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The South African Young Academy of Science (SAYAS) was launched in 2011. The Minister of Science and Technology, Mr Derek Hanekom, inaugurated twenty leading young scientists as founder members of SAYAS at the launch. Subsequently, ten additional members are elected into the Academy annually. SAYAS was borne out of the need for young scientists to contribute towards solutions to national and global challenges facing society. It represents the voice of young scientists in South Africa and provides a platform for young scientists to influence policy decisions.

# The Research Experience of Young Scientists in South Africa

## SAYAS Working Group

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# Acronyms and Abbreviations

ASSAf	Academy of Science of South Africa
CSIR	Council for Scientific and Industrial Research
GYA	Global Young Academy
NRF	National Research Foundation
SADC	Southern African Development Community
SAYAS	South African Young Academy of Science

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# Foreword

Every nation has the responsibility to lead and enable their young scientists to achieve scientific excellence. South Africa has responded through, amongst other actions, the launch of the South African Young Academy of Science (SAYAS), supported by the Academy of Science of South Africa (ASSAf). This is recognised as a milestone event in the South African science and higher education sectors.

SAYAS seeks to be the representative voice of young scientists on issues affecting their career development, and in that, also to contribute to the national strategic priority of strengthening the skills and human resource base of the country, with a focus on the next generation of scientists.

As the very first output of SAYAS, this report, an analysis of a survey conducted by SAYAS in 2012, provides a deeper understanding of the profile and general needs of young scientists in South Africa. It provides the insight required to identify shortcomings in our science sector and the evidence needed to inform future activities.

These activities are aligned to a key objective of SAYAS, namely to play an active role in human capital development and the mentoring of young scientists in South Africa. The data collected in this report will feed directly into the planning, development and implementation of SAYAS

activities in order to have a meaningful and sustained impact on the science pipeline in South Africa.

SAYAS hopes that the recommendations in this report will impact on science policy reform in relation to postgraduate students and postdoctoral fellows, and initiate the necessary programmes and support actions for young scientists in South Africa.

The report and the *SAYAS Survey of Young Scientists* were envisaged and implemented by a Working Group of SAYAS members, led by Prof Alta Schutte from the North-West University. The enormous effort of this Working Group, from conceptualisation of an online questionnaire, through attaining research ethical clearance from multiple institutions, to finally producing the report, is gratefully acknowledged.



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# Acknowledgements

The SAYAS *Survey of Young Scientists* is the result of the enthusiasm and motivation of several of the 20 founder members of SAYAS. The vision of all SAYAS members to address the lack of evidence on the profile and research experiences of postgraduate students and postdoctoral fellows stemmed from their own experiences as PhDs or postdoctoral fellows in recent years. This culminated in the very first SAYAS report, *The Research Experience of Young Scientists in South Africa*. The study is a collaborative effort involving not only the Working Group, but also input from other SAYAS members and experts. While not an exhaustive list, we wish to thank the following individuals who contributed to the success of the study:

- SAYAS members for supporting the initiative to determine what the profile and research experience of young scientists are. Insights thus gained will form the basis of several future initiatives of SAYAS.
- The five members of the Working Group for their diligent commitment to ensure the success of the survey, and for the unique contribution of each member.
- The time and input of the participants in the survey (Honours, Masters, and doctoral students, as well as postdoctoral fellows) who made the study possible.
- The peer reviewers who made significant and valuable suggestions on additional data analyses and interpretation to improve the draft of the report.
- ASSAf staff for co-ordinating the publication process.
- Ms Dorothy Ngila for her contributions and continuous support, including administrative assistance in contacting the tertiary institutions for approval and dissemination of the survey.



**Prof Alta Schutte<sup>1</sup>**

*Chair: SAYAS Survey of Young Scientists – The Research Experience of Young Scientists in South Africa*

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# Key Findings

1

43% of respondents indicated that the reason for pursuing postgraduate studies was the desire to pursue an academic career. This proportion increased to 58% among PhD students and postdoctoral fellows. This may highlight a knowledge gap regarding the developmental needs of the country (e.g. industry), other career opportunities and career planning by postgraduate students.

2

Young scientists are well aware of the importance of quality – in terms of institution choice, supervisor choice, and the importance of mentorship. The majority prefers an institution that provides high-quality teaching and research (although quality is not defined by the respondents), and a supervisor who is regarded as an expert in their field of study.

3

Respondents with mentors (in addition to supervisors) were more likely to report good or excellent progress with their studies than those without mentors.

4

Postgraduate students and postdoctoral fellows in South Africa are well aware of the need to publish research results. More than 50% of the respondents ranked courses in writing for publication as important for their development as young scientists, indicating a desire for institutional support in this critical area.

5

The majority (64%) of young scientists afforded their studies by making use of bursaries, either as stand-alone source or with other support. In their open-ended responses, the respondents placed significant emphasis on the need for adequate financial support at all levels. Arguably, if more bursaries are not made available, the number of postgraduate students in South Africa will not increase.

6

Respondents had the opportunity to voice specific concerns in an open-ended category. The responses focused on three key aspects: (a) concerns and challenges regarding funding of present and future postgraduate studies; (b) concerns regarding opportunities following completion of their current degree; and (c) the need for support with respect to mentorship, career guidance and financial support.

7

The SAYAS Working Group pursued various avenues to ensure that responses to the SAYAS *Survey of Young Scientists* were representative of South African institutions and population groups. The majority of responses were from white respondents (65%), with one fifth of responses from black respondents, indicating over-representation of white and under-representation of black respondents based on national enrolment figures of 19% and 59%, respectively. Representation from female students (56%) and Masters students (46%) were in line with national enrolment figures, but respondents enrolled for natural sciences (39%) were higher than the national enrolment of 11%. Approximately 70% of the respondents originated from four of the largest tertiary institutions in South Africa. Some elements of response bias can therefore not be ruled out.

# Introduction

The South African Young Academy of Science (SAYAS) was initiated in September 2011 when 20 founder members were inaugurated by the Minister of Science and Technology, Mr Derek Hanekom. This diverse group of young academics were selected after a stringent process of individual selection, executed and administered by the Academy of Science of South Africa (ASSAf).

Part of the SAYAS mandate is to act as the voice for young scientists in South Africa. In order to fulfil this mandate, it needs a deeper understanding of the profile and research experience of young scientists in the country. The Young Academy's close affiliation with ASSAf and the Global Young Academy (GYA), enables it to build on the knowledge and experiences gained by these organisations. However, it seems that sufficient knowledge on the research experience of young scientists is lacking at present – not only in South Africa, but also on a global scale.

