students will work as a part of a team to develop a prototype software product that addresses a real-world problem faced by a community partner.

In this course, students will learn software engineering techniques and knowledge, which include requirements elicitation,
analysis & design, implementation, and testing. Students will apply skills gained in the classroom to develop prototypical software that addresses a need of a community partner. Software product requirements tend to be unspecified or poorly specified at the beginning. Students will be expected to work along with community partners to document software requirements. Students will analyze requirement specifications and design the software. The major outcome for this semester will be a beta-level implementation of the software product.

**Instructor Responsibilities**

- Provide an environment that allows students to gain practical experience and acquire an ethic of community service.
- Provide curricular-based service opportunities that apply to course learning objectives, class schedules, and student capabilities to community partners.
- Provide guidance and supervise student service-learning activities.
- Work towards resolving concerns arising as a consequence of service-learning activities.
- Provide students with learning materials and in-class activities that will enable them to perform service-learning activities.
- Evaluate student service learning activities based on feedback received from community partners.

**Student Responsibilities**

- Students are expected to work at minimum 10 hours per week towards the project.
- Students are expected to work collaboratively as a team. Students are expected to work face-to-face and asynchronously on shared tasks on regular basis.
- Maintain regular communication with each both community partner and instructor.
- Help community partners understanding software technological capability to address their problem.
- Regularly attend the class, team meetings, weekly and monthly sprint review meetings, and community partner meetings.
- Work towards understanding community partner needs and develop a software product that addresses their problem.

**Service-Learning Community Partnership Memo Assignment**
The purpose of this memo is to inform community partner about the nature of the service-learning activities to be performed by the UNF students and to outline your responsibilities. This memo also serves to make the community partner aware of certain intellectual property and confidentiality matters concerning community-based learning course projects.

**Scope of student work**
UNF students are capable of providing a wide variety of computing services, including Web-based application development, information systems development, and mobile application development. Student work includes the following:

- Work towards understanding community partner needs and developing a prototypical software product that addresses the identified problem.
- Help community partners understand the technological capability of software to address their problem.
- Analyze the problem context and document system requirements.
- Analyze requirement specifications and document systems design, using Unified Modeling Language (UML) models.
- Develop detailed system documents, including database design and interface design.
- Develop test cases and subsequently test the software product.

**Community Partner Responsibilities**
- Assign a point of a contact person to answer student questions and provide clarification.
• Agree the outcome of the student service learning activities will be a prototypical product.
• Participate in problem definition, requirements elicitation, design reviews, prototype reviews, product demonstrations, presentations, and other relevant activities.
• Help students gain understanding of the community partner organization rules, policies, procedures, methods and operations, community issues, and population served.
• Maintain regular communication with students and instructor throughout the project.
• Attend project presentations at the beginning and at the end of each semester.
• Provide feedback on student work, project reports, and other artifacts, including continuous program improvement surveys.

University of South Florida

Discipline: Global Positioning Systems
Faculty Member: Hyun Kim
Category: Sample Project Overview

What is the Project? Participants will complete infrastructure surveys related to pedestrian, bicycle and public transit modes by performing field assessments of local, county and state roads and adjacent sidewalks and right-of-ways within identified priority planning areas throughout the City. Most of these surveys shall be completed by on-the-ground assessments which will be performed primarily by walking; in rare exceptions windshield surveys may be substituted for walking in order to expedite the process of data gathering. In no case shall online mapping systems such as Google Maps be used to perform these assessments as the content is dated and would undermine the integrity of this project. These data shall be formatted into Excel spreadsheets and if possible, integrated into GIS layers for future use by city planners and public works/engineering staff. After data is compiled students are encouraged to synthesize findings and provide
recommendations for staff consideration regarding gaps in critical infrastructure.

What is the community need that it fulfills and how was it identified? This project fulfills the city’s need for comprehensive infrastructure data which will help to formulate capital improvements funding and scheduling. It was identified during the city’s ongoing efforts to create safer pedestrian and bicycle networks.

How many total hours would you estimate that the project will take? It is expected that one or two students will be assigned to each priority planning area due to the amount of data that must be gathered. Due to the variation in size of planning areas it is difficult to predict with certainty the amount of total hours however each priority planning area is designed to be easily surveyed over the course of a semester.

