Challenges of Teaching in a Small Computing Department

CCSC:SC 2003
Millsaps College
Jackson, MS
April 12, 2003
10:15 – 11:45 am
Panelists

- Barbara Boucher Owens, Southwestern University
- Adel M. Abunawass, University of West Georgia
- Anne Gates Applin, Pearl River Community College
- Laura Baker, St. Edward’s University
- David Luginbuhl, Western Carolina University
Background of the project

- SIGCSE 2001 discussions
- Accreditation problems
- Needs expressed by colleagues
  - Standards by which to compare with other small departments
  - Aids for assessment
  - Help when teaching specialized courses
  - Best practices website
- Formed committee in Feb. of 2002 which met during SIGCSE 2002
- First task was to better understand the audience (i.e. a survey)
Committee which met at SIGCSE 2002

- Will Mitchell  U. Arkansas Little Rock
- Cathy Bareiss  Olivet College
- Jim Caristi  Valporiso University
- Susan Dean  Samford University
- Laurie Smith King  Holy Cross
- Rick Koontz  Grace College
- Barbara Boucher Owens  SU
- Scott Thede  Depauw University
SIGCSE 2003

- Meetings on Friday and Saturday
- Discussed where to go from here
Future plans

- Define target audience
- Further analyze survey results
- Detail survey to get comprehensive data
- Determine future tasks
- Form working committees
- Apply for grants
- Get involvement from SIGCSE and other institutions
Survey overview  (link to paper)

- **Sections**
  - Institutional data (number of students, faculty/student ratio, load requirement, etc.)
  - Departmental statistics (faculty, student, majors, hours, department identity and support, lab issues, needs, etc)
  - Course information (course name, frequency, comfort level)
Survey Details

- FTE – 2000 or > 3000
- Faculty/student ratio: 1/17.5
- Load requirement: 22.5 (24)
- Full time faculty in C.S.
  - 31 <= 3 faculty
  - 16 = 4 faculty
  - 20 >= 5 faculty
- Majors: (113 mean, 101 std. dev.)
- Hours in major (30 (30-40), 17 (40-50))
Survey Details (cont.)

- Campus computerization responsibility (59 out of 62)
- Lab Help
  - Student (3, 10, 8, 10, 10, 11)
  - Faculty with load (3, 18, 10, 6, 6, 3)
  - Faculty without load (3, 16, 10, 5, 6, 3)
  - Department dedicated staff (6, 12, 1, 3, 5, 7)
  - Computer service staff (1, 13, 10, 7, 8, 13)
- Research required (35 out of 65 with 30 allowing educational research)
Goals – Produce Report

- Contact information of anyone new who wants to get involved
- Areas of need expressed by those at the sessions
- Ideas for the future (if covered)
- Other issues deemed appropriate by the panel members and/or those at the session.
Challenges in recruiting Computer Science Faculty: The Small Department Experience.

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Presentation site with data http://adel.cs.westga.edu/ccsc03

14th Annual South Central Regional Conference
Consortium for Computing Sciences in Colleges
Spring ’03.
Jackson, MS.
At the SIGCSE ‘03

- Several items were discussed
  - White Paper
  - Curriculum
  - Survey
  - Panels
  - Showcase of faculty in small colleges work
  - Directory
  - Publicity
The Shortage

- The Shortage is real *(perhaps easing up a little)*!
- Production of PhDs not keeping up with demands
- Faculty have high demands & higher expectations
- Enrollment in Computer Science is soaring
- More Reliance on Technology in Higher Education
The Shortage

By the numbers:

Ph.D Production:
- 1980- 252 PhD graduates/ 1990- 627 PhD graduates
- 1997- 894 PhD graduates/ 1998- 933 PhD graduates
- 1999- 825 PhD graduates/ 2000- 852 PhD graduates
- 2001- 902 PhD graduates/ 2002- 847 PhD graduates
The Shortage

• Where do they go?
  • most of graduates are hired in Ph.D. granting departments & industry.
  • small colleges compete with the rest of non-Ph.D. granting schools (compete over 20+ graduates on the average).