A previous landmark consensus study commissioned by ASSAf, namely *The PhD Study*, aimed at assessing and making recommendations about the status, needs, and challenges of PhD graduates in South Africa. One of the main outcomes from *The PhD Study*, published in 2010, was the recommendation to escalate the number of doctoral graduates in South Africa through various mechanisms such as external intervention programmes and increased funding for doctoral studies in the country. This recommendation was

based on the relatively low doctoral graduation rate in South Africa – South Africa produced 1 274 doctoral graduates in 2007 (i.e. 26 doctorates per million persons), considerably lower than the production rates of other countries such as Turkey (48 per million persons) and Australia (264 per million persons). This shortage of doctoral graduates threatens the future development of science, technology and innovation in the country. In addition, *The PhD Study* recommended further research to develop a better understanding of the dynamics affecting postgraduate throughput and doctoral education in South Africa (such as funding and mentorship).

Based on the findings of *The PhD Study*, the National Research Foundation (NRF) responded in 2011 with a document titled *Scaling up the South African Research Enterprise* for the period 2011–2020, indicating important interventions to be implemented in order to grow the number of graduates produced in South Africa to 6 000 PhDs per annum, and to enlarge the active science workforce. These interventions are also mirrored in the Vision for 2030 in the National Development Plan (2011), which urges growth in the production of highly skilled professionals, especially PhDs, to improve South Africa's research and innovation capacity.

South Africa is thus at a strategic moment in time where key national strategy and policy documents emphasise growth in the number of the country's

PhD graduates to achieve its science and socio-economic ambitions. In order to reach this vision, and to steer this developmental and growth process effectively, it is important to understand how young scientists experience their present research environment. This report is a first step towards obtaining a broad overview of the profile and research experience of young scientists in South Africa. It reports on the challenges and needs of a wider range of postgraduate students than *The PhD Study*, including those at the earlier stages of postgraduate studies (for example, Honours and Masters students). By understanding the experiences of postgraduate students who form part of the pipeline of doctoral studies, this survey provides insights into some of the reasons for the relatively low production rate of doctoral students in our country. The experience of postdoctoral fellows adds an extra dimension to the survey results that has not been reported on before. The results of this report may also act

as a baseline that policymakers and academic institutions can use for evaluating interventions to assist the development of young scientists and the process of expansion of the quantity and quality of postgraduate students and researchers.

It is anticipated that the findings and recommendations will influence decisions and policies relating to the development of young scientists in South Africa, including those of the Department of Science and Technology, the Department of Basic Education, the Department of Higher Education and Training and executive institutional management at all tertiary institutions in South Africa.

It is the long-term aim of SAYAS to promote a more supportive and fertile research environment for young scientists, and to assist with policy decisions through the production of evidence-based reports, with a view to ultimately increase the production of young scientists in South Africa.

## Preparatory Procedures

SAYAS aims to understand the experiences and obtain a basic demographic profile of a broad spectrum of young scientists in South Africa. In this study a 'young scientist' is defined as a postgraduate student currently engaged in postgraduate studies or holding a postdoctoral fellowship.

A SAYAS Working Group was established in 2012, comprising representatives from five different tertiary institutions throughout South Africa (Refer to Appendix 1). These members of SAYAS volunteered to form part of the Working Group, based on their specific interest in the purpose of the study. Important considerations in the final selection of the group were to ensure a balanced representation of scientists in the humanities and natural sciences, as well as balanced geographic representation. Thereafter, the SAYAS Working Group prepared a research proposal, setting out the aims, methodology and content of the survey. The proposal was formally supported by ASSAf.

The research proposal was submitted to and approved by the Health Research Ethics Committee of the Faculties of Medicine and Health Sciences of the University of Stellenbosch and the Nelson Mandela Metropolitan University. Permission was also obtained from all other participating institutions, which included tertiary education institutions in South Africa (Question #8 in Appendix 2 contains a full list of participating institutions). The *SAYAS Survey of Young Scientists* was subsequently distributed online to Honours, Masters and doctoral postgraduate students and postdoctoral fellows via

the research administration offices of the various tertiary institutions. Young scientists were invited to complete an online version of the survey, developed with Google Drive and presented in Appendix 2. The survey was open for responses between 18 September 2012 and 17 January 2013, a total of four months.

## Content and Implementation of the Survey

The survey consisted of a questionnaire to be completed anonymously. It comprised four main sections:

- A. General demographic profile
- B. Description of respondent's current academic situation [focused on motivation for study and academic indicators]
- C. Financial indicators
- D. Future plans

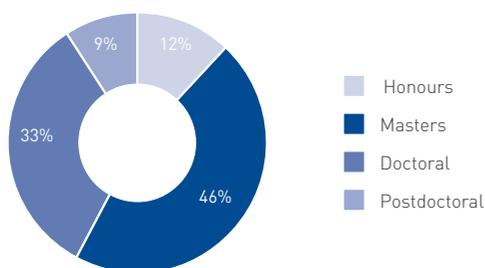
The questions were formulated by the Working Group members to obtain information on the respondents' demographic profile; academic status, including qualifications, current level of study [i.e. Honours/Masters/PhD student/postdoctoral fellow], fields of expertise and research interests; needs and challenges, and available opportunities within the respective academic settings. The survey took approximately 10–20 minutes to complete, and consisted mostly of multiple choice questions and a few open-ended questions. The final open-ended question gave respondents the opportunity to voice any concerns or ideas not addressed by the survey. The complete survey questionnaire is provided in Appendix 2.

# Main Findings

During the survey period of four months, a total of 1 021 young scientists completed the online survey. This section describes the main findings from the survey.

## A. General Demographic Profile of Respondents

Most respondents were South African citizens (N = 867, 85.2%), with 111 (10.9%) respondents hailing from the Southern African Development Community (SADC) and other African countries. The remaining respondents studying or working in South Africa (less than 4%) originated from Europe, Asia and the Americas. The distribution of current enrolment amongst respondents is shown in Figure 1 below.



**FIG. 1.** Type of Registration of Respondents (N = 1 021)

Most respondents were registered for a Masters (46%) or doctoral (33%) degree, whereas Honours and postdoctoral fellows comprised 12% and 9% of the sample, respectively (Fig. 1). More specific details regarding the age, race and gender profile of respondents, registration period and study discipline are presented in Table 1.

The age range of the group was 20 – 78 years, with a mean age of 29 years. Young black respondents represented about one fifth of responses across all registration categories, indicating under-representation according to national enrolment figures for black Honours (68%), Masters (50%) and doctoral (46%) students. In contrast, 65% of respondents identified themselves as white, indicating an over-representation in responses, since national enrolment numbers for white Honours (20%), Masters (34%) and doctoral (39%) are lower. In total, there was a higher representation from female students (56%) which compares well to the national enrolment of 55%; as well as Masters students (46%), comparing well to the national enrolment figure of 40%. The responses from students enrolled for natural sciences (39%) were higher than expected as the national enrolment figure stands at 11%.