What resources (documents, websites, willing informants, etc.) are available to the students to complete the research? This project assumes no prior knowledge of the city’s infrastructure but planning staff is fairly knowledgeable about existing issues and therefore will be a critical resource for students during the process. General knowledge regarding how to perform these surveys, treatments for livable communities pedestrian and bicycle infrastructure, as well as Federal requirements to accommodate those with disabilities through AADAAG can be acquired by browsing the following documents:

http://katana.hsrc.unc.edu/cms/downloads/PedRSA.reduced.pdf
http://www.pedbikeinfo.org/
http://www.ite.org/bookstore/RP036.pdf
http://www fhwa.dot.gov/environment/sidewalk2/pdf.htm
Engineering

Florida A&M University

_Discipline:_ Architectural Design  
_Faculty Members:_ Olivier Chamel, Beth Lewis, & Gretchen Miller  
_Category:_ Cross-Institutional Engineering and Technology  
_Partnership with Tallahassee Community College_

**Service Learning:** A service-learning opportunity will be available and incorporated into the studio during the semester. It will involve design and hands-on experience on a construction project, helping to build a home for a nonprofit. This will be an ongoing opportunity. Participation will be mandatory and will count towards your final grade and will also provide important learning that will be discussed and incorporated into design studio projects. Only very unusual or dire circumstances are the basis for not being a part of these opportunities.

This semester the service-learning project will be a design charrette and joint project with Gadsden County Youthbuild and Tallahassee Community College. The intent of a Design Charrette is to investigate and develop ideas in an intense short period of time to explore possible design solutions for a succinct design challenge. In this case the challenge is to explore design solutions for a 1,000 SF house in Midway, Florida.

This activity will bring together representatives of the community, TCC faculty and students, Gadsden Youthbuild participants as well as faculty and students of the Florida A&M University, School of Architecture (SOA) for an intense session of brainstorming, discussion, and concept design development.

By exposing Youthbuild participants to this design process they will be informed about potential career possibilities. In addition FAMU, SOA students and TCC students will exchange ideas and form partnerships. FAMU and TCC students will also provide mentoring to Youthbuild participants through the charrette design process and later on during the construction phase.

The products developed during the charrette have the potential to communicate their intents and educate a broader audience.
such as the Gadsden YouthBuild organizers and community members. The design event will be followed by a formal design presentation of the ideas explored in the charrette. In addition SOA students will have opportunities to participate in the hands-on construction of the house in Midway, Florida. This will also provide further opportunities for SOA students to mentor YouthBuild students and build relationships with TCC students.

Tallahassee Community College

*Discipline:* Construction Materials and Methods
*Faculty Member:* Luke Nicholson
*Category:* Cross-Institutional Engineering and Technology

**Partnership with Florida A&M University**

**Service-Learning:** A service-learning opportunity will be available during the semester. Participation is voluntary but is an opportunity to integrate your learning in class with actual construction work, for a good cause. The service-learning opportunity will involve working on a construction project, helping to build a home for a program called YouthBuild. Participants will mentor high-school aged students who are learning a trade while helping to build a house, and also working on improving their academic skills. Our community partners for the YouthBuild project are the TCC Center for Workforce Development, the United States Department of Labor, and Workforce Plus of Quincy, Florida, and the Florida A&M University.

Mathematics

Florida Atlantic University

*Discipline:* Calculus for Engineers
*Faculty Member:* Daniela Popova
*Category:* Sample Project Overview

**The Academic Service-Learning (A S-L) Project:** Following a successful experience from previous years, students will be invited to develop individually, or in groups, projects about the applica-
tion of Calculus in the real world under the supervision of the instructor. This time we will focus on community impact, and try to take these projects from design through implementation. As a result, community service organizations are provided with alternatives for solving important technical problems related to local environmental issues. You are required to spend a minimum of 15 hours on your project.

The stress this year will be on *how to preserve the environment*. Rather than just any project that a student could do, we shall try to identify community need for which Calculus could potentially provide a solution. As a reminder, the Environment is part of community as is land development and anything related to conservation of resources.

**A S-L Project Reflection Presentation:** Students will put together a presentation on their A S-L project and include the issue identified, the agency/organization for whom the project is based, how Calculus was applied to the project (thus linking the project to course objectives), how your work impacted the community agency/organization, and how your work impacted your personal/professional development.

The best projects will be visually presented at Earth Day on April 22, 2011, on the Boca Raton campus, together with other Academic service-learning projects. There will be a monetary award for the organization/agency for which a sustainable solution has been designed.

**Stetson University**

*Discipline:* Mathematical and Statistical Modeling  
*Faculty Member:* Will Miles  
*Category:* Sample Project Overview.

