

Higher education and work

Setting a new research agenda

Charlton Koen



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Contents

Preface iv

In Memoriam – Charlton Koen (1964–2005) v

Tribute to a Friend, Confidant, Mentor and Colleague – Charlton Koen (1964–2005) vi

Acronyms ix

Paper One

An Analysis of Research on Graduate Employment in South Africa 1

Paper Two

Challenges Facing the Education, Training and Employment of South Africa's Scientific Labour Force 31

Charlton Koen: Contribution to South African Higher Education Studies 45

Farewell My Friend 50

Preface

The Human Sciences Research Council (HSRC) has established an occasional paper series. The occasional papers are designed to be quick, convenient vehicles for making timely contributions to debates or for disseminating interim research findings, or they may be finished, publication-ready works. Authors invite comments and suggestions from readers.

In Memoriam – Charlton Koen (1964–2005)

The Education, Science and Science Skills Development Research Programme at the HSRC offers this publication in tribute to the scholarly contribution of our late colleague, Charlton Koen. His pioneering research on student throughput and retention, and on graduate labour markets, serves as an important benchmark for understanding a set of higher education issues that are of increasing importance nationally. The two papers included here provide an indication of the range and depth of his work on postgraduate education in particular.

The first paper was completed shortly before his untimely death. It reviews the current state of research on graduate employment and unemployment, demonstrating that there is typically a convergence around a narrow set of institutional concerns and methodologies. The paper attempts to set a new research agenda to determine the impact of postgraduate education on the labour market, through national longitudinal and cohort studies over an extended period.

The second paper was prepared in June 2005 for the ‘Human Resources for Knowledge Production in South Africa’ conference, hosted in Cape Town jointly by the Department of Science and Technology and the Department of Education. It provides an overview of current levels of master’s and doctoral graduates and the quality of the academic workforce. On this basis, it identifies challenges facing the future reproduction of the South African scientific workforce. Dr Adi Paterson lauded his contribution in the following words: ‘It contained insight and analytical reach as well as tightness and clarity – a rare combination.’

We mourn the passing of a great young talent, who was very close to completing his PhD and from whom further work of substance was expected.

Andre Kraak

Executive Director

Education, Science and Skills Development Research Programme

Tribute to a Friend, Confidant, Mentor and Colleague – Charlton Koen (1964–2005)

Mahlubi Mabizela

Gabriel Mlungisi Cele

Perhaps this tribute represents the views of many who have worked with and befriended Charlton.

When the sad news of the untimely death of Charlton was delivered to one of our common friends, she exclaimed, “Oh! What a loss of a genius!” Indeed, Charlton was a genius.

When death struck so suddenly, as it did with Charlton, we run out of things to say. We turn to the written word searching for answers, but answers never come.

We are left asking questions, though: Why did it have to be you, Charlton? Why now? Could we have done something to prolong your company with us? We ask these questions knowing very well that we will never find answers. But, we ask them anyway, because we seek comfort.

Today we mourn the passing of a doyen, a down-to-earth genius, and a young intellectual who would have made South Africa a better place. It would not be an exaggeration to assume that all our higher education institutions, in one way or the other, have heard of or have had direct or even indirect dealings with Charlton Koen. In his short life, Charlton managed to touch the lives of many through his work, especially those at institutions of higher learning. He taught and mentored many students who are now successful in their own right.

Charlton had an eye for research on issues that really matter. He worked on issues affecting employability of graduates; student retention by institutions of higher learning; skills development and matters relating to human resources development. He also concerned himself with many other divergent issues, and was apparently involved in research on water – as we only learned upon his death.

Death has indeed robbed us of a great young talent.

We began our friendship in 1999 while we were at the Education Policy Unit (EPU) at UWC, together with Paul Lundall, Tania Opel, Colleen Howell and Carlene Davids. We were more than just colleagues. We had serious discussions of our individual work, but also shared jokes and laughter, even our life experiences, and indeed Charlton was always happy in this company.

One would often find him with tousled hair, wearing a T-shirt, jeans and training shoes, a leather bag hanging over one shoulder – that is the picture he leaves us with.

In the mornings he would walk into our offices and greet by giving a soft whistle, which sometimes would be hard to hear. A newly appointed colleague joined us in sharing an office space at the EPU. Charlton's penetrating green eyes behind his slightly dark glasses intimidated her, and she found it even worse when he peered at her over his glasses that were perched on the tip of his nose. She thought him cold, arrogant and unfriendly, and complained that he did not greet her in the mornings; that she consequently felt unwelcome. However Charlton, as we knew him, was none of those things. Yes, he probably appeared so, especially at a first encounter, but as one spent time with him, one would realise how warm and friendly he actually was. His laughter came from the heart and was never as soft as his morning greetings.

Within no time, Charlton had befriended the very colleague who thought he was cold. He went on to mentor her in her master's thesis without having been asked to do so. At the same time he had many other students whom he supported, including us. Charlton was always ready to support young and inexperienced researchers. He would make things sound so simple that one would look forward to performing a task that had initially seemed to be insurmountable – such was his skill and talent. He sacrificed his time to serve others, because he was driven by a desire to see others succeed. His abundance of knowledge and vast memory were for everyone to share.

Death has indeed robbed us of a selfless person.

To many, Charlton was not an easy person to befriend. Truly, he was very stubborn at times, even to us as his friends. But, once one had broken through the invisible cocoon that surrounded him (as with most other individuals), one would discover a whole new person, a gentle giant, and the most soft-hearted person. Charlton would not sit and watch others being subjected to injustice and inhumane treatment. Naturally, this attitude had caused him to be involved in the struggle for liberation in South Africa, but he was never too open and brash about this role.

He liked to greet us using his left hand, raised as though he were to pull the person he was greeting. When asked why he did that, he would look away, with a rare smile. He had, on several occasions, done that: refusing to answer a question, knowing that one would eventually give up. He was not always successful in hiding his feelings, though.

One would become afraid when, very rarely, he would get very angry. On occasions like these, he would resist even to let us know what had made him angry. He would only mumble a few swear words, not to be heard beyond the distance of his breath.

He was as human as all of us are.

He would never give the impression of being cluttered, unlike many of us who always portray an image of being extremely busy. Yet, the amount of work he would produce over a short period of time would equal a year's hard work produced by some of us.

We would talk extensively about our work, ambitions, personal goals and how we plan to achieve them. Although we learnt a lot from him, he was always eager to learn from others too.

Charlton was an intellectual, an academic, a friend, a father and a lover. He loved his daughter, Andrea, very much. He talked with pride about her and his feelings were most obvious at such moments. Reluctantly and with a paining lump in our throats, we say farewell to our friend and mentor, Charlton – a scholar at heart.

Acronyms

CESM	Classification of Educational Study Matter
CDE	Centre for Development Enterprise
CHE	Council for Higher Education
CSD	Centre for Science Development
CUP	Committee of University Principals
DAAD	Deutscher Akademischer Austausch Dienst/German Academic Exchange Service
DoE	Department of Education
FET	Further Education and Training
FRD	Foundation for Research Development
HEMIS	Higher Education Management Information System
HESA	Higher Education South Africa
HSRC	Human Sciences Research Council
NLRD	National Learner Records Database
NRF	National Research Foundation
SAGDA	South African Graduate Development Association
SAQA	South African Qualifications Authority
SET	Science, Engineering and Technology
UCT	University of Cape Town
UDW	University of Durban-Westville
UWC	University of the Western Cape

Paper One

An Analysis of Research on Graduate Employment in South Africa

Introduction

This paper offers a reflection on the state of research on graduate employment and unemployment in South Africa. First, the contents and results of the main types of graduate studies are examined. Then, the value of graduate tracer studies and employer perception studies is assessed in relation to whether they promote organisational learning for higher education institutions and provide good rates of return for employers and government.

The analysis is based on data from national graduate and institutional surveys, questionnaires on employment outcomes in particular professions and data from census, household and labour force surveys in South Africa. The literature is large and growing; it lies scattered across a wide range of journals and in some cases is not readily accessible because it is tucked away in the records of higher education institutions. Consequently, this paper is restricted to an examination of about 46 studies. While this constitutes a small sample – and excludes discipline-based research on science, engineering and technology graduates – an important finding that emerges from the study is that there is considerable overlap in the design and research outcomes across the 46 studies.

An analysis of the studies indicates four trends:

- A diversity of research types
- A reliance on cross-sectional research

- Neglect of data matching across studies
- A reliance on the same dependent variables across research types

The questions informing the studies address 'what return society derives' from graduate training, 'the edge' graduates have over other labour market participants and the utilitarian function education provides. Informed by such human capital perspectives, the guiding principle behind graduate research is employment: examining and quantifying the relationship between demographic factors, educational qualifications, first destinations and initial job outcomes. This theoretical starting point is reflected in several institutional research reports (see Beerlall & Naidoo, 1993), national graduate studies (see Moleke & Albertyn, 1999), reports from university associations (see Committee of University Principals, 1987) and policy documents from advisory bodies (see Council for Higher Education, 2000). It also means that tracer studies provide both a theoretical and empirical account of employment.

Worldwide, such research often formulates questions in diverse ways and produces considerable variation in the data. However, this is not the case in South Africa. An examination of 30 questionnaires used in institutional research and national graduate studies reveals considerable conceptual overlap and that largely similar questions appear in all questionnaires. And, on the positive side, this is not necessarily a problem since uniformity provides a level of coherence.

However, the central issue that emerges from the analysis is that the studies do not add much value to our knowledge about graduate employment or unemployment patterns because different result sets often merely confirm each other. This conclusion is not aimed at dismissing knowledge generated by graduate studies. Rather, it is proposed that researchers have not sufficiently appraised the knowledge yielded by graduate studies and have not sufficiently explored links between educational study, the curriculum, higher education training, the world of work, graduate career trajectories and changing labour market characteristics. One indicator of this state of affairs is the absence of debate about graduate unemployment despite the fact that the South African Graduate Development Association (SAGDA) has for several years suggested that unemployment figures are higher than those suggested by national graduate studies.

The challenge this presents – with a view to increasing the value of graduate research – is to generate new research ideas and to look at information needs concerning graduates, institutional training and the supply and demand fit in a different way.

The scope and value of graduate research in South Africa

The extent of research on graduate employment and unemployment is unclear and sometimes understated in South Africa. For example, Seekings (2001), in a substantial paper on the scope of quantitative social science and use of sample surveys, does not once mention graduate studies. This despite the fact that surveys have, since at least the 1950s, provided empirical data on the scale of graduate employment, unemployment, skills and competencies, and have offered an indispensable understanding of both the role of higher education graduates in national development and the productive function of higher education institutions with regard to the economy. Findings from national graduate surveys also figure prominently in the conclusions of policy bodies and reports such as the National Manpower Commission, the *De Lange Report on Future Educational Provisioning* (see Buckland 1984; Muller 1984), the Council on Higher Education's *Size and Shape Report* (2000) and the DoE *National Plan for Higher Education* (2001).

In addition, the implications of graduate research for employment policy and for training and qualifying graduates have also been substantial, despite the fact that the results often do not differ significantly from plausible speculation. In other words, despite considerable social change over the past 50 years, the research agenda demonstrates that the key graduate employment problems relate to the demographics of graduates, mismatches between graduate skills and labour market needs, graduate shortages in key fields, bias in terms of institutions attended, and crucial differences in time-to-employment across economic sectors. For example, Moleke (2001: 215) writes:

While the higher education institutions produce a considerable number of graduates, the skills they possess do not match the skills the economy needs to make great strides ... The undersupply of highly skilled black South Africans and women compounds the issue.

Moreover, Cosser (2003: 9), in an assessment of national and institutional graduate tracer studies, concludes:

There is sufficient evidence that students who choose the science, engineering and technology (SET) fields are more likely to be immediately employed upon completion of their programme of study than are commerce or economics graduates (Moleke & Albertyn, 1999; Moleke, 2001; Maharasoa & Hay, 2001). For commerce and economics graduates, there is a waiting period. The situation is worse for

students who choose humanities and arts in that there is an even longer waiting period before employment opportunities can be realised.

Viewed more historically, this finding was made by Terblanche as far back as in 1969 and by Erens and Louw in 1976. The above quotations touch on the functional nature of graduate employment, provide empirical evidence to support the widely trumpeted idea that race and gender matter in the high-skill workforce, and highlight important differences in graduate outcomes by field of study. Because educational and employment advantage and the emphasis on increased equity are situational features of higher education studies, graduate tracer studies have duly reflected the general rise of the black middle class and of sections of the poor into high-paying employment fields. The studies cited above, and others, also consistently show that the first destination jobs of graduates in non-professional areas are often not linked to a distinctive career; they are rather an initial job step and involve graduates taking jobs for which they are 'overqualified'.

As is often emphasised, such research findings are relevant and valuable because they

- show whether universities and technikons are producing graduates who meet labour market demands;
- indicate the degree of responsiveness of higher education institutions to national economic needs;
- demonstrate the labour market absorption patterns for the generally expanding number of graduates; and
- provide insight into the changing nature of employment and social class dimensions.

Furthermore, while one view of employment in South Africa holds that expanded graduate training is the solution to South Africa's economic development problems, the research has shown that expanded graduate training has not diminished demand problems.

However, despite the importance and persuasiveness of such findings, the results tell us little that we do not already know, as evidence of demographic and skills mismatch as well as graduate shortages (Dreijmanis, 1988) has been available since the 1960s. In other words, given the racialisation of South African society and the level of systemic inequalities, the results from graduate studies show that the main demographic characteristics that coincide with high-level employment patterns have not really changed (for systemic reasons) and that the range of mismatches between demand and higher education supply has persisted in several sectors.

Such results are evident from a broad range of graduate studies that can roughly be divided in terms of their population coverage and purpose. In terms of population coverage, some tracer studies can be described as national, institutional or profession related, and others as policy focused or scholarship related. In terms of purpose, policy research is the most common as most national, institutional and profession-related research has this focus. In line with these study types, it is evident that graduate studies are of interest to many different stakeholders. They have received widespread attention from a broad range of sources and have served a broad range of purposes at all levels. Importantly, the focus of different studies further emphasises the point that one type of study is not a substitute for another, because the purpose of studies differs. This is briefly illustrated below with reference to different types of study and a discussion of their focus.

National graduate studies

As far as national graduate studies are concerned, several such studies have defined 'high' graduate unemployment as the main employment problem and have focused on graduate outputs and outcomes. However, only two of these (Moleke & Albertyn, 1999; Moleke, 2001) were published in the last seven years. The existence of a distinct knowledge gap is also evident from the fact that the 1999 study by Moleke and Albertyn sampled graduates who graduated in the early to mid-1990s, while the later study by Moleke (2001) focused on pre-2000 graduates. (Moleke and Albertyn (1999) describe the population for this study as students who graduated from 1992 to 1996, while Moleke (2001) indicates that the sample population in her study consisted of students who graduated from 1991 to 1995.) The HSRC is currently conducting a study that will compare the employment results for seven institutions relating to the year 2002, and a separate study that will establish what happened to the students who dropped out of institutions in 2002. This clearly suggests the limited availability of contemporary information on graduates.

One feature of the outcome-based focus of such national studies is that they typically place graduate employment, unemployment and skills and competency results in their wider political and policy contexts and endeavour to establish whether higher education institutions provide graduates with the knowledge, skills and competencies required in the labour market. The political and policy impact of recent national graduate studies has also shown the equity effects of university and technikon education in the labour market by tracking the success of black graduates, relative to white graduates, in finding jobs. One consequence of this

race-based political focus is that it has given a distinctive coherence to economic data and to the supply issues covered in a broad range of graduate employment-related research. Another consequence is that data analysis has consistently placed racial patterns and assessments of underemployment (the discrepancy between educational qualifications and job type, which sometimes reflects external valuation of the quality of degrees) at the forefront of labour market analysis.

Alongside such foci, for much of the past 40 years the main function of national graduate studies has been to identify graduate outputs in the form of employment uptake; entry into different economic sectors; entry into economic sectors in which graduates are overemployed or underemployed and in which they have difficulty finding jobs quickly; and the contribution of higher education to graduate success and graduate competencies. Part of the reason for such research was a preoccupation in government circles during the 1960s with shortages in the crucial high-skill science and technology (SET) and public service fields and an insistence that progress in addressing these needs should be monitored.

This situation underlined the need to have a major research database from which national graduate samples could be drawn. The countrywide research record came in the form of the Graduate Register, which was compiled and updated from 1965 to about 2000 from records supplied by the HSRC. Subsequently, this function was transferred to the South African Qualifications Authority (SAQA) where the Graduate Register now forms part of the National Learner Records Database (NLRD), along with annual entries on matriculants. The availability of the Graduate Register as a national database led to a dichotomous situation in which the HSRC ended up controlling national graduate data and assuming responsibility for national graduate tracer studies, while other academic and research agencies conducted institutional, regional or local area-specific and profession-based studies.

In terms of its brief, the Graduate Register – which includes Classification of Educational Study Matter (CESM) categories such as engineering and agriculture – has also been an important source of information on institutional, sector and discipline-specific studies, and from 1971 it served as a respondent source on 14 occasions where income of graduates was surveyed and monitored (Roodt, 2001a, b). In addition, since 1965, the Graduate Register has been used to

- provide alumni details to universities (Shapiro, 1999a, b);
- establish employment levels among graduates from specific higher education institutions (Shapiro, 1999c, d, 2000);

- determine graduate output in high-level scarce skill fields (Shapiro, 1999e, f, g); and
- signal overproduction of graduates in some fields.

