

Towards a Doctorate in Physics

Presented by Marietjie Greeff



Authors:

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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]

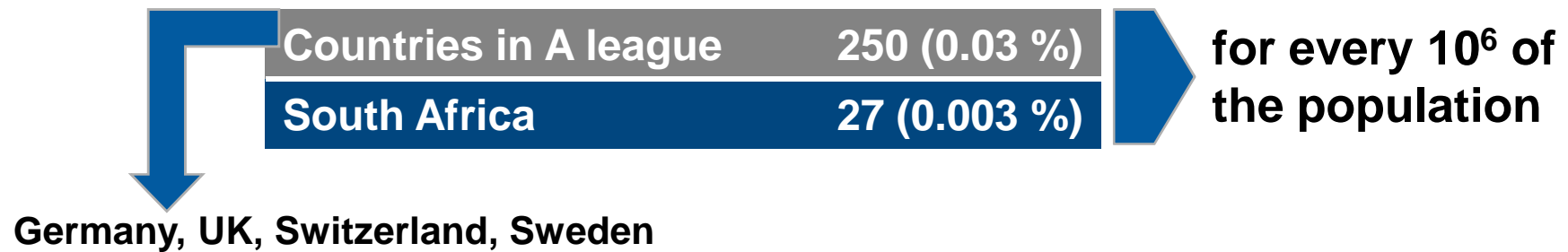
India	0.01 %
South Africa	0.001 %

[1] A. Bawa, The PhD and South Africa's Research Capacity, 2005



Introduction

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



[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

- **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**

[3] M. Diale et al., Women in Physics in South Africa: The Story to 2008, American Institute of Physics, 2009



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]**

[4] M. Thoennesen, Giving students a taste of research, Physics World, February 2008

[5] D. J. Grayson, A Baseline Study of Women Physics Graduates, Report to DST, 2008

[6] K. Meyer, The Physcis500 Brochure, a Project for DST by SAIP, 2008



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]

[7] R.C. Hilborn, R.H. Howes, K.S. Krane, Strategic Programs for Innovation in Undergraduate Physics: SPIN-UP Project Report, 2003



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**

[5] D. J. Grayson, A Baseline Study of Women Physics Graduates, Report to DST, 2008

[7] R.C. Hilborn, R.H. Howes, K.S. Krane, Strategic Programs for Innovation in Undergraduate Physics: SPIN-UP Project Report, 2003



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]**

[8] M.A. Hellberg et al., Report of the International Panel “Shaping the Future of Physics in South Africa”, March 2004, www.saip.org.za

[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]**

[5] D. J. Grayson, A Baseline Study of Women Physics Graduates, Report to DST, 2008

[8] M.A. Hellberg et al., Report of the International Panel “Shaping the Future of Physics in South Africa”, March 2004, www.saip.org.za



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]**

[8] M.A. Hellberg et al., Report of the International Panel “Shaping the Future of Physics in South Africa”, March 2004, www.saip.org.za