**Service-Learning:** This course incorporates service-learning as part of our educational experience. As a class we will coordinate a youth sports league to act as the statistical analyst for the league for their season. Students will be divided into groups to follow each team in the league, attending games and recording...
data. Coaches will be consulted to determine which statistics are to be kept and tracked. The class will maintain a website dedicated to the league, providing statistical information at the player, team, and league level. We will use our Thursday class session for updating league stats and discussing statistical concepts and how they relate to the league. At the conclusion of the season, our class will present a summary report to the coaches. These stats may be used to determine the most improved player, the most outstanding player, the most consistent player, etc. Finally, player cards will be produced and presented to each player. I hope that you will find this enjoyable and rewarding.
In the past thirty or so years, scholars in many academic fields have conducted research on the value of service-learning, on strategies for and challenges in implementing this pedagogy, and on the usefulness of various models and approaches. This chapter provides only a brief overview of some of the scholarship related to service-learning. The bibliography section of this book includes information about all the original sources described here. Consider discussing some of the definitions, models, and approaches included in this chapter with colleagues as you think about how service-learning might fit into your course. We hope you’ll also think about how you might engage in scholarly research related to your service-learning teaching experiences in the future. Florida Campus Compact provides a variety of types of support for such efforts.

Defining Service-Learning

Service-learning has roots in early U.S. history, according to Kinsley and McPherson. In their book *Enriching the Curriculum through Service Learning*, they note that in the early 1800s, historian Alexis de Tocqueville observed Americans engaged in “civic and social support.”¹ They write that, “historically, community service has been part of the activities of families, churches, community organizations. . . and school groups.”² Berman cites the

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2. Ibid., 3.
creation of the Peace Corps by President John F. Kennedy as a key moment in the history of service-learning. However, service-learning is not just volunteering, community service, or civic engagement. Service-learning has been defined in the following ways:

- An experiential education approach that is premised on "reciprocal learning."
- A method under which students learn and develop through active participation in thoughtfully organized service experiences that meet actual community needs, that are integrated into the students’ academic curriculum or provide structured time for reflection, and that enhance student learning beyond the classroom and into the community.
- Any carefully monitored service experience in which a student has intentional learning goals and reflects actively on what he or she is learning throughout the experience.
- A course-based, credit-bearing educational experience in which students (a) participate in an organized service activity that meets identified community needs and (b) reflect on the service activity in such a way as to gain further understanding of course content, a broader appreciation of the discipline, and an enhanced sense of civic responsibility.
- A teaching method where guided or classroom learning is deepened through service to others in a process that

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provides structured time for reflection on the service experience and demonstration of the skills and knowledge required.\textsuperscript{8}

Service-Learning and Course Objectives

To determine whether a service-learning component would be a good fit with your course, begin by outlining your course objectives and your learning objectives. After all, in a service-learning class, “the service provided by students flows from course objectives.”\textsuperscript{9} Next, consider what types of assignments and activities will allow students to meet those learning objectives. If the learning objective involves applying knowledge of theory or processes in a specific context, communicating and negotiating with others, assuming a leadership role, writing about and reflecting on learning over time, developing a sense of civic duty or personal responsibility, or designing a plan of action to solve a community-defined problem, for example, service-learning might be a good fit.

After articulating course objectives and planning activities that can help students meet those objectives, you should also ask questions about the purpose and scope of your service-learning assignment:

- Is service-learning an integral part of this course?
- Will service-learning be a required or an optional experience?
- How will the service-learning experience be evaluated?
- Will I need to modify past course content to accommodate a service-learning experience?\textsuperscript{10}


\textsuperscript{10} Carol A. Sedlak, Margaret O. Doheny, Nancy Panthofer, and Ella Anaya, “Critical Thinking in Students’ Service-Learning Experiences,” \textit{College Teaching} 51, no. 3 (2003): 103.
When framing course objectives in terms of service-learning outcomes, it is beneficial to include not only a learning goal but also an indication of how the goal will be measured or assessed or both. Without this second portion, the learning goal cannot become a learning objective. Some examples of student *learning goals* include improving students’ thinking and problem-solving skills, helping students identify their personal strengths, and encouraging students to develop a sense of civic responsibility.¹¹ To turn these learning goals into *learning objectives*, you can add verbs that signal how students will achieve the goal, as well as a criterion for successful achievement. For example, “improving students’ thinking and problem solving skills” can be modified to state the following objective: “Students will demonstrate problem-solving skills by collaborating with community partners to articulate a problem, discuss possible solutions, create a plan of action, reflect on the outcomes of the plan, and adapt the plan as needed.” To take this learning objective one step further, you can also add a description of what types of activities will be involved. For example, in the above learning objective, students can document their learning through process notes, reflective journal entries, and project proposals.

There are six types of student learning that a service-learning course can foster:

- Course-specific academic learning
- Generic academic learning
- Learning how to learn
- Community learning
- Inter- and intrapersonal learning
- Civic learning ¹²

In addition, according to the Center for Community Engagement’s *Service Learning Curriculum Development Resource Guide for Faculty* (Long Beach: California State University, 2010), 25.