- Source: Professor Henry Walker (link to site)
- Source: Taulbee Survey (CRA) http://www.cra.org/
The Competition

- Competitive starting salaries of new Ph.Ds
- Reported mean of salary minimum for a starting salary for 00-02, tenure track position, is $75,902 (49% increase over 96-97 of $51,037)
- Table shows the Average of all salaries

<table>
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<th>Average of all salaries</th>
<th>96-97</th>
<th>97-98</th>
<th>98-99</th>
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<td>15%</td>
<td>6%</td>
<td>7%</td>
<td>7%</td>
<td>4%</td>
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</tbody>
</table>

-Source: Taulbee Survey (CRA) [http://www.cra.org/](http://www.cra.org/)
Our Experience…

- Plenty of Faculty positions, but not enough Faculty...
- Faculty retiring/leaving, but no “suitable” replacement can be found…
- Enrollment is soaring, but no classes for students…
- For the most part Faculty are happy with small departments…
What Can be Done?

- Recruiting…
  - start with the advertisement
  - emphasize “small is good”
  - highlight the Department & the People
  - leverage what your city, community & campus offer
  - strive to attract the best
  - use your students as a recruiting tool
For more Information…

- Taulbee Surveys http://www.cra.org/statistics/
- “The Supply of Information Technology Workers in the United States”, Supported by the National Science Foundation (Grant No. EIA-9812240) and published in 1998 by the Computing Research Association. http://www.cra.org/
- “IT worker availability, skill sets, and hot jobs & technologies” Information Technology Association of America (ITAA), http://www.itaa.org/
Small Departments:

The Community College Perspective

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14th Annual South Central Regional Conference
Consortium for Computing Sciences in Colleges
Spring 2003
Jackson, Mississippi
Overview

- About the College
- About the Department
- Courses / Loads
- Computing Resources
- Physical Facilities
- Faculty Issues
- Budget Concerns
About the College:

Oldest of the 15 CC/JC s in Mississippi

- Fully articulated and accredited
- Record enrollments every semester for the past several years, currently 3472 (2339 academic)
- Approximately 80 full time academic faculty
  - course load of 15 credit hours/semester
  - can't count a night class as part of the regular load
  - adjuncts teach most of the night classes
- Department Directors to teach reduced loads
  - 12 hours next year - and maybe a shared secretary
About the Department

Started in 1982 with 4 Apple computers

- 1982-1983 Lone instructor
- 1991-1993 L1 3/5 instructors
- 1994-1995 L 2 instructors (I was #2)
- 1997 L became part of the "Dept. of Mathematical Sciences"
- 2002 L became part of the "Dept. of Sciences, Mathematics and Business"
  - Instructional area coordinators
  - 24 declared CS majors - but they don't all declare
Courses / Loads

Our Dean Counts a Lab as a Class

- **Fall - 14 contact hours each**
  - 1 section of Intro Programming (3/2) + 3 sections of the Literacy course (9)
  - 1 section of Computer Science I (3/2) + 3 sections of the Literacy course (9)

- **Spring - 16 & 15 contact hours each**
  - 1 section of FORTRAN programming (3) + 1 section of a web applications course (3) + 3 sections of the Literacy course (9)
  - 1 section of Computer Science II (4) + 1 section of Discrete Structures (3) 3 sections of the Literacy course (3)
Computing Resources

We're almost on our own

- 3 technicians for approximately 900 computers
  - Our only support is with campus network issues
  - If we can handle a problem in-house we don't call support

- Faculty installed and maintained network
  - Novell on a 386 server with 24 IBM PS2

- NT 4 on dual PII 266 server
  - Instructor installed / administrated until 1998
  - full-time LAN admin (AA degree) hired 1999 - dropped to part-time in 2000 to go back to school to go back to full time next year

- NT 4 (PIII 350) and RHL servers (PII 266)
Physical Facilities

No scheduling issues here...

- One classroom equipped with a computer workstation and data projection system.
- One lab of 24 student workstations (WinNT4) used for hands on teaching in literacy course
  - nice because it caps the enrollment for a course required for graduation. All sections are always full
- One lab of everything that still runs (Linux) used for lab component of programming courses and open use for those students
  - Machines are P90 and P120 systems from the teaching lab - so there's no GUI
Faculty Issues

- Hard to hire new CS faculty.
  - Open position filled by many adjuncts for 2 years
  - Last 2 searches resulted in one qualified applicant each
    - Some high schools pay better than the CCs at the moment
- Advising is difficult -- not mandatory
- Literacy class uses common preps
  - full-time faculty share responsibility for the preps which include: syllabus, rigid schedule, handouts, tests and a lab manual. Night class instructor uses our preps.
  - all students take the same tests & final. SACS likes it, but new faculty take a while to convince
Budget Concerns

Statewide Problems

- Budgets have been cut 3 years in a row
  - "base" salary reduced to keep salaries effectively frozen (salary schedule - degree by years of service so the "base" is a Masters with 0 years). Next year?
- Warranties on the computers in the teaching lab will run out in June.
- Software Licensing fees forced the change to Linux for compilers
  - may have the same effect for the entire academic division just so we can all have the same office suite.
Challenges of Managing a Small CS Department

