LSC Webinar

Anticipating Renovating and Renewing Learning Spaces

LTC John Hartke, Professor of Photonics, United States Military Academy
Jeanne L. Narum, Director, Learning Spaces Collaboratory

19 April 2012
Webinar Agenda

• Project Overview
  – Establishing objectives
  – Addressing challenges

• Process
  – Building a team
  – Asking questions
  – Determining design principles

• Educational Initiatives
  – Making science visible
  – Blurring the learning experience
The United States Military Academy at West Point

- Four-year, undergraduate only, federally-funded institution.
- Every graduate receives a BS degree and is commissioned a 2LT in the US Army with a 5-8 year service commitment.
- The academic program consists of a strong 30 course core program and a study in-depth component in one of 47 majors.
- Every cadet is required to take 2 semesters of general chemistry in the freshman year and 2 semesters of a calculus based introductory physics in the sophomore year.
Project Overview

The building complex that included the Old Cadet Library and the Bartlett Hall Science Building is undergoing a two-phase renovation into the Bartlett Hall Science Center.

Building houses the Department of Chemistry & Life Science, Department of Physics & Nuclear Engineering, Photonics Research Center, Nuclear Science & Engineering Research Center, Center for Molecular Science, Space and Missile Defense Research and Analysis Center, and Archives & Special Collections.

The project renovates 317,912 sq. ft. of nationally registered historic space into 329,747 sq. ft. of classroom, teaching labs, research labs, office and archive space: total estimated cost—$164 million.
Phase 1

• Bartlett Hall Science Center: a two-phase renovation of Bartlett Hall North (formerly known as Cadet Library) and the Bartlett Hall Science Building

• Phase 1 – Bartlett Hall North
  – Cost – $46 million; 112,450 sq. ft. of renovated space
  – Anti-terrorism, force protection (AT/FP) upgrades (blast resistant windows); Seismic upgrades (collector cords and thicker walls)
  – LEED Silver
  – Construction began Nov 2009; substantially complete Dec 2011
  – Architect and Engineer—URS
  – Lab design—RFD
  – General Contractor—Consigli Construction
The Planning Team

- A representative from each department occupying the building
  - Physics – LTC John Hartke
  - Chemistry – COL Russ Lachance
  - Archives & Special Collections – Ms Suzanne Christoff

- Architect & Engineer Team (URS)
  - Head architect
  - Reps from the MEPs
  - Interior designer
  - Lab designer (RFD)

- The contracting officer from Army Corps of Engineers
Challenges

• Making the case
  – Army regulations dictate the sizes of rooms
  – Had to convince the Army and US Congress of our needs

• Calibrating needed space against available funds
  – Not enough space for the entire desired program
  – Costs driven at AT/FP requirements and seismic upgrades

• Transforming an historic building
  – Portion of building is nearly 100 years old and has historic features
  – Linking sections of the building constructed in 1910’s, 1930’s, and 1960’s

• Teaching during construction
Planning Process

- Started with a 2001 planning charrette
- Defined project objects and principles of design
- Defined desired functionality and requirements
- Looked around at others
- Great team work between architects and users
- Followed the US Army Corps of Engineers design process.
Principles of Design

- Flexible to adapt to emerging STEM educational initiatives and technologies (50 years before next renovation)
- Maintain small class size (16 cadets per section)
- Make the building “Comfortable” and “Welcoming”
- Maximize the use of the space
- Immerse the cadets in the science and technology of the US Army.
Principles of Design
Beginning with the End in Mind

• Grouping like type labs in a single area
• Gives the majors a sense of ownership
• Gains synergy between courses
Project Objectives

- **Environmental Objectives**
  - Create and environment that encourages study in science and reinforced the process of scientific investigation
  - Promote communication between cadets and faculty to further learning and foster mentoring relationships through a positive physical environment
  - LEED Silver Certification

- **Operational Objectives**
  - Create space that is flexible and can accommodate future equipment and technology
  - Provide a state-of-the-art utility and infrastructure system
  - Develop an environment that is durable and easily maintained
  - Meet federal seismic and anti-terrorism force protection requirements

- **Aesthetic Objectives**
  - Create an environment that is visually attractive
  - Design a facility that reflects the quality, character, and tradition of USMA
  - Ensure that all new design elements preserve and contribute to the USMA National Historical Landmark District
Project Functionality and Requirements

• Started with the courses to be taught in Bartlett Hall North
  – Defined functional requirements for IT, power, air handling, gasses, water and shielding
  – Analyzed student population and scheduling paradigm – defined room size and number of rooms
  – Explored how courses could be taught
  – Created desired adjacencies

• Found we needed more space than was available
  – Had to defend requirements to the Army.
Look Around

• Attended PKAL (LSC) workshop
• Visited other institutions, including:
  – Naval Academy
  – Duke University
  – Notre Dame
  – University of Virginia
  – Virginia Institute of Technology
  – Rochester Institute of Tech
  – Patriot League schools
• Sought input from our faculty.

Visited every science building of every college my son considered in his college search
Questions about the Planning Process?

• How did you address the challenge of renovating an historic building? What did you need to find out? Were there any surprises?