¹². Ibid., 34.
Faculty, service-learning course objectives can cover a variety of developmental areas:

- Students’ critical thinking and analysis skills
- Students’ research, communication, and leadership skills
- Students’ awareness of—and involvement with—community
- Students’ commitment to service and civic responsibility
- Students’ career development
- Students’ understanding of course content
- Students’ self-awareness
- Students’ sense of ownership
- Students’ sensitivity to diversity
- Students’ appreciation of multiple teachers and pedagogies

Therefore, most learning objectives for a service-learning course will probably speak to one or more of the “types of learning” or “developmental areas” mentioned above.

In keeping with the example of a problem-solving learning objective discussed in chapter 3, then, we might articulate a related objective about connecting course content to lessons learned from the service-learning site. For example: “Students will obtain, analyze, and synthesize data from the service-learning site and use this data to evaluate the community problem in light of concepts and theories presented in class.” For additional examples of service-learning course objectives, please see pages 30–33 of Service Learning Curriculum Development Resource Guide for Faculty.

Service-Learning Models: Some Ideas to Consider

In Service-Learning in Theory and Practice, Dan W. Butin outlines what are commonly referred to as the four Rs of service-learning: respect, reciprocity, relevance, and reflection.

13. Ibid., 30–33.
These core principles frame service-learning as a learning method that requires servers to (1) respect the choices and perspectives of those being served, (2) balance their own goal of providing service with the community’s right to articulate their own needs, (3) align their service with course learning objectives, and (4) reflect on the experience in order to provide “meaning and context.”

While these represent core elements of the service-learning experience, scholars have noted that there are variations in approaches to balancing service and learning. Citing Robert Sigmon in *A Practical Guide to Service Learning*, Wilczenski and Coomey identify four permutations of service-learning:

1. Service-*learning*, where the emphasis is on learning objectives.
2. Service-*learning*, which is service oriented.
3. Service-*learning*, with separate service and learning goals.
4. Service-*learning*, where service and learning goals are of equal weight and enrich each other.

Wilczenski and Coomey argue that, regardless of the emphasis, “service-learning has synergistic effects in promoting positive social and emotional growth as well as enhancing career and academic outcomes.”

Butin discusses other models of service-learning. He looks at the lenses practitioners might use to implement service-learning projects and views service-learning from the following perspectives: technical, cultural, political, and antifoundational.

From a technical perspective, Butin states that scholars have “particularly emphasized the need to link service-learning with enhanced cognitive outcomes as the key to legitimize and sustain

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16. Ibid.
service-learning in higher education.” The cultural perspective, according to Butin, represents a “second major strand within the service-learning movement,” one in which students encounter cultures different from their own and through learning and interaction gain a richer understanding of others. In contrast to the previous two approaches, the political perspective “rejects service-learning as an instrumental and amelioristic methodology.” Instead, Butin notes that advocates of this approach see service-learning as a means of critically examining and challenging ideas of privilege and power structures and engaging students in “social and political activism.” Similarly, an antifoundationalist perspective treats service-learning as an opportunity to “[disrupt] the unacknowledged binaries that guide much of our day-to-day thinking and acting.” Butin suggests that this approach might allow students, for example, to “question to what extent academic success impacts identity formation.”

In *Service-Learning: History, Theory, and Issues*, the authors outline three other theoretical models: the philanthropic model, the civic-engagement model, and the communitarian model. Editors Speck and Hoppe juxtapose justifications and critiques for each approach in their volume.

Abel describes the philanthropic model as designed to “provide access to both the joys of education for its own sake and the fuller life that it provides. . . . It is the disinterested pursuit of knowledge and the growth of character and wisdom within the individual.” Sementelli critiques this model as, in part, treating

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20. Ibid., 9.
21. Ibid., 10.
22. Ibid., 12.
23. Ibid., 136.
24. Ibid., 13.
25. Ibid., 136.
service as a voluntary add-on to the curriculum rather than a critical piece of education.27

The second approach, outlined by Watson, is the civic-engagement model, which is focused primarily on service; it is “based on the premise that ‘democracy demands equal participation and voice by all citizens.’”28 While Exley agrees that this social-justice model has merit, he argues in his critique that higher-education institutions cannot practically act as “bottomless reservoirs of resources to solve all social ills.”29

The third approach, called the communitarian model, involves classrooms in which “teaching styles and content should be consciously designed to teach students that they are part of larger communities,” according to Codispoti.30 He argues that the ideal setting for such classes are cross-disciplinary, with such an approach calling for a radical revision of higher education. In her critique of the communitarian model, Murphy argues that supporters of this model have not clearly defined how such an approach would be implemented in practice.31

Ultimately, Speck and Hoppe suggest in a synthesis of the three models that different approaches might be needed based on the values and beliefs of the disciplines.32 For example, they

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note that “a nursing major (and likewise a nursing faculty member) might well embrace a philanthropic-based service-learning program while a history or political science student or faculty member might see more applicability in the civic approach.”