The database is therefore clearly a valuable research resource that also doubles as a national record of annual graduate output. In this latter respect, it has been used to analyse trend data but has not yet functioned as a tool to track graduate job changes and mobility in the labour market over different decades. What this underscores is that over and above qualification output, a serious deficiency exists in attempts to understand the labour market contribution of graduates. Regarding trend data, at best we can establish net changes in jobs from a diverse set of cross-sectional studies that include census and general survey data.

It is also worth noting that among the more peripheral features of national graduate studies are studies on labour market outcomes for Further Education and Training (FET) and college graduates. Here, the most recent national investigation examined learner destinations and the responsiveness of FET colleges to labour market developments (Cosser, 2003). The investigation stemmed from recognition that the economy requires higher levels of intermediate skills (HSRC, 2003; Kraak, 2004) and from a concern that we know little about the low employment rates among FET graduates. A further important feature of the investigation was the involvement and assistance of researchers from Europe, who fulfilled a similar support role in institutional and comparative studies in other African countries. This collaboration follows on the boom in research on Africa internationally, re-emphasising the concern expressed by Seekings (2001) about the paucity of quantitative social science skills in South Africa.

Institutional research

Institutional research includes the following:

- Portraits of first destination outcomes
- Findings on the impact of student services on promoting graduate labour market knowledge and job entry
- Findings on initial labour market experiences of graduates
- Employer perception studies and findings on the employment of former scholarship holders

However, the motivation for institutional research studies differs fundamentally from that for national graduate studies, which are concerned with comparing

graduate employment/unemployment across institutions with graduate competition for employment. Institutional research, on the other hand, stems from institutional endeavours to facilitate knowledge management, to formulate educational plans and to augment local knowledge. In this sense, although some studies cover the same issues as national tracer studies, they are clearly not a substitute for national graduate studies. Rather, they reflect institutional efforts to compile knowledge and to better understand

- regional labour markets;
- the consequences of the training and services institutions provided by institutions; and
- the implications of the research results for institutional enrolment patterns, student support systems and institutional activities.

The origin of institutional studies, which were initially undertaken by academics attached to career or student counselling or information units, can be traced to efforts to understand the alignment between career guidance and career outcomes. Institutional research consistently reveals that most students received little career guidance at school and at higher education institutions and that they lack adequate information about careers in their study fields. Institutional research is still continuing but is undergoing changes. In particular, recent studies by researchers attached to institutional research or quality promotion units point to the need for pre-enrolment counselling and extended career services at higher education institutions and schools. They also reveal general satisfaction with institutional services and give some indication of what services make a difference to employment outcomes.

The change in who conducts research at certain institutions and for whom the research is conducted in turn signals a major change in the way higher education is organised. In particular, it indicates an increasing tendency to

- centralise information on student outcomes;
- obtain indicators on how responsive institutions are to economic issues;
- use employment, training and service-related data for planning and marketing exercises; and
- assess the image of various institutions.

Since an institution's image undeniably impacts on its ability to recruit top students, a key feature of institutional graduate studies is organisational learning. However, there may not be a direct link between such studies and organisational learning. One measure of the impact of research is how widely research results

filter through institutions. Another measure is the adaptations institutions make to institutional practices as a result of research. On both these issues, very little evidence exists.

If organisational learning does result from such studies, it is generally lopsided across institutions because the frequency of institutional and employer perception research tends to be uneven. The available data suggest that regular graduate studies are a standard feature at historically white institutions, but that – for resource reasons – the same does not apply in the case of historically disadvantaged institutions. While the institutional data for this review may be skewed, the literature search yielded few signs of ongoing graduate research at most historically black institutions. The literature search did, however, reveal that the Cape Technikon and Peninsula Technikon conduct bi-annual alumni surveys and that the University of the Western Cape has done so for the past five years. Historically white universities have a longer data series – universities such as Natal, Rand Afrikaans and Rhodes have conducted annual studies for the past decade.

This body of research is uneven in terms of depth of analysis. Several studies merely provide tabular results on the characteristics of graduates, their employment uptake and their satisfaction levels (Cape Technikon, 1999; Hendry, 1994; Rhodes University, 1999, 2000, 2001; Shaw, 1994, 1995). Little attempt is made to explain the economic, political and social processes that are linked to the observed employment trends. For example, whereas the economic and political restructuring of labour markets no doubt impacts on graduate employment, institutional research makes no effort to understand this relationship. This research also tends to portray graduates as characterless actors, offers little by way of a sociological analysis of employment trends and is not particularly useful as a planning aid.

Indeed, only a few institutional research reports include analysis that integrates graduate data with broader labour market trