The Foundation Coalition
....an agent of change

Engineering Classrooms

Before and After Innovation

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Workshop Overview

- **Introduction (20 min)**
  - Guidelines, what is an “innovative classroom”?
- **What Other Institutions Have Done (25 min)**
  - Information dump
- **Classroom Transformation (30 min)**
  - What do you do? How do you do this?
- **Other Issues and Considerations (20 min)**
  - Items that can impact potential changes
- **Wrap-up (5 min)**

Introduction: Basic Guidelines

- **Will operate in a team-based mode**
  - The group knows more than any one person
- **Interrupt frequently**
  - No pre-defined set of material that "must" be covered in this workshop
- **When looking at innovative classrooms, we will focus on**
  - The use of technology in the classroom
  - Lower-division engineering courses

Introduction: Share information

- **Within your group: discuss the following question among yourselves**

What is an innovative classroom?
(and could you recognize one if you saw it)

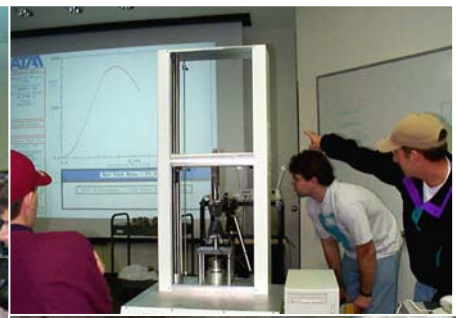
Appoint a reporter to capture group results

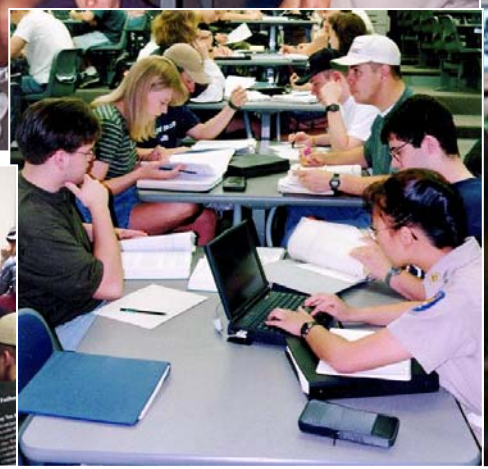
Part 2: What others have done

Short (~25 minute) information dump

- **Background Information**
  - one-page introduction to technology-enabled learning
- **Representative Foundation Coalition efforts**
  - Arizona State University
  - Rose-Hulman Institute of Technology
  - Texas A&M University
  - University of Alabama
- **Other sample initiatives**
  - RPI's studio model
  - Drexel's EE laboratories
  - Penn State online forum

New Classroom Environments





Arizona State University

Classrooms vary based on need

- **Philosophy**
  - College focus on technology in classrooms, different classrooms for different needs, faculty training essential
- **Classroom layout & equipment**
  - Hold 40 to 80 students, team-based seating, instructor has ability to project student work on main screens
- **Software & Applications**
  - Wide variety, different rooms have different packages, all information available via the Internet
- **Audience**
  - All fundamental engineering courses

