Service Learning in the Computer Science Classroom

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Background Information

• Introductions
• EPICS High Program
  – More later...
• Motivation…
DO THINGS THAT MATTER.
Activity

- Using the Post-It Notes provided...
  - Generate a list of service projects, volunteer opportunities and/or community service experiences in which students are engaged in your school.
## Service vs. Learning

<table>
<thead>
<tr>
<th>service learning</th>
<th>Service and learning goals are separate</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERVICE-learning</td>
<td>Service outcomes are primary; learning goals are secondary</td>
</tr>
<tr>
<td>service-LEARNING</td>
<td>Learning goals are primary; service outcomes are secondary</td>
</tr>
<tr>
<td>SERVICE-LEARNING</td>
<td>Service and learning goals have equal weight; each enhances the other for all participants</td>
</tr>
</tbody>
</table>
What are some characteristics of service-learning?
Service-Learning Definition

We define service learning as a type of experiential education in which students participate in service in the community and reflect on their involvement in such a way as to gain further understanding of course content and of the discipline and its relationship to social needs and an enhanced sense of civic responsibility.

- Hatcher and Bringle, IUPUI, 1997
Context: Learning Pedagogies

• Experiential education

• Active learning
  – Problem-based learning
  – Inquiry-guided learning
  – Project-based learning

• Service learning
  – Engagement in the community
  – Tied to academic learning outcomes
  – Reciprocal Partnerships
  – Reflection
Characteristics of Service-Learning

- **Service** (community engagement) – part of the service-learning experience involves service opportunities for students for the underserved in the community.

- **Academically-based** - the service being performed by the students must provide reinforcement and connection with the subject material of the academic course.
  - Students given credit for mastery of course content, not simply for the service they perform
Characteristics of Service-Learning

- **Partnerships**
  - Partnerships between those who serving and those being served.
  - The students and community members are partners in addressing the community need.
  - The community, students and teachers benefit from the service-learning.
Characteristics of Service-Learning

- **Analysis or Reflection**
  - Participants are intentionally guided through activities to analyze and reflect upon the work and learning
  - Metacognitive activities include reflection to improve learning in language arts/technical writing
  - Metacognition can help students understand academic material covered by the course
  - Activities for reflection can take several forms (written, oral, combinations)
Activity Part 2

• Using the Post-It Notes you filled out…
  – Separate the service activities into three groups

A. No STEM or service-learning
B. No STEM or service-learning but could be modified to add them
C. Design-based STEM service-learning would be part of the activity or solution
Design-Based, Service-Learning

EPICS projects follow a design process to identify needs, analyze solutions, and redesign as needed

• **Design Learned Through Experience**
  – Experience making mistakes and good guesses
  – Experience seeing implications of decisions
  – Experience in serving a real customer or user

• **Teachers Act as Facilitators and Coaches**
  – Guide design work and exploration
  – Allow students to experience their decisions and work
  – Guide students in filling roles on teams and
EPICS High Design Cycle
What is EPICS High?

• EPICS brings students together with Community
• Exposes them to STEM Fields
• Partner with non-profits
• Fill needs of community organization
• Serves own community
• Connects STEM with service-learning
Flexible Program Models

- Modular curriculum and pedagogy
- Rural, Urban, Suburban
- Curricular and co-curricular
- Part of a course or as a stand alone
- Extra-curricular- clubs or service activity
- Adaptable to individual school and community needs
EPICS High Motivation
Connecting Engineering with People and Local Communities

• High % of students interested in volunteering
• Service hours are needed for diplomas
• Attracting a diverse population of student to STEM
  – 44% Females
  – >50% underrepresented Minorities
• Over 950,000 people positively affected by EPICS High projects
EPICS Core Values

• Academic credit

• Multi-year partnerships with not-for-profit community organizations to fulfill mutual needs

• Community partners who assist the student teams
Meeting Needs

innovative, hands-on, problem-based methods based in design

• Student Benefits
  – Communication Skills
  – Reinforces STEM Learning
  – Entrepreneurship
  – Career Exploration
  – Professional Skills
  – Community Involvement
  – Real World Experience

Community Benefits
  – Improve Current Services
  – Try new, Innovative ideas
  – Positioning as a leader among area non-profits
  – Access to normally cost-prohibitive knowledge/resources
Meeting Standards

Many standards can be met through EPICS. Academic Standards incorporated could include:

- Computer Science
- Science
- Technology
- Engineering
- Math
- Language Arts
EPICS Project Areas

- **Education:** K-12 schools, museums, after-school programs
- **Access and abilities:** clinics for disabled children, adult disability programs, assistive technology
- **Human Services:** Habitat for Humanity, humane society, food pantries, neighborhood improvements
- **Environment:** environmental organizations, neighborhood associations, parks and recreation
Project Example:
Chantilly High School Academy, Virginia

- **Partner:** Adapted Physical Education Program for Special Needs Students

- Enabled safe and successful participation in sports with minimal assistance

- Designed, prototyped and produced ball tossing catapult toys
Project Example:
Prospect Hill Academy, Massachusetts

School Energy Analysis
• Educated school on energy conservation
• Created signs and video

Green Roof Project
• Elective course to learn about impact
• Designed and built portable green roof carts for school presentations
Project Example:
Harbor Beach HS, Michigan

- Computerized Food Pantry Project

Students worked with all food pantries in rural Huron County to design a computerized systems for tracking food items, customer information and coordinate operations.
How to Use Service-Learning in Computer Science

• Example:
  – Park Tudor High School
    • [http://www.parktudor.org/academics/upper/Pages/computer-science-technology.aspx](http://www.parktudor.org/academics/upper/Pages/computer-science-technology.aspx)
  – Westinghouse Prep
    • Conservatory Database-
Brainstorming

• What are you doing that is already a service-learning project?

• How could you adapt one project into a service-learning project?
Service-Learning and Diversity

- Research on science education suggests that “context” is important to students.
- “Image” is increasingly being cited as a deterrent to attracting women in the U.S.
- Image of engineering was the motivation for the National Academy’s *Changing the Conversation* report
- Cultural context for developing technical solutions
Concluding thoughts

• Young people today want to make a difference but they don’t see engineering, computing or technology as the way to do this
• Communities need technical assistance
• Service-learning connects many of the local and national needs for engineering and our communities
• We can make a difference
• https://www.solveforx.com/about/whatisamoonshot/
Contact Information

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