Given the wide variety of potential models educators could choose to frame a service-learning course, aligning institutional values with learning and community outcomes for a project is crucial to achieving an effective service-learning partnership.

**Models of Reflection**

While all four Rs (*respect, relevance, reciprocity, and reflection*) are core elements of service-learning, special attention has been given to reflection to the extent that it arguably is the feature that distinguishes service-learning from other types of experiential learning. John Dewey’s educational philosophy is often cited with respect to service-learning and the role that reflection plays in the method’s epistemology. Bringle and Hatcher quote Dewey’s definition of reflection as “active, persistent, and careful consideration of any belief or supported form of knowledge in light of the grounds that support it.”

Eyler defines reflection as “the process that helps students connect what they observe and experience in the community with their academic study.”

Stewart, in an essay titled “Opening Up Service-Learning Reflection by Turning Inward,” reviews more than a dozen reflection methods suggested by service-learning scholars and practitioners, including journaling, podcasts, group dialogue, and electronic forums. Stewart pays particular attention to Kolb’s experiential-learning cycle, in which the learner begins by having a concrete experience. Then, through a reflective activity, the learner reviews and reconceptualizes the experience abstractly.

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33. Ibid., 146–47.
The learner then actively experiments with the new understanding, creating new concrete experiences. The cycle restarts and continuously repeats.

While it is often cited by service-learning practitioners and scholars, Stewart contends that Kolb’s model is limiting in that it is “unidirectional” and “does not reflect the messiness of reality.” Stewart extends Kolb’s model to allow including more opportunities for introspection in the reflective process.

Another approach comes from Ash and Clayton, who suggest a three-phase model for reflective practice in service-learning. This involves “(1) description (objectively) of an experience, (2) analysis in accordance with relevant categories of learning, and (3) articulation of learning outcomes.” This form of “articulated learning” involves four key questions posed to learners: “What did I learn?” “How did I, specifically learn it?” “Why is it significant?” and “In what ways will I use this learning?”

Bringle and Hatcher present a three-level scale for assessing the quality of student reflections in service-learning classrooms. For example, at level one, students “give examples of observed behaviors or characteristics of the client or setting, but [provide] no insight into reasons behind the observation.” At level three, students with higher levels of reflection would “view things from multiple perspectives . . . and place them in context.”

In The Measure of Service Learning, Bringle, Phillips, and Hudson provide a series of quantitative scales to assess service-learning projects. They provide research scales to measure factors such as motives and values, moral development, self and self-


concept, attitudes, student development, and critical thinking.\(^{39}\)

In addition to the use of scales, Steinke and Fitch review tools for evaluating service-learning projects in an article in *Research & Practice in Assessment*. They address the use of a critical-thinking rubric developed at Washington State University and the use of qualitative interview protocols for assessing service-learning. They contend that an “increase in service-learning assessment may lead to a greater emphasis overall on assessments that better measure the skills and abilities needed for success outside academia.”\(^{40}\)

**Strategies for Collaboration with Partners**

As noted in chapter 3, partnerships are critical for successful service-learning projects. Students and faculty alike must keep in mind the values of reciprocity and mutual benefit as they work together. In *Partnerships for Service-Learning*, Kelshaw, Lazarus, and Minier caution that “‘just doing [service-learning]’ without careful preparation and reflection may have harmful consequences in both community and educational contexts.”\(^{41}\) In the same volume, Anderson, Daikos, Granados-Greenberg, and Ruth-erford offer a three-stage process for creating partnerships in P-12 schools. They claim that such partnerships are effective when, among other things, they are

- “founded on a shared vision and clearly articulated values,“
- “clearly organized,“
- “integrated into the mission and support systems of the partnering institutions,” and

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72 | Faculty Guide to Service-Learning in STEM
“evaluated regularly with a focus on both methods and outcomes.”\textsuperscript{42}

In their book \textit{The Unheard Voices: Community Organizations and Service Learning}, Stoecker and Tryon argue that there is “growing dissatisfaction among many people both inside and outside the service learning movement”\textsuperscript{43} about the benefits of service-learning to its intended recipients—the broader communities that higher-education institutions wish to serve. They cite concerns over students using poor communities “as free sources of education.” They suggest that educational institutions are overly focused on learning outcomes and sometimes fail to adequately consider community outcomes.