Arizona State University

Sample

ASU

Classroom

Rose-Hulman Institute of Tech

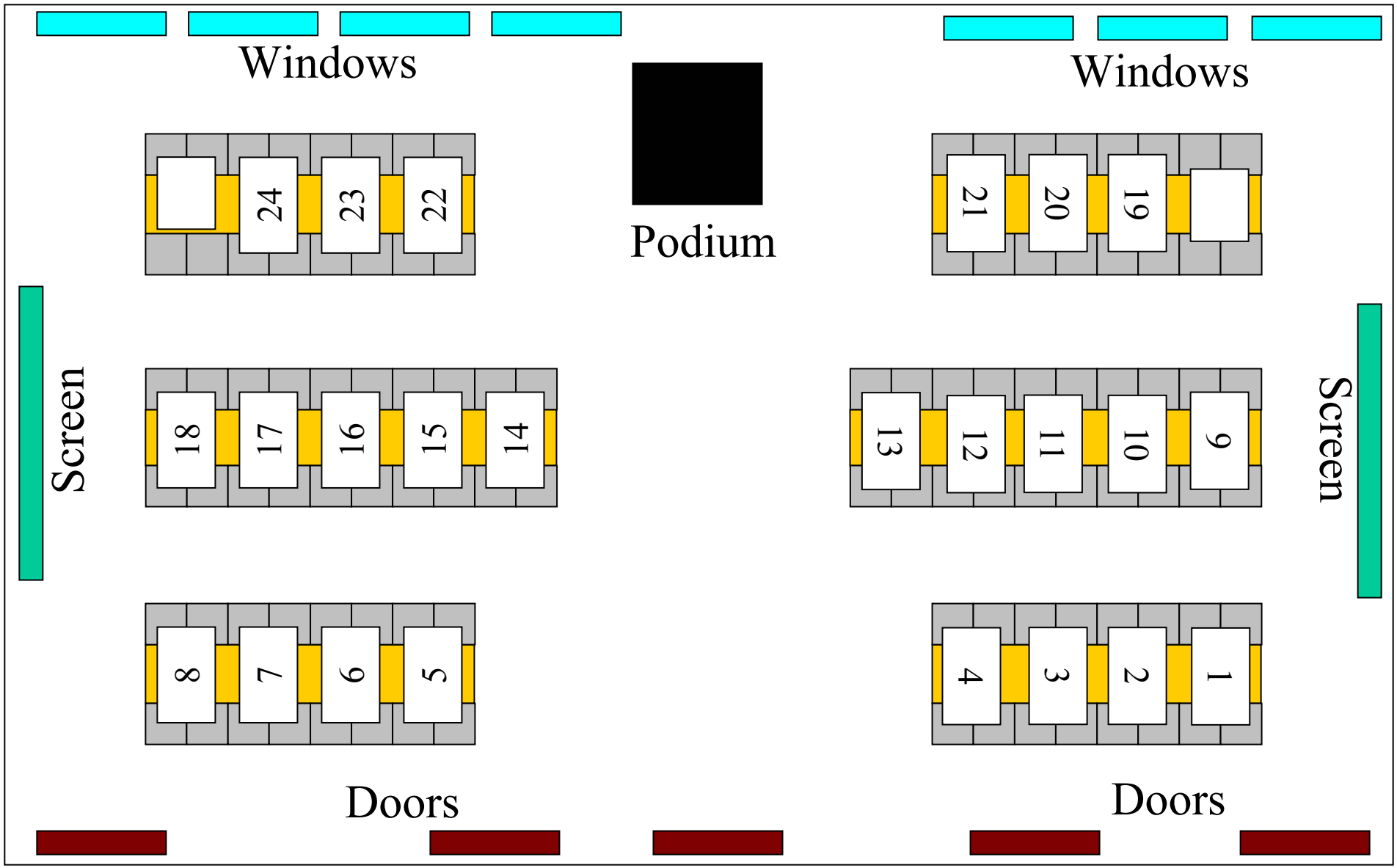
Student laptop environment

- **Philosophy**
  - Completely networked campus environment
- **Classroom layout & equipment**
  - Every student purchases a notebook computer as an entering student (model is specified by institution)
  - Over 20 classrooms have been equipped with network and power connections to support notebook computers
- **Software & Applications**
  - Maple (calculus), Working Model & Maple (dynamics), Physics labs (Excel - data acquisition/analysis)
- **Audience**
  - All engineering students and classes

Texas A&M University
Issues of scale (large population)

- **Philosophy**
  - Classroom technology must be scalable for large classes (~100)
- **Classroom layout & equipment**
  - Remodeled about 10 classrooms for first-year and sophomore courses
  - One computer per two students
  - Departments have constructed their own classrooms, more are planned
- **Software & Applications**
  - Microsoft Office, Maple, AutoCAD, Eng. Equation Solver (EES), Internet
  - EE has students design, simulate, construct, measure and compare behavior of circuits. Class uses NI hardware and software.
- **Audience**
  - Freshman and sophomore engineering students
  - Specialized classes in specific disciplines

