Service Learning on the River: Educating for Sustainability in the NRV

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What is Service Learning?

• Three essential elements (Howard 2003):
  – Service is provided to community to meet a real need
  – Students’ academic learning is strengthened
  – Students’ commitment is strengthened for:
    • Civic participation
    • Active democratic citizenship
    • Social responsibility

• Just because there is a hands-on component doesn’t mean you’re doing service learning...
Service Learning for Sustainability: A Contextual Client-oriented Model

(Pearce & Manion)
A good service learning project should...

- Allow the learner to practice skills learned in the classroom using real-life experiential learning;
- Provide an opportunity for the learner to interact with project recipients;
- Be feasible, considering the amount of time available in the specific course;
- Be complex enough to allow the learner to be challenged, but not overwhelmed;
- Contain an element that will allow for learning through reflection;
- Include components that can be evaluated to determine the relative success of the project and the effect of the experiential learning process.

(Cline & Kroth)
Barriers to good service learning in construction courses

- Student mediocrity/lack of commitment
- Substandard workmanship
- Mistaken identity as a trade school
- Faculty workload (esp. on weekends)
- Finding time for reflection
- Non-traditional assessment/grading
- Construction safety/institutional liability
- Negative student perceptions of course structure
So why do it?

• It’s interesting and fun
• It benefits the community AND students
• It’s the absolute best way to experience tradeoffs and learn to manage them
• It results in tangible outcomes
• Never a dull moment!
Four Rounds of Fun So Far!
Round 1: Spring 2014

BC 5134: Sustainable Facility Systems

**Detailed facility assessment:** Structural condition, site, interior finishes, systems, operational practices, comparable case studies, sustainable technology scan
CRAZY CAT LADY STARTER KIT
No assembly required
Round 2: Spring 2015

**BC 4334: Sustainable Bldg Performance Mgt**
- Required senior-level course for Sustainable Building Performance track
- 8 students (All BC)

**BC 5134: Sustainable Facility Systems**
- Graduate elective course
- 8 students:
  - BC
  - Architecture
  - Civil (Structural/Construction)

Project-based learning: Sustainability theory put into practice
Radford Animal Shelter: The Year of the Cat

Trying to actually fulfill identified needs...
Our first client...
Intermission

• Summer 2015:
  – Seniors graduated; others went on internships
  – A job site accident shut the project down in June

• Fall 2015/Spring 2016:
  – Instructor finished the project with help from local contractors
  – Ribbon cutting – May 2, 2016
    (over 12 months after project start)
Ribbon cutting euphoria convinced me to try again...
Round 3: Fall 2016

BC 5144: Sustainable Infrastructure Systems

- Sustainable Riverfront Development Plan
- Graduate-only class
- 18 students from multiple majors
- Presented Nov 21 to Council, City staff, Planning Commission, and Parks/Rec
F16 Class Project – Approach

• Inventory of existing assets/conditions:
  – Geographic assessment
  – Infrastructure systems review
  – Stakeholder analysis/interviews
• Review of precedents and local peers
• Sustainability opportunity assessment
• Visioning and concept development
• Stakeholder input
• Final public web site of findings
Goals for Sustainable Riverfront Development in Radford

1. Improve recreational and other sustainable uses of the river by residents and visitors.
2. Increase connectivity along and across the river as well as with key features/neighborhoods in the city.
3. Develop complementary destinations near, along, and across the river for residents and visitors.
4. Provide key supporting infrastructure to encourage economic activity by river users and beneficiaries.
Team West – Recreational Enhancement

- Trash & Recycling
- Clear invasive species
- Environmental Education
- Bike Trail
- Shower facilities
- Riverview Park facilities
- River access points
- Art in the Park
- Park-based activities
- Food truck festivals
Team South – West End Destinations

1. Business development
   - Foundry redevelopment + bike trails
   - West Main St. Village Center
   - Radford Industrial Center

2. Outdoor activities
   - Riverview Park (facilities)
   - Historic Ingles Farm events
   - River access, activities, art in park
   - Old landfill site opportunity

3. Destinations outside city
   - Proposed New River Heritage Museum & Welcome Center
   - Mountain bike park
   - The Sportsman campground
Team North – East End Destination Development

Key Points

1. Lack of Formal Public River Access
2. Underutilized Riverfront Area
3. East Main Street Corridor
4. Abandoned Railroad Bridge
Round 4: Spring 2017

- Conjoint class:
  - 4 grad students/21 seniors
  - Goal: sustainable river access for recreation in Bisset Park

- Multiple realignments:
  - USACE permits
  - Creativity battles

- Outcomes:
  - Design concepts
  - Implementation plan
  - Site investigation
Structure 1: Floating treehouse viewing platform with break-away ramp (Location 1)

Structure 2: Step-based kayak and tubing access for use by abled and disabled users, including whatever is necessary for access from transportation drop-off point

Rail/Inclined Plane with lightweight trolley for ADA transfer
Structure 3: ramp-based extraction for all recreational users (Location 3), including rail/trolley for access to transportation pick-up point.
Transit modification plan: revised route and capital modifications to provide regular connectivity between locations during the summer.

Bus modifications
Supporting infrastructure
Capital improvements
Outdoor Expo – Public Input
Popular Ideas

- More (away from the river)
- Water fountain (drinking)
- Vendor Boardwalk
- Wider bike trails
- Swim area in River Bank
- Art in the Park
- Small sculptures by local artists in various places around the park
- Similar to Blowing Rock and Asheville
- Tube loops on N
- Rio Plata
- New bus stop
- Shuttle from Crossroads
- Transit pickup at Rt 114
- More publicity about recreational events
- More bird and gecko parks around
- More...
Reflection: Observations

- High risk/high reward pedagogy
- Key success factors:
  - Avoiding scope creep (need cutoff milestones!)
  - Project experience of client organization
  - Autonomy/resources of project champion
- There is a fine line between flexibility and chaos
- What if the project fails?
  - Risk to instructor/university vs. student vs. client
- River-related service learning poses special challenges
- Where/when to draw the line...
Glad we weren’t mid-construction...