In an essay in \textit{Higher Education, Emerging Technology, and Community Partnerships}, Loving, Stoecker, and Reddy suggest that service-learning practitioners shift their focus from “[building] the project around the course” to “[building] the course around the project.”\textsuperscript{44} Other scholars, like Dolson, have suggested using Web 2.0 technologies to create online venues to connect educators with community partners to create an effective match.\textsuperscript{45}


\textsuperscript{43} Randy Stoecker and Elizabeth A. Tryon, eds., \textit{The Unheard Voices: Community Organizations and Service Learning} (Philadelphia: Temple University Press, 2009), 3.


Dupuis, Bowdon, and Schwemin examine service-learning partnerships through a legal framework, considering risk and liability in the development of such educational ventures. They offer the following guidelines for creating a service-learning project:

1. Set clear objectives for the service-learning experience.
2. Choose/approve activities and sites responsibly. Faculty members can limit the number of approved sites.
3. Be sure that your students are 18 or over. Many non-profit organizations cannot accept volunteers, or by extension, service-learners, who are under 18.
4. Work with your colleagues and campus leaders to develop institution-specific policies.
5. Involve students and community partners in the discussion of minimizing risk.46

In addition to these recommendations, the authors also note that a service-learning contract among the student, the university, and the community partner can be helpful in protecting the institution’s and the educators’ liability. Such a contract describes all parties’ roles in the project and includes a “learning plan” that outlines students’ responsibilities in the class and in the community.

For more on forming and sustaining effective partnerships, see Jacoby’s comprehensive Building Partnerships for Service-Learning47 as well as Sandy and Holland’s “Different Worlds and Common Ground”48 published in the Michigan Journal of Community Service Learning. These sources offer excellent guidelines from a variety of perspectives.

This chapter has discussed only a small fraction of the scholarship available about service-learning. We encourage faculty members who participate in this work to capture data on their own experiences and consider working to have information about their service-learning efforts published in one of the many journals that include this kind of work.
Service-Learning Discussion Topics

In February 2012, the University of North Florida hosted one of the most successful day institutes associated with the FL\CC STEM initiative. The event, called “Bridging Community-Based Learning and STEM,” included a series of valuable workshops focused on helping faculty members to carefully think through how best to implement service-learning in their courses with an emphasis on student learning. This section includes sample discussion questions from those workshops, which will be valuable for faculty members working individually or in teams as they consider strategies for incorporating service-learning into STEM courses. At the end of this chapter, you’ll find a list of the resources that the institute leaders used to guide discussions with participants.

Using Community-Based Learning in STEM Disciplines

- Why do students stop participating in STEM courses beyond the mandatory introductory level or drop out of STEM disciplines?
- What have we learned from 50 years of science and math reform efforts and how can community-based learning help?
- What differences do you notice between community-as-the-object of learning, community-oriented learning, and community-engaged learning? It’s all about relationships.

Defining Course Outcomes

- What is important to you? Identify outcomes that can be achieved and measured effectively.
• Are outcome statements aligned with what is most important?
• How many outcome statements are enough? How many are too many?
• Are students able to understand outcome statements?

Learning Outcomes in Community-Based Settings
• What is important to you? Identify outcomes that can be achieved and measured more effectively because of community-based experience.
• How do learning outcomes related to community-based settings look in STEM disciplines?

Assessment in Community-Based Settings
• What is authentic assessment? Why does it matter?
• How is critical reflection different from open reflection? What type of learning does critical reflection demonstrate?
• How can I assess student reflection?
• How can rubrics be valuable in saving time and in determining acceptable evidence of student learning?
• What changes do I need to make to my current assignments and assessments to determine students have learned what I hoped they would learn?

Creating Assessments and Assignments
• How can assessment be accomplished efficiently?
• What is the difference between assessment and grading?
• How can I use reflection to support community-based assignments?
• How can rubrics be valuable in saving time and in determining acceptable evidence of student learning?
• What changes do I need to make to my current assignments and assessments to determine students have learned what I find most important?
Planning STEM Activities in the Community
- What are the elements of learning? (Attention, Participation, Elaboration, Motivation, Emotion)
- What’s an appropriate level of engagement with the community?
- Activities in the community versus with the community. Does it matter?
- Developing a course activity. How does it fit into the whole of the course?
- Evaluating course activities. Are expectations realistic?

Course Planning
- How do you ensure that the course is organized around student learning outcomes?
- What adjustments do I need to make to my course based on the situational realities of my institution?

Syllabus Construction
- Describe why service learning/community-based learning is relevant to your course.
- Putting it all together. Reason, what, why, when, where, and how of community-based learning.
Creating a successful service-learning program, whether in STEM or in other fields, requires considerable efforts on the parts of many representatives from an institution as well as significant resources on the local, state, regional, national, and international levels. This chapter highlights actions and resources recommended at each of these levels assembled by participants in the spring 2013 STEM initiative fellows’ meeting. Work through this chapter with colleagues from your campus or program to think about what you can do together to build and maintain service-learning and community engagement on your campus and in your community.