CVLB 319: ENGR 112 Team Layout
Sections 501 - 503



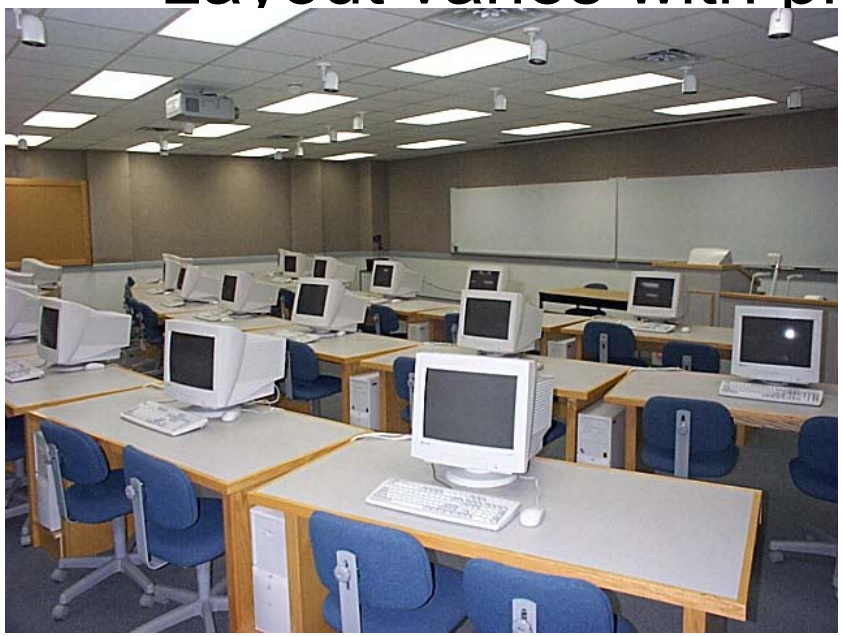
University of Alabama

One model for all classrooms

- **Philosophy**
  - Technology in classrooms, classrooms convenient to students (one new classroom in “engineering dorm”)
- **Classroom layout & equipment**
  - Remodeled six different classrooms
  - Tables for four, one computer per two students
  - Departments constructing their own classrooms
- **Software & Applications**
  - Microsoft Office, compilers, FORTRAN, Maple
- **Audience**
  - Freshman engineering students
  - All students in introductory computing sequence

Alabama Classroom Layout

- **Standard materials in all classrooms**
  - Student computers, console, projection system
  - Primarily used for lower-division classes
  - Layout varies with physical room restrictions