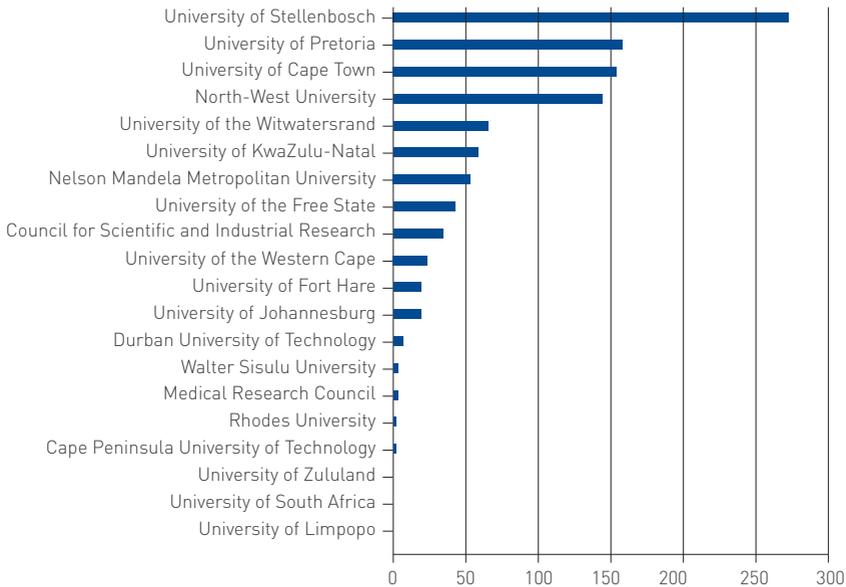
Although the invitation to complete the online questionnaire was sent to all tertiary institutions in South Africa, approximately 70% of the responses were from four institutions (Fig. 2), namely the Universities of Stellenbosch, Pretoria, and Cape Town and the North-West University. The University of the Witwatersrand, Nelson Mandela Metropolitan University and the University of KwaZulu-Natal also feature, each comprising approximately 5% of the sample. The remaining 15% of responses originated from 13 different institutions, as shown in Figure 2.

**Table 1.** Detailed Demographic Profile of the Different Registration Categories

	Results from the 2012 SAYAS Survey of Young Scientists				
	Total	Honours	Masters	Doctoral	Postdoc.
<b>Number of Registered Students in SA 2011<sup>1</sup></b>	938 200	60 506	48 873	12 832	-
<b>Number of Survey Respondents</b>	1 021	127	467	331	88
<b>Age (yrs) mean [min; max]</b>	29 [20; 78]	24 [20; 51]	29 [21; 68]	31 [24; 61]	34 [26; 51]
<b>Gender</b>					
Men, N (%)	435 [43]	56 [44]	196 [42]	139 [42]	42 [48]
Women, N (%)	572 [56]	70 [55]	264 [57]	190 [57]	46 [52]
<b>Ethnicity</b>					
Black, N (%)	202 [19.8]	30 [23.4]	87 [18.6]	71 [21.4]	13 [14.8]
Coloured, N (%)	55 [5.4]	6 [4.7]	25 [5.4]	22 [6.6]	2 [2.3]
Indian, N (%)	60 [5.9]	5 [3.9]	30 [6.4]	15 [4.5]	10 [11.4]
White, N (%)	667 [65.3]	82 [64.5]	313 [67.0]	210 [63.4]	59 [67.0]
Other, N (%)	30 [2.9]	3 [0.78]	10 [2.1]	13 [3.9]	4 [4.5]
<b>Broad Discipline</b>					
Com., Law, Manage.	109	25	59	21	4
Eng., Built Env.	179	25	101	45	8
Health Sciences	202	17	87	70	28
Social Sci./Human.	132	19	62	45	5
Natural Sciences	394	41	158	149	43
<b>Period Registered</b>					
< 1 year	361	91	167	81	21
1–2 years	348	21	192	107	28
3–4 years	207	10	84	103	8
≥ 5 years	56	1	17	35	3
<b>Full-time Reg., N (%)</b>	742 [72.7]	108 [85.0]	316 [67.6]	258 [77.9]	-

<sup>1</sup>HEMIS data, 2012; Postdoc., Postdoctoral fellow; Com., Commerce; Manage., Management; Eng., Engineering; Sci., Sciences; Human., Humanities; When the sum of numbers of degree categories does not equal the total group, it is due to missing data.

It is possible that the higher responses from the Universities of Stellenbosch, Cape Town and the North-West University are due to the fact that SAYAS Working Group Members are based at these institutions. However, responses from all institutions were continuously monitored on the live online database and significant efforts were made to contact institutions directly to urge greater participation. It is unclear whether the online format of the questionnaire contributed to under or over-representation of ethnic groups or disciplines, but this is unlikely since 92% of respondents indicated access to computer facilities at their institution.



**Fig. 2.** Number of Responses from the Various South African Institutions/Survey Sites

## B. Motivation and Academic Indicators

This section describes the survey results about young scientists' motivation for study and other academic indicators, and will be addressed according to the different themes below:

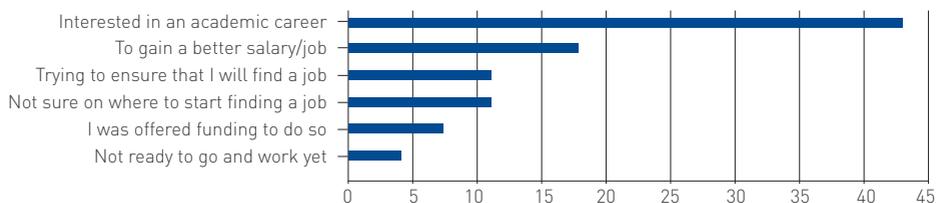
### *Motivation for Pursuing Postgraduate Studies*

The main finding and broad consensus from *The PhD Study* was that not enough PhDs are being produced in South Africa in relation to the developmental needs of the country. The *SAYAS Survey of Young Scientists* therefore attempted to understand the motivation of young scientists to continue their studies and to pursue a PhD locally.

When viewing the 2011 figures of registered undergraduate and postgraduate students in South Africa, it is noteworthy that 476 840 students were registered for three-year or four-year undergraduate degrees, whereas 48 873 and 12 832 students were registered for Masters and PhD studies, respectively (HEMIS, 2012). Based on crude calculations it appears that approximately 10% of undergraduate students continue to study at Masters level. In the *SAYAS Survey of Young Scientists*, 70% of respondents indicated that they planned to perform postgraduate studies while being an undergraduate student.

