A Hands-On Experiences for Future Green Building Professionals through Coursework

Presenters:

Ansgar Killing, MS, Architecture, Cal Poly San Luis Obispo
Barry Williams, MS, LEED™ AP, RA, Architecture, Cal Poly, San Luis Obispo

The view presented here is strictly our view and not the view of anyone who has the power to terminate our job.

2015 CA Higher Education Sustainability Conference (CHESC)
A. The CSU Proposal - an opportunity
The ‘Campus as a Living Lab’ Grant Program is a unique opportunity to partner faculty and facilities management staff in using the campus as a forum for the exploration of sustainability concepts and theories. The program aligns the California State University’s long-standing commitment to sustainability with the fundamental goal of preparing students for the workforce.
B. Opportunity Decisions- The ‘Campus as a Living Lab’ Grant Program will provide funds for two schemes:

1. The **development or redesign of a course that ties elements of sustainability into opportunities for learning using the campus physical plant**. Funds of up to $12,000 will be awarded to support the preparation of the proposed course.
B. Opportunity Decisions- The ‘Campus as a Living Lab’ Grant Program will provide funds for two schemes:

2. **The creation of an interdisciplinary Learning Community, focused on campus sustainability**. The learning community may be comprised of faculty, staff, students, and community college partners. Funds of up to $12,000 will be awarded to support the activities of the proposed Learning Communities.
C. Our application – We saw both options as viable avenues.

The vision behind our proposal was to:
• The vision behind this project is to leverage this asset by transforming selected rooms into laboratories that serve the CSU and local communities as prototypes for evaluating the effectiveness of sustainable strategies in their environment.
  • use the multi-disciplinary resources available on campus.
  • put together a team of student and faculty problem solvers.

Note: in all of our focus on the grant writing we missed the opportunity to attend a grant writing workshop.
Opportunity

Insert Chart, simplified budget table
A. The Search for a suitable room, a discussions with Stakeholders
   1. Building Facilities personnel
   2. College Dean
   3. School Department Head
B. Logistics - The Search for a suitable room
   1. Classroom
   2. Office
   3. Multi-use

The Winner!!
Preparation

**INTERIOR**
The selected space becomes our studio lab.

2015 CA Higher Education Sustainability Conference (CHESC)
C. Scope – Our grant proposal was based on using a radiant floor delivery system.

Early in the design preparation the following systems were discussed
1. Radiant floor
2. Wall or Baseboard
3. Ceiling panels
D. Cost – proposed for Grant:

For the preparation of the Grant we were very conservative with our cost projections.

Project soft costs - $11,800  **separate out teaching**
Includes the design and operation of a course on campus, engineering costs and permitting fees

Construction costs - $12,000
Includes coring of the slab and walls, radiant system complete, topping slab and monitoring

Total project costs – $21,800
E. Cost – proposed by Facility Services:

Or so we thought – the facility services project manager had a different take

Project soft costs - $27,228.03
Includes the design and operation of a course on campus, engineering costs and permitting fees.

Construction costs - $48,430.92
Includes coring of the slab and walls, radiant system complete, topping slab and monitoring.

Total project costs - $75,658.95

Only $53,885 difference not including teaching
The Project Goals -
• Teaching - to develop a studio where students will develop a real project from initial idea to built realization and even testing.

• Laboratory - to transform the selected room into a laboratory for the development and testing of a prototype for a sustainable cooling system

• Laboratory - to design a system that can be used by campus facilities to address overheating throughout the campus and decrease overall energy use

• Laboratory - to make use of off-the-shelf construction products in order to verify the feasibility of this system within the building industry
Realization

Advertising the studio

Arch 480
When: T, Tr 12-1
Where: TBD
Who can enroll: 8-12 eager students

2015 CA Higher Education Sustainability Conference (CHESC)
Realization

Learn by Doing

COMMITMENT TO Sustainability

The team

2015 CA Higher Education Sustainability Conference (CHESC)
## Realization

<table>
<thead>
<tr>
<th><strong>BD</strong> Building Design</th>
<th><strong>SD</strong> System Design</th>
<th><strong>R&amp;D</strong> (Research &amp; Doc.)</th>
<th><strong>PR</strong> (Public Relations)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prelim. Design on External Appearance of the Roof Collectors including but not limited to: 1. 2D drawings in 1/8” scale, 2. 3D digital model, 3. Start physical model, scale 1/4”, 4. Resulting construction requirements, 5. Question catalog</td>
<td>Prelim. Design on Roof Collectors and Radiant Floor including but not limited to: 1. 2D schematic design, 2. Component listing including 3. List of resulting requirements for building design, 4. Resulting construction requirements, 5. Question catalog</td>
<td>Preparation for data capture, including but not limited to: 1. Initiate Weather station relocation for measuring outside conditions, 2. Research and if possible obtain sensors for measuring room performance, 3. Organize data collection set-up on lab computer, 4. Document existing state (int. &amp; ext.)</td>
<td>Roadmap for Public Relation effort including but not limited to: 1. Sort brainstorm results regarding target group and suitable timeframe, 2. Develop campaign by sequencing PR events, 3. Finalize draft templates for slide and hardcopy, 4. Start a weekly log</td>
</tr>
</tbody>
</table>

**POC:** Curtis McNally | **POC:** Dennis Elliot | **POC:** Steve Spencer | **POC:** Ray Ladd |

---

**Team Work Assignments**

2015 CA Higher Education Sustainability Conference (CHESC)
Realization

BD – Meeting with stakeholders

2015 CA Higher Education Sustainability Conference (CHESC)
Coring detail

**BD** – Specific plan

**BD** – Specific details

2015 CA Higher Education Sustainability Conference (CHESC)
Realization

BD – Specific plan

2015 CA Higher Education Sustainability Conference (CHESC)
Learn by Doing

Realization

BD – Specific section

2015 CA Higher Education Sustainability Conference (CHESC)
Realization

SD - Student system plans

2015 CA Higher Education Sustainability Conference (CHESC)
Realization

1. Collector panel
2. Water storage tank
3. Manifold
4. Conc. slab flooring w/ Pex piping
5. Insulative layer
6. Main control
7. System controller
8. Room thermostat /humidity sensor
9. Outdoor air sensor

SD - Student system section

2015 CA Higher Education Sustainability Conference (CHESC)
Realization

RD – Sensor location

2015 CA Higher Education Sustainability Conference (CHESC)
Above: An example of some data the sensors gathered. Regular fluctuations come on a daily basis with the rising and setting of the sun.

**RD** – Student’s document diurnal swing in test space system plans

2015 CA Higher Education Sustainability Conference (CHESC)
Learn by Doing

Realization

THE LIVING LAB

PHASE 1: RADIANT COOLING RESEARCH LAB
TRANSFORMING THE MEDIA LAB STEP BY STEP

COMING SOON

ARCH.CALPOLY.EDU/CONTENT/ARCH480

PR - Student Info Plan

Coring detail

2015 CA Higher Education Sustainability Conference (CHESC)
After many long fought hours we came to the realization we had a viable project.

2015 CA Higher Education Sustainability Conference (CHESC)
Learn by Doing

COMMITMENT TO Sustainability

Construction

2015 CA Higher Education Sustainability Conference (CHESC)
Learn by Doing

Construction

2015 CA Higher Education Sustainability Conference (CHESC)
Learn by Doing

Construction

COMMITMENT TO Sustainability

2015 CA Higher Education Sustainability Conference (CHESC)
Learn by Doing

Construction

2015 CA Higher Education Sustainability Conference (CHESC)
Conclusion