Francis College of Engineering

SLICE: Service-Learning Integrated throughout a College of Engineering

Service-Learning Integrated throughout the College of Engineering: SLICE
Presenter

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Engineering Service-Learning Coordinator
SWE Collegiate Section Advisor
What do you think Service-Learning is?

- Who has had Service-Learning experience?
- Any Examples?
Service-Learning defined

Service-Learning (Bringle & Hatcher, 1995)
A credit-bearing, educational experience in which students participate in an organized service activity that meets identified community needs and 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.
Scenario # 1

Solo paper cup company needs help redesigning machinery/process – cups getting stuck

Professor teaching “Design of Machine Elements” course has a team of students work on this for their course project
Scenario # 2

A professor in a Chemical Engineering Materials class says that she will drop the lowest homework grade of any student who volunteers to be a judge for the Regional Middle School Science Fair.
Scenario # 3

National Grid (for-profit power company) has an issue with squirrels nesting next to their transformers. Unfortunately, the squirrels are little dare devils and sometimes cause the transformer to blow up leaving a whole block without power. A Plastics Engineering Capstone team designs a Squirrel Guard that can be snapped in place.
Overall aim at UMass Lowell:
Combine community-based projects in regular courses to meet learning objectives and meet real community needs (S-L)

Strategic objectives:
Achieve one course every semester for every student
Be more efficient: teaching/learning/research
Attract underrepresented groups
Meet ABET criteria
President’s Higher Education Community Service Honor Roll – with Distinction

Goal:
Better Engineers, Better Citizens
Service-Learning examples

All Majors
Course: 25.107 Introduction to Engineering I
Project: Design, build & deliver Big Cat Enrichment Playthings
Community Partner: Franklin Park Zoo

Students visiting zoo and cats

Students in lab building devices, from hands-on to paws-on.
Service-Learning examples

Chemical Engineering
Course: 10.304 Heat Transfer
Project: Heat loss analysis with recommendations for improvements
Community Partner: Merrimack Valley Food Bank

Where’s the Heat going?
Service-Learning examples

Civil and Environmental Engineering
Course: 14.301 Fluid Mechanics
Project: Design, build and demo hardware illustrating Fluids principles
Community Partners: HS Science teachers of students’ choice

Students demo the new hardware for High School classrooms
Service-Learning examples

Electrical and Computer Engineering
Course: 16.499 Capstone
Project: Design, build & deliver custom Assistive Technology device to improve the life of a person with disabilities
Community Partners: many agencies & individuals

Final testing with the client – it works!
Service-Learning examples

Mechanical Engineering
Course: 22.342 Convective Processes
Project: Design a drip irrigation system for farms in the high Andes
Community Partner: Village Empowerment Peru Project
Plastics Engineering
Course: 26.218 Introduction to Plastic Design
Project: Computer model and prototype of big button switches
Community Partner: Assistive Technology clients
## Service-Learning Research: Student Impacts

<table>
<thead>
<tr>
<th>Mean responses to Likert scale of 1 (disagree) to 5 (neutral) to 9 (agree)</th>
<th>General mean</th>
<th>Different from Neutral (*)</th>
<th>Male</th>
<th>Female</th>
<th>Different across gender (significant*, 5%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Service and academic coursework should be integrated</td>
<td>6.30</td>
<td>6.24</td>
<td>6.77</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>3. Engineers should use their skills to solve social problems.</td>
<td>6.75</td>
<td>6.71</td>
<td>7.19</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>4. I learn more when courses contain hands-on activities.</td>
<td>7.92</td>
<td>7.91</td>
<td>7.95</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>5. Service in general should be an expected part of the engineering profession.</td>
<td>6.57</td>
<td>6.51</td>
<td>7.05</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>6. People who receive social services largely have only themselves to blame for needing services.</td>
<td>4.17</td>
<td>4.25</td>
<td>3.36</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>7. Social problems are not my concern.</td>
<td>3.63</td>
<td>3.67</td>
<td>3.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. I can have an impact on solving problems that face my local community.</td>
<td>6.70</td>
<td>6.65</td>
<td>7.14</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>9. I can have an impact on solving problems that face underserved communities internationally</td>
<td>6.18</td>
<td>6.10</td>
<td>6.90</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>10. Working in teams is a waste of time.</td>
<td>2.04</td>
<td>2.09</td>
<td>1.60</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>11. It is important to me personally to influence the political structure.</td>
<td>4.76</td>
<td>4.75</td>
<td>4.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. It is important to me personally to have a career that involves helping people.</td>
<td>6.56</td>
<td>6.46</td>
<td>7.45</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>13. I am uncomfortable working with people who are different from me in such things as race, wealth, and life experiences.</td>
<td>2.61</td>
<td>2.65</td>
<td>2.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. I have a close working relationship with at least one faculty member at this institution.</td>
<td>3.15</td>
<td>3.18</td>
<td>2.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Within service-learning courses, the service-learning projects should be required and not optional (with a choice of both service and non-service projects).</td>
<td>4.98</td>
<td>4.94</td>
<td>5.40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Service-Learning Research: Student Impacts

### Importance of Career Values

<table>
<thead>
<tr>
<th>Category</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Challenge:</strong></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Learning new skills or information, doing things in a new way</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Helping:</strong></td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Doing things for others, building a better world</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Income:</strong></td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Making a high salary</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Security:</strong></td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Having Stable employment and income, not worrying about lay-offs</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Variety:</strong></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Doing many different activities, not doing the same things all the time</td>
<td></td>
<td></td>
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</tbody>
</table>
Qualitative Research

“When you know that your work will impact someone’s life, you know you need to get it right, and it makes you driven to succeed. I think that all too often, students are more focused on just getting the work done, rather than on the impact their work may have in the future.”

Other student quotes, “the obstacles were learning experiences. I learned much more from solving community problems than from pushing paper,”

and, “This [S-L capstone project] is the best thing I have ever done.”
Service-Learning: Want more?

Custom Technical Electives:
- Sequence of 1 credit courses
  25.200, 25.300, 25.400
- Community-based Engineering Project
  25.401

Established Courses:
16.100 Introduction to Electrical and Computer Engineering
16.541 Introduction to Biosensors

Other Courses:

What would you like to see?
Francis College of Engineering

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For more information on SLICE visit our website:
www.uml.edu/engineering/slice

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