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.**

[6] K. Meyer, The Physcis500 Brochure, a Project for DST by SAIP, 2008



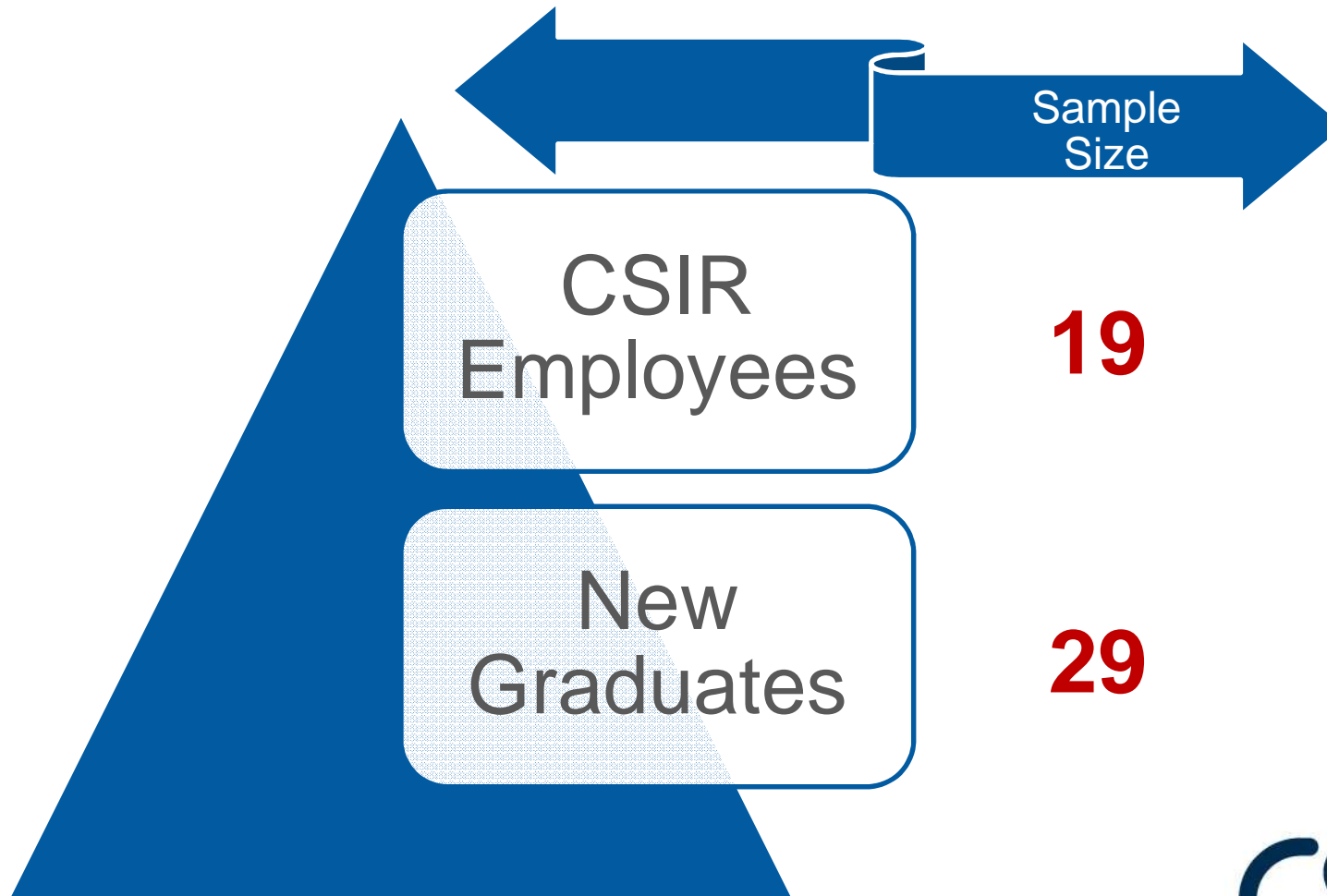
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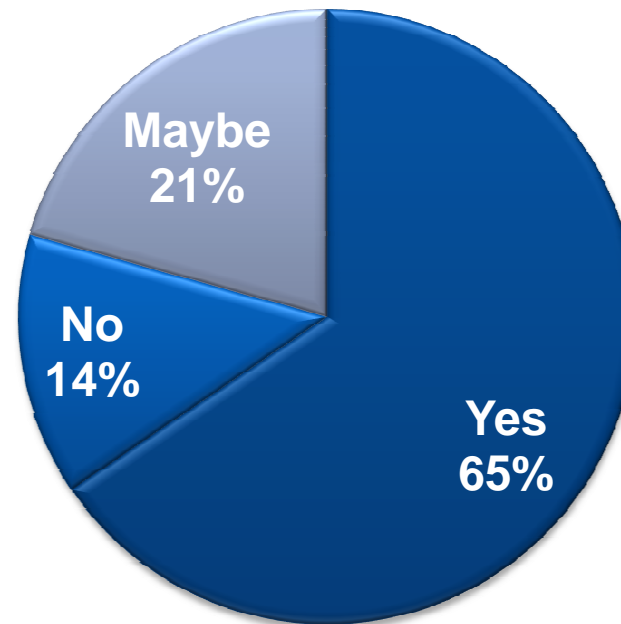


