Outline and introduction

• focus – Computer Science at university level
• motivation
• international trends
• South Africa and Wits
• why?
• what can be done?
• research and curriculum at Wits
• WWW resources
Motivation

- shortage of IT professionals
- lack of diversity
- importance for South Africa as a developing country
- untapped source of potential resources

International trends

- USA and Canada [Camp et al., Kozen and Zweben 1998]
  - incredible shrinking pipeline – decrease from percentage at bachelors to percentage at full professor and decreasing trend over time
  - percentage of degrees awarded to women in biological sciences, engineering, and physical sciences is increasing
– two sources of data
* US Department of Education – all US universities
* CRA – US/Canadian PhD granting universities
– percentage of degrees awarded to women
– undergraduate – increase from mid 70’s, then decrease from mid 80’s, prediction of a slight increase in next few years

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<td>37%</td>
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<td>PhD gr</td>
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<td>16%</td>
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– postgraduate

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– percentage female academics in 1996/7 at PhD granting institutions
  assistant professor | 20%
  associate professor | 10%
  full professor      | 6%
• Britain [Lovegrove and Hall 1991, UCAS]
  – undergraduate – acceptance into degrees, decrease in 80’s as computers introduced into schools

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– postgraduate and academic – anecdotal, low percentage in mid 90’s

• similar problems in Australia, New Zealand, Netherlands

**South Africa**

• general situation – anecdotal information from early 90’s
  – undergraduate – 20% to 50%
  – differences between English-speaking and Afrikaans-speaking universities
  – differences between Computer Science and Information Systems
  – academic - only one female full professor

• some evidence of shrinking pipeline
University of the Witwatersrand

- ongoing monitoring of gender and race breakdown
  [Herbert 2000, Galpin and Sanders 1993]
  - undergraduate – 1986-1992 20-30%
    no trends, no difference in persistence
  - Honours – 1986-1992 23%
  - MSc and PhD – percentages are lower
- evidence of shrinking pipeline

Why?

- social factors, socialisation
- stereotyping
  - computers
  - science and computer science
- differences in ability?
- differences in knowledge
  - maths background
  - prior experience with computers
differences in self-confidence
• differences in preferred learning environment
• misconceptions about computer science
  – programming
  – computing culture
  – administrative/clerical work
• lack of role models and mentors
• survey of causes [Galpin 1992, Herbert 2000]

What can be done
• understanding of causes and solutions
• understanding of local situation and causes
• social change
• schools
• university environment
  – mentors
  – role models
  – physical safety
• university teaching – various solutions have been suggested (discussed in [Galpin 1992, Herbert 2000])
  – subject matter
    * maths
    * applications
    * human-oriented
  – teaching approach
    * introductory courses
    * structured labs
  – change of perceptions
  – removal of gender bias

Research and curriculum at Wits

• ongoing monitoring of gender and race breakdown
  – build from fundamentals
  – give overview of computer science
  – emphasis is not programming
  – does not favour those with computing experience
• research into attitudes to computer science of first year Faculty of Science students [Sanders and Galpin 1994]
  – males registered for CS I, more informal and less formal exposure, more confidence
  – females registered for CS I, more formal exposure, less confidence
  – males not registered for CS I, less exposure, more negative perceptions
  – females not registered for CS I, more female role models, more games

• research into role models [Herbert 2000, Herbert and Sanders 1999]
  – lack of positive role models
  – male dominated but women can learn
  – perception of good careers
  – confusion about what computer science is

• current research
  – how perceptions of computers and computer science change during the first year curriculum

• possible future research
  – national survey at university level
Conclusion

- shrinking pipeline is an issue
- need to understand causes and solutions
- Department of Computer Science at Wits
  - doing research into causes
  - developing curriculum
  - monitoring

WWW Resources

  http://www.sawise.org.za
- TAP (The Ada project) – information and resources relating to women in computing
  http://www.cs.yale.edu/~tap/tap.html
- The Grace Hopper Celebration of Women in Computing – conference held every three years focusing on technical and academic contributions from women in computing
  http://www.sdsc.edu/Hopper/
- ACM-W (The ACM’s Committee on Women in Computing) – committee of international professional organisation
  http://www.acm.org/women

- IEEE Women in Engineering Committee – committee of international professional organisation
  http://www.ieee.org/organizations/committee/women/

- WiC (Women in Computing) – predominantly British organisation
  http://osiris.sunderland.ac.uk/wic/

- CPSR (Computer Professionals for Social Responsibility) – professional international organisation concerned about impact of computer technology on society, based in USA
  http://www.cpsr.org/program/gender/index.html

- CRA-W (The Computing Research Association’s Committee on the Status of Women in Computer Science and Engineering) – committee of North American association of university departments and research laboratories
  http://cra.org/Activities/craw/

- SWIFT (Supporting Women in Information Technology) – research program to increase the participation of women in Information Technology
  http://taz.cs.ubc.ca/swift/

- IWT (The Institute for Women and Technology) – works on technology that has positive impacts on women around the world
  http://www.iwt.org/
References


