University of the Witwatersrand, Johannesburg

School of Computer Science

Perceptions of Computer Science

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Introduction and outline

- motivation
  - related research
  - computer science at Wits
- research methodology
  - data collection
  - sample
- data analysis
  - gender differences
- further research
- conclusion
Motivation

- perceptions of computer science often incorrect among school learners
  - use of application software, secretarial
  - only programming, limited career possibilities
  - no interaction with people, only with machines
  - ‘nerdy’, ‘geeky’
  - limited understanding of breadth of computer science
- perceptions affects who studies computer science
  - low participation by women worldwide [Galpin 2002]
  - perceptions may cause this
    [Clarke and Teague 1996, Selby et al. 1998]
  - accurate perceptions may increase participation

Computer Science at Wits

- innovative first year curriculum
  [Sanders and Mueller 1994, Sanders and Mueller 2000]
  - build from fundamentals and present overview
  - emphasis is not programming
  - does not favour those with computing experience
  - Bloom’s taxonomy and skills hierarchy [Bloom 1956]
  - evaluation necessary
- gender
  - from 1986 to 1998 BSc and BSc Hons, 27% female, no clear trends
    [Galpin and Sanders 1993, Herbert 2000]
  - research: attitudes to computer science [Sanders and Galpin 1994], role
    models [Herbert 2000], self-efficacy [Turner 2001]
Methodology

- survey on at registration or first day of the academic year
- analysed data from new students only
- sample

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<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>All</th>
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<td>66.7%</td>
<td>74.4%</td>
<td>77.4%</td>
<td>70.9%</td>
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<td>90</td>
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</table>

- statistical techniques – descriptive

Understanding of Computer Science

- “Do you have a clear idea of what CS involves?”
  - Yes responses

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</thead>
<tbody>
<tr>
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<td>65.7%</td>
<td>57.4%</td>
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<tr>
<td>Female</td>
<td>58.1%</td>
<td>38.9%</td>
<td>28.6%</td>
<td>36.4%</td>
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<tr>
<td>Male</td>
<td>69.7%</td>
<td>66.7%</td>
<td>57.6%</td>
<td>36.6%</td>
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</tbody>
</table>

- clear trends
- clear gender differences
Clear idea of what CS involves

Content of Computer Science

- “Do you think CS and Maths are closely related?”
  - Yes: 95% of total sample
  - no gender differences
  - constant trend

- “CS is not interesting because it involves working with machines instead of people”
  - no gender differences
  - trend in disagreement with statement

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<th>2000</th>
<th>2001</th>
<th>2002</th>
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</thead>
<tbody>
<tr>
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<td>83.7%</td>
<td>84.2%</td>
<td>87.8%</td>
<td>92.7%</td>
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</table>
Content of Computer Science (Cont.)

- “CS involves mainly programming”
  - no clear trends
  - gender differences

<table>
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<th>Agree</th>
<th>Disagree</th>
<th>Other</th>
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</thead>
<tbody>
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<td>25.3%</td>
<td>25.3%</td>
<td>49.4%</td>
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<tr>
<td>Male</td>
<td>19.0%</td>
<td>35.2%</td>
<td>45.7%</td>
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</tbody>
</table>

- “CS work involves mainly word processing”
  - no clear trends
  - gender differences

<table>
<thead>
<tr>
<th></th>
<th>Agree</th>
<th>Disagree</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>1.2%</td>
<td>48.8%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Male</td>
<td>0.9%</td>
<td>74.4%</td>
<td>24.6%</td>
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</table>

Careers

- “Do you think that there are good jobs available for people with Computer Science degrees?”
  - Yes: 97.7% of total sample
  - no gender differences
  - constant trend

- “It is difficult to find interesting jobs in computer science”
  - Disagree: 75.0% of total sample
  - no clear trends, no gender differences

- “There are many jobs for people who have studied computer science”
  - Agree: 73.2% of total sample
  - no clear trends, no gender differences
Stereotyping

- “CS, Engineering and Maths are more appropriate fields for men than for women”
  - variation over time, but no clear trends
  - definite gender differences

<table>
<thead>
<tr>
<th></th>
<th>Agree</th>
<th>Disagree</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>1.2%</td>
<td>91.7%</td>
<td>7.1%</td>
</tr>
<tr>
<td>Male</td>
<td>10.9%</td>
<td>55.0%</td>
<td>34.2%</td>
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**Further research**

- perceptions before and after first year course
  - choice of students
  - trends – 2000 and 2002
- international study about computer professionals
  - UK, Australia, Hong Kong, USA, South Africa
  - intermediate results [Craig et al. 2002]
  - further data analysis and interpretation
- current Honours research reports
  - impact of incorrect perceptions on outcomes for disadvantaged students
  - survey of school children before subject choice

**Conclusions**

- main results
  - students perceive they are unclear about CS
  - CS is closely associated with Maths
  - female students less clear on content
  - perceptions of good, interesting jobs
  - male students are more negative about women in CS
- strategies
  - information about computer science before career decisions made
  - early introduction to breadth at universities
References