Current Survey

Prepared questionnaires for community

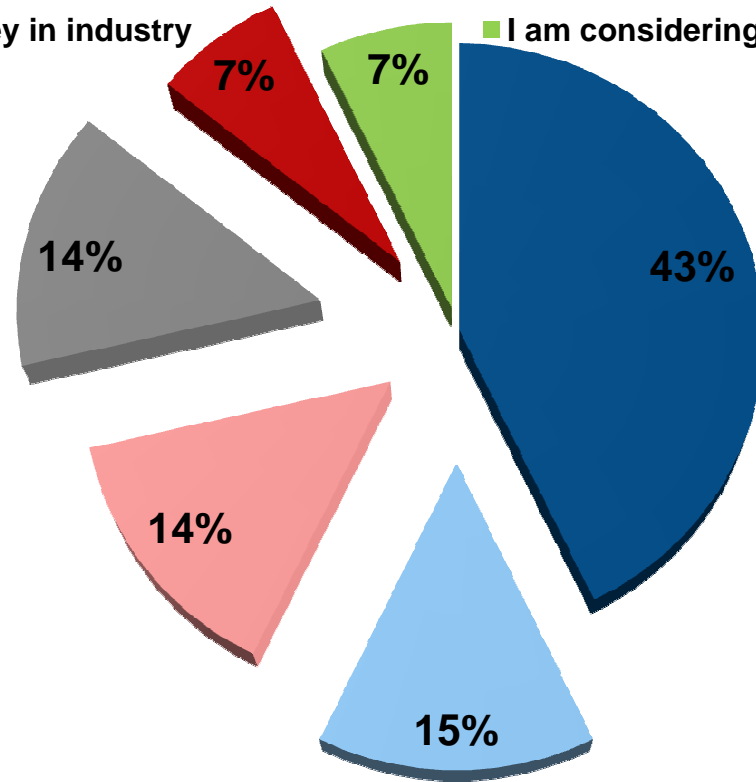


Will you continue your education?



Why will you not continue?

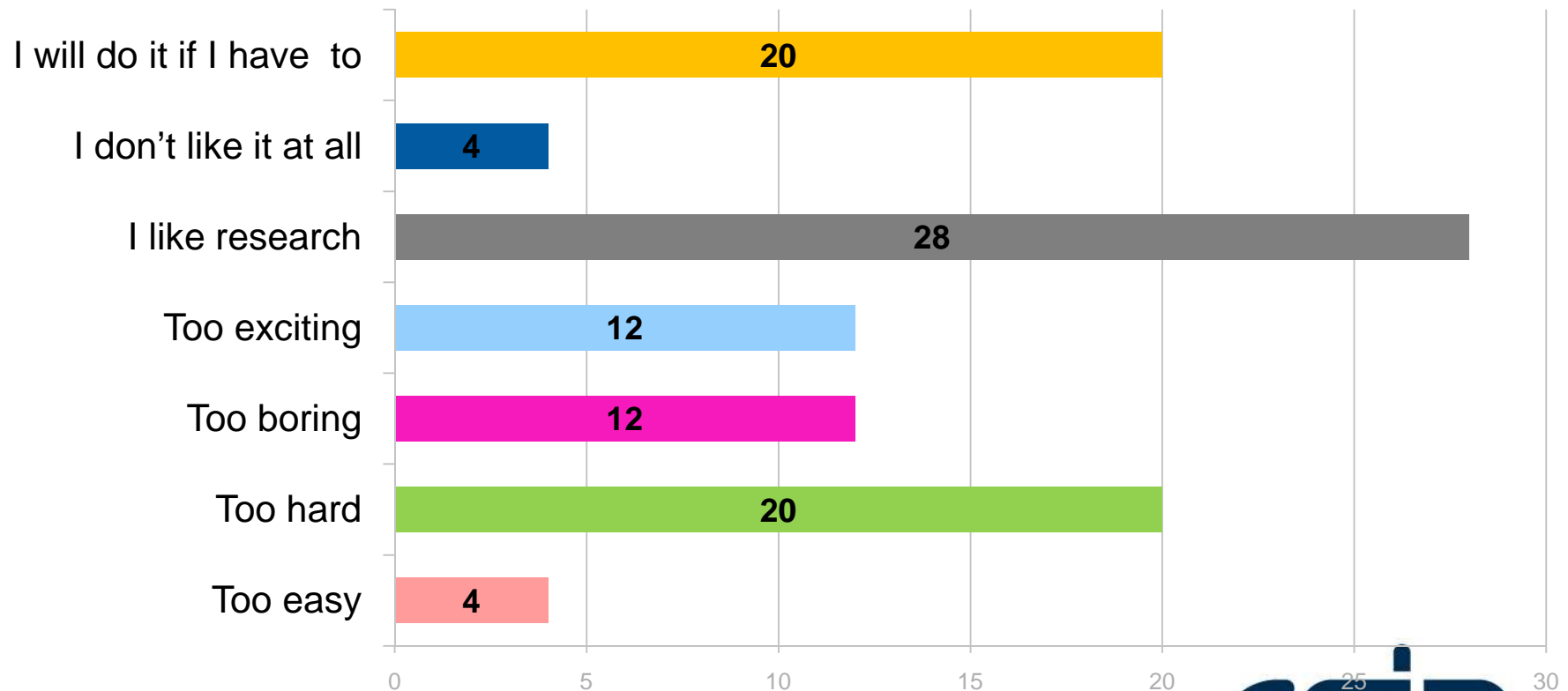
- I want to support myself and function independently
- I need to support my family
- I am not interested in research
- I want to change my career
- I will earn more money in industry
- I am considering relocating to another country



