Integrated AEC Studio
Iteration between analysis and design for interdisciplinary learning

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High Performance Buildings require Collaboration
Complexity => interdisciplinary learning

More than one discipline

Language

Methodology

(Schaffer et al. 2008, Orr, 2006)

Interdisciplinary Studio
(Lab) Design Courses

(McCuen & Fithian 2010
Dossick & Pena 2010
Holland et al. 2010
Dib & Koch 2010
Gardzelewski et al. 2010
Salazar et al. 2010)
Theoretical Grounding – Interdisciplinary Work

“design as a social process”
(Bucciarelli 1994)

develop shared mental models collaboratively
(Orr 2006)

A move away from Cooperative Approaches
- division of work into independent parts (Smith et al. 2005)

to Collaborative Interdisciplinary Learning

• unstructured processes
• negotiate goals,
• define problems,
• develop procedures, and
• produce socially constructed knowledge
(Goldsmith & Johnson 1990, Dorsey et al. 1999)

Learning Objectives:
- Apply new knowledge in team context
- Appreciate allied AEC disciplines
- Integrate analysis and design

Students:
- CM Seniors - right before their capstone
- Arch Seniors - 5th of 6 required arch studios quarters
- Required for dual (ARCH/CM) major students
- Civil, Structural, Landscape students
- Teams of 3-7
Arch/CM 404: ‘Design Build’ or ‘Integrated AEC’ studio

2009: Net Zero Office

2010: Net Zero Classroom

2011: Rural ER/Clinic

2012: Community Center
Arch/CM 404: ‘Design Build’ or ‘Integrated AEC’ studio

2013: Modular Multi-Family
Analysis and Design Iterations

CYCLE 0: Introduction

CYCLE 1: Massing & Value

CYCLE 2: Energy & Envelope

CYCLE 3: Structure and Module

CYCLE 4: Final Integration
Arch/CM 404: ‘Design Build’ or ‘Integrated AEC’ studio

CYCLE 0: Introduction
- Multi Family Housing: Zoning and Code Charrette

CYCLE 1: Massing & Value

CYCLE 2: Energy & Envelope

CYCLE 3: Structure and Module

CYCLE 4: Final Integration
CYCLE 0: Introduction

CYCLE 1: Massing & Value
- Testing two zoning heights 85’ and 125’
- Compare design and cost to assess value

CYCLE 2: Energy & Envelope

CYCLE 3: Structure and Module

CYCLE 4: Final Integration
Iteration 1: Massing/Value

85 FT: OPTION A

This option uses 1/2"x4"x4" modules to create a simple, repetitive massing that requires minimal value engineering. The massing is simplified to make it as cost-effective as possible, with a focus on massing the core structure as efficiently as possible.

125 FT: OPTION A

The first option for the 125 ft Alternative has the second story housing over the entrance, providing the corner with an entrance. The second story is simplified to make it as cost-effective as possible to reflect how basic design concepts, such as stairs, can support a massing in the back. The core structure of the units offers views to the first and second levels of the second floor, with the second story extending over the corner to become a roof terrace.
Arch/CM 404: ‘Design Build’ or ‘Integrated AEC’ studio

CYCLE 0: Introduction

CYCLE 1: Massing & Value

CYCLE 2: Energy & Envelope
  ▶ Testing façade options
  ▶ Compare energy, design, cost and logistics

CYCLE 3: Structure and Module

CYCLE 4: Final Integration
Arch/CM 404: ‘Design Build’ or ‘Integrated AEC’ studio

Iteration 1: Massing/Value
Throughout the quarter, many building massing options were considered, and the final design encompasses elements from every iteration. Simplicity drove the design during the first few weeks, but there wasn’t enough substance to move forward with. Switching gears to an option that was more efficient, the team got a bit frustrated in trying to make the new work on the reality side, and lost momentum on design. As a solution, design members of the team each whipped out an alternative based on one central concept. Frustrated with fresh ideas, the team returned to designing with ideas, combining the four alternatives into one harmonious building. One concept each scaling in the woonerf street, maximizing daylight, simplifying circulation, and creating movement by stepping volumes were retained throughout the entire design process.

Analysis/Design Cycle: track progress, integrate and create design narrative