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About St. Edward’s University

Approx. 4000 students
1200 Graduate students
2800 Undergraduate students
65% full-time
35% working adults
Classes day/evening mixture of both populations
About the Computer Science Department

270 total majors (approx.)
  170 Computer Science
  100 Computer Information Science
Offer Day and Evening programs in both majors
Teaching Load 12 hours per semester
Scheduling Issues

- Scheduling classes (regular offerings, number of sections, rooms, times)
- CS major requirements:
  37 sections of 3 hour classes each semester
- CS non-major requirements:
  18 sections of 3 hour classes each semester
- service level courses
- Total Classes scheduled per semester
  55 sections of 3 hour classes
Lab Management Issues

- Lab management difficulties
- Supervising full-time lab manager
- and managing student lab workers
- Overseeing training, equipment maintenance, backups etc.
- Equipment purchases and budget
Budgetary Issues

- Departmental budget, separate from lab budget
- Hardware/software purchases
- Student workers for lab and for grading
Student Advising

- Degree plan advising for students
- Degree audits
- Graduate School planning/advice
- Letters of Recommendation
- Internship coordination
- Independent study and special projects
Student Advising

- Time to meet with prospective students including preview days, parent weekends
- Selecting scholarship candidates and outstanding students
Managing Faculty

- Curriculum revisions and adjustments to maintain current and credible programs
- Managing full-time and adjunct faculty within department
- Reaching consensus on major decisions
- Scheduling meetings
- Offices scattered in different buildings
- Philosophical differences among faculty
Challenges of a Small Computing Department

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Dept of Mathematics and Computer Science
Western Carolina University
CCSC-SC
Jackson, MS
April 11, 2003
Overview

- Profile of Western Carolina’s CS Program
- Problem: Bench Depth and Curriculum Coverage
- Challenges
- Solutions/Discussion
Western Carolina University and Computer Science

- Westernmost campus in the UNC System
- 7000 Students, undergraduate/graduate
- CS Program resides in the Mathematics and CS Department, College of Arts and Sciences
  - CS is Undergraduate only
- CS Faculty
  - 2000-2001: 3 full-time CS faculty members
  - 2001-2002: 3.5 full-time CS faculty members
  - 2002-2003: 4.5 full-time CS faculty members
  - No 5th faculty position in sight
- Course load: 3 courses per semester
Problem: Curriculum Coverage

- **Systems**
  - Networks
  - Operating Systems
  - Systems/Architecture
  
- **Software**
  - Software Engineering
  - Software Development
  
- **Theory**
  - Theory of Comp
  - Programming Lang
  - Data Structures
  
- **Capstone**

- **CS2**

- **CS1**

- + 2 Electives

- Logic and Proofs
Bench Depth – Current Configuration (sort of)

- Prof A: Systems
  - Networks, O/S
  - Database (a popular elective)
- Prof B: Systems
  - Architecture, Systems elective
- Prof C: Software/Theory
  - Software Development, Data Structures, Logic and Proofs
- Prof D: Software/Theory
  - Theory, Software Engineering, Capstone
- Prof E: Half-time
  - Programming Languages, Advanced Programming (Elective)
Other Courses

- CS1 – Intro to Java
  - 2 or 3 sections taught by a subset of CS faculty
- CS0 – Intro to Computing: HTML and JavaScript
  - Popular service course
  - 2 to 4 sections taught by a subset of CS faculty
- Two or three other electives taught by Math faculty
- Math requirements taught by Math faculty
Challenges

- Need for a backup plan
  - We are one faculty departure away from radical restructuring
- Faculty talents & strengths drive curriculum
  - Always with accreditation and CC2001 in mind
  - And of course, state and university requirements…
  - A balancing act, to say the least
- Lack of ability to offer many electives
Solutions

- We have begun to identify “backups” for each course
- Rely on:
  - part-time help or Mathematics graduate students for service and CS1 courses
  - Mathematics faculty for math-related courses
- “Creative” course substitutions for students
Rewards

- Increased breadth of teaching experience
- Ability to determine program direction
  - Changes to curricula
  - Changes to courses
- Contact with students in multiple settings
Is there a more robust structure to a CS curriculum to inoculate against the bench-depth problem?
- Cross-cuts?
- Mini-courses (half/third semester)?
- Component-based curriculum architecture?

Something is needed to allow for real-time flexibility

Ideas?
Questions?