Current Survey

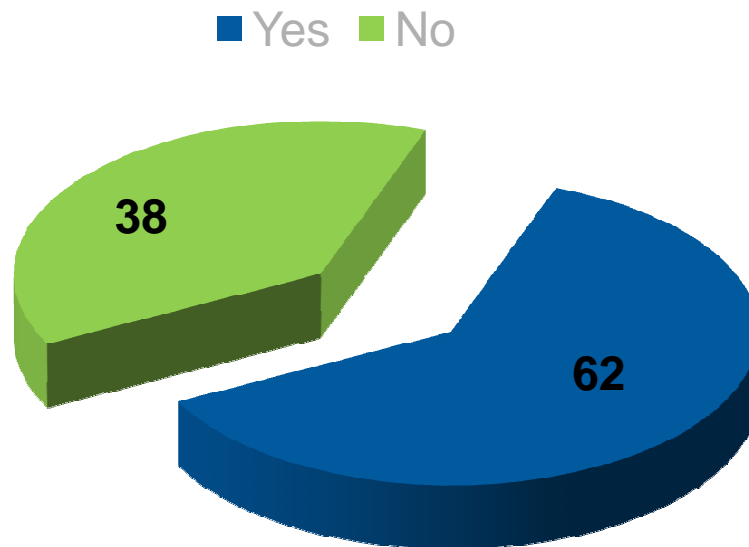
New Graduates: 14

I find Research ...



