Why I Chose A “Hybrid” Format

- To address two basic instructional problems:
  - the general ineffectiveness of the "large lecture" format in conveying course content
  - inherent "group paced" nature
  - sporadic attendance
  - the general ineffectiveness of "handed in" homework in helping students learn the course material
  - widespread "cheating" (students copying one another's work)
  - difficulty with providing timely feedback
  - observations from attempts to use on-line discussion groups to promote homework collaboration

The Targeted Course

- Each outcome is assessed using a comprehensive, in-lab practical exam consisting of:
  - standardized multiple-choice questions that gauge understanding of content
  - analysis/design questions that gauge basic skills
  - application programming questions that gauge more advanced (synthesis) skills
  - Standardized examination questions and procedures facilitate meaningful comparisons among cohort groups

Experimental Course Format (DPS)

- Lecture content delivered via video streaming
- Contact hours used for collaborative problem solving in small-group settings (multiple sections)
- Conducted in lab so that a variety of hands-on exercises could be completed (DPS page) once sufficient time given to work each problem
- Instructor walk-through of solution (via Net Meeting) once sufficient time given to work each problem
- Students' "homework" score based on attendance and participation in DPS sessions
- Traditional lecture division run in parallel with experimental division (students were given choice of course format)
Preliminary Results (F-05 / S-06)

- For each trial, approximately 2/3 of the students selected the experimental course format.
- Based on survey results, a significant majority (78% F05, 93% S06) believed that the on-line lecture and directed problem solving combination helped them learn the course material better.
- A majority (67% F05, 79% S06) also said they would choose the experimental format in another ECE course.
- An adjustment made for the S-06 trial was to schedule the DPS sessions prior to students’ lab periods.
- The directed problem solving cohort exam average was generally higher than that of the traditional lecture cohort (most notably for higher-order problem solving skills).

Advantages and Challenges

Advantages
- Direct, immediate feedback on problem solving methodology (“bi-directional”).
- Ability of students to employ “cognitive rehearsal” (talking through how to solve a problem with their partner).
- Significantly less day-to-day overhead (handling homework and giving lecture).
- Students have more control over their education (can attend “virtual lecture” when best for them).

Challenges
- Ensuring students “keep up” with virtual lecture.
- On-line quizzes and/or resource utilization tracking tools are often easy for students to circumvent.
- In-class quizzes to track progress take time away from problem solving (“useful work”) and incur additional overhead.
- Ensuring students use the collaborative problem solving sessions “wisely.”
- Coming to class with their annotated notes.
- Not just “sitting there” and attempting to learn by osmosis.

Current Work

- Third trial in ECE 362 currently underway, again with parallel divisions.
- Similar model developed for sophomore-level prerequisite course (ECE 270 Introduction to Digital System Design) – first trial with parallel divisions currently underway.
- Used on-line ILS Questionnaire to help students decide which course format might be best for them.
How ILS Survey Results Utilized

- On-line 44-item questionnaire that assesses preferences on four dimensions
  - Active / Reflective
  - Sensing / Intuitive
  - Visual / Verbal
  - Sequential / Global
- The traditional lecture division was recommended for students with some combination of reflective, verbal, and/or sequential preferences
- The directed problem solving division was recommended for students with some combination of active, visual, and/or global preferences

Tips for Potential Adopters

- On-line lecture content doesn’t need to be “super fancy” to be reasonably effective
- Employ some mechanism to help ensure students “keep current” with on-line content
- Give students a choice of course format if possible – this will give them perhaps their first opportunity to think about (and hopefully discover) how they best learn