Towards a Doctorate in Physics

Presented by Marietjie Greeff

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Overview

• Introduction
• Key factors that affect postgraduate influx
• Current Survey and Preliminary Results
• CSIR
• Summary
## Introduction

### 2005 Comparison: PhD per % population [1]

<table>
<thead>
<tr>
<th>Country</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>0.01 %</td>
</tr>
<tr>
<td>South Africa</td>
<td>0.001 %</td>
</tr>
</tbody>
</table>

Introduction

2008 Comparison: South Africa in the B league [2]

Countries in A league: 250 (0.03 %)
South Africa: 27 (0.003 %)

for every $10^6$ of the population

Germany, UK, Switzerland, Sweden

[2] L. Cameron, South Africa still lagging the world's leaders in the development of PhDs, April 2008
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- **Key factors that affect postgraduate influx**
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Key factors that affect postgraduate influx

- Interest and subject presentation
- Encouragement and Departmental Atmosphere
- Bursaries and funding
- Employment prospects
Key factors that affect postgraduate influx

Interest and subject presentation

• fascination with the subject [3]
  - interest in, or enjoyment of, the subject; a favourite subject

The Women in Physics in South Africa Project:
“.. is looking at ways to make the curriculum girl-friendly and to help teachers encourage girls to take physical science at school, as well as to pursue careers in physics.”

- emphasis placed on thinking for oneself

Key factors that affect postgraduate influx

Interest and subject presentation

• presentation of the subject
  - School experience [4]
  - enthusiasm of lecturers and their ability to make the subject interesting; their love of the subject; their knowledge and approachability [4]
  - boring vs. exciting practicals [5], relevant practicals [6]

Key factors that affect postgraduate influx

Interest and subject presentation

- presentation of the subject
  - making the subject easy to understand
  - interesting topics presented for postgraduate study
  - a strong disposition towards continuous evaluation of, and experimentation with, the undergraduate program [7]
  - a challenging but supportive and encouraging program [7]

Key factors that affect postgraduate influx

Encouragement and Departmental Atmosphere

• strong and sustained leadership in the department [7]
• a strong disposition towards continuous evaluation of, and experimentation with, the programme [7]*
• supportive environment in the Physics Department, a feeling of being welcome [5]
• * in [7] conclusions were drawn for the undergraduate programme; it is suggested that these are relevant to the postgraduate

Key factors that affect postgraduate influx

Bursaries and funding

• Recommendation 5 [8]: “There is considerable concern in the science community about the low level of remuneration in academe, school-teaching and student bursaries”
• “From reports received by the Panel, there are a number of problems relating to transmission of information about and the administration of student bursaries”: late payment of bursaries, and “Catch-22” on pay before registering (University) and register before paying (grant agency) [8][9]

[9] Instructions related to Armscor A-STD-0020
Key factors that affect postgraduate influx

Bursaries and funding

• It appears that gender bias can make bursaries either easier (NRF) or harder (Engineering) to obtain for women [5]
• At least one university has waived the first two semesters of fees for postgraduate students in areas of scarce skills (UKZN)
• In contrast to the 1970’s and 1980’s, postgrad students in the 1990’s and the 21st Century are more likely to be supporting children, spouses, aging parents or extended families [8]

Key factors that affect postgraduate influx

Employment prospects

• Many families expect graduates to assist with income as soon as they are first qualified, rather than studying further [8]

• The income of a Physics PhD is likely to be lower than that of a comparable commercially qualified contemporary on graduation, but is likely to rise faster [8]

Key factors that affect postgraduate influx

Employment prospects

• The choice of moving to industry is affected by: [6]
  - the need for money, independence
  - involvement with industry during studies
  - large industrial projects on the go
  - opportunities and recruitment
  - better skilled at application rather than research
  - exploring industry before going back to academia.

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Current Survey

Prepared questionnaires for community

Sample Size

CSIR Employees 19

New Graduates 29
Current Survey

New Graduates: 29

Will you continue your education?

- Yes: 65%
- No: 14%
- Maybe: 21%
Current Survey

New Graduates: 14

Why will you not continue?

- I want to support myself and function independently
- I need to support my family
- I am not interested in research
- I want to change my career
- I will earn more money in industry
- I am considering relocating to another country

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I find Research ...

- 28 people like research
- 12 people find research too exciting
- 12 people find research too boring
- 20 people think it's too hard
- 4 people think it's too easy
- 4 people don't like it at all
Current Survey

If you relocate countries, will you consider continuing your studies

- Yes: 38
- No: 62

New Graduates: 21

- My family/boyfriend/girlfriend/life partner/friends are moving to another country or has already relocated: 29%
- I have an opportunity at another university: 28%
- There is too much crime in South-Africa: 36%
- Other: 7%

New Graduates: 14
Current Survey

New Graduates: 27

Mode of Study

- Study full time: 19
- Work full time and study part time: 63
- Work part time and study full time: 19
Current Survey

New Graduates: 17

Type of part-time job

- Academic industry, like tutoring: 59
- Private sector, like extra maths: 24
- Hospitality industry (e.g., waiter): 12
- Other: 6

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Current Survey

New Graduates: 29

Funding for Further Studies

- Parental support: 27%
- CSIR scholarships: 21%
- Bursaries with other institutions: 28%
- Other: 24%
Current Survey

New Graduates: 49

Career decision influences

- Other: 10
- Grant agency: 6
- Potential employer: 14
- Employer: 16
- Friends: 8
- Girlfriend/Boyfriend/Spouse/Life partner: 10
- Lecturers/Teachers/Mentors: 12
- Parents: 22

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Current Survey

New Graduates: 26

Commitments towards a bursary

Yes | No
--- | ---
12% | 88%

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Current Survey

New Graduates: 21

Presentation and Environment

- Physics society
- Field trips
- A physics journal
- Other engineering student societies

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The CSIR is committed to making a contribution to the national efforts to address the skills shortage in science, engineering and technology (SET)

- A bursary programme
- A studentship programme for selected students
- An internship programme offering experiential learning that allows qualified individuals to gain practical experience and acquire core technical skills
The total number of PhDs has grown by 10.9% and the number of Master’s by 3.2% compared to 2006/07.
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## Summary

| Interest and subject presentation | • 65% will continue with studies  
|                                  | • 62% will continue studies overseas  
|                                  | • 28% like research, 20% find it too hard, 20% will do it if required  |
| Encouragement and departmental atmosphere | • 63% work full time and study part time  
|                                          | • 59% part time job in academic industry  |
## Summary

| Bursaries and funding | • 43% want to function independently rather than study  
|                       | • Even exploration of all funding opportunities  
|                       | • 88% don’t have a bursary |
| Employment prospects  | • Career decisions primarily influenced by parents  
|                       | • Employer, potential employer and lecturers follow |
Acknowledgements

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All survey participants

This lovely audience for your kind attention and interest