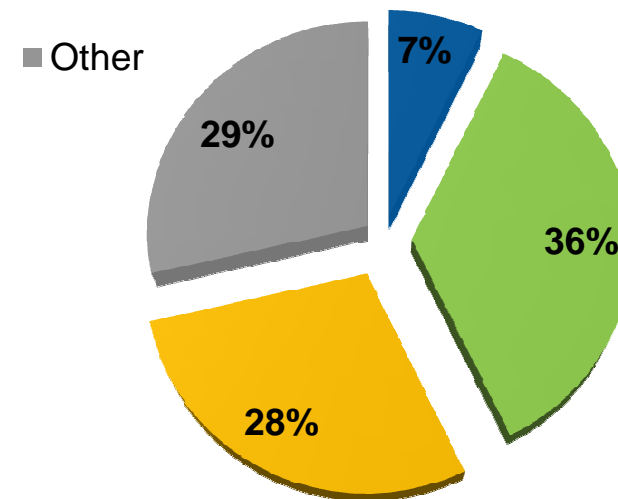
Current Survey

If you relocate countries, will you consider continuing your studies



New Graduates: 21

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



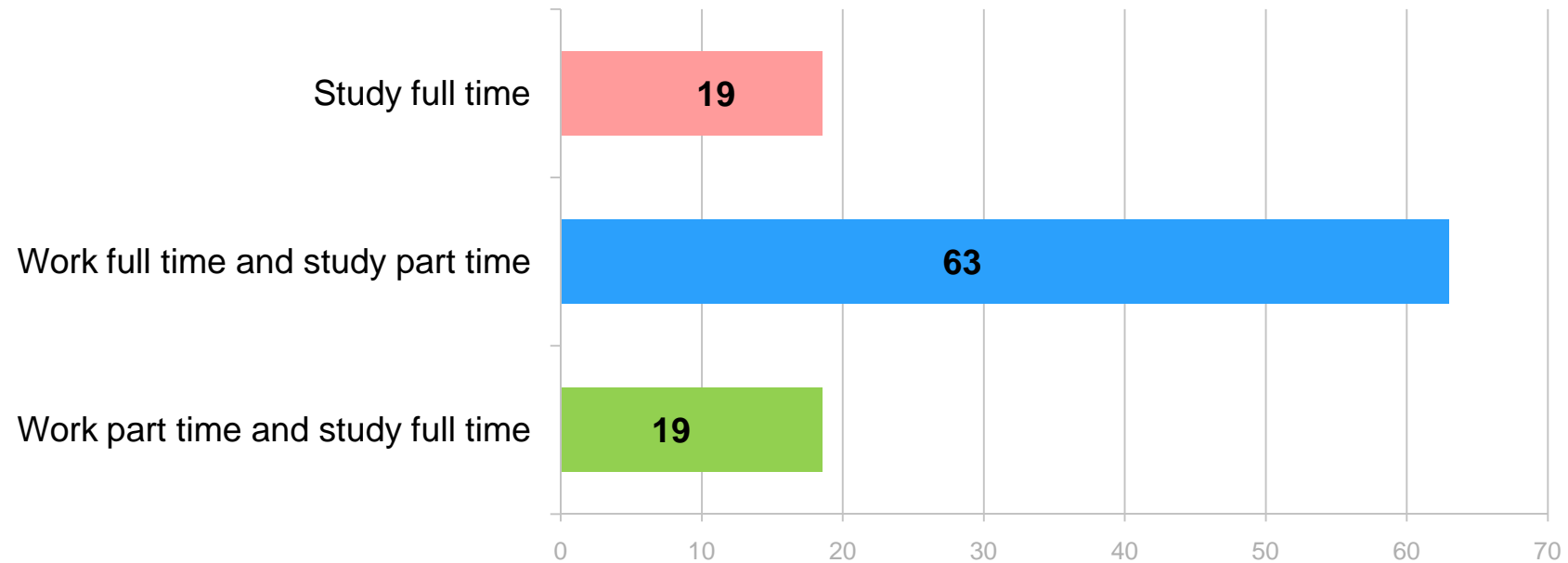
New Graduates: 14

CSIR
our future through science

Current Survey

New Graduates: 27