A noteworthy finding from the *SAYAS Survey of Young Scientists* is that 43% of respondents indicated that the reason for pursuing their postgraduate studies was an interest in an academic career (Fig. 3). This figure increased significantly according to degree categories (as might be expected) from 24% at Honours level, to 34% at Masters level, and to 58% for PhDs and postdoctoral fellows. While the key national strategy and policy documents and the broader established scientific community realise the importance of increasing PhDs in South Africa to contribute to the high-level skill demands in our emerging economy, large numbers of postgraduate students have career aspirations in academia. Career opportunities in the tertiary education sector may not be sufficient to accommodate these numbers of graduates at present, or young scientists may not be aware of career opportunities in industry. Moreover, apart from two new universities planned for Mpumalanga and the Northern Cape, no large-scale expansion of teaching and research staff at higher education institutions has been identified in the National Development Plan. Similar mismatches in the career aspirations of and opportunities for postgraduate students are experienced overseas, leading to potential unhappiness if this expectation is not properly managed and if alternative careers in government and industry are not promoted.

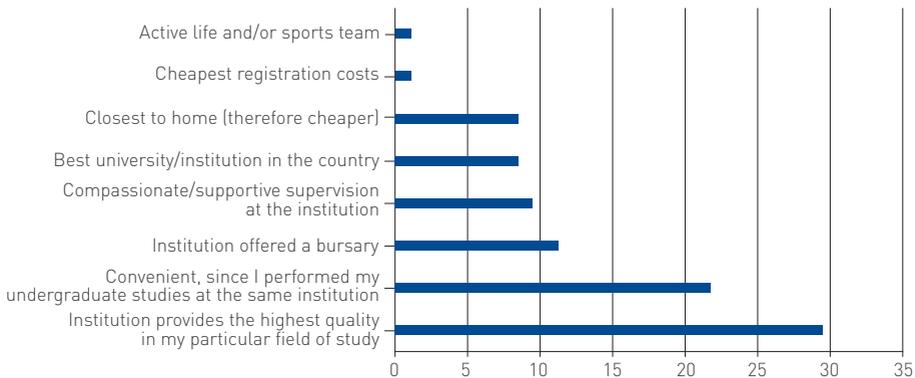
The career aspirations and expectations of postgraduate students is a subject that is flagged here as needing further investigation. Further support for 'soft skills' development (beyond that which is strictly required to meet the academic requirements of their chosen degrees) should be made available to postgraduates, e.g. by means of the implementation of mentorship programmes. In addition, better communication, focused career planning and strengthened relationships between universities and industry are strongly encouraged. Postgraduate students need career development information and opportunities.



**Fig. 3.** Responses to the Question: “What is the reason for doing postgraduate studies?” (%)

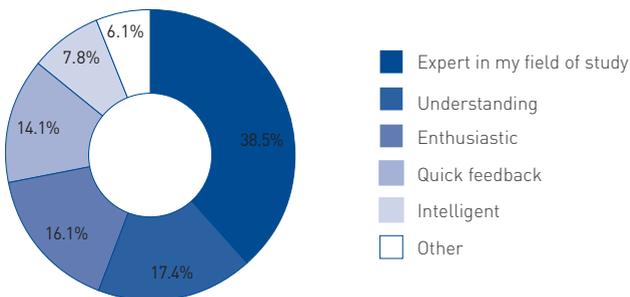
### *Emphasis on Quality*

The general trend at tertiary institutions to focus on quality research and to publish research results was also evident from the responses. Respondents were knowledgeable when it came to the characteristics that would make an institution favourable for postgraduate studies (e.g. “University/institution provides the highest quality in my particular field of study”), beside factors that would make postgraduate studies more convenient (e.g. “Closest to home (therefore cheaper)” or “Cheapest registration costs”)(Fig. 4). However, it seems that the institution where undergraduate studies were performed and institutions that offered bursaries were also favoured, for obvious practical and logistic reasons.



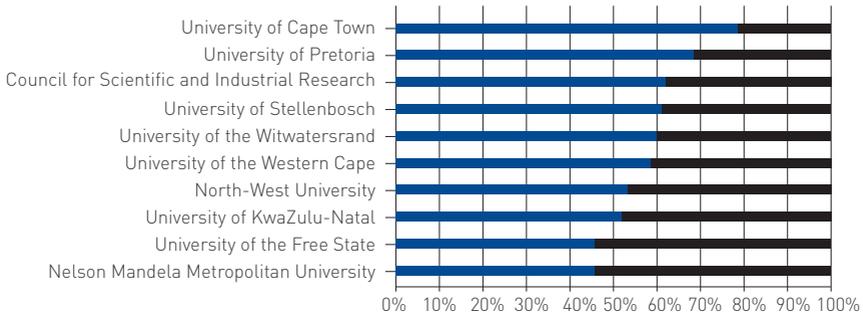
**Fig. 4.** Characteristics Favoured when Choosing an Institution for Postgraduate Studies (%)

The focus on quality was maintained when asked which characteristic was perceived as the most important when choosing a supervisor (Fig. 5). Being an expert within the study field was considered five times more important than being 'intelligent'. Supervisor characteristics such as being understanding and enthusiastic were also appreciated, with 14% perceiving quick feedback to be of primary importance.



**Fig. 5.** Most Important Characteristics of Supervisor

Despite the emphasis on quality in choosing an institution or supervisor, students and postdoctoral fellows expressed variable levels of satisfaction with their current experience, with respect to the academic quality of the research subject and environment. In Figure 6 we captured the ratio of satisfied (stating "probably the best on a national level" and "competes with the best internationally") versus the expression that the research quality and environment have a "poor standard" or only "acceptable quality". This ratio provides an indication of satisfaction with their current postgraduate experience. These ratios were only captured for institutions with 17 or more responses (ranging between 17 to 269 responses per institution). The satisfaction of those registered at the University of Cape Town was overall the highest (N = 156), with almost 80 % (N = 122) being satisfied.

