Redesigning Computer Programming I Using Multi-level Online Modules for a Mixed Audience

Nira Herrmann, Jeffrey Popyack, Bruce Char, Paul Zoski, Chris Cera

Department of Mathematics and Computer Science, Drexel University, Philadelphia PA 19104

The Drexel Environment

- All students required to have own computer since 1983-84
- Hugs growth in computer science and related majors: $5596-97: 380 CS majors = 280 IS majors
$2700-01: 825 CS majors = 710 IS majors = 28 Digital Media majors = 454 CS majors
- Increasingly varied student backgrounds in computing

Instructional Objectives for Redesign

- Personalize course presentation for individual students
- Minimize resources, particularly faculty, needed in course
- Create modules with multiple knowledge levels to serve multiple constituencies for the course: CS, CE, DM, IS
- Allow for multiple entry points into course material depending on previous knowledge

Old versus New Class Organization

<table>
<thead>
<tr>
<th>Old course</th>
<th>New course</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 lecture hours = 1 lab hour per week</td>
<td>1 lecture hour = 1 lab-hour per week</td>
</tr>
<tr>
<td>Individual lab projects in a standard computer lab</td>
<td>Individual and group lab projects</td>
</tr>
<tr>
<td>Some online materials (instructor-created)</td>
<td>Substantial online support: chat groups, asynchronous discussion, on-line assignment submission</td>
</tr>
</tbody>
</table>

Modular Organization

- Course material divided into modular units
- Each module equivalent to 1 credit of course work
- Typical courses are 3 credits: 9 modules per full course
- Week to week modular format
- Modules to include:
  - 5 pre-recorded lectures on module topics
  - Homework assignments
  - Lab assignments, group and individual
  - Enrichment materials

The course on WebCT

- WebCT with links to separately hosted course Web site
- Course Pipeline will be Drexel campus portal to WebCT: Student Info System (BANNER)
- Automatically creates WebCT accounts for registered students
- Allows seamless communication between Drexel's record system and course. WebCT site automatically graded student software
- Performs rapid downloads of assignments from WebCT
- Sets criteria for assignments per lab sections
- Grading can be added by other sections
- WebCT Functionality

| online submission of assignments |
| online labs and quizzes |
| lab worksheets are filled out and graded on-line in webCT |

Lectures

A page of a lecture notes. These are used as presentation slides in the live and recorded lectures.

Assignments

Conventional assignments are posted in webCT. Students submit their solutions electronically to webCT. They are timetabled and available for upload by graders working for the course. An answer sheet generator for the course (shown above) allows the instructor to standardize the marking information.

Supervised group problem-solving sessions

Wireless networked laptop computers in clusters of five, with one projector per cluster. The walls are covered with "whiteboard wallpaper" for board work and projection.

Plans for evaluation

- Pilot Study
- Format of pilot
  - Two traditional lecture sections
  - Same redesign section
  - Common quizzes and exams
  - Common individual assignments
  - Redesign section also does group assignments
  - Evaluation will include:
    - Comparison of exam performance
    - Follow-up on performance in sequel course
    - Standard student course evaluations
    - Evaluation by participating faculty
    - Focus groups to get student feedback
    - Institutional Review Board review
    - Informed consent for focus groups
  - Anonymity of evaluations