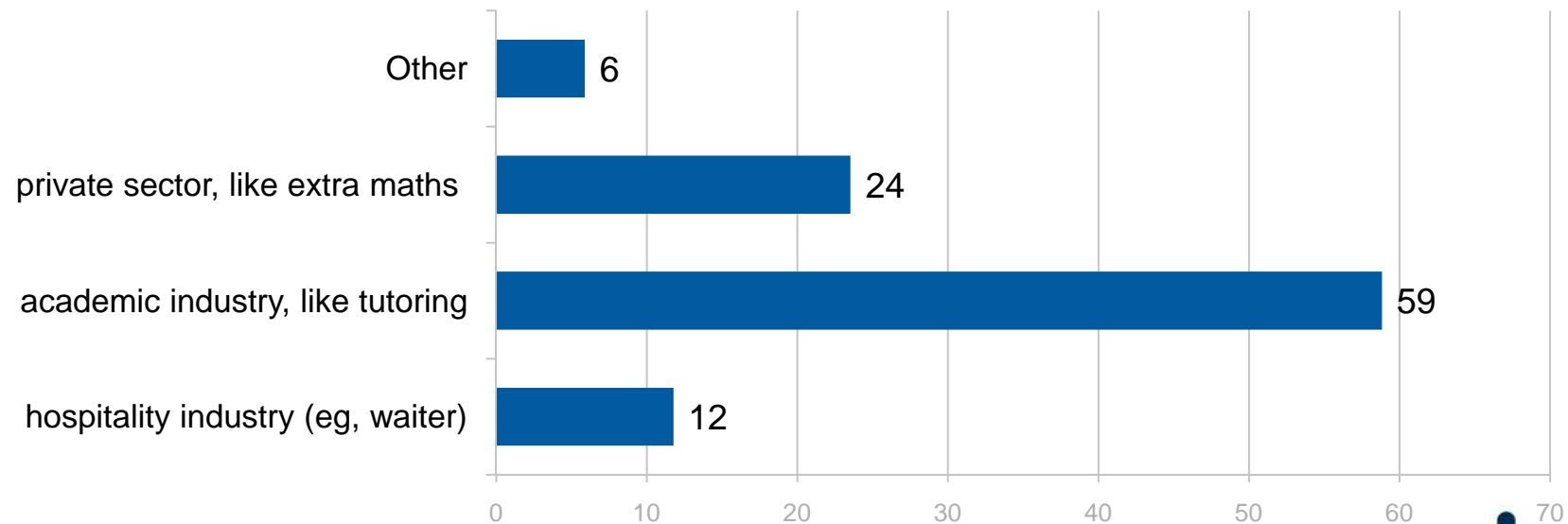
Mode of Study



Current Survey

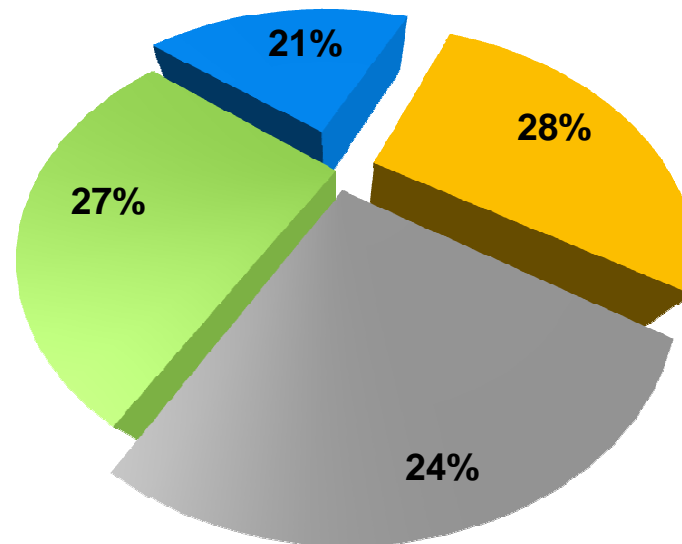
New Graduates: 17

Type of part-time job



Funding for Further Studies

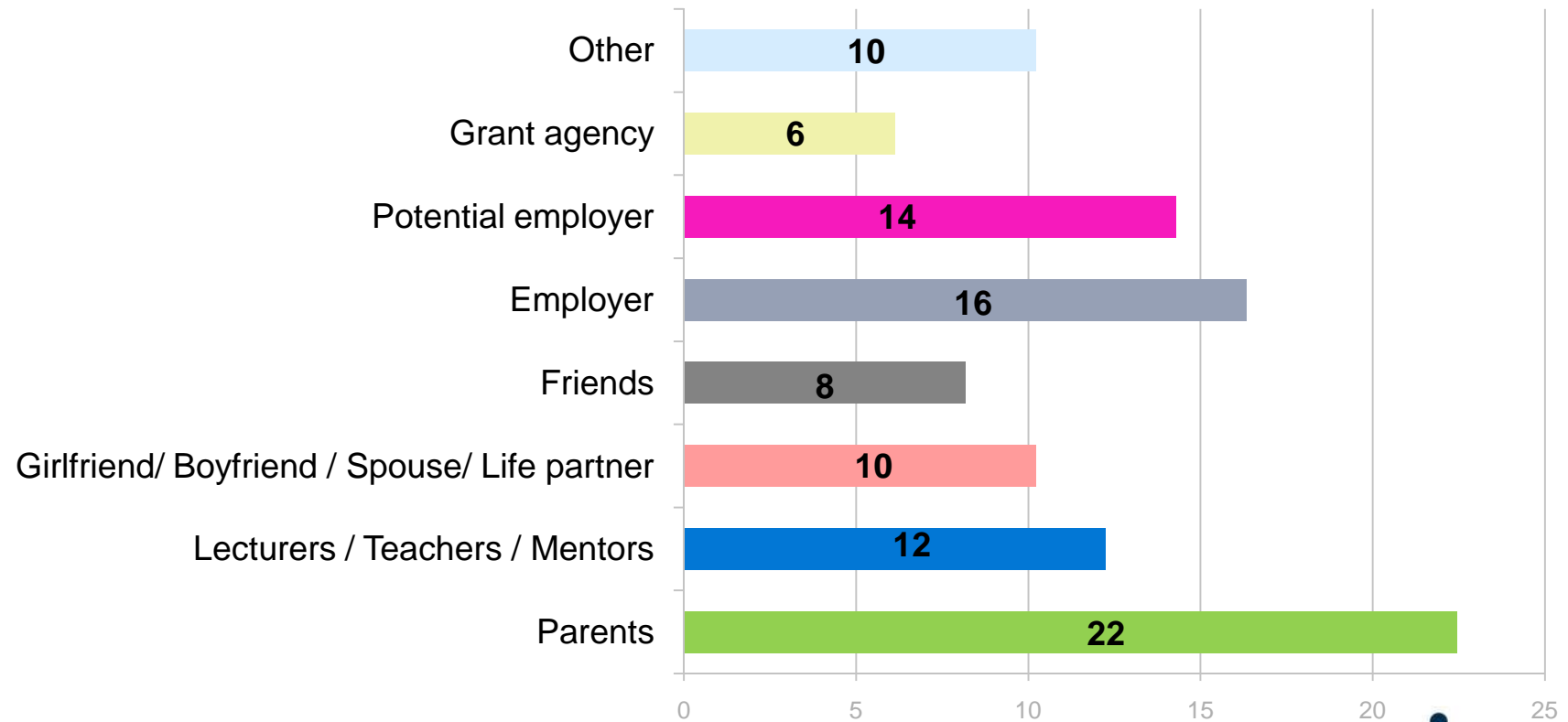
■ Parental support ■ CSIR scholarships ■ Bursaries with other institutions ■ Other



