Building a Water Tower and Learning about a Role for Service Learning in the Civil Engineering Curriculum

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 Degrees
 - Bachelor of Science (BSCE)
 - Master of Science (MSCE)
 - Doctor of Philosophy in Environmental Science and Engineering (Ph.D. ESE)

 Hands-on Laboratories
 - Environmental Engineering Lab
 - Hydraulics and Hydrology Lab
 - Geotechnical Engineering Lab
 - Materials Lab
 - Computer Aided Design (CAD) Lab
Other Hands-on Experiences...

- MS Research
  Treatment of recycled water using membrane filtration

- HS Independent Study
  Understanding the design and operation of water filters
Service Learning

• Appropriate Definition

  – Conveys the idea that service learning allows the university to provide benefits to members of the community (client) while educating students.
CE SL Suggestions

• Community partners
  – that understand expectations and accessibility of the students
  – can serve as client mentors

• Incorporation of research into the student learning experience

• Determine specific technical need that fits with the core objectives of the course
Water Tower Project

Description

• Goals
  – Design and construct a water tower to demonstrate lifting of water

  – PHYSICAL:
  – shortened tower in appearance with hand pumps used to lift water from a reservoir up to the tank through standpipes
Water Tower Project
Placement
Water Tower Project
Documenting the Experience

• Course Applications
  • Construction planning and management
  • Fluid Mechanics
  • Engineering Practice

• Design Experience
  – Assigned Roles (faculty, students, client)
  – Participants (who remained involved)
  – Tasks (centered around progress meetings)

• Construction of Working Model
  – Budget (potential snag)
  – Significant part of experience (comparable to ASCE teams)
Water Tower Project
Final Product

- Foam and wood tank
- Stand pipes
- Hand pumps
- Pipe supports bolted to wood base
- Water reservoir hidden under wood base

Other deliverables:
- design schematics
- materials list
- model of structure
Water Tower Project
Evaluations/Assessment

• Client
  “This was a great opportunity to work with the university.”

  “Our target audience really enjoyed the project (water tower).”

  “We would be very willing to work with these folks again.”
**Water Tower Project**

**Evaluations/Assessment**

- **Student**
  
  “Completing the project at the Witte was the next best thing to having an internship...every student should have the opportunity to work with a real client on a real project.”

  “Experience on this project enhanced my academic experience.”

  “Experience of having to construct own design was useful in improving my approaches to design.”
Water Tower Project
Translating the Experience

For this Project

• Create/establish a project idea
• Develop a student contingent (leaders & workers)
• Interact with client (active participation)
• Keep up with deliverables
• Review the learning objectives (with construction)
• Assess student understanding of the objectives (qualitative)
Water Tower Project
Translating the Experience

• Milestones
  – Establish community service learning partners
  – Create a project ideas pipeline
  – Create project idea summaries
  – Enlist student participation with a signed commitment sheet
Water Tower Project
Translating the Experience

• Milestones (continued)
  – Agree on deliverables and timeline
  – Follow up on deadlines; assess student progress (quizzes; progress reports)
  – Submit project along with final report
  – Survey students and client on the success of the project and the application of course concepts
Water Tower Project
Translating the Experience

• Success is dependent on
  – # of students involved *(relatively small groups)*
  – Investment of the client in the project *(active)*
  – Level of corresponding CE course
    • level of project should match level of course
    • water quality concern in river for water treatment course
Water Tower Project
Translating the Experience

• For a *Water Resources* class
  
  – Understanding of source water considerations
  
  – Evaluation of design and performance of local storm water control measures
Water Tower Project
Translating the Experience

- For a Geotechnical Engineering class
  - Understanding of soil types in the area, and
  - Surveying the occurrence of foundation cracks in different areas of the community
Water Tower Project
Translating the Experience

• For a *Transportation Engineering* class
  
  – Understanding of pavement types
  
  – Evaluation of traffic flow patterns near the university