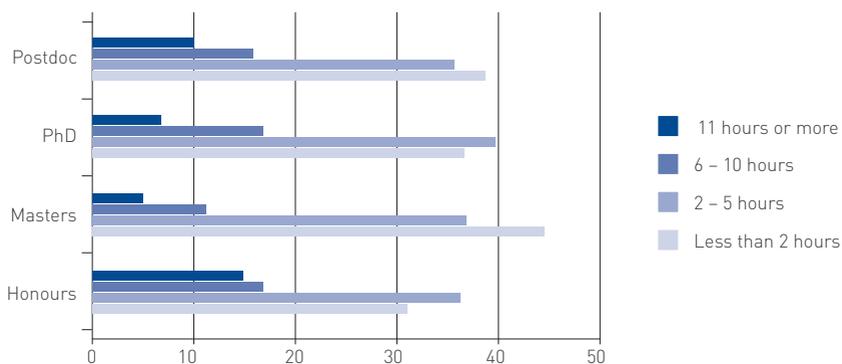


**Fig. 6. Satisfaction with Academic Quality and Working Environment**  
 (Best on National Level/Competes with Best Internationally *versus* Poor Standard/Acceptable Quality)

### Supervision

The survey also included a number of questions on the supervisor relationship. Most respondents, regardless of degree category (Honours to PhD students and postdoctoral fellows) were satisfied with their own study progress and their primary supervisor. Seventy percent of respondents reported 'good' or 'excellent' levels of satisfaction with their study progress, whereas 73% gave similar ratings to their satisfaction with their primary supervisor. Only 6.5% and 7.7% rated their progress or supervisors as 'poor' and 'very poor' respectively. The majority (82%) were satisfied with their current supervisor, although 17.3% of respondents indicated that they would switch to another supervisor if it were possible.

Figure 7 depicts the number of hours of supervision received by respondents on a monthly basis. The majority of respondents (approximately 75%) from all different levels of registration received less than five hours of supervision per month. This result is very similar to the results reported in *The PhD Study*, which indicated that 73% of PhD students received less than two hours' supervision per month. The fact that both *The PhD Study* and the *SAYAS Survey of Young Scientists* found similar results on the limited time spent on postgraduate student supervision is noteworthy considering a recent comment indicating that 200–300 hours per year should be spent on PhD student supervision (Wingfield, 2012). A breakdown of this figure equates to 16 to 25 hours which should be spent per month on PhD student supervision. Perhaps supervisors are overloaded with additional tasks, too many postgraduate students or teaching duties to provide students with so many supervision hours. However, the failure to provide adequate supervision may impact on the progress of postgraduate students. Consequently, this result requires further scrutiny, especially in the light of South African key national strategy documents aiming to significantly grow the number of graduates in South Africa.



**Fig. 7.** Hours of Supervision per Month According to the Registration Category (%)

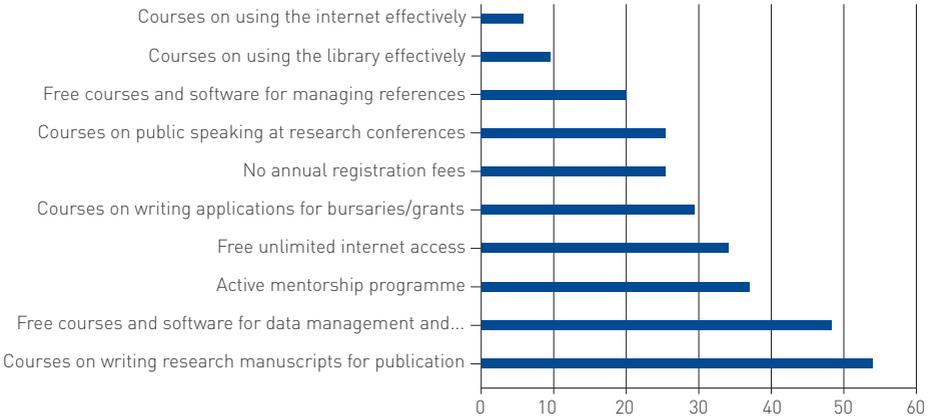
### *Mentorship*

The majority (82.5%) of respondents indicated that they see the need for or the value of having a mentor in addition to their supervisor. When asked what type of support from their institution they would value, 36% indicated that “an active mentorship programme” would be one of the most important types of support (Fig. 8). It is encouraging to note that 59% of respondents had at least one mentor in the academic environment that was not their academic supervisor. Against expectations, fewer postdoctoral fellows reported on have a mentor (49%) than doctoral (61%), Masters (58%) or Honours (66%) students.

Further analysis indicated that young scientists with at least one mentor were 46% more likely to report good or excellent academic progress (rather than very poor, poor or adequate progress) compared to those without mentors ( $p = 0.007$ ). This finding highlights the importance of young scientists having mentoring relationships with more established scientists.

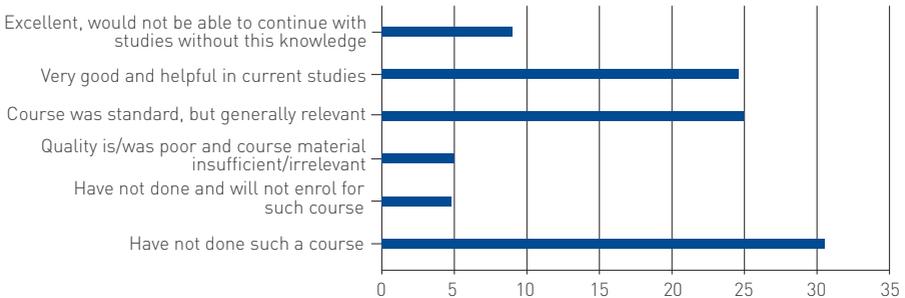
### *Expected Support from the Institution*

The survey sought to understand what type of institutional support respondents perceive as important for their development as young scientists. Respondents had the opportunity to choose three options from ten suggestions (See question #21 in Appendix 2). More than 50% of the respondents ranked courses in writing for publication as important for their development as young scientists, indicating a desire for institutional support in this critical area. Postgraduate students in South Africa, it appears, are well aware of the need to publish research results. Other notable needs indicated were for courses on analysing/managing their data, active mentorship and improved internet access.



**Fig. 8.** Ranking of Research Support Expected from Institutions (%)

Solid research methodology is of critical importance to the success of postgraduate research. Question #20 of the survey explored postgraduate students' experiences of courses on research methodology. Forty percent (N = 413) of young scientists reported that they either had not done such a course, would not enrol for such a course, or that the quality of the course(s) that they attended was poor (Fig. 9). Respondents were least likely to endorse courses on using the internet effectively, possibly indicating a high level of computer literacy. This was also supported by the reported availability of computer and laptop facilities by respondents, with 96% reporting access to a computer at home, and 92% reporting access to computer facilities at their institution. Reported internet access at home was somewhat lower [73%] which supports the fourth-ranked need for unlimited free internet access at their institution (Fig. 8).



**Fig. 9.** Description on Whether a Formal Course on Research Methodology was done (%)

### Research Exposure and Dissemination of Results

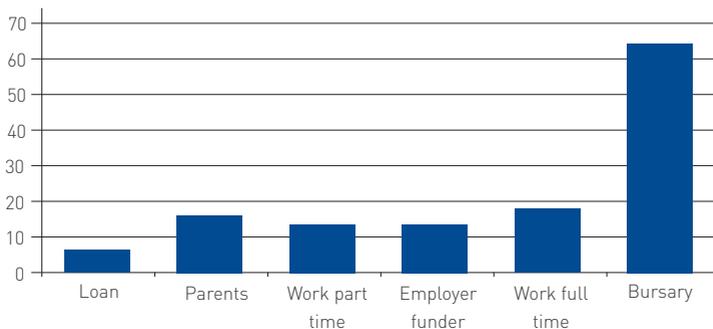
The survey probed the young scientists' experience of writing and presenting conference and journal papers. The importance of publishing research results and presenting results at local and international conferences is highlighted by the responses of survey respondents, with 52% reporting that they have been an author of one or more research articles before, and 86% indicating that they planned to publish their results. A total of 64% reported that they planned to submit two or more manuscripts for publication resulting from their current degree.

Some of the respondents reported that they have had opportunities to attend scientific meetings locally (34%) or internationally (47%). Whereas attendance is typically funded fully or in part by some institutions (62%), 20% reported that all costs would have to be covered by their personal funds, a potential barrier for many young scientists.

### C. Financial Indicators

The ability to financially support postgraduate studies was an area that attracted a great deal of comment from respondents. When asked how their studies are funded (Fig. 10), 63% of respondents indicated that they funded their studies with bursaries, while all other reported sources of funding were less than 20%. From the results, it appears that many young scientists use multiple ways to fund their studies, such as bursaries and part-time work (many respondents ticked more than one box).

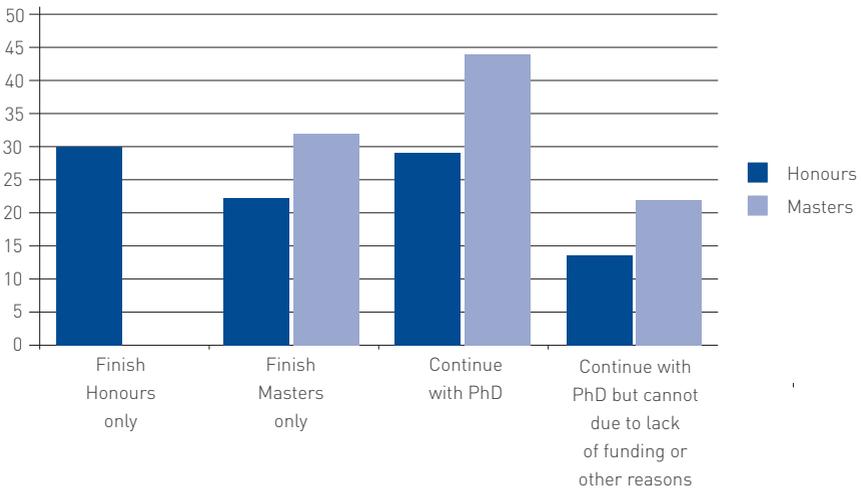
In support of this finding, 77% of respondents indicated that they applied for bursaries and from these 80% had a successful outcome. Forty-four percent (44%) received help from an academic staff member or another person when applying for a bursary. One area where institutions could improve their visibility is to provide information to undergraduate students regarding possible scholarships or bursaries for continuation of postgraduate studies, since only 43% indicated that this information was readily available. This could lead to increased interest from undergraduates in pursuing postgraduate studies.



**Fig. 10.** Number of Respondents According to Funding Sources (%)

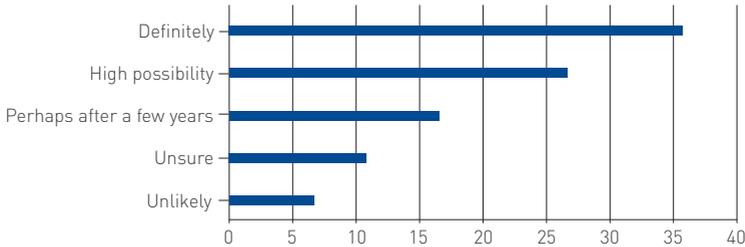
## D. Future Plans

Earlier in this report it was indicated that a surprisingly high percentage of young scientists expect to pursue an academic career, with the highest percentage of 58% reported for those registered for a PhD or postdoctoral fellowship (Fig. 3). When focusing only on Honours and Masters students (Fig. 11), about a third of both Honours and Masters students wanted to complete their current degree only. Considerable proportions of both these groups plan to continue with a doctoral degree (29% and 43% for Honours and Masters students, respectively). More than 20% of Masters students wanted to pursue PhD studies but were prevented from doing so by external factors, as shown in Figure 11. Obtaining further information about those external factors and providing support to assist students with overcoming those barriers may improve the number of enrolled PhD students in the future.



**Fig. 11.** Possible Future Studies Expressed by Honours and Masters Students (%)

When questioned on whether young scientists would consider postgraduate studies abroad, 68% indicated that they would consider this, and 23% of Masters and doctoral students indicated that they already have an opportunity to work internationally after completion of their studies. More than half of the respondents also reported that they were interested in pursuing postdoctoral fellowships locally or internationally (57%). When questioned on whether they would return to South Africa after a postdoctoral fellowship, the majority reported “definitely” or a “high possibility” (64%), whereas 17% reported that it was “unlikely” or that they were “unsure” (Fig. 12).



**Fig. 12.** Number of Respondents Indicating that they Plan to Return to RSA after Postdoctoral Studies Abroad (%)

### Summary of Issues Concerning Postgraduate Students and Postdoctoral Fellows

The final open-ended question of the survey (Question #42, Appendix 2) invited suggestions, comments and challenges from respondents.

By far, the most responses discussed concerns and challenges regarding funding of postgraduate studies. Given that many respondents were bursary holders, their concerns may have been about funding the next level of study should they wish to continue with their studies. The second key focus of the open-ended responses was on the need for more opportunities following completion of their current degree. The third key focus was on support: respondents requested financial support, mentorship and career guidance.

# Recommendations

In summary, SAYAS aimed to understand the profile and research experience of postgraduate students and postdoctoral fellows in South Africa, at all levels from Honours to post-PhD. The survey findings may assist in developing postgraduate students at junior levels into PhD graduates.

The results should be interpreted in the context of the limitations of this study, including that some elements of response bias cannot be ruled out. Participation from white respondents (65%) from the four largest institutions (approximately 70%) was high, and the overall results may under-represent challenges and needs of black scientists, as well as young scientists from smaller institutions. Additionally, the unique academic environment of postdoctoral fellows suggests that surveys tailored to address their specific needs should be conducted in the future.

Finally, it is critical to translate any increased numbers of PhD graduates into a valuable resource for national and industrial development. Achieving these aims will require additional development of young scientists, in terms of numbers, 'soft skills' and academic quality.

Based on the survey results, the following key findings are summarised:

1. A mentorship programme may prove extremely valuable to postgraduate students, not only for progress on their current degree, but also to assist with career guidance. It is acknowledged that such a system is already in existence at some of these institutions (e.g. University of Stellenbosch and University of Cape Town). Further research on the functioning and efficacy of these systems should be encouraged. Young scientists with at least one mentor were more likely to report good progress with their studies than respondents without a mentor.
2. Young scientists in South Africa are well aware of the need to publish research results. More than 50% of the respondents ranked courses in writing for publication as important for their development as young scientists, indicating a desire for institutional support in this critical area. Although some institutions provide such courses, in many instances these are focused on academic staff members, and the focus should therefore also be shifted towards postgraduate students and postdoctoral fellows.
3. Information on scholarships and bursaries should be made readily and prominently available to all senior undergraduate and postgraduate students. Although institutions may all have financial departments focusing on bursaries and loans, the services of such departments need to be advertised more effectively to students. Assistance with completing scholarship and bursary applications should also be provided by all institutions.
4. Approximately 20% of Masters students indicated an interest in continuing to PhD level, but were prevented from doing so by external factors such as lack of funding. The external barriers preventing Masters students from continuing to PhD studies should be researched in more detail and ways to overcome them should be addressed.
5. Postgraduate students should receive adequate institutional support to assist them with the development of other skills necessary for careers outside of the academic environment, and be assisted with career information and development opportunities. Further research should explore the career aspirations of postgraduate students.

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# Appendix 1: Working Group Members



**Alta Schutte** is Professor and South African Research Chair in Early Detection and Prevention of Cardiovascular Disease in South Africa, hosted by the Hypertension in Africa Research Team (HART) of the North-West University. Her main research interests are the development of hypertension and chronic diseases due to lifestyle in black South African populations.



**Caradee Wright** is a Senior Researcher in the Climate Studies, Modelling and Environmental Health Research Group at the Council for Scientific and Industrial Research (CSIR) in South Africa. She specialises in public health, with a particular focus on environmental health research. She obtained a PhD at the University of Otago in New Zealand, where she measured school children's personal solar UV radiation exposure for skin cancer prevention.



**Genevieve Langdon** is an Associate Professor and Deputy Head of the Department of Mechanical Engineering at the University of Cape Town and is a member of the Blast Impact and Survivability Research Unit. She obtained her PhD in Mechanical Engineering from the University of Liverpool in 2003. She works on the response of structures and materials to dynamic loading, specialising in lightweight material response to explosions.



**Christine Lochner** is Co-director of the South African Medical Research Council (MRC) Unit on Anxiety and Stress Disorders at the Department of Psychiatry at the University of Stellenbosch. She is a qualified and practicing clinical psychologist, with clinical, genetics and brain imaging research on anxiety disorders, particularly obsessive-compulsive spectrum disorders, as a priority.



**Bronwyn Myers** is Chief Specialist Scientist in the Alcohol and Drug Abuse Research Unit of the MRC, where she heads up the Substance Abuse Treatment and Interventions Research sub-stream. She is also an Associate Professor in the Department of Psychiatry and Mental Health at the University of Cape Town.

# Appendix 2: SAYAS Survey of Young Scientists



## Survey of Young Scientists conducted by the South African Young Academy of Science (SAYAS)

As a bunch of young scientists, the South African Young Academy of Science (SAYAS)'s mandate is to act as a voice for young scientists in South Africa. In order to do so, SAYAS needs to find out more about the profile, general needs and challenges facing young scientists in South Africa.

Importantly, we are interested in figuring out what makes young scientists tick and how things can be improved for you. We want to help you and others to survive and succeed in this endurance race.

We would therefore like to invite you to participate by answering this short survey. We expect that this web-based mostly multiple choice item questionnaire will take less than 20 minutes to complete.

We hope to use this information to provide knowledge and recommendations on the profile and needs of young scientists in South Africa to a number of powerful local role players, including the Department of Science and Technology, the Department of Education, and/or the Department of Higher Education and Training.

Your participation is voluntary and the survey is anonymous. When you submit your answers, it will not be possible for anyone, including the research team, to establish your identity. Your responses will be combined with those of other participants and the findings will be reported as a group. None of the reported data will capture individual participant responses.

The researchers representing SAYAS will answer any questions you might have about the procedures described above, or about the results of the study. If you have any questions, you may contact the SAYAS office, (Dorothy Ngila; email: mutheu@assaf.org.za; tel. (012 349 6607)) who will forward your queries to the relevant persons.

### *Consent form*

I hereby agree to participate in this project on the profiles and challenges of young scientists in South Africa. I understand that I am participating freely and without being coerced in any way to do so. I also understand that I can stop completing the questionnaire at any time and withdraw as a participant in the research. My results are confidential, however, direct quotations from my questionnaire may be published in an academic journal along with the final results of the study. In such a case I will be assigned a pseudonym that will protect my anonymity.

I have received the details of a person to contact should I need to voice any issues which may arise from this survey.

I understand that my answers will be anonymous and will remain entirely confidential.

If you agree with all the above, please select 'Yes' and proceed.

## QUESTIONS:

### *Section A: Who are you?*

1. What is your age?  
\_\_\_\_\_ years
2. Gender:
  - a. Male
  - b. Female
3. Which of the following best describes your ethnic background?
  - a. Black
  - b. Coloured
  - c. Indian
  - d. White
  - e. Other
4. Which of the following describes your origin or citizenship best?
  - a. A South African citizen/permanent resident of South Africa
  - b. Originally from a SADC (Southern African Development Community) country
  - c. Other African country
  - d. European
  - e. Asian
  - f. Australian
  - g. North American
  - h. South American
5. What is your broad field of study?
  - a. Commerce, Law and Management
  - b. Engineering and the Built Environment
  - c. Health Sciences
  - d. Humanities/Social Sciences
  - e. Natural Sciences
6. What is your current level of enrolment?
  - a. Honours
  - b. Masters
  - c. Doctoral
  - d. Postdoctoral

7. Is your registration:
- Full time?
  - Part time?
  - Not applicable
8. At which institution(s) are you based?
- Cape Peninsula University of Technology
  - Central University of Technology
  - Council for Scientific and Industrial Research
  - Durban University of Technology
  - Human Sciences Research Council
  - Nelson Mandela Metropolitan University
  - North-West University
  - Rhodes University
  - South African Medical Research Council
  - Tshwane University of Technology
  - University of Cape Town
  - University of Fort Hare
  - University of Johannesburg
  - University of KwaZulu-Natal
  - University of Limpopo
  - University of Pretoria
  - University of South Africa
  - University of Stellenbosch
  - University of the Free State
  - University of the Western Cape
  - University of the Witwatersrand
  - University of Venda
  - University of Zululand
  - Vaal University of Technology
  - Walter Sisulu University of Technology and Science
  - Other \_\_\_\_\_

*Section B: Description of your current situation*

9. For how long have you been registered for your current degree?
- Less than 1 year
  - 1-2 years
  - 3-4 years
  - 5-6 years
  - 7-8 years
  - More than 8 years
  - Not applicable

10. What is the reason for doing your postgraduate studies?
- Not ready to go and work yet
  - Not sure on where to start finding a job
  - Trying to ensure that I will find a job
  - To gain a better salary/job
  - Interested in an academic career
  - I was offered funding to do so
  - I don't know
  - Not applicable
  - Other (please specify) \_\_\_\_\_
11. As an undergraduate student, did you plan to perform postgraduate studies later on?
- Yes
  - No
  - I don't know
12. When you decided to enrol for postgraduate studies, which one of the following factors was the most important when deciding on an institution?
- Cheapest registration costs
  - University/institution offered a bursary
  - Closest to home (therefore cheaper)
  - Active student life and/or sport teams
  - Best university/institution in the country
  - University/institution provides the highest quality in my particular field of study
  - Compassionate/supportive supervision at the university/institution
  - Convenient, since I performed my undergraduate studies at the same university/institution
  - Other (please specify) \_\_\_\_\_
13. How would you rate your overall progress with your postgraduate studies?
- Very poor
  - Poor
  - Adequate
  - Good
  - Excellent
14. How would you rate your satisfaction with your primary supervisor/promoter?
- Very poor
  - Poor
  - Adequate
  - Good
  - Excellent

15. Which one characteristic would you rate highest in a good supervisor/promoter?
- a. Intelligent
  - b. Understanding
  - c. Enthusiastic
  - d. Quick feedback
  - e. Expert in my field of study
  - f. Other (please specify) \_\_\_\_\_
16. If you could switch to another supervisor/promoter at this stage, would you choose a different person?
- a. Yes
  - b. No
17. How many hours do you typically meet your supervisor(s) each month?
- a. Less than 2 hours
  - b. 2-5 hours
  - c. 6-10 hours
  - d. 11 hours or more
18. Do you have one or more mentors (not your supervisor/promoter) – person(s) providing you with encouragement, advice, support in the academic environment?
- a. Yes
  - b. No
19. Do you see the need for or value of having a mentor in addition to your supervisor/promoter?
- a. Yes
  - b. No
20. How would you describe the formal course that you have done/are busy with in Research Methodology?
- a. Have not done such a course
  - b. Have not done and will not enrol for such a course
  - c. Quality is/was poor and course material insufficient/irrelevant
  - d. Course was standard, but generally irrelevant
  - e. Very good, and helpful in current studies
  - f. Excellent, would not be able to continue with studies without this knowledge

21. Which type of support do you think should the University offer which would be most valuable for postgraduate students? (choose maximum of three options)
- a. Free courses and software for data management and analyses
  - b. Free courses and software for managing references
  - c. No annual registration fees
  - d. Active mentorship program
  - e. Courses on using the internet effectively
  - f. Courses on using the library effectively
  - g. Courses on writing research manuscripts for publication
  - h. Courses on public speaking at research conferences
  - i. Courses on writing applications for bursaries/grants
  - j. Free unlimited internet access
  - k. Other (please specify) \_\_\_\_\_
22. As a postgraduate student, were you a (first or co-) author on one or more research articles submitted to peer-reviewed journals?
- a. Yes
  - b. No
  - c. Not applicable
23. Do you plan to publish the results of your studies?
- a. Yes
  - b. No
  - c. Not applicable
24. How many articles do you expect to publish from the work resulting from your degree?
- a. None
  - b. One
  - c. Two
  - d. Three
  - e. More than three
  - f. Not applicable
25. Do you have opportunities to attend scientific meetings/conferences?
- a. Yes, nationally
  - b. Yes, internationally
  - c. Yes, both nationally and internationally
  - d. No

26. If you have the opportunity to attend a scientific meeting/conference, how would this typically be funded?
- University covers all costs
  - University covers part of the costs, I have to cover the rest
  - I have to cover all costs with personal funds
  - Not applicable
27. What is your satisfaction with the academic quality of the research subject and environment in which you are working?
- Poor standard
  - Acceptable quality
  - Probably the best on a national level
  - Competes with the best internationally
28. Do you have a laptop/tablet or desktop computer at home?
- Yes
  - No
29. Do you have internet access at home?
- Yes
  - No
30. Do you have easy access to a laptop or desktop computer at the institution where you are based?
- Yes
  - No
31. If you are a student enrolled part-time, and working at an academic institution, how much time per week are you allowed to work on your research project?
- No time allowed
  - Less than 2 hours
  - 2-5 hours
  - 6-10 hours
  - 11 hours or more
  - Not applicable

*Section C: Description of your financial situation*

32. How are your studies funded? (more than one box may be selected)
- a. Loan
  - b. Bursary
  - c. Parents pay for studies
  - d. Working part-time while studying
  - e. Working full-time while studying
  - f. Study support through employment
  - g. Other (please specify) \_\_\_\_\_
33. Did you apply for scholarships or bursaries?
- a. Yes
  - b. No
34. If so, were you successful in any of your applications?
- a. Yes
  - b. No
  - c. Not applicable
35. As an undergraduate student, was information on possible scholarships or bursaries for postgraduate continuation of studies readily available to you?
- a. Yes
  - b. No
36. When applying for a scholarship or bursary, did you have help from an academic staff member (or someone else)?
- a. Yes
  - b. No
  - c. Not applicable

*Section D: After completion of your studies*

37. If you are presently enrolled for an Honours or Masters degree, which option would describe your situation best?
- a. I want to finish my Honours degree only
  - b. I want to finish my Masters degree only
  - c. I want to continue with a PhD
  - d. I want to continue with a PhD but will not be able to due to lack of funding
  - e. I want to continue with a PhD but will not be able to due to other reasons
  - f. Not applicable
  - g. Other (please specify) \_\_\_\_\_

38. Would you consider enrolling for postgraduate studies internationally?
- a. Yes
  - b. No
  - c. Not applicable
39. If you were offered the opportunity to study internationally, would you return to South Africa afterwards?
- a. Unsure
  - b. Unlikely
  - c. Perhaps after a few years
  - d. High possibility
  - e. Definitely
40. Do you have an opportunity to work internationally after completion of your studies?
- a. Yes
  - b. No
41. If you are not already a postdoctoral fellow, would you consider doing postdoctoral studies?
- a. Yes, internationally or locally
  - b. Yes, only internationally
  - c. Yes, only locally
  - d. Unsure
  - e. No
  - f. Not applicable
42. If you have any comments/suggestions/challenges that you wish to share with SAYAS, please type your response here: \_\_\_\_\_