• QUESTIONS FROM WEBINAR PARTICIPANTS
  – Raise your ‘virtual’ hand
  – Send a ‘chat’ message

• What other challenges emerged as the planning progressed?
More Challenges…& Opportunities

- Fitting the requirements inside the shell of the building and around support columns
- Making compromises and trade-offs
- Managing the budget estimate
- Utilizing the Corps of Engineers Design Process
Corps of Engineer Design Process

• 15% design
  – Architects laid things out in a sketch
  – Identified requirements not meet
  – Users traded spaces, combined functionality, made sacrifices

• 30% design
  – Set the wall locations
  – Sized the MEP requirements
  – First real budget estimate
  – Start casework design
Corps of Engineer Design Process (cont)

• 60% design
  – Deconflict and look for efficiencies
  – Integrate into campus infrastructure
  – Refine casework design
  – Interiors details
  – Good big idea cut-off
  – Budget estimate
  – First construction schedule
  – Formal external review

• 90% design
  – Final good idea cut-off
  – Deconflict and details
Planning during Construction

- Weekly user meetings
  - Address construction issues that were having an impact on teaching/learning
  - Manage changes that affect functionality
  - Watch for schedule impacts on the transition between phases
  - Ensure quality control
  - Identify opportunities for improvements along the way.
Lessons Learned So Far

• Don’t trap yourself in the, “This is how we do it”
• Think about, “what we could do if…”
• Ask, “how are we going to be teaching in 50 years and how can the building enable that process?”
• Include the students
• Immerse the architect team in the culture of the institution
• When making compromises during design, remind yourself of first principles
• Stay connected to construction process
• Teaching during construction is hard
• Transition between construction phases requires very detailed planning.

QUESTIONS?
Educational Initiatives
Again: Principles of Design

- Flexible to adapt to emerging STEM educational initiatives and technologies (50 years before next renovation)
- Maintain small class size (16 cadets per section)
- Make the building “Comfortable” and “Welcoming”
- Maximize the use of the space
- Immerse the cadets in the science and technology of the US Army
Educational Initiatives

Again: Project Objectives

• Environmental Objectives
  – Create and environment that encourages study in science and reinforced the process of scientific investigation
  – Promote communication between cadets and faculty to further learning and foster mentoring relationships through a positive physical environment
  – LEED Silver Certification

• Operational Objectives
  – Create space that is flexible and can accommodate future equipment and technology
  – Provide a state-of-the-art utility and infrastructure system
  – Develop an environment that is durable and easily maintained
  – Meet federal seismic and anti-terrorism force protection requirements

• Aesthetic Objectives
  – Create an environment that is visually attractive
  – Design a facility that reflects the quality, character, and tradition of USMA
  – Ensure that all new design elements preserve and contribute to the USMA National Historical Landmark District
Educational Initiatives

• Make science visible
• Blur the laboratory and classroom experience
  – Area clusters
  – Classatories
• Make the learning environment comfortable
Why Make Science Visible?

- Cadets have a natural aversion to the sciences until they start to experience it.
- Classes from other disciplines are taught in our building.
- Demonstrate that physics (chemistry) is not proprietary to the “priestly” smart people but that it is all around, part of all we do, and accessible to all.
Making Science Visible

- Based on research and practice in the field, sciences become more accessible and interesting when the doing of science and the world of science is visible to the students.

  - Putting windows into labs
  - Putting display cases in the halls.
Questions

- Any reaction from faculty?
- Any reaction from students?

QUESTIONS FROM WEBINAR PARTICIPANTS?
Blurring the Learning Experience
Classatories

- Combine the classroom and laboratory functions into a single space
- Rearrangement of the desks provides either small group work space or individual work
- Supports a wide range of contemporary research-based pedagogies and/or more traditional approaches.
Physics Classatory Example 1

LEGEND

- Storage cabinets
  1 cabinet per lab station

- Overhead service providers

- Chalk board

- Overhead Projector

- Moveable 2 person lab benches

- Movable individual student desks

- Instructor station
- Lab vacuum, gas, air
- IT station

Nominal lab side

Nominal class side

23' 60'

60'
Storage cabinets
1 cabinet per lab station

Overhead service providers

Chalk board

Overhead projector

Moveable 2 person lab benches

Movable individual student desks

Instructor station
Lab vacuum, gas, air
IT station

Nominal lab side
Nominal class side

LEGEND

23'

60'
Classatory
Blurring the Learning Experience
Lab/Class Combos

• Combination rooms that have movable walls to open lab into classroom

• Maintains the flexibility of allowing other courses to be taught in the same room

• Instead of “take boards” now we can “take experiments”
Questions

• Has faculty development been linked to the development of these new kinds of learning spaces?

• Are there challenges to adaptability/flexibility?

• What is the relationship between the spaces for teaching and for research in Bartlett?

QUESTIONS FROM THE WEBINAR PARTICIPANTS?
Creating Adjacencies: Area Clusters

- Grouping like type labs in a single area
- Gives the majors a sense of ownership
- Gains synergy between courses
Comfortable Building

• Why should the building look like a prison?

• Soft seating at the end of halls

• Make science visible items in “dead space”

• Adding “bumper spaces”
Chalkboards all around
Movable student desks

Instructor Bench with:
  AC/DC power
  Water
  Air
  Vacuum
  Gas

Computer and IT controls

Smartboards, wireless,
Document projectors

Standard Classroom
Questions

- Any regrets?

- Any lessons learned that are informing the evolution of Phase II of Bartlett Science Center?

QUESTIONS FROM THE WEBINAR PARTICIPANTS?

- What’s next?
Phase 2

• Remainder of Bartlett Hall
  – Cost – $118 million
  – 212,718 sq ft of renovated space and 11,906 sq ft new construction
  – Same AT/FP, seismic and environmental controls as phase 1
  – LEED Silver
  – Broken into two parts:
    • Part 1 began Feb 2012 expected completion summer 2014
    • Part 2 from summer 2014 to Christmas 2015
  – Architect and Engineer – URS and STV – Lab design - RFD
  – General Contractor – Walsh Const.
Final Reflections