

Researching Retention in Our CS Departments

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Session Goals

- Define “retention”
- Learn about each other’s local experiences, resources
- Think concretely about local retention research
- Discuss in context of past retention research
- Identify future directions in retention research

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Session Format

- Mixed presentation, discussion
- Discuss in pairs
- Reconvene to share
- Goal: Start conversations to be continued later

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Defining “Retention”

- “Keeping” students in CS
- When are they “in” or “out”?
 - Interests upon entering college
 - Introductory CS course enrollment, success
 - Major declaration/application
 - Graduation and beyond
- Individual tracking [BC98]
- Varies with department

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Recruitment and Retention

- “Getting” students
- Some common means, factors
 - Combating negative stereotypes about CS
 - Encouraging intrinsic interest in CS
- Reasons for entering not nec. matched with reasons for leaving [SH97]
- Varies with department (e.g., 2+2 programs)

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“Retention” in Our Departments

Discussion:

How would you define “retention” in your department? What determines whether a student is “in” CS?

Until Session 4, focus on *what* to measure, rather than the mechanics of *how* to measure it.

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Cross-Institutional Analysis

- Any statistics we can compare, aggregate?

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Not Much Research So Far

- Few retention studies specific to CS
 - Some in science/tech./engineering/math (STEM)
- Most focus on widening audience for CS (more in next session)
- Est. 15% to 30% CS 1 drop/fail rates [GS02]
- Probably wide variance [Coh01]
- Why so little research?
- Your local estimates?

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SME Retention [Seymour & Hewitt]

- *Talking About Leaving: Why Undergraduates Leave the Sciences*, Seymour & Hewitt, 1997
- Science, math, engineering fields
- 3-year longitudinal study (1990--1993)
- 7 institutions, 335 students
- Ethnography: depth, context; rich data

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Reasons for Entering SME Majors

1. Outside influence (18%)
2. Intrinsic interest (17%)
3. Pragmatism, materialism (16%)
4. Math/science confidence (12%)

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1. Outside Influence

- Family
- Teachers, esp. math/science

- Reported more by “switchers” and women

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2. Intrinsic Interest

- Understanding the major
- Longer-term goals
- Facing short-term challenges
- Key predictor for retention

- Reported more by “non-switcher” women

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3. Pragmatism, Materialism

- Career
- Salary
- Employability

- Reported more by “switcher” women

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4. Math/Science Confidence

- Ability in high school math/science
- Based on self-assessment

- Reported more by men

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Reasons for Leaving SME Majors

1. Loss of interest
2. Curriculum overload, fast pace
3. Poor teaching
4. Career rewards not worth effort
5. Inadequate academic support, advising
6. Discouragement at low grades early
7. Rejection of SME careers, lifestyle

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True for SME, True for CS?

Discussion:

How might these reasons for entering/leaving SME majors help explain the recent drop in intro. CS enrollment and low retention rates?

What other factors affect recruitment/retention in your department?

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True for SME, True for CS?

Reasons for Entering SME

- Outside influence
- Intrinsic interest
- Pragmatism, materialism
- Math/science confidence

Reasons for Leaving SME

- Loss of interest
- Curriculum overload, fast pace
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Reasons for Leaving CS

- Bunderson & Christensen, 1995
 - Not enjoyable, interesting (esp. women)
 - Another major more attractive
 - Unrealistic expectation of prior experience
- Wilson, 2002
 - Self-confidence with computing
- Jagacinski et al., 1988
 - Not enjoyable
 - Large, impersonal classes
 - Assumptions of prior programming experience

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Entering and Leaving Our Depts.

- What challenges do our depts. share?

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Approaches to Better Retention

Not too early to address problems

- Collaborative learning
- Creativity, multimedia
- Combining CS with other disciplines

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Approach: Collaborative Learning

- Pair programming [MWBFF02, MWBF03]
 - Better retention
 - Better academic performance
 - More likely to continue in CS
- “Defensive climate” and “conversational classroom” [Barker, Garvin-Doxas, et al., SIGCSE]

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Approach: Creativity, Multimedia

- Alternative intro CS for non-majors [GS02, RPG04]
- 12% withdrawal/failure rate (vs. 28%)
- Encourages CS interest in non-majors
- Especially popular among women

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Approach: Interdisciplinary

- Alternative intro CS stressing interdisciplinary applications, context [U. of British Columbia]
- Combined major programs
- Interdisciplinary capstones

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Approaches in Our Departments

Discussion:

Which of these approaches are a good fit for your department?

What current/planned practices and policies promote recruitment/retention in your department?

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Problems Unique to CS?

Discussion:

CS, among the SME fields, seems to have particularly bad retention. What unique aspects of CS do you think are responsible?

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DISCLAIMER: This slide contains at least 75% speculation.

Problems Unique to CS?

- "Miscalibrated" intro courses [Wi02, SP96]
- Misunderstanding of CS and computing careers
 - CS as (exclusively) programming
 - Sitting at a PC all day, working alone
- Problems with teaching quality
 - Less incentive, pressure (until recently)
 - Difficulty recruiting teaching talent
 - Fast-changing field
 - Shorter history of "scholarship of teaching and learning" (vs. math, physics)

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What have we learned? (I hope.)

- Defining retention precisely, concretely
 - For evaluating success
 - For analysis across institutions
- Must understand local recruitment/retention
- ...but keep mindful of national trends
- Role of qualitative research, patterns in rich data suggesting more specific hypotheses
- Not too early to start addressing problems

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Future of CS Retention Research

- Cohoon: national version of Virginia study
<http://curry.edschool.virginia.edu/ITattrit/>
- CRA: national study of graduate students
- Lopez, Giguette, and Schulte: national study of CS retention at HBCUs
<http://webusers.xu1a.edu/tlopez/PROACT/GED.htm>
- (your study here)
- (my dissertation here)

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Thank you!

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