On an institutional level, colleges and universities can promote service-learning initiatives in a number of ways.

**Campus-Wide**

- Incorporate service-learning goals into the institution’s mission statement, particularly regarding areas of community engagement and service.
- Include success stories from service-learning classes and projects as evidence of institutional effectiveness, and continue to emphasize such projects in subsequent strategic plans.
- Offer financial support (scholarships, travel reimbursement, etc.) for faculty members and students creating or participating in service-learning projects.
• Emphasize community service in the promotion and tenure process, and encourage faculty members to document their service-learning participation in teaching portfolios and curricula vitae.

• Provide administrative support to faculty members creating service-learning courses (by creating an office of service-learning or civic engagement, which could offer resources such as a list of regional community partners, appropriate course forms, and a library of service-learning scholarship).

• Create an administrative presence in service-learning committees or advisory boards, such as a community civic engagement committee.

• Present information regarding campus-wide service-learning initiatives to the board of trustees.

• Encourage nonprofit community board membership.

REGIONALLY
• Create and maintain partnerships and collaborations with community organizations, such as local chambers of commerce, United Way (http://www.unitedway.org/), and Rotary Clubs (https://www.rotary.org/en/search/club-finder).

STATEWIDE
• Become a member institution of the Florida Campus Compact (http://www.floridacompact.org/).

• Apply for Florida Campus Compact Awards (http://www.floridacompact.org/awards.html).

• Follow news released by the Association of Florida Colleges (http://www.myafchome.org/).

• Follow news released by the Independent Colleges and Universities of Florida (http://www.icuf.org/new-development/).

• Represent the institution on the Association of Florida Colleges Council of Presidents (http://www.myafchome.org/council-of-presidents).
• Represent the institution on the State University System of Florida Board of Governors (http://www.flbog.edu/).
• Encourage administrators, as well as faculty and staff members, to advocate for service-learning initiatives in legislative hearings.

NATIONALLY AND INTERNATIONALLY
• Apply for the Carnegie Community Engagement Elective Classification (http://classifications.carnegiefoundation.org/descriptions/community_engagement.php).
• Apply for the President’s Higher Education Community Service Honor Roll (http://www.nationalservice.gov/special-initiatives/honor-roll).

ON A DEPARTMENTAL LEVEL, offices of service-learning or civic engagement can promote service-learning initiatives in a number of ways.

CAMPUS-WIDE
• Create a civic and community engagement center.
• Create a system for tracking service-learning hours; include this information in annual impact sections of institutional-effectiveness reports.
• Create and maintain a database with information about community partners (contact information, the types of projects offered, the number of open volunteer positions, etc.).
• Showcase past and present service-learning projects on a campus website.
• Publish a campus newsletter or periodical with feature stories about service-learning events, faculty members, students, sites, classes, or projects.
• Include service-learning articles in alumni magazines.
• Manage service-learning risks and liabilities.
• Appoint a service-learning coordinator or student leaders or both.
• Articulate and adopt a definition of high-quality service-learning.
• Include a service-learning designation for service-learning classes in course catalogs and on student’s schedules and official transcripts.
• Survey faculty members to record their participation on nonprofit boards.
• Advertise service-learning courses through published materials (website showcase, promotional newsletters, flyers, brochures, etc.).
• Present information regarding campus-wide service-learning initiatives to individual departments, the faculty senate, and the administration.
• Attend monthly or quarterly community partner meetings.
• Create a service-learning guide for faculty.
• Create a service-learning guide for community partners.
• Encourage students to move away from a “volunteer-hours” model to a “service-learning-hours” model.

REGIONALLY
• Create a consortium for regional institutions that are engaged (or interested in becoming engaged) in service-learning or civic-engagement initiatives.
• Create a regionally focused website with local content, news (e.g., service-learning project updates), and links to service-learning resources.

STATEWIDE
• Collect examples and record a list of past and present service-learning projects.
• Integrate service-learning presentations into conferences and meetings.
• Represent the institution at Florida Campus Compact’s Community Service Directors’ Retreat (http://www.csd.floridacompact.org/).
On an individual level, faculty members can promote service-learning initiatives in a number of ways.