Thanks for your attention!
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Backup Slides
What Service Learning is NOT

A hands-on project with no stakeholder involvement

BOTH service AND learning!

An experiment with a community guinea pig
Conventional Model of Service Learning
Photographic Inventory – East Elevation of Main Facility

1. Cracks on brick wall
2. Disconnection / Gap
3. Rust
4. Faucet outlet
5. Plastic pipe outlet
6. Exposed rebar
7. Paint damage
8. Exposed steel structure
Photographic Inventory – Individual Photos of Condition/Details

- Drain pipe openings on wall surface
- Gaps near foundation
- Concrete Abrasion
- Exposed rebar in pavement & wall
- Cracks on concrete surface
- Exposed steel beam
Term Project Objectives (50% of grade)

- Listen to clients and articulate their requirements
- Brainstorm concept designs that would meet those requirements
- Pitch potential solutions to clients, and refine them based on their feedback
- Evaluate solutions based on cost, performance, and other criteria, and develop the best one
- Create a project execution plan to build the solution using available resources
- Implement the project execution plan
- Document everything in a professional fashion.
Course Structure

Course begins

- Initial scope & client expectations
- Finding an appropriate project

Course time (15 week semester)

- Engaging students
- Students assigned to teams
- Instruction through program development
- Program of requirements with detailed scope

- Design and presentation
- Instruction through design

- Build coordination supervision
- Finished project

Reflective activities
Learning objectives:

• Identify key stakeholders/interests over your project’s whole life cycle
• Characterize those interests using personae
• Distinguish between objectives and constraints
• Articulate objectives based on SMART criteria
• Develop a functional specification for a design solution
• Verify your functional spec and prioritized objectives with client
Design

Learning objectives:
• Employ creative/systematic concept generation approaches
• Refine concepts through scenarios presented to client
• Obtain stakeholder input/manage stakeholder expectations
• Develop design solution
• Apply life cycle costing/continuous value enhancement to fine-tune
Learning objectives:
- Apply project planning and management techniques from the whole curriculum
- Recruit necessary resources (including labor, materials, equipment, and funding)
- Promote the projects through various outreach efforts
- Experience the “planned vs. actual” differential
- Resolve any issues encountered
- Document the experience for further reflection
# Key Systems Characterization

<table>
<thead>
<tr>
<th>S.No</th>
<th>Building Systems</th>
<th>Components</th>
<th>Type of Material</th>
<th>System Condition</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Structural System</td>
<td>Building Frame</td>
<td>Steel/Concrete/CMU</td>
<td>Good</td>
<td>3 slightly exposed I-Beams in brick façade.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Structural Foundation</td>
<td>Reinforced Concrete</td>
<td>Good</td>
<td>Some exposed rebar in foundation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soil/ Geotechnical</td>
<td></td>
<td>Good</td>
<td>Flood zone (basement area has flooded)</td>
</tr>
<tr>
<td>2</td>
<td>Building Envelope</td>
<td>Exterior Walls &amp; Insulation</td>
<td>Brick on CMU/Precast &amp; CMU</td>
<td>Poor</td>
<td>Exterior walls are taking in water causing brick to freeze and thaw.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(No Insulation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Windows &amp; Insulation</td>
<td>Metal framed/Single Payne</td>
<td>Poor</td>
<td>Windows need to be sealed where windows meet brick.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exterior Doors</td>
<td>Metal/Wood/Single pane glass</td>
<td>Fair</td>
<td>Wood door frame is deteriorating, and some doors could be sealed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Storefront &amp; Shutters</td>
<td>Glass/Wood</td>
<td>Good</td>
<td>The glass is single pane, but is in good shape</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Balconies / Porch</td>
<td>Reinforced Concrete</td>
<td>Good</td>
<td>Minor cracking and some exposed rebar.</td>
</tr>
<tr>
<td>3</td>
<td>Roofing</td>
<td>Roof Components</td>
<td>Concrete on metal deck</td>
<td>Poor</td>
<td>We believe the roof is taking in water, and causing the face brick to freeze and thaw. There's also a good amount of efflorescence on the brick close to the roof. Animal housing building has a new roof.</td>
</tr>
<tr>
<td>4</td>
<td>Surface Fittings</td>
<td>Lighting Fixtures</td>
<td>Cannot be ascertained</td>
<td>Fair</td>
<td>Can be replaced with LEDs to improve energy efficiency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drainage Fittings</td>
<td>Metal</td>
<td>Poor</td>
<td>Rusted with jammed openings. Need to be replaced or removed and wall surface sealed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrical Outlets</td>
<td>Cannot be ascertained</td>
<td>Good</td>
<td>In proper working condition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HVAC</td>
<td>Single AC units</td>
<td>Poor</td>
<td>AC units are place over doors. The penetrations around the AC units were not properly sealed.</td>
</tr>
<tr>
<td>5</td>
<td>Other</td>
<td>Stairs</td>
<td>Reinforced Concrete</td>
<td>Good</td>
<td>Cracking and chipping of concrete, and some exposed rebar.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Openings / Penetrations</td>
<td></td>
<td>Poor</td>
<td>The main building has multiple unnecessary penetrations in the wall from the structure previous use. The doggie doors are no flush with the penetration, and this allows water and air to enter/exit.</td>
</tr>
</tbody>
</table>