Next Generation Classroom

Department of Aerospace Engineering
Iowa State University

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Final Configuration
Ames, Iowa
30 miles from
Des Moines, the state capital

Within 200 mi of 7 other states
Iowa is a Sparsely Populated Agricultural State

Slightly over 3M population (avg 55/sq mi)
Vast majority of students are from small towns
Vast majority are first generation engineers
Iowa State Facts

• First land-grant university in the US
  • Chartered in 1864; opened in 1868

• University Enrollment
  • Hit a record high 31,040 students in fall 2012.
  • Increase 4% from previous year.
Enrollment Challenges

**College of Engineering**
- 7,508 students in Fall 2012.
- Increase of 8.2%

**Aerospace Engineering**
- 706 undergrads in Fall 2012.
- Increase of 10%
Howe Hall

Department of Aerospace Engineering
Online Learning
Virtual Reality Applications Center
Center for Industrial Research and Services.

192,944 total sq. ft.
Construction

Opened in 1999
Challenges and Opportunities

• Growing Department enrollment
• Growing Engineering enrollment
• No large classrooms in near proximity
• Modern, spacious building
• What can be done at reasonable cost?
Lower Level Configuration

Labs
Building
Office
Auditorium
Classrooms
Available Lab Space
Freshman Retention Challenge

Student attrition first to second semester

![Bar chart showing retention rates from 2004 to 2010.](image-url)
Objectives

Adjust to growing enrollment
Create a classroom space capable of supporting 120 students

Increase student retention
Improve the freshman retention rate
Inspire students from sophomore year and beyond

Implement new technology
Develop a classroom concept that utilizes new technology
Create flexibility to encourage innovation
Avoid technology overload
The DARPA Director spoke to Congress about one of our Nation's biggest challenges: the decline in our ability to make things.

Simply stated, “to innovate, we must be able to make”.

M:2:I is a for-credit independent study program in which student teams build things.

They must have a goal, a faculty advisor, and a team to execute their vision.

The goal is to engage 50% of our students in M:2:I.
Step 2: Develop a freshman course to build excitement

Goal: Generate excitement about aviation and space

Based on MIT’s “Introduction to Aerospace Engineering” but scaled up from 40 to 240 students

Hands-on team projects

Introduction to MATLAB

Focus on qualities (e.g. team building, ethics, and writing)
Step 3: Provide the facilities to execute the plan

Lab space was easiest part, and was handled by reallocating existing space.

Other labs were consolidated and moved to smaller rooms.

Classroom space was far more difficult to acquire
Proposed Space Reallocation
Atrium Area
The Wing

Concrete wing 10 ft. at widest point, and 48 ft. long.
Pilot Project – Fall 2011

Folding chairs and a projection screen

Space returned to other use between classes
Results

Noise and distractions were not an issue

Students enjoyed the open environment

Faculty were generally surprised that it worked

People who walked by the class stopped to observe and listen
Our Concept: Conventional Classrooms

Three simple rooms

Movable partitions to allow expansion

Boring, dull, and conventional

Proposal to Provost for Next Generation Interactive Classroom

Video, whiteboard, and LED lighting
Architect’s Screen-Wall Concept

Desire to preserve open environment

Dramatic concept consistent with the design of the building

Focus cost on technology and not on bricks and mortar
Curved Whiteboard Configuration
Glass Whiteboard Configuration
Final Configuration
Final Configuration
Final Configuration
Classroom as Built
Demolition
Completed Classroom
Seating

Steelcase Node Chair

- Five-Star Base
  - Designed for movability

- Personal Work surface
  - Adjustable
  - Non-handed
  - Large enough for laptop

- Seat
  - Flexible
  - Easy maintenance
Frost style.
Laminated ¼ inch tempered safety glass.
   4-5 times stronger than normal glass.
Non-staining writing surface.
Modular.
LED lightbars
Screens

NEC 42” Large Format Display.

12 Screens spread around the room.

Each screen has HDMI and VGA connections.

Full HD resolution.

Low power consumption.
3 modes

**Lecture Mode**

All screens show same content. Direct connect to single laptop

**Lab Mode**

Student teams tether laptop to each screen.

**Wireless mode**

Direct broadcast to Apple TV from laptop, iPad, or even iPhone
Lecture mode
Lab Mode
Lighter-Than-Air Competition
Change in Freshman Attrition Rate
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LSC Webinar: Learning Environments for Creating Interdisciplinary, Global Problem Solvers
  ➢ March 7, 2013

Contact Information

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http://www.pkallsc.org/