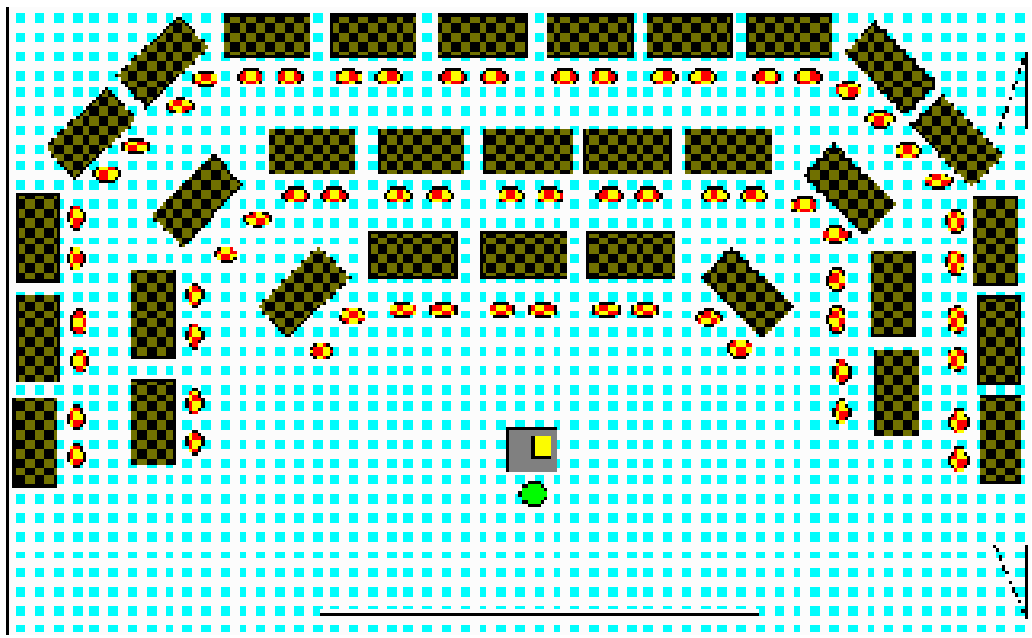


Rensselaer Polytechnic Institute (RPI)
Studio Classrooms

- **Philosophy – studio environment**
  - Integrate classroom (lecture) with laboratory (experiments, acquire/display/analyze data)
- **Classroom layout & equipment**
  - Tables with two students (one computer)
  - Student
    - Using computer faces ***away*** from instructor
    - Listens to lecture facing ***away*** from computer
- **Audience**
  - Mathematics, sciences, engineering students

RPI Classroom Layout

- **Students face instructor during lecture**
  - Away from computers
- **Student away from instructor when using computers**
  - Instructor can see monitors easily



Drexel Classrooms

Laboratory Equipment

- **Laboratory layout & equipment**
  - Laboratory bench for two students (one computer)
  - Suite of measurement equipment with computer control
  - First-year and sophomore students
    - Perform experiments and laboratory projects for three hours/week
- **Philosophy**
  - From the start students work with current equipment and explore stimulating physical phenomena
- **Audience**
  - Engineering students

Technology in Large Classes

Penn State University Large Class Forum

- **Penn State Survey (large lecturers, n=54)**
  - Only 16.7% of faculty to not regularly collect feedback
  - Why collect feedback from students?
    - Comprehension checks
    - Surveys/determine preconceptions
    - Check on student preparation
    - Illustrate concepts
    - Survey student attitudes and preferences
  - Low-tech methodologies employed
    - Written quizzes (33%), in-class voting (48%)
  - How would you utilize “high-tech” survey instruments?
    - 96% - quick feedback regarding concepts in lecture
    - 73% - surveys or attendance
    - 71% - classroom assessment (muddiest point)
    - 67% - individual response to class problem solving exercise

Part 3: Transformation

- **As a team, design your "ideal classroom environment" for the Fall of 2002**
  - Describe this classroom environment
  - Describe how your new activities would benefit students and their learning
  - Describe the resources (besides $$$) that would be required to realize your visions
  - Select a different reporter from last time

Other Critical Issues

- **Design & Utilization**
  - Rooms available for renovation
  - Physical layout considerations
  - Equipment (cost, size, location, power, HV/AC)
  - Time (often takes more than one summer to build)
  - Faculty support and education & development
  - Scheduling of these rooms
  - Monitoring & after-hours access
  - Maintenance & upgrade time availability
- **Administrative**
  - Institution's computing policies
  - Software licensing
  - Purchase, replacement & upgrade costs
  - Support staffing
  - Clear plan for what inst. is doing with technology
  - Impact on T&P process
  - Want to assess results, how to best do this
  - How to get financial support from State or outside sources?

Resources

- **Relevant resources**
  - Foundation Coalition
    - **www.foundationcoalition.org/**
  - Arizona State University
    - **www.eas.asu.edu/ceasrooms/**
    - **www.eas.asu.edu/~asufc/teaming.html**
  - Texas A&M University
    - **coalition.tamu.edu/**
  - RPI Studio Classroom
    - **ciue.rpi.edu/studioteaching.html**
  - Drexel Classroom
    - **www.educatorscorner.com/education/case_studies/drexel.shtml**
  - Penn State Large Classroom Forum
    - **www.psu.edu/celt/largeclass/forum.shtml**
  - Sigma Xi Resources
    - **www.sigmaxi.org/scienceresources/undergradedu.htm**

End of workshop

Questions?