Current Survey

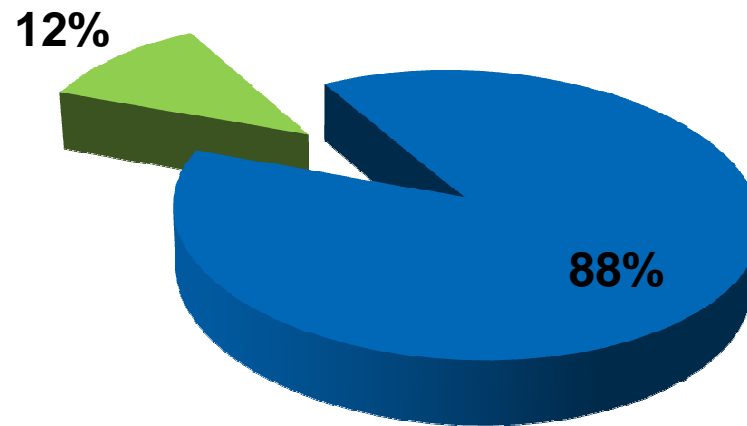
New Graduates: 49

Career decision influences



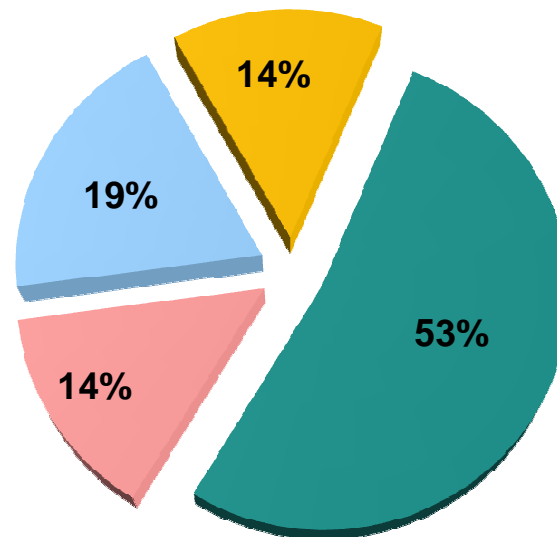
Commitments towards a bursary

■ Yes ■ No



Presentation and Environment

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



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CSIR

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**



CSIR

CSIR Annual Report 2007/08

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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CSIR Annual Report 2007/08

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Summary

Interest and subject presentation	<ul style="list-style-type: none">•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	<ul style="list-style-type: none">•63% work full time and study part time•59% part time job in academic industry



Summary

Bursaries and funding	<ul style="list-style-type: none">•43% want to function independently rather than study•Even exploration of all funding opportunities•88% don't have a bursary
Employment prospects	<ul style="list-style-type: none">•Career decisions primarily influenced by parents•Employer, potential employer and lecturers follow



Acknowledgements

SAIP for the opportunity to present this first step

Staff at CSIR, DPSS for their support

All survey participants

This lovely audience for your kind attention and interest