**Campus-Wide**

- Become service-learning faculty leaders.
- Mentor faculty members in STEM disciplines and encourage them to incorporate service-learning into their courses.
- Make contacts in the civic and community engagement center.
- Participate in interdisciplinary service-learning projects.
- Host and attend brownbag lunch service-learning sessions, series, or workshops.
- Attend and participate in service-learning showcases.
- Participate in faculty learning communities (which sometimes offer stipends and free meals and materials).
- Integrate service-learning topics into professional-development days.
- Appoint a set of faculty ambassadors who present service-learning projects and initiatives to community members.
- Emphasize service-learning participation in annual faculty evaluations, teaching portfolios, teaching award applications, and curricula vitae.
- Incorporate service-learning scholarship in classroom activities, research, and publication (i.e., the scholarship of teaching and learning).
- Create a faculty advisor for club projects.

**Regionally**

- Appoint service-learning STEM mentors.
- Host service-learning STEM workshops.
- Create, host, or attend service-learning showcases.
- Present service-learning research and scholarship at regional conferences.
STATEWIDE

- Become a Florida Campus Compact Certified Scholar (http://www.floridacompact.org/programs/development.html).
- Advocate for service-learning initiatives in legislative hearings.
- Appoint or become a service-learning STEM mentor.
- Create, host, or attend service-learning showcases.
- Present service-learning research and scholarship at state conferences.

NATIONALLY AND INTERNATIONALLY

- Create or participate in service-learning study-abroad programs.
- Present service-learning research and scholarship at national and international conferences.
- Publish service-learning research in national and international journals.
- Collaborate with faculty from across the nation and around the world.

ON AN INDIVIDUAL LEVEL, students can promote service-learning initiatives in a number of ways.

CAMPUSS-WIDE

- Learn about the institution’s civic and community engagement center.
- Become involved in student service-learning organizations.
- Attend and participate in service-learning showcases.
- Apply for service-learning awards.
- Contribute to the scholarship of service-learning by conducting service-learning research and publishing results.
- Apply for grants.
- Work toward the service cord or service-learning designation, which is usually presented at graduation.
- Become a service-learning student mentor.
• Join a service-learning-oriented honor society, such as Phi Theta Kappa (http://www.ptk.org/).

REGIONALLY
• Attend and participate in regional service-learning showcases.
• Present service-learning research and scholarship at regional conferences.
• Connect with current and alumni service-learning student mentors.

STATEWIDE
• Participate in the Student Scholars’ Institute (http://www.ssi.floridacompet.org/).
• Contribute to the scholarship of service-learning by conducting service-learning research and publishing results.

NATIONALLY AND INTERNATIONALLY
• Apply for the Newman Civic Fellows Award (http://www.compact.org/initiatives/awards-programs/the-frank-newman-leadership-award/).

ON A GROUP LEVEL, communities can promote service-learning initiatives in a number of ways.

CAMPUS-WIDE
• Appoint a leader or contact person to the civic and community engagement center.
• Host service-learning fairs.
• Host faculty-community connection workshops.
• Create, distribute, and collect results from a “community needs and agency” survey.
• Create a recognition or reward system for community partners (monetary awards, certificates, ceremonies, luncheons, etc.).

NATIONALLY AND INTERNATIONALLY
• Foster study-abroad collaborations between schools and local service providers.
Bibliography


Sandy, Marie, and Barbara A. Holland. “Different Worlds and Common Ground: Community Partner Perspectives on Campus-Community


U.S. Department of Labor, Employment and Training Administration. *The STEM Workforce Challenge: The Role of the Public Workforce*


Online Resources for Service-Learning

American Association of Community Colleges:
http://www.aacc.nche.edu/

Campus Compact
http://www.compact.org/

Campus Community Partnership Foundation
http://www.c2pf.org/

Corporation for National & Community Service
http://www.nationalservice.gov/

Florida Campus Compact
http://www.floridacompact.org/

Imagining America
A consortium of universities and organizations dedicated to the advancement of the civic purposes of humanities, arts, and design
http://imaginingamerica.org/

Michigan Journal of Community Service Learning
Service-learning course design book
http://www.drexel.edu/~media/Files/lindycenter/Faculty/CourseDesignWorkbook.ashx

National Service Learning Conference
Annual conference for learning professionals
http://servicelearningconference.org/

Project Ideas
Links to service-learning project ideas
http://www.marylandpublicschools.org/MSDE/programs/servicelearning/project_ideas.htm
Project Learning Tree
*Grants and project suggestions for environmental learning*
https://www.plt.org/

Service-Learning Clearinghouse
*Comprehensive site devoted to research on service-learning*
http://www.servicelearning.org/

State Farm Youth Advisory Board
*Grant opportunities*
http://www.statefarmyab.com/apply/national-grants

Read, Write, Think
*Lesson plan on critical literacy for sixth- through eighth-graders*

What We Know about the Effects of Service-Learning on College Students, Faculty, Institutions and Communities
*Online annotated bibliography*