

AFRICAN RESEARCH UNIVERSITIES ALLIANCE (ARUA)

Towards developing a collaborative PhD programme across ARUA member universities

Experiences from South African universities

**A research report produced for ARUA by the
Human Sciences Research Council (HSRC)**

Compiled by

Dr Angelique Wildschut, Dr Samuel Fongwa and Ms Zama Mthombeni

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1. Introduction to study and country context

1.1 Introduction to the study

The South African higher education system has been recognised as the leading producer of knowledge on the continent, contributing to 73% of total publications from all ARUA universities in 2018 (Van Shalkwyk et al., 2021). Furthermore, a recent study by ARUA shows that South African universities had higher doctoral enrolments and graduates than their alliance counterparts (ARUA, 2021). What is less obvious is the nature of collaboration, and how this can be enhanced. This report highlights the status of doctoral training in South Africa using evidence from the six South African ARUA member universities. The study explores the nature of the doctoral programme within the member universities as a sample of the system with the aim of making recommendations towards the development of collaborative doctoral programmes across the alliance.

The report first provides a brief overview of the country's socio-economic status, which has a bearing on the higher education system and how universities and doctoral programmes are organised, and which may influence the direction of the design of collaborative programmes as envisaged by ARUA. It further details the national and institutional policy and operational frameworks, identifying institutional and systemic challenges. The report uses institutional data to explore the doctoral life cycle in South Africa along three main themes: access, structure of the programmes, and experience through the programme; thereafter making recommendations towards designing collaborative arrangements, and challenges that need to be addressed. The report is divided into five sections. The next section provides an overview of South Africa's socio-economic and political context, including a brief description of the higher education landscape. Section three delves into the case study of the university and the two selected programmes. Section four presents the findings from the data collected from the two case study programmes. Section five provides some recommendations and conclusions.

1.2 Country context

South Africa became a constitutional democracy in 1994 with the demise of apartheid and the introduction of a democratic government. It is considered a middle-income country, and is classified as an emerging economy (OECD, 2009). Its economy has been founded on

significant amounts of natural resources such as gold, platinum and diamonds, along with well-developed financial, legal, communications, energy and transport sectors.

South Africa boasts 11 official languages and three national capitals: Pretoria (administrative), Bloemfontein (judicial) and Cape Town (legislative). The city of Johannesburg is considered the economic capital of the country and even the continent, owing to the volume of its economic activity, which includes the largest African stock exchange by market capitalisation. In the wake of the global financial crisis of 2008, and subsequent political and governance issues within the ruling political party, the African National Congress (ANC), the South African economy has experienced muted economic recovery. It has failed to exceed projected growth figures of four percent reaching the best figures of just over two percent (2.2%) in 2013. Economic conditions worsened with the COVID-19 pandemic which resulted in jobless growth in gross domestic product (GDP) at just under five percent (4.9%). Unemployment reached a record proportion of 35.3% (Stats SA, 2021).

The National Development Plan (NDP), established a decade ago, was put in place as a pivotal growth and development policy to bring together all sectors of government towards a coordinated development pathway. One of the core aspects of the *NDP: Vision 2030* is advancing all spheres of education and skills development. The higher education sector, specifically, was recognised as a critical component of education and skills development in the economy. According to the NDP (NPC, 2011), South Africa aims to:

- Increase its research and development expenditure as part of GDP to between one and a half (1.5%) to two percent by 2030.
- Increase university participation rates from 17% to 30%.
- Increase the percentage of university academics with doctorates to 75%.
- Increase the number of doctoral graduates to 100 doctorates produced for every million of the population, which would require the production of 5 000 doctorates annually by 2030.

The NDP has also informed the development of other sector policies such as the *Higher Education White Paper* (DHET, 2013) and the *2018 Ten Year Innovation Plan* (DSI, 2018). Both policy documents recognise the role of universities and higher education as knowledge producers in achieving national development targets while advancing the country's objectives towards establishing itself as a knowledge economy (Pedersen, 2014). The innovation plan goes further in its identification of the grand challenges facing the innovation system, highlighting the role South Africa should play within the region and continent. Higher

education is thus clearly emphasised in the country's developmental aspirations, of which strengthening the production of doctorates is a recognised priority.

2. Higher education landscape

2.1 An overview of the system

The South African higher education landscape was set on a transformation pathway post 1994 in efforts to transform inequalities which characterised the system. As noted by Reddy, Wildschut, Luescher and Petersen (2018: 21), “the period immediately after 1994 saw the repeal of apartheid legislation and a massive effort to develop a new post-school education and training system that would redress the apartheid past, both in terms of the number and type of institutions involved in skills development, the type of skills development they provide (and related services), and the demographic profile of individuals participating in skilling”. In the wake of democracy, the National Plan for Higher Education (DoE, 2001) identified “indicative targets for the size and shape of the higher education system, including overall growth and participation rates, institutional and programme mixes and equity and efficiency goals”. Thus, the mandate of the system was to ensure growth in participation in higher education, and to provide a range of differentiated institutions and programmes, while ensuring efficiency within an equitable system. At the time, South Africa had 16 universities separated along racial lines.

2.2 Size and shape of higher education in the democratic system

The National Plan for Higher Education (DoE, 2001), and the process of reconfiguration of the higher education landscape between 2001 and 2005, resulted in the creation of 23 public universities through inter alia, the reconfiguration of technikons as universities of technology, the incorporation of colleges into universities, and the merger of universities (Bunting, 2003). Most recently in 2013, the Department of Higher Education and Training (DHET) (which was formed through its split of the Department of Education which became the Department of Basic Education in 2009) approved the creation of two new universities in provinces that did not have universities, as well as unmerging the former Medical University of South Africa from the University of Limpopo. Thus, by 2022 the South African higher education landscape comprised of 26 public universities (in addition to over 100 registered private higher education providers).

Table one below shows the participation rates across the public South African higher education system. South Africa's university system is widely acknowledged as diverse and highly uneven (Fisher and Scott, 2011; Cooper, 2015). The 26 public universities in the country are classified by the DHET into three broad categories based on their main 'function' (see Table 1), traditional universities (more academic and research-oriented in focus), universities of technology (more vocationally and technically inclined), and comprehensive universities (formed from the amalgamation of traditional universities and universities of technology offering a blend of both academic degree programmes and technical and vocational training).

Another categorisation observed in the literature sees universities grouped along the historical context of higher education provisioning, emphasising the fragmentation along historical (racial) lines. This categorisation adopts a simple grouping of universities into either historically advantaged institutions (HAIs) or historically disadvantaged institutions (HDIs) (see Baldry 2016; Bhorat et al. 2010; CHE 2004). This approach remains popular in the literature although it has drawbacks (particularly in the cases where an HAI and an HDI were merged in the early 2000s) (Essop, 2020). Moreover, and precisely because of such challenges associated with this classification, the Centre for Higher Education Trust (CHET) proposed a classification system in which South African universities are grouped into three 'clusters' based on performance and functional characteristics (Fisher and Scott 2011; Cooper 2015). This clustering system seems to capture both the unevenness in quality, and the historical differences across institutions, where cluster one includes the high-performing research-focused universities in South Africa, and who they perceive are training the bulk of African academics of the future. These all happen to be HAIs. On the other extreme of CHET's classification is cluster three universities which constitutes all of the historically disadvantaged black universities which offer opportunities to students from disenfranchised poor working-class backgrounds, who otherwise might not be able to access universities. The middle cluster includes a mixture of historically advantaged and disadvantaged universities which require refinement of purpose and focus within the higher education and knowledge landscape (Fisher and Scott 2011; Van Broekhuizen 2016).

Finally, others such as Essop (2020), have recognised the changing landscape of the system¹, and based on a review between 2005 and 2017, proposes a categorisation by five institutional

¹ In Essop's report titled "The Changing Size and Shape of the Higher Education System in South Africa 2005-2017" he suggests this categorisation.

types with similar traits across the system. These include: 1) research intensive universities (RIUs), 2) historically black universities (HBUs), 3) Universities of Technology (UoT), 4) other universities (OUs) and 5) the only distance university (Unisa). While this is not an uncontested version of categorisation, it is adopted in this report as the category of RIUs represent all the ARUA universities with the exception of Rhodes University. Considering that Rhodes University contributes only four percent of the total ARUA enrolments in South Africa (12% at doctoral level), the RIUs category provides the closest reflection of all ARUA universities compared to the other rankings. It further provides for the separate consideration of Unisa (the country’s only public distance learning institution, also capturing the largest proportion of participation). Furthermore, Essop’s classification is closely linked to CHET’s classification. Table one follows the five-category route.

Table 1: Higher education participation rates across the system by institutional type

Institutional Type	2016	2017	2018	2019	2020	Growth % (2016-2020)
RIUs	196545	198009	230366	201806	197988	0.7
HBUs	122352	127732	103785	136805	128802	5.3
UoTs	168270	177589	185238	194536	184846	10
OUs	189346	189639	192200	198968	191122	1
Unisa	299324	344015	373979	342797	392050	31
Total	975,837	1,036,984	1,085,568	1,074,912	1,094,808	12

Source: HEMIS Data 2021

The above table illustrates that the system has experienced growth in participation rates and diversity in terms of institutional type. Also, in terms of size and shape, the table shows that Unisa captures the largest participation rate (35%), followed by RIUs (18%), with the smallest proportion of participation being at HBUs (11%). It is notable that research intensive universities experienced the smallest growth, in comparison with the largest growth being noticeable at the only distance university in the country (Unisa).

2.3 Doctoral enrolments across the system

Table two focuses on doctoral enrolment across South African universities between 2014 and 2020. The data generally underscores the growth in participation illustrated across the entire system in showing that doctoral enrolment has similarly grown over this period, except for the Walter Sisulu University. The two new universities, Sol Plaatje University and the University of Mpumalanga, have not yet recorded any doctoral enrolments, and one university of

technology is not represented due to its focus more on vocational training. A total of 23 588 doctoral enrolments² were observed within the higher education system in the 2020 academic year. A few aspects bear noting. There has been an overall percentage growth rate of 31% in doctoral enrolments across the system between 2014 and 2020. The six ARUA universities contributed more than half (51.2%) of all the doctoral enrolments.

Table 2: Doctoral enrolments across the system (2014 to 2020)

	2014	2015	2016	2017	2018	2019	2020	% growth
CPUT	199	215	236	285	292	297	297	49,2%
CUT	112	120	163	156	191	218	202	80,4%
DUT	163	216	322	356	397	506	524	221,5%
NMU	527	581	641	602	627	632	582	10,4%
NWU	1341	1448	1560	1597	1625	1645	1496	11,6%
RU	513	560	597	597	620	605	605	17,9%
SMU		68	89	91	81	97	87	27,9%
TUT	321	378	381	401	455	485	526	63,9%
UCT	1604	1746	1973	2082	2134	2245	2222	38,5%
UFH	477	637	688	778	791	640	486	1,9%
UFS	668	599	903	946	986	1029	999	49,6%
UJ	765	858	988	1078	1363	1401	1573	105,6%
UKZN	2453	2798	3044	3164	3320	3303	2917	18,9%
UL	249	208	246	296	353	350	301	20,9%
UNIVEN	209	242	320	353	398	378	253	21,1%
UNIZULU	209	198	246	253	296	359	298	42,6%
UNISA	2100	2117	2179	2287	2372	2481	2549	21,4%
UP	2155	2279	2357	2318	2307	2375	2411	11,9%
US	1435	1534	1570	1694	1678	1707	1664	16,0%
UWC	714	792	885	968	1029	1095	1140	59,7%
VUT	33	49	47	71	98	116	127	284,8%
WITS	1646	1816	2019	2143	2168	2328	2252	36,8%
WSU	50	54	56	56	69	94	77	54,0%
TOTAL	17943	19513	21510	22572	23650	24386	23588	31,5%

Source: HEMIS 2021

Note: CPUT: Cape Peninsula University of Technology, CUT: Central University of Technology, DUT: Durban University of Technology, NMU: Nelson Mandela University, NWU: North-West University, RU: Rhodes University, SMU: Sefako Makgatho University, Tshwane University of Technology, UCT: University of Cape Town, UFH: University of Fort Hare, UFS: University of the Free State, UJ: University of Johannesburg, UKZN: University of Kwazulu Natal, UNISA: University of South Africa, UP: University of Pretoria, US: University of

² This includes Doctor of Technology, Doctor of Philosophy and professional doctoral degrees.

Stellenbosch, UWC: University of the Western Cape, VUT: Vaal University of Technology, WITS: University of the Witwatersrand, WSU: Walter Sisulu University.

Table three presents doctoral graduation rates across the same time period. While the ARUA member universities (in italics) have not experienced as much growth as some of the others, it bears noting that these arguably started from a substantially stronger baseline in comparison to most of the other universities whose enrolments were historically very low. For example, this explains a growth rate of 4900% at the University of Venda, because in 2014 they only had one doctoral enrolment compared to having 50 as at 2020. The university with the highest doctoral throughput is found to be the University of Kwazulu-Natal.

Table 3: Doctoral graduates across the South African universities

Name of University and institutional type	2014	2020	% change
Research Intensive universities / Traditional university			
<i>University of Cape Town</i>	204	276	35
<i>University of KwaZulu-Natal</i>	264	487	84
<i>University of Pretoria</i>	237	375	58
<i>University of Stellenbosch</i>	234	299	28
<i>University of Witwatersrand</i>	199	321	61
Other Universities*			
North-West University (T)	171	251	47
Nelson Mandela University (C)	72	80	11
Rhodes University (T)	76	104	37
Sol Plaatje University Northern Cape (T)	0	0	0
University of Johannesburg (C)	106	224	111
University of Mpumalanga (T)	0	0	0
University of the Free State (T)	104	113	9
Historically Black Universities*			
Walter Sisulu University (C)	8	3	-63
Sefako Makgatho Health Science University (C)	0	11	
University of Fort Hare (T)	66	81	23
University of Limpopo (T)	25	51	104
University of Venda (C)	1	50	4900
University of the Western Cape (T)	104	123	18
University of Zululand (C)	25	48	92
University of Technology			
Central University of Technology	12	24	100
Cape Peninsula University of Technology	17	36	112
Durban University of Technology	18	64	256
Mangosuthu University of Technology	0	0	0
Tshwane University of Technology	46	91	98
Vaal University of Technology	1	19	1800
Distance learning University			

University of South Africa (C)	268	422	57
Grand Total	2258	3553	57

Source: HEMIS 2021; *T=Traditional university, C=Comprehensive University

Table four illustrates the breakdown of doctoral graduates by field of study. This shows, based on the latest available data (2020), that the biggest doctoral graduate output for South African universities occur in the education (407), physical sciences (402), business, economics and management studies (BEMS) (398) and health professions and related clinical sciences (HPRCS) fields (395), with the lowest output currently in the fields of family ecology and consumer studies (FECS) (7) and architecture and the built environment (ABE) (22).

Table 4: Number of doctoral graduates by broad classification of educational subject matter (CESM) categories

Classification of Educational Subject Matter (CESM)	2014	2020	% change
Agriculture, Agricultural Operations and Related Sciences	79	139	76
Architecture and The Built Environment (ABE)	22	22	0
Business, Economics and Management Studies (BEMS)	194	398	105
Communication, Journalism and Related Studies	19	49	158
Computer and Information Sciences	55	97	76
Education	228	407	79
Engineering	154	282	83
Family Ecology and Consumer Sciences (FECS)	4	7	75
Health Professions & Related Clinical Sciences	244	395	62
Languages, Linguistics and Literature	110	104	-5
Law	70	126	80
Life Sciences	250	340	36
Mathematics and Statistics	67	85	27
Philosophy, Religion and Theology	133	158	19
Physical Sciences	255	402	58
Psychology	105	134	28
Public Management and Services	71	71	0
Social Sciences	166	285	72
Visual and Performing Arts	32	45	41
Grand Total	2258	3546	7

It is clear that the South African system has been growing substantially since democratisation, in terms of size and shape, but also diversification of institutional types. It appears also, that in terms of doctoral enrolment and graduation, some universities are much more active, but also over time, almost the entire system has become involved in doctoral training. Finally, the graduation data illustrates the field of study as an important differentiator in terms of successful

doctoral throughput. These features of the South African higher education system are surely important contextual parameters for considering collaborative doctoral programmes in terms of scale and capacity. Before we delve deeper into exploration and analysis of key aspects of doctoral training, access, structure and student experience, to support recommendations towards collaboration, it is important to also have an understanding of the wider contextual factors facing doctoral training in the country.

2.4 Challenges facing doctoral training in South Africa

Some institutional and systemic challenges continue to hamper improved effectiveness in doctoral training within the South African context. These relate to supervisory capacity, funding and infrastructure for doctoral level training.

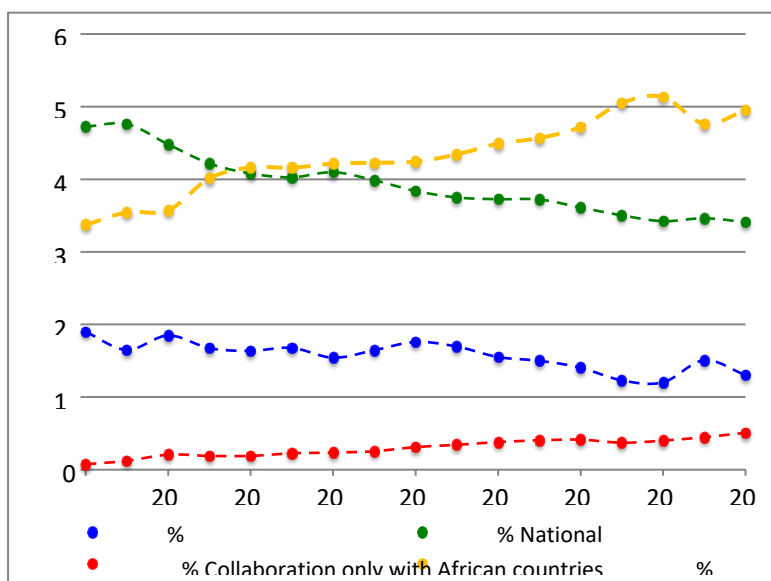
Low capacity for supervision is an oft cited issue across many African universities and South Africa is no exception in this regard. One of the critical minimum requirements for supervision is for staff to themselves have doctorates. Staff with doctorates represent just over a third of the academic staff in South African universities, and this has contributed to limited supervisory experience and ability to supervise candidates and high student-to-supervisor ratios (NDP, 2012: 317). However, ARUA member universities comparatively have much higher ratios of staff with doctoral level qualification reaching above 60%, with the UP having the highest ratio of 70% as of 2020 Higher Education Management Information System (HEMIS) data.

A second challenge is relatively inadequate funding to support doctoral students. As a reflection of low levels of funding, Mouton and Van Lill (2022) show that more than 70% of doctoral students work full-time and study part-time to meet their financial demands. While there are many funding instruments existing at national and institutional level, government funding within the wider higher education context remains lower than the one percent GDP target.

Thirdly, inadequate institutional infrastructure and support environments have also been observed to hinder students' research and throughput rates. Several South African universities continue to struggle with laboratory equipment, advanced software and hardware for computational research and analysis, while dedicated libraries and resource centres are only established at a few departments and units. Furthermore, as described by Mouton and Van Lill (2022), some PhD programmes do not always experience a conducive, positive and encouraging research environment, which is a key attribute for doctoral success.

The policy context is also key when considering efforts to collaborate towards quality doctoral production across ARUA member universities. Cloete, Maassen and Bailey (2016) observe that while South Africa is involved in many initiatives such as the Department of Science and Innovation (DSI) and other government bodies, more could be done. Here especially, reference is made to the need for improvement in the conditions of other universities within the continent to favour substantive collaboration (Cloete et al., 2015). As shown in Figure one below, while research collaboration with researchers and countries outside of Africa has remained high, and has also increased over time, the collaboration between South African institutions and researchers on the continent remains relatively low. The recent enactment of the Policy Framework for Internationalisation of Higher Education in South Africa (DHET, 2020) will form an important structure towards collaborative efforts, but clearer implementation guidelines around the various forms of potential collaboration and the specificity of broader implications are required (for example, how can credits be transferred across particular higher education systems).

Figure 1: South Africa’s research collaboration profile (2000 to 2016)



Source: Mouton and Blanckenberg, 2018

While collaboration between South Africa and other African countries has been low, the ratification of ARUA is a positive step towards enhancing and enriching more collaboration. This report aims to provide proposals for such collaboration, particularly with a view towards doctoral level programmes.

2.5 The higher education policy landscape

Several policies are relevant to the provision of doctoral training at the national level. While we do not attempt an exhaustive list here, some of the key policies governing the higher education landscape in South Africa include the following:

- A Framework for Transformation of higher education by the National Commission for Higher Education (NCHE, 1996)
- The White Paper 3 on the Transformation of Higher Education (DoE, 1997)
- The National Plan for Higher Education (DoE, 2001)
- The White Paper on Post-school Education and Training (DHET, 2013)
- The National Development Plan: Vision 2030.
- The White Paper on Science Technology and Innovation (STI 2019)
- Policy Framework for Internationalisation of Higher Education in South Africa (DHET, 2020)

In terms of the implementation of these policies, the NDP aims for South Africa to increase its production of doctoral graduates from 28 per million to at least 100 doctoral graduates per million by 2030, and to strengthen universities' culture of research as well as provide performance-based grants for research (NPC, 2011).

On 6 November 2020, the South African government approved its policy framework for the internationalisation of higher education in South Africa. The policy is a commitment from the South African higher education system to comprehensive internationalisation requiring novel approaches to science diplomacy from its academic leaders, especially those at the head of public higher education and research institutions. Other aims stated in the policy include positioning the South African higher education system in a globalised world, while advancing the quality of education within South Africa, the Southern African Development Community (SADC), the African continent and beyond. Essentially, the objective is towards enhancing intellectual diversity, furthering the higher education system's public good mandate, and contributing to resolving global challenges.

The policy further emphasises the role of collaboration, while not undermining the transformation of the curriculum as it is being internationalised. It further promotes the importance of the quality of programmes while requesting that institutional and national structures be put in place to mitigate the effects of brain drain. The International Education

Association of South Africa (IEASA) is recognised as a non-statutory membership organisation that advances the internationalisation of higher education in South Africa. As reflected by most of the Vice-Chancellors at ARUA member universities, the policy terrain in South Africa is not yet fully developed to support a range of doctoral collaborations, joint degree programmes and other forms of internationalisation and harmonisation efforts. However, there is space for individual institutions to begin exploring various forms and avenues for collaboration with universities within the continent and beyond. The proliferation of such collaboration initiatives within the current policy directives will provide more guidance for policy makers.

2.6 The doctorate in South Africa

The South African Higher Education Qualifications Sub-Framework (HEQSF) of the NQF distinguishes between two types of doctorates. The Framework is one of three coordinated qualifications sub-frameworks of the South African National Qualifications Framework (NQF). The definition of the doctoral degree, being at the NQF exit level 10, explains that “the designator of Philosophy is typically used for general doctoral degrees by thesis. However, other designators may be used to denote the area of study or the name of the discipline” (Government Gazette, No. 38116, 2014: 40). Abbreviations are indicated as PhD, DPhil and DLitt. While not dealt with separately in the definition, another ‘type’ is also alluded to. This is the ‘Higher Doctorate’, which “may be awarded on the basis of a distinguished record of research....judged by leading international experts to make an exceptional and independent contribution” (Government Gazette, No. 38116, 2014: 40). The other main type is the Doctoral Degree (Professional), with its recognised abbreviations of DEd, DCom, DBA, Deng, LLD, DNursing, DSW, DPharm, DPpsych. It differs from the academic doctorate in that it “provides education and training for a career in the professions and/or industry” (Government Gazette, No. 38116, 2014: 41). A key differentiation in its characteristics is that it requires candidates to undertake a combination of coursework and advanced research, providing for the research component to comprise 60% of the degree as well as the inclusion of work-integrated learning. The predominant mode of doctoral degrees within the South African context is the academic doctorate (PhD, DPhil and DLitt), which constitutes more than 82% of all enrolled doctorates in the system, with the Doctor of Technology and the Professional Doctoral both registering 3 364 and 846 enrolments respectively, of the total doctoral enrolments of 23 588 across the system (HEMIS, 2020).

3. Participating universities and data collection

3.1 Recap of research focus and objectives

The overarching impetus of this research report is to respond to ARUA's objective to understand the current conditions of the provision of doctoral level programmes amongst ARUA member universities to inform the development of collaborative programmes. More specifically, the research seeks to review selected doctoral programmes at ARUA members and make recommendations that could possibly serve as principles around which ARUA can facilitate the establishment of collaborative doctoral programmes across the alliance.

To support this investigation, two doctoral programmes were selected from each university; one from the humanities and one from the natural sciences. Data was collected from each of the programme coordinators or head of programmes. Institutional data was further collected from the institutional websites and these were analysed according to three main themes: (1) access to the programmes, (2) structure of the programme, and (3) experience through the programme. In addition, interviews were conducted with each university Vice_Chancellor to gather inputs into four main issues related to collaboration: national and institutional policy, current practice, challenges and recommendations from an institutional, but also country perspective.

As ARUA was interested in getting a sense of the current process and structures with regards to how doctoral programmes are being implemented within their member community, a case study approach was selected. This aimed to give a breath of coverage of important elements of doctoral programmes, while also allowing some ability to uncover institutional and departmental nuances.

3.2 Overview of participating universities and programmes

South Africa is represented within the ARUA network by six universities. All six universities participated in the study. According to the DHET classification of universities, all of these are seen as traditional universities.

University of Pretoria

The UP is one of the top-rated research-intensive universities in Africa and is recognised for its extensive footprint of collaboration within the continent and beyond. It is a dual-campus institution with nine faculties, one business school (the Graduate Institute of Business Studies), four centres of excellence and 51 research chairs. About 70% of its academic staff have doctorates. Current student enrolments stand at over 55 000 contact students. From a collaboration point of view, the UP is host to many collaborative research initiatives within the continent and beyond. The university is part of the Erasmus Mundus+ collaboration as well as the Future Africa Institute, which is an initiative to foster collaboration with the African continent through the advancement of innovation, food security and agriculture.

For this study, the ARUA Centre of Excellence (CoE) in Food Security was selected as the entry point for the identification of one of the two PhD programmes to participate in the study. However, like most other ARUA CoEs, the operation remains in its infancy phase and not fully functioning across most of the universities. The PhD programme in plant science was selected within the broader science, technology, engineering, and mathematics (STEM)/natural sciences field, while the PhD in public administration and management was selected to represent the broader social science/humanities field. Data from the two programmes was collected through their respective programme coordinators and analysed along the core aspects of the study focus.

University of Cape Town

As the top university in Africa, and among the best in the world, the University of Cape Town (UCT), uses international partnership to support research excellence, student and staff mobility, and access to funding through global university networks. Internationalisation is an important component of the International Offices' mission and is promoted through, (1) student and staff exchange, (2) global short-term academic programmes (standardised, customised, faculty-led, service-learning and island programmes), (3) African partnership and programmes, (4) study abroad, (5) joint and co-badged postgraduate degrees, and (6) full-degree study.

The two programmes that were selected at the UCT were the PhD in economics by coursework and dissertation, and the PhD in climate change. The PhD in economics by coursework and dissertation is housed under the Faculty of Commerce. This is also where the African Economic Research Consortium (AERC) collaborative programme is offered with other universities in sub-Saharan Africa and supported through donor funding. It claims its distinguishing features are the integration of advanced theory, tools and African applications in the academic

programme. The programme is equivalent to 360 NQF credits, with the prerequisite courses being non-credit bearing.

The PhD in climate change is housed under the African Climate and Development Initiative (ACDI). The ACDI is a university-wide initiative at the UCT and supports collaborative research and training in climate change and development. The ACDI was established in 2011 by the Vice-Chancellor of the as a strategic initiative to, “facilitate and substantially extend climate change research and education at UCT with the specific context of addressing the development challenges of Africa from an African perspective”. Simultaneously, this initiative holds an ARUA awarded CoE status for ‘Climate and Development’, alongside partners at the Universities of Nairobi and Ghana. Viewed as one of the continent’s foremost climate change institutes, the ACDI provides a platform for the university and ARUA’s collective response to the challenge of climate change. It coordinates and centralises resources to enable inter- and transdisciplinary research, teaching, and learning in the areas of climate change and sustainable development across Africa and beyond.

Stellenbosch University

The Stellenbosch University (SU) is home to an academic community of 29 000 students (including 4 000 foreign students from 100 countries) as well as 3 000 permanent staff members (including 1 000 academics) on five campuses. The university is amongst South Africa’s leading tertiary institutions based on research output, student pass rates and rated scientists, and is recognised internationally as an academic institution of excellence. It boasts the highest weighted research output per full-time academic staff member of all South African universities, and the second-highest number of scientists in South Africa who have been rated by the National Research Foundation (NRF). It also has the highest student success rate in the country.

According to the Times Higher Education World University Rankings, the SU is one of the top 300 universities in the world, and among the top 20 in BRICS (Brazil, Russia, India, China and South Africa) countries. It also features among the world's elite institutions in 10 out of the 36 subjects featured in the QS World University Rankings by Subject for 2015. The university was also included in the 2014 CWTS Leiden Ranking, which measures the scientific performance of 750 major universities worldwide. With 18 research chairs under the NRF South African Research Chairs Initiative (SARChi), the university is regarded as a leader in the fields of biomedical tuberculosis research and management, wine biotechnology, animal

sciences, and mathematical biosciences. Another SARChi chair, in the field of invasion biology, is shared between the SU and the University of Venda. This constitutes a few of the university's many partnerships, both local and international. The university also participates in various international academic networks.

The following PhD programmes were identified as high-quality programmes using the criteria developed by the research team, and by adding some other comparative dimensions: the PhD in earth sciences and the PhD in economics. The process of identification involved initial contact with the Deputy Vice-Chancellor (DVC): Research, Innovation and Postgraduate Studies. This was followed by direction and engagement with the head of the postgraduate office who was engaged with on the criteria for selection and the proposal of the initial four programmes. The DVC also facilitated contact with willing academics/PhD conveners of the selected final two programmes.

University of Witwatersrand

The University of Witwatersrand is a multi-campus South African public research university situated in the northern areas of central Johannesburg. It is more commonly known as Wits University or Wits. The university has its roots in the mining industry, as do Johannesburg and the Witwatersrand in general. It has more than 35 000 enrolments and is classified as one of the HAUs. In terms of collaboration, Wits University is one of six African strategic partners to the CIVIS Alliance, which committed to deepening African-European science cooperation by tapping the potentials of European University alliances. CIVIS is a European Civic University formed by the alliance of 10 leading research higher education institutions across Europe.

There are two PhD programmes from Wits that have been chosen as case studies for this university. Due to their history, and identified as suitable for this case study by the heads of departments, the chosen programmes are the PhD in psychology; and PhD in paleosciences. The PhD in palaeontology started several decades ago as part of the Bernhard Price Institute for Palaeontological Research. It is now the Evolutionary Studies Institute, home to the largest fossil collection in South Africa, and one of the largest in the world. What makes this PhD programme significant is that South Africa is the only country in the world to have a continuous record of reptile, dinosaur and mammal fossils dating from between 300 million to 80 million years ago.

University of KwaZulu Natal

The University of KwaZulu-Natal (UKZN) is a five-campus university in the province of KwaZulu-Natal in South Africa. It was formed on 1 January 2004 after the merger between the University of Natal and the University of Durban-Westville. UKZN was ranked fourth out of the universities in South Africa by the Times Higher Education World University Rankings, and sixth by the QS World University Rankings in 2018 (THE, 2013). The UKZN has historically had a very strong reputation in the areas of science, technology, engineering, and mathematics, and is ranked first in the country for physical sciences and engineering, second for computer science, and third for mathematics (QS Ranking, 2018). The university has also produced several prominent entrepreneurs and innovators. It was ranked first in Sub-Saharan Africa in Q4 2020 by the amount of venture capital funding raised by unicorn start-ups founded by UKZN's alumni (QS Ranking, 2018).

In terms of collaboration, the university undertakes collaborative projects abroad and locally. An example of a recent collaboration that the UKZN is a part of is one between the United Kingdom (UK) and South Africa. This project was aimed at strengthening research capacity amongst master's and doctoral training programmes through partnerships with the UKZN, the Mangosuthu University of Technology (MUT), and the Africa Health Research Institute (AHRI) in South Africa, and the University College London (UCL) in the UK. The International Centre for Genetic Engineering and Biotechnology (ICGEB) and the UKZN partnered with local companies to develop advanced biotherapeutics to be used in the treatment of various conditions, including diabetes, arthritis, cancer and others.

The two PHD programmes from the UKZN that have been chosen as case studies are the PhD in development studies and PhD in physics. The former being recommended by the university for its interdisciplinary nature, and the latter for its reputation for ongoing partnerships and collaborative projects.

Rhodes University

Rhodes University (RU) is a public research university located in Makhanda (Grahamstown) in the Eastern Cape Province of South Africa. It was founded in 1904 and is one of four universities in the province. It is a well-established university with a reputation for academic excellence. With just over 8 200 students, this is a small university which enjoys the distinction

of having an outstanding postgraduate success rate and research output per academic staff member. The university is seen as a key stakeholder in society and openly promotes the ideal that it exists for the public good. It asserts that “partnerships enable us to express our values and realise this strategic purpose. The university has numerous research collaborations with local and international universities” (Rhodes, 2019). Their teaching and learning strategies are reinforced by mutually beneficial external partnerships and collaborations. Some of the strategic teaching and learning partnerships enhance postgraduate environments with six South African and six European universities funded by European Union Erasmus.

The two programmes from Rhodes that have been chosen as case studies are the PhD in environment and sustainability education and the PhD in water science. These programmes were recommended by the dean of the institution after consultation with the university structures. Both these programmes are transdisciplinary and thus gives strength to the nature of the programme and its potential to be collaborative.

4. Insights from the institutional data

The case studies involved detailed data gathering of institutional data on the two programmes identified across each institution. It is important to note that the choice of the programmes largely depended on the member university. While several criteria were suggested, including the academic staff quality, institutional reputation of the programme, academic productivity, financial sustainability, and international exposure of the programme, the choice of the programme was strongly based on institutional preference and availability of institutional respondents. Universities were asked to use the above criteria to propose programmes which can serve as case studies for the analysis.

The collected data sought, inter alia, to understand the nature of access into the programme, programme requirements, the structure of the programme and how the doctoral learners are experiencing the programme, including support structures available and opportunities for collaboration. Data about the application procedure, admission requirements, enrolment, graduation rates, and programme expenses, were obtained under the dimension of access. Information on the credit system, programme duration, registration process, course design, supervisory model, and collaborative aspect, were obtained under the dimension of structure. Finally, information on staff quality, infrastructure quality, funding, programme highlights and support, were obtained under the dimension of student experience. While some detail is

important as background information (see table five), we aim in this section to elevate the insights across institutions towards a South African perspective across the member universities.

Section three consequently outlines high-level findings across the institutional level to reflect on the three high-level dimensions of access, structure and experience of doctoral programme delivery across these cases. This is done with a view towards highlighting challenges but also opportunities for establishing and strengthening collaboration towards the production of quality doctoral graduates across Africa in ways that promote mobility and improved student experience.

Table 5: Summary of data collection across South Africa ARUA institutions

Institutions		Humanities				Natural Sciences			
		Admission Requirement	Duration	Structure	Examination	Admission Requirement	Duration	Structure	Examination
1	UP	Masters Degree Aggregate 65%	Min: 2-3 years (full-time)	Apprenticeship supervisory model (governed by MoU) and no coursework Compulsory cohort seminars	Full research thesis	MSc Degree: Aggregate60%	3 years	Apprenticeship supervisory model (governed by an MoU) and no coursework No compulsory components	Full research thesis
2	RU	Masters	2-3 full-time 6 years P/T	Apprenticeship supervisory model, growing trend toward cohort. No compulsory elements	Thesis report or Published articles (hybrid model)	MSc	2-3 full-time 6 years P/T	Apprenticeship supervisory model, but growing trend toward cohort No compulsory elements	Thesis report or Published articles (hybrid model)
3	UKZN	Masters Aggregate60%	3 years full-time; 5 years P/T	Apprenticeship model (with co-supervision) No compulsory components	Full research thesis or journal publication (hybrid model)	MSc Aggregate65%	3 years full-time; 5 years P/T	Apprenticeship model (with co-supervision) No compulsory components	Full research thesis
4	WITS	Masters Aggregate70%	2-3 years (full-time): 5 years P/T	Traditional apprenticeship model (with co-supervision). Full research thesis or journal publication (hybrid model)	Thesis or one paper submitted to an accredited journal	MSc Aggregate70%	3-year (full-time) 4 years P/T	Full research thesis or journal publication (hybrid model)	Thesis or No paper submission mentioned
5	US	Masters	Minimum:2 years	Full research thesis or journal publication (hybrid model)	Thesis or 3 papers of publishable quality	Masters	2-4 years	Thesis or paper model	Thesis or 2 papers published or submitted in review (1 international and 1 local)
6	UCT	Masters	Minimum: 2 years	Thesis with coursework (coursework is non-credit bearing)	Graduation by examination of the thesis only	MSc	Minimum 2 years	Thesis	Full research thesis

4.1 Access

The cases illustrated process, regulations, and opportunities, around access to doctoral programmes within the South African context.

4.1.1 Admission requirements

Firstly, a positive insight emerging from comparison across the six institutions is that access to a PhD programme, whether in the natural sciences or humanities, appears to be quite standard across South African universities. The requirements for admission tend to be a master's degree or an equivalent. While some institutions (like SU and Rhodes) do not specify a particular percentage score that should have been achieved at master's level, some are more prescriptive in this regard. For example, UP specifies a minimum average score of 65% for admission into their programmes, and while UCT does specify a minimum level for admission in the focus humanities programme (economics), this is only a second class (lower division) achievement at master's level. As the focus doctoral programme in the natural sciences at UCT is through research, the admission requirements were not found to be restrictive in terms of minimum scores required. From the two programmes analysed at UP, there seemed to be a strong multidisciplinary emphasis, enabling a wide range of potential students to enroll into the programme. Similarly, at UCT, it is not essential for candidates to proceed through the faculty in which they have obtained their bachelor or master's degree. In the case of Rhodes, there was a disciplinary difference in accessibility, in that the doctoral programme for humanities did not seem to be restrictive as it is a multidisciplinary programme accepting candidates from any field. Whereas for their natural sciences programme, there is a restriction, and the master's degree must be from the sciences. Overall, for Rhodes, UCT and UP, the process for admission, regardless of the field of study, does not seem to be very restrictive.

However, in the case of UKZN and Wits, both doctoral programmes in the natural sciences and humanities were found to be restrictive as minimum scores are stipulated. Wits specifies a minimum average score of 70% at master's level for admission into their programmes, while UKZN specified a minimum average score of 65% at master's level for admission into their programmes. This also applies to the type of candidates accepted, where in both, the humanities and sciences fields, candidates are required to hold master's degrees that are within the field or associated.

Another important consideration with implication for access is the costs of registration and tuition (where applicable), and related to that, funding. We found across the focus programmes a range from a low of US\$750 to a high of US\$2 125 for natural sciences, and a low of US\$1 500 USD to a high of US\$1 930 for humanities.³ Given the structure of the PhD programmes, where they are mostly full research or a paper model, and the majority do not offer a course work component,⁴ these fees can be considered as high.

4.1.2 Access to funding for doctoral students

Historically, the state provides the core funding support for South Africa's public universities. The degree of dependence on state funds by individual universities differs (a range of between just over 30% to almost 65% of total revenues) (MoE 2004; Ouma 2007; Van Heerden et al., 2007). While a large proportion is driven by the state, the model of higher education funding in South Africa is one of cost-sharing, whereby a student, including doctoral students, are typically required to self-fund their studies. The costs of doctoral programmes differ between institutions and is typically made up of a registration fee, annual programme fees, specialised course/module fees, and other fees (e.g. library cards and fines, access cards, examination fees, graduation fees, fees for administration). Alongside recurrent concerns on the inadequacy of funding for higher education as a whole, the increase in the proportion that student fees comprise of the over-all funding formula over time, has received considerable attention and concern (Cloete, Mouton and Sheppard, 2015).

While the burden for funding to some extent always rests on the student, the South African doctoral landscape boasts a variety of structures that facilitate access to individual/project-based funding at PhD level, international conference attendance, and even some mobility programmes. Students are also able to access some financial support at university by being employed as tutors, library assistants, laboratory assistants or research assistants. Another substantial and notable programme, particularly with a view towards improving academic capacity across the South African system, is the DHET's *New Generation of Academics* (nGap) programme. This is a three-year programme that aims to support early career academics and/or facilitate academic staff to gain doctoral level qualifications as the structure of the programme allows for reduced workload, doctoral/post-doctoral study, participation in developmental

³ These figures exclude data from UCT, as these were not provided at a programme level.

⁴ It is only the PhD in Economics at UCT that consists of a coursework requirement.

programmes, research study costs and international mobility⁵. Furthermore, the NRF funds a broad range of research activities (research travel and collaborative initiatives in the continent), as well as the SARChi Chairs, which channels funding towards developing or strengthening a specific area of research or theme of research alongside recognised national challenges or priorities.

However, across all cases, much of the responsibility to obtain funding towards a PhD level qualification, whether in the natural sciences or humanities, appear to still lie very strongly with the prospective student. This can be a potential stumbling block or barrier for collaborative PhDs. This is because international applicants might be less inserted in networks and less familiar to the available funding opportunities and projects through which to access such funding. For prospective students in the natural sciences, this might be especially challenging as we found registration into such PhD programmes to be much more dependent on the prospective candidate having secured their own funding. For example, the ACIDI (an ARUA CoE) at the UCT, does not always have its own funding available for PhD candidates. While they do advertise project-based funding or opportunities throughout the year, if potential candidates are not aware that they need to constantly check for these opportunities, this will not reach them.

A further challenge to accessing funds within the South African context is that most funding is directed towards full-time study. This was illustrated in both the UCT and UP cases. As shown, “UCT financial assistance is only available to full-time students [and there is] a limited number of scholarships available for international students” (UCT, 2022) with much not available on an all-inclusive ‘full-cost of study’ basis. However, certain faculties, schools or departments might have slightly different funding opportunities available to them, for example, as the brochure states, “the Graduate School of Business has funding opportunities available to postgraduate students” (UCT, 2022: 5).

In the case of the UKZN, it appears that efforts have been made to remove funding as a potential stumbling block to gaining access to PhD level training. But even in this case, it is full-time students that enjoy advantages. Here, students who are registered for a full-time PhD are eligible for fee remission. The fee remission period is 36 months (six semesters) for a doctoral

⁵ Government carries the full cost of the post for the first 3 years, with cost-sharing mechanisms between government and the appointing university from the fourth year of the programme. (<http://www.ssauf.dhet.gov.za/ngap.html>)

student. During the fee remission period, no tuition fees are payable by the student (UKZN, n.d). A continuation fee is payable by students if they do not complete their studies within the fee remission period. Aside from the fee remission, the doctoral students at the UKZN, tend to rely on funding through the NRF. Reliance on the NRF, in conjunction with funding from supervisors through grants, was also found to be the main modality for students to gain access to funding at Wits and Rhodes.

4.1.3 Timing, language competency, international student permits

Another important aspect is the timing throughout the year where access to a PhD programme in South Africa would be considered. The general rule is that, across all research-based PhD programmes, applications are considered throughout the year. However, there are some considerations given to the formal institutional deadlines, especially where these stipulate slightly earlier closing times for international applicants. The closing date for funding applications for international students is 31 July. However, this is more likely in the programmes that comprise a coursework element, which currently appears to be more the exception, than the rule, in most South African institutions. As shown for the UCT, the general rule is that “all research masters and PhD applications remain open throughout the year” (UCT, 2022: 5-6). Coursework postgraduate qualifications however, have an application submission deadline, with some variation across some departments and fields of study.

Furthermore, and especially with a view towards creating access for students from all over Africa, and even abroad, is that of English language proficiency. This is an important aspect that requires engagement as it is a stipulation for admission to most institutions. For example, the UCT indicates that as set out by the guidelines for postgraduate study, “English language proficiency is a requirement for study at UCT. All international students for whom English is not a first/home language or have not passed English at NSC Grade 12, AS-level, IGCSE, NSSC level or equivalent secondary school-leaving qualification from an English medium-of-instruction institution must provide proof of English language proficiency” (UCT, 2022). This is also the case for Rhodes, Wits and the UKZN, where international students would need to demonstrate that they are proficient in English to the required level for university study.

Finally, another consideration for international students is the fact that a study visa is a requirement for all. This is the case at the UCT, where it is stipulated that “the study visa [must be] valid for studies at the University of Cape Town” (UCT, 2022: 10) in addition to valid

medical aid cover from a South African medical aid scheme. A similar requirement exists at the UKZN, where international students must fulfil the international clearance requirements. They would need a study visa, and it is compulsory for them to obtain one of the UKZN recommended medical health cover⁶. At the UP, the situation is not uncommon, as this is linked to the national immigration policies where international students need study or research visas to facilitate their studies. While most students from the SADC countries can visit South Africa, and receive port of entry visas, the absence of a clear collaboration or internationalisation policy would be a constraint in facilitating short academic visits and stays as part of PhD programmes.

One advantage found at the UCT, is that a dedicated unit exists to facilitate all issues regarding international students. As alluded to before, the International Academic Programme Office (IAPO) facilitates the processing of all documentation as part of the pre-registration process, which is a prerequisite for registration in any chosen postgraduate programme at the university. As such, this would be an important structure to use with a view towards formalising collaborative efforts at the institution, as it supports, and is mandated to, facilitate international students and researchers. As stated, “the IAPO is the hub for all aspects that relate to ‘internationalisation’, which spans not only to that of international students but also collaborative efforts” (IAPO, 2022).

4.1.4 Supervisor selection

In addition to the more formal admission requirements, it is also important to understand the process of negotiating access to a suitable supervisor(s). In this regard, most cases highlighted the field of study as a potentially important consideration in the process of strengthening collaborative efforts. Across cases we found a comparatively more closed process for entry into natural sciences programmes as opposed to that found in most humanities programmes. For example, at the SU, the applications process in the humanities is more open, in that the proposed area/topic for the PhD is submitted by a prospective applicant, and then evaluated by the relevant programme coordinator. This then leads to a process of identification and alignment with a suitable supervisor⁷. In contrast, the model in the natural sciences is much

⁶ The accepted medical cover must be from CompCare and Momentum Health (UKZN, 2022).

⁷ It bears noting that the focus programme at US (PhD in Economics) arguably has a much more open applications process, which facilitates access and participation to external applicants from a wider locational footprint, owing to notable support through the African Economic Research Consortium (AERC) and a specific African Collaboration grant that is currently available at the institution.

more dependent on prior contact and engagement directly with an appropriate or potential supervisor, before application and proposal development.

While this process ensures higher success rates in the acceptance of a proposal/PhD project and alignment with appropriate supervisors alongside budget availability, from the perspective of a so-called ‘outsider’ or random application, the process is much more closed. As indicated:

“applications, where there has been no prior contact between potential supervisors and prospective students are invariably unsuccessful, principally because no thought has been given to the project’s running expenses and to bursary support for the candidate. Experience of not being able to match project and project design with the candidate’s capabilities has tended to result in very low probabilities of a candidate being accepted on a so-called random application” (Respondent: US case).

This insight was similarly confirmed in the UP case. The focus natural sciences programme at this institution demands a more rigorous, staggered approach for the application process which includes psychometric testing, completing a writing task, and doing an interview with a panel. It is important to reflect on the extent to which this practice or additional ‘hurdles’ (pre-candidacy or title registration) are becoming accepted within the South African context. While this process is viewed as important for eliminating some candidates based on merit, it also seeks to align the interest of the potential candidates to that of the department and the supervisor to be. It enables the department to ensure that students enrolled will have the right support they need, as opposed to cases, where some PhD students upon registration, struggle to get the right supervisor to adequately support them. As indicated by the department, “this is an excellent opportunity for the staff and prospective students to meet and discuss potential collaboration” even before the student has enrolled (Respondent: UP case). The prospective student already has an idea of different research programmes or teams, the expectations, and possible support available to them. This initial alignment effort appears to prepare students better for the programmes in comparison to where there is minimal contact between the student and the department. In some instances, where the candidate deals only with a prospective supervisor, significant frustrations could arise if there is a breakdown in the relationship. Finally, most institutions have as a prerequisite for full registration, the acceptance of a PhD proposal, within six to 12 months of registration.

Many would argue that the secret of success at PhD level lies in who is recruited into the PhD programme. As Louw and Miller (2014:9) note, the life cycle of graduate education begins

with recruitment and admissions. Additionally, Golde (2005) states that the lack of academic integration is key to PhD attrition. Our analysis suggests that, while the more structured process for selection into PhD programmes in the natural sciences are advantageous to successful application, acceptance, retention and throughput; it is a potential limit to collaborative efforts in that it tends to favour internal candidates within the member institutions, and within South Africa. Comparatively, humanities programmes appear to have more open processes in terms of access to PhD programmes that would lend itself more readily to successful applications from students outside of South Africa.

4.2 Structure of the typical South African doctoral programme

Typically, the doctoral study process in South Africa entails writing a pre-proposal; writing a substantial proposal after having been admitted; getting approval of the proposal and clearance for research ethics; collecting and analysing data; participating in and presenting at seminars and workshops (departmental and institutional), as well as conference attendance beyond the registered university; writing the thesis; and the examination of the thesis (Mouton, 2011 in Daniel-Oghenetega, 2020). In this section of analysis, our report focuses, in terms of structure of the programmes, on three aspects: the course model, the supervisory model, and the completion requirements.

4.2.1 Supervisory models

Three types of supervision models can be identified, according to McCallin and Nayar (2012): the traditional, group supervision, and the mixed model. The latter would be a combination of the first two models, with the addition of new possibilities for the modalities based on technology. The traditional model involves a committed and intimate relationship between the supervisor and the student but there could be a co-supervisor; and the group model involves a supervisor and a group of students where there exists a close relationship between the supervisor and the students and between the students as well. Some scholars consider the group supervision model as a cohort model (CM) and view it as an alternative model to the apprenticeship-master model (AMM)” (Daniel-Oghenetega, 2020: 23).

Across the cases in this study, the predominant model of supervision was found to be the traditional ‘apprenticeship’, where there is one student to one supervisor. This was found to be the case at UKZN, Wits, UCT, UP and SU. Rhodes and SU (in the economics programme) are

starting to incorporate elements of a so-called cohort model of supervision. Thus, the traditional one-on-one model appears to still be the main supervisory model used. Since the typical structure for a doctorate is by research for these universities (rather than the 'taught doctorate' model, popular in North America), this, by default, seems to direct the model to the one-on-one structure (Obamba, 2017). This is especially the case of the research-based degree (tending to be Doctor of Philosophy), which is under the guidance of a supervisor for the minimum of two years. Considering that humanities' programmes tend to lean more towards the doctorate by full research thesis only, it is not surprising that there seems to be a tendency towards the apprenticeship model predominating in these programmes as opposed to the natural sciences. Co-supervision also seems to be a growing practice across faculties and institutions, and might soon become the dominant form of supervision. The well acknowledged limited capacity in the system for doctoral supervision could be driving this noticeable trend. In the focus cases, we did not find evidence of the group supervision model.

In terms of the length of study, it appears quite standard that the minimum required period of registration of a doctoral level qualification in the South African context is three years, with extreme cases in which the qualification can be completed in a minimum of two years. As illustrated in the case of the UCT, the general rules of the institution stipulate that candidates must be registered for at least two consecutive years, although registration for a year at another university may be accepted as part of that period. No maximum period is prescribed for completing a thesis, but the university stipulates a "reasonable time", which is generally taken to be five years. If a candidate is not making satisfactory progress, a faculty's Higher Degrees Committee may issue a warning, and, if necessary, refuse re-registration. While the minimum time for completion of a doctoral programme in the full-time mode is considered to be three years, the actual completion times tend to range from between five to seven years (Cloete et al., 2015).

On the other hand, while most universities and faculties do not state a maximum time, this was found to be the case at SU for the focus natural sciences programme, where four years was stipulated as the maximum, requiring re-application for the continuation of studies. This was also the case in the natural sciences focus programme at Rhodes, which stipulated a maximum of six years. Again, the overall analysis suggests that stricter rules apply to the maximum number of years permitted in the natural sciences programmes, as opposed to PhD study in a humanities programme.

Relatedly, it also appears to be a growing formal requirement, a memorandum of understanding (MoU) is signed between the student, supervisor and co-supervisor (if applicable), which clarifies student and supervisor/s expectations/timetable/schedule for completion, etc. In the case of natural sciences programmes, this often includes provisions around intellectual property (IP) management and ownership. This trend towards formalised MoUs or contracts between supervisors and students is positive, as it has been established that the lack of mutual understanding between the student and supervisor could lead to supervisees' dissatisfaction, drop out or lack of adequate mentorship (Saleem and Mehmood, 2018). In a more recent study, Le et al. (2021) add that “the uncertain relationship, the dissatisfied relationship and the admonishing relationship negatively influence PhD students' satisfaction with their supervisors' supervisory styles” and compromises their learning and development process.

4.2.2 Components of the programme

Across the cases and fields of study we found a mixture of modes of the pursuit of the PhD, by full thesis/monograph and by journal publication, or the so-called hybrid model, but with the full thesis model being dominant. The focus programme in the natural sciences at the UCT is an example of a pure research-based PhD, governed by the policies and procedures of the university. This PhD is hosted in an institute, which is also an ARUA CoE. This provides both opportunities and disadvantages. A primary concern is that PhDs hosted in an institute are primarily funded by research projects and faculty support. Therefore, sustainability over the long term, will require a suite of strategies which encompass funding streams from the host faculty, the university, and a variety of external sources, especially with a view towards collaborative PhD programmes. On the positive side, as an ARUA CoE, it is collaborative in nature, and can draw on a range of networks and alliances along a specific theme of study.

The cases of the UP and the UCT however illustrate, that even the inclusion of a coursework component appears to be a growing trend in the South African context. At the UP, one of the focus programmes has a more traditional PhD structure of no coursework with the thesis carrying all the credits, while the other programme has a compulsory coursework component with a duration of one year, which provides students exposure to a wide range of knowledge within the field. As part of the coursework programme, students get to interact with both national and international scholars, expanding their social and academic network serving to enhance their academic or professional life after completion of the PhD programme. In the

humanities programme, there are about six compulsory cohort seminars including quantitative research tools (SPSS), qualitative research tools (Atlas.ti), philosophy of science, micro theories, macro theories, and proposal design and defence. These courses support the preparation of students for the dissertation part of the programme compared with those who do not have access to these. There are other optional courses or seminars which students are encouraged to attend based on their research interest. While there are no compulsory courses or seminars in the focus natural sciences programme, it should be mentioned that in the university most students traditionally follow a cohort model where they work with a supervisor along a specific research project in the laboratory. A general observation from most of the Vice-Chancellors interviewed suggest the need for all doctoral programmes within South Africa, and the African continent, to have some coursework components:

“I think, in future, for us in Africa is to have a hybrid model, to introduce some coursework elements into the PhD. Not necessarily for grades, not for qualification, but to enhance students' capacity to be able to complete a PhD” (VC 2).

At the UCT we found the structure of the focus programme in the humanities also departs from the research only based PhD in that it has a structured course-based component. While this Doctor of Philosophy specialising in economics (with coursework) is offered in collaboration with other universities in sub-Saharan Africa, and supported by the AERC through donor funding, it is necessary to consider that it could present a structure that allows less mobility between institutions. The advantages of the structure of the programme is that it is collaborative in nature, ensuring exposure to African applications, but especially as the course aspect is not recognised in the awarding of the degree, one needs to consider how it would facilitate mobility across countries and member universities. As the coursework component is not awarded any credit, moving to another institution would probably lead to no recognition of this knowledge gained. The programme is that of a four-year full-time course, of which two years are for pre-requisite courses with the final two years devoted to writing a thesis. The requirement that the student must submit a topic and sign an MoU with a supervisor by the end of February of the year following the completion of the pre-requisite course, is also an aspect that needs to be considered towards collaboration.

While we have dealt with issues of supervision and course design separately, these two aspects overlap considerably and are key considerations when seeking to find collaborative ways in which to produce PhD graduates. Traditional approaches to postgraduate supervision tend to

be characterised by isolated, intense and sometimes, intimate personal relationships (the apprenticeship model referred to earlier). It often sets up a dependency relationship between the supervisor and student, and potentially abusive and unequal power relationships (De Lange, Pillay and Chikoko, 2011). This has caused many to assert that doctoral programmes based on a cohort model is one approach of supervision which may serve to ‘dilute’ the supervisory relationship, and yet complement the supervision process (De Lange et al., 2011). With a view towards facilitating collaboration and, bearing in mind the relatively small pool of available supervisors in the South African context, it is possible that the cohort model⁸ could be advantageous for collaborative PhD programmes.

4.2.3 The completion requirements

For completion of the traditional thesis model, a study is considered completed after a pass mark is received from the three external examiners, two of whom are external, with a minimum of one being an international examiner. For the paper or hybrid model, the completion of the studies is based on the completion of two or three publishable papers accepted by the supervisor and the higher degree committee, which sometimes require that the articles are submitted to a DHET accredited journal. At the UKZN for example, the focus programme in the humanities stipulates that three papers are required, in which the student must be the first author in two. At SU, across fields of study, the requirement for passing is three papers of publishable quality in the focus programme in the humanities, while in the focus natural sciences programme, the requirement is only for two papers – these must be published or submitted, and in review (one in a ISI) listed journal, and one in a local journal). There is no policy demanding an oral exam. However, some universities have opted to introduce the viva in some departments or programmes.

4.3 Student experience

The third dimension of the analysis presents how PhD students within ARUA universities experience the doctoral programme. Three main themes were considered along the research objectives. Firstly, the quality of the academic and supervisory staff; secondly, the nature of

⁸ A cohort model was set up as a ‘structure’ to support intellectual development and knowledge production in doctoral research, through a community of learning. The intention is to provide a safe and critical space for learning to work together to bring about this change.

institutional infrastructure and support to the programme's doctoral students; and thirdly, collaborative initiatives available for students within the selected PhD programmes analysed.

4.3.1 Quality of staff

The success of doctoral students depends heavily on the quantity and quality of the supervision and staff support they can get during their programme. In addition to the responsibilities around teaching and learning and research, academic staff must provide supervision to doctoral students. Consequently, the quantity of appropriately qualified and experienced academic staff is a critical consideration for the collaborative capacity of institutions towards producing quality PhDs.

While we acknowledge that obtaining a doctoral qualification does not automatically enable one to become a good supervisor (Frick, McKenna, and Muthama, 2017; Manathunga 2005; Manatunga and Goozee, 2007), it is an important yardstick of the ability of academic staff to successfully supervise a dissertation at that level. As duly acknowledged in the NDP (NPC, 2012), having staff with doctorates is a prerequisite for the acceleration of knowledge and research outputs, and for the improvement of the qualification levels of academic staff at universities.

Across the focus programmes we found high proportions of academic staff having doctoral degrees. In both the selected humanities and natural sciences programmes at the UCT, the capacity to supervise PhD candidates appears extensive. The UCT draws on external networks, for the former and the latter, from a network of available supervisors across departments and institutions. As noted for the ACIDI "in addition to the permanent staff the extensive network of associates provides for an extensive range of offerings of areas for research in relation to climate change". The School of Economics at the UCT has approximately 40 academic staff, of which 80% (33) are engaged in PhD supervision. This has enabled an enrolment rate of, on average, 77 students, and graduation of on average 10 students per year, over the last five years. The Plant Sciences Department at SU has approximately 10 staff available for PhD supervision, of which all have PhD qualification, and 30% are at professorial level. In this regard, the enrolment ratios are much smaller, at 16 students per annum, and about three graduates per annum. Comparatively, the capacity for supervision in the economics department at SU is larger, with just under 80% (32 of 41) of academic staff being available for supervision. This

enabled an enrolment rate of roughly 35 students per annum, and about seven graduates per annum. About 43% of staff are at professorial level.

At Wits School of Psychology, approximately 31 academic staff have PhDs and are engaged with supervision. In addition, the department has seven academic staff who are professors. On average, this has enabled an enrolment of 61 students each year, and graduation of five students per year over the last five years. The Palaeontology department at Wits has 11 staff available for PhD supervision, all of whom have their PhD's and 50% are at professor level. Their average enrolment numbers are 30 students, with a graduation rate of 14 students over the last five years.

The UKZN School of Development Studies has 22 academic staff with PhDs, and who are available for PhD supervision. Of the 22 staff members, eight are professors. The department has had 111 students over the past five years with a graduation rate of 31. Within the School of Physics at the university, there is an average enrolment of 96 students each year, and a graduation rate of 28 students per year over the last five years. The physics department has 20 academic staff available for PhD supervision and an additional three at professorial level.

The Rhodes' School of Environmental and Sustainability Education department has 16 academic staff with PhDs, with six being at the level of professor. The department has had an average enrolment of 97 students each year, and an average graduation of 12 students per year over the last five years. At the UP, across the selected natural sciences and humanities programmes, all staff have PhDs - though a higher proportion of staff in the natural sciences (50%) were at professorial level than what was found in the humanities (40%). Generally, the UP has the highest proportion of staff with PhD qualifications (70%) which provides a good base for quality and quantity PhD supervision.

The long-acknowledged issue in the South African context is a combination of both scale (relatively smaller amounts of academic staff with PhD level qualifications), and concerns around the quality of staff (assertions that some are ill prepared or less supported for supervision from a pedagogical standpoint and often must rely on the example set by their own supervisors). It is therefore not surprising that – at the systemic level – concerns are expressed about the available pool of doctoral supervisors in the country. Given the relatively low doctoral production across the continent (UNESCO, 2015), there seems to be a need for capacity building, not only through doctoral education itself, but also through building the

capacity of supervisors. Several initiatives to develop PhD supervision capacity have been observed. Professor Jan Botha of Stellenbosch's University Centre for Research on Evaluation, Science and Technology has been leading this initiative across the continent through the DIES/CREST Course for doctoral supervisors at African Universities. More focused training for ARUA member universities could be explored.

4.3.2 Institutional infrastructure and support

Most of the South African ARUA member universities boast excellent institutional infrastructure for hosting and supporting doctoral programmes. In the SU, in addition to having a main university library, it is supported by five further branch libraries, alongside extensive collections of e-books and sources. What was noteworthy in this case was in addition to the general ICTT, library and research service support to PhD level candidates, the natural sciences programme has a dedicated office space/lab for PhD students, with individual working spaces and desks, as well as full internet and library access. Computers and other hard- and software are typically provided by the respective supervisors from their research grants (this would also be of relevance to the earlier discussion in section 4.1.2 where funding in relation to various aspects of the doctoral programme, is discussed).

The Central Analytical Facilities (CAF)⁹ at SU is in a unique position nationally to provide high-quality, hands-on training on the use and functioning of a range of high-end analytical equipment, not readily available at all universities in South Africa. Within the focus natural sciences programme at SU, supervisors are obliged to raise the funding of the study. This includes a student bursary, running/analytical/field costs, travel and conference attendance. Depending on the project and nature of funding, bursary amounts may vary greatly between candidates; between R 150 000 to R 300 000 per year (2021).

Other forms of support at SU include statistical consultation and additional general doctoral level skills development support through its African Doctoral Academy (ADA), and the postgraduate skills development programme in the postgraduate office (this would also be of

⁹ The Central Analytical Facilities (CAF) aims to ensure optimal utilisation of expensive multi-user research equipment in the service of the research community of Stellenbosch University, and the South African research and development sector in general. It consists of operational units built around logical clusters of equipment and managed by a staff scientist, who provides advice to potential users on relevant analytical and sample preparation techniques, performs analyses for clients, trains users to perform their own analyses and ensures good maintenance, calibration and performance of the equipment.

relevance to the earlier discussion in section 4.2.2 where the course components are mentioned). Furthermore, it also offers multiple institutional solutions, storing and sharing of research information, and every doctoral student has access to five terabytes (5TB) of cloud storage, as well as access to high-performance computing centres and ethics review support.

Similarly, the UP provides excellent institutional infrastructure such as up-to-date laboratories, libraries with access to online journals, resource centres and opportunities for students to attend international conferences. While this level of support is available to PhD level students regardless of field of study, there are also some departments and programmes that also provide more specialised resources for the students. For the natural sciences programme, the department offers a complex combination of specialised laboratories and related programmes aimed at facilitating the research and study process.

The UKZN provides cutting-edge institutional infrastructure, which to a large extent is a product of the collaboration and industry related partnerships in the School of Physics. They have access to up-to-date laboratories and research equipment, plus access to PhD rooms for isolated reading and thesis writing.

4.3.3 Emerging collaborative initiatives

South African universities form part of many collaboration initiatives with a wide number of universities and international institutions. While most of these initiatives have been with institutions in the global North, there are emerging opportunities for collaboration with other African countries. For example, the EU-Africa academic cooperation is one of the initiatives with the aim of enhancing academic cooperation and mobility of students, researchers and academic staff. One of the PhD programmes at the UP has already reported participating in the Erasmus Mundus. According to the UP, the European Commission-funded Intra-ACP Mobility Scheme provides PhD students the opportunity to travel to another African country to do a PhD. They were fully funded for travel, subsistence, accommodation, and registration fees for PhD degree (this is also of relevance to section 4.1.2 where different opportunities for funding for the doctoral programme is considered). An added advantage of this scheme is that students receive some funds for research expenditure during the PhD. The positives are:

- Prospective supervisors are incentivised to host the student if they have running costs.
- The research funds give the PhD student added control and pride in their PhD research.

In addition to the national level policy, important examples of this recognition are expressed in institutional policy at SU and the UCT. These frame collaborative efforts towards the production of postgraduate degrees. SU has a policy that governs joint and double degrees, specifically at master's and doctoral levels with foreign universities (US, 2013), while the UCT has a policy on co-badged qualifications and joint or jointly awarded qualifications (joint degrees) (UCT, 2015). The SU policy indicates the structure and conditions associated with the offering of these degrees, and stipulates importantly, that the outcome is a single qualification in both cases.

At Wits, there is evidence of several international networks and platforms that their students can benefit from. For instance in South Africa, CUBES is part of a loose new network of academic urban research centres which includes the Urban Futures Centre at the Durban University of Technology (DUT), the South African Research Chair in Spatial Analysis and City Planning, the Wits City Institute (WiCI), the African Centre for Cities (ACC) at the UCT, and the Chair for Education in Human Settlements Development and Management at the Nelson Mandela University (NMU). The partnership between CUBES and the Department of Urban Studies and Planning at the University of Sheffield has included various research and education partnerships, as well as the co-supervision of PhD students. Joint initiatives include a research focus on state-funded, low-income housing developments, and in 2014, the two organisations co-hosted a side event at the World Urban Forum in Medellin, Colombia.

On the other hand, SU, has various collaborative efforts to produce PhDs with African and international universities, and important institutional structures to mobilise towards collaboration (such as the Graduate School of Business (GSB) and the ADA). The African collaboration grant and co-supervision arrangements between universities, arrangements where PhD's are part of research projects, or staff exchange are all elements that can facilitate the collaborative production of PhDs. The SARChi Chairs were also found to be important structural elements that draw funding for PhDs in certain fields, and also facilitate collaboration. In the natural sciences, however, it does appear that collaboration is strongly driven by the nature of PhD production, through projects funded through the supervisor or even national funding agencies. In the humanities, while there is a strong project structure underpinning the production of PhDs, there appears to be much more of a reliance on institutional infrastructures, national and international collaborative projects, and funding from

specific grants (i. e. the Africa Collaboration Grant¹⁰). In addition, the Africa Collaboration Grant (ACG) supports SU postdoctoral fellows to nurture partnerships with institutions in other African countries and provides support to postgraduate students to attend conferences throughout Africa.

5. Emerging insights from university senior management

In addition to the elements gathered through the research instrument, greater insight was sought through interviews with Vice-Chancellors to provide a broad overview of collaboration within their universities and the South African higher education system (five out of the six Vice-Chancellors participated).

5.1 Positive disposition from South African universities

Based on these interviews there is evidence of a strong disposition towards collaboration and internationalisation globally, and within the continent. One of the Vice-Chancellor's argues that:

“internationalisation is important in that it enhances the educational experience of students and staff with people coming from Africa and other parts of the world” (Vice-Chancellor One).

There is undoubtedly a recognition in South Africa of the importance of growing doctoral production for the development of universities, and the country more broadly, and the role that collaboration plays in this regard (Mouton et al., 2015). Evidence from the recently drafted policy on internationalisation shows that from a national level, government is placing enhanced emphasis on collaboration between South African universities and those from the region, the continent and globally. At the institutional level, one of the institutional leaders indicated that they have developed a minimum target of international students to be included in their postgraduate programmes.

Notwithstanding the positive sentiments, there was some caution from some of the Vice-Chancellors that collaboration should, and must be, meaningful and not just symbolic. In this regard the assertion was that:

¹⁰ The Centre for Collaboration in Africa (CCA) at Stellenbosch University International offers this grant to staff to host and visit partners in other African countries, support emerging scholars and contribute towards workshops.

“meaningful collaboration demands parity of interest, mutuality in research interest and complementarity in collaboration” (Vice-Chancellor Two).

For example, universities should identify areas of mutual research interest through which they can collaborate through their doctoral students. Additionally, universities at similar levels of advancement (laboratory resources, ICT connectivity, supervisory capabilities, amongst others) in a particular field or research area, should collaborate to ensure sustainability of the collaboration after students have returned to their home universities. It is importantly recognised that:

“while symbolic gestures may be important, symbolic collaboration just for the sake of perceptions would compromise the sustainability of such an endeavour and the potential benefits for the students and staff” (Vice-Chancellors Three).

5.2 Ambiguous policy environment for internationalisation and collaboration

The interviews with the Vice-Chancellors also recognised that at a policy level, there is need for more, and better policy development regarding collaboration between South African universities and foreign universities. Universities South Africa¹¹ (USAf), the body representing South African universities, had noted, inter alia, that the NDP lacks a vision for higher education in the region and the continent (HESA, 2012). USAf pointed to a lack of emphasis on the cross-national, or collaboration objectives, of the higher education system within the SADC region and the broader continent. This sentiment was shared by most of the Vice-Chancellors interviewed with one of the Vice-Chancellor suggesting that:

“government policies at national level seem to militate against joint programmes between South African universities and those from the continent and even global” (Vice-Chancellor Two).

The absence of a clear national policy environment has played out differently at institutional levels. This has led to collaboration being largely characterised by bi-lateral relationships through individual universities, departments or centres, and even more so across individual academics. As noted by Vice-Chancellors three:

¹¹ Previously known as Higher Education South Africa (HESA)

“this form of collaboration lacks the strategic dimensions to mitigate power imbalances, ensure sustainability of the collaboration and promote integration”.

A possible example, as observed with the UCT policy for joint degrees, was enacted within a national policy vacuum for internationalisation. The policy reflects on the ambiguous nature of the term “course”, which needs to be clarified, as it has effectively led institutions to prefer or opt for, co-badged joint offerings. “Co-badged joint offering appear to present no problem in this regard, but joint degrees and double degrees require a university to qualify this statement” (UCT, 2015:3). Their interpretation is that the HEQSF does not provide for double degrees.

While the UCT policy recognises three forms of awards (co-badged¹², joint¹³ and double¹⁴), similar to the SU policy stance, they align themselves towards co-badged and joint awards, and not the awarding of double degrees. The policy further states that joint awards “which was popular for a time in Western Europe, is now less frequently encountered and has fallen out of favour” (UCT, 2015: 1). It recognises joint offerings as a strategy that is increasingly seen as a vehicle for internationalisation or enhancing the student experience. In the instance of all these permutations, it is important to note that a formal collaboration agreement remains a prerequisite for these type of qualification awards. This is a possible entry point for facilitation from ARUA.

5.3 The introduction of hybrid models of doctoral programmes

There is a strong support among senior management for the consideration of hybrid models of the doctoral programme towards building a PhD community that is adequately supported and strengthened. This can be done through the introduction of various non-credit bearing courses such as, methodology courses, theoretical grounding block programmes and research ethics (this is also of reference to section 4.2.2 where the course components are discussed). While the DHET largely recommends the PhD by dissertation, research has shown that the hybrid model of course work and dissertation largely attributed to the United States of America’s education system, might be better at exposing the students to diverse knowledge and skills that

¹² Programmes which lead to an award by one institution which recognises the contribution of one or more partner institutions by co-badging.

¹³ Programmes leading to the joint award of a single qualification by more than one institution.

¹⁴ Programmes that lead to the award of a qualification by each of the participating institutions. These forms of programmes have recently been required to be phased out and new registrations are prohibited by the South African Minister of Higher Education, Science and Technology.

they will need for the dissertation phase (Louw and Muller, 2014). However, it has also been recognised that no PhD structure or supervisory model can be described as best, as each model has its strengths and weaknesses (UNESCO, 2015).

Three of the five Vice-Chancellors interviewed support this position as they argued for more coursework to be introduced into the South African PhD programme. One of them suggested that the course work could form part of the collaboration across a few universities, and can be carried via face-to-face, or through the use of ICT technologies developed and utilised during the COVID-19 pandemic. The use of ICTs could also mitigate the challenges of visa applications and travel logistics which sometimes could constraint collaboration. Such coursework components, as part of the PhD process, could also expose some supervisors and academics to other potential collaborative work being done at other universities.

5.4 Addressing power imbalances in collaborative research

Collaboration across the continent and globally has always been characterised by power imbalances between more affluent partners and less affluent ones (Fongwa, 2016). Addressing power imbalances in collaborative research is a salient issue that needs to be considered when embarking on collaborative doctoral programmes. It is important that institutions who enter collaborative relationships possess complementary capabilities and resources through which they can maximise the use of their own capabilities. Our discussion with Vice-Chancellors highlight that capabilities and resources determine power positions. As an example, one of the Vice-Chancellors alluded to the imbalances that occur in working relationships between researchers from the global South and North, where researchers from the global South are subjugated to a subordinate status, despite contributing equally critical, and high-quality, research insights. Another Vice-Chancellor also highlighted the importance of recognising various types of resources in developing collaborative programmes at institutional levels.

6. Recommendations for collaborative PhD programmes

To enhance collaboration across doctoral programmes within ARUA member universities, a number of recommendations are proposed from the South African perspective.

6.1 Review of the policy environment

For South African universities to effectively adopt a sustainable internationalisation policy for collaboration, there is need for legislative clarity from the DHET, alongside clarification of implications across the HEQSF. While the department currently provides guidelines for internationalisation initiatives such as joint degrees, and co-badged degrees, there is a need for an overarching policy framing to support collaboration, especially at the doctoral training level. Such a policy would have to clarify several policies including the output subsidy formula for PhD completion, which could serve as a limitation to joint degrees where academics or institutions remain uncertain on the state of the full recognition regarding the subsidies for outputs. Other issues, which a national internationalisation policy will address include, admission criteria, durations of exchanges, and the nature of visas required for such exchanges. At the institutional level, universities which have not yet developed clearly articulated internationalisation policies, will have to provide such clarity to clearly position themselves. These are needed to guide current bi-lateral collaborations which need to be mainstreamed to ensure more support, efficiency and sustainability.

The policy review must also consider other ‘supporting’ policy that would need adjustment to best facilitate the objectives of collaboration and internationalisation. This would require, in the South African context, close consideration of how to maximise synergies with the nGAP programme, the NRF, directives on work-integrated learning, the credit bearing components of a programme, and examination requirements, amongst others.

6.2 Develop supervisory capacity across ARUA universities

It is common knowledge that ARUA universities, even in South Africa, are at different levels when considering supervisory capacity. While the UP has above 70% academic staff with doctoral degrees, other universities have less than 50%. This figure is even lower for other African universities, some of which also have large student components with extensive undergraduate teaching responsibilities. Even among the staff with doctoral degrees there is a need for better training in supervisory capacity. Producing the quality and desired number of doctoral graduates in South Africa, as established by the NDP, demands a significant increase in the capacity and number of potential supervisors. Developing greater levels of supervisor training and development programmes, capacity building, and exposure, will surely enhance collaborative capacity. More South African academics will benefit from different approaches

to doctoral training, methodologies and theorisation. In addition, different models, such as cohort supervision mentioned earlier, could also contribute to broadening available supervision capacity.

6.3 Introduce coursework for wider skills development

A strong recommendation from both the literature and university managers interviewed suggest that the coursework or hybrid model of doctoral training could be beneficial to collaborative efforts. Through coursework, there could be stronger potential for collaboration compared to PhDs without coursework. Identifying suitable and meaningful programmes within CoEs, where coursework can be done in a rotational approach, would enhance collaboration. Furthermore, the coursework, as part of the PhD programme, has been argued to enhance the quality of the doctoral programme as students are exposed to a host of research methodologies, theories, and supervisory approaches which they will not necessarily attain from the full thesis approach. However, the non-credit bearing nature of coursework within the academic doctorate will need close engagement as there might be negative implications for mobility across institutions.

6.4 Support and expand the ARUA CoEs for effective collaboration

Strengthening collaboration across ARUA universities could be rapidly facilitated through the existing CoEs. However, during the collection of institutional data from the selected programmes, it was observed that some of the ARUA CoEs are not functioning at the intended capacity. University Vice-Chancellors also indicated that the support, and even expansion of the CoEs, will be a more sustained vehicle for collaboration across the member universities. A combination of institutional support, ARUA support, and African Union (AU) support of the CoEs' initiative would promote the establishment of sustained collaboration. One of the Vice-Chancellors suggested a five-year review of the current CoEs to assess their effectiveness and expand the initiative along existing institutional strengths, and prospects for collaboration.

7. Conclusion

At a national level, the case studies within the South African context highlights the a robust higher education system disposition towards collaboration. However, it also highlights that this needs to be further strengthened by a systematic review of relevant policy synergies that can facilitate misalignments that hamper the implementation of collaborative doctoral programmes.

Collaboration across, and within the continent, is characterised by power imbalances, and addressing these at the onset, would be important for the success of such programmes. In both these respects (policy and power related), ARUA can play a facilitative role to address these across their member universities.

At institutional level, it emerged that there is strong support for the hybrid model of coursework and dissertation as a strategy towards building a doctoral community, and improving student experience and development. Key entry points for ARUA intervention have been recognised as the CoEs (where they are operating) and the NRF's SARChi Chairs.

At the programme level, the South African cases reinforce the importance of nuanced approaches to collaboration as distinct differences across the doctoral lifecycle became apparent through the investigation. For example, the doctoral programmes in the natural sciences tend to have stricter entry and completion requirements that are largely driven by the project funding nature of doctoral training, whereas the humanities programmes tend to have more open processes for admission, but with a higher burden on the student to fund their studies. Additionally, at programme level, the consideration of engaging in a larger repertoire of doctoral supervision models (for instance, the team supervision model is not very widely adopted) could be an alternative method to address limited supervision capacity across institutions and programmes.

The insights at national, institutional and programme level offer important starting points for ARUA intervention across these different aspects.

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Appendix A:

Name of Country	South Africa
National Population	59.5mil
GDP per capita	USD 5,655
Human development index	
Unemployment rate	33.6
Main economic sectors	Mining, service, manufacturing, finance, transport
Gross primary enrolment ratio	98.5%
Gross secondary enrolment ratio	76%
Gross tertiary enrolment ratio	24%
Number of public universities	26
Number of private universities	None
Name of participating university	6 universities (UCT, UP, UKZN, SU, Wits, and Rhodes)
Total number of doctoral enrolments (latest data)	23,588
Number of doctoral graduates (latest statistics)	3553 (2020)
Education expenditure as % of GDP.	6.2
Higher education expenditure as % of GDP	0.9
GERD as % of GDP	0.83
Doctoral production per million of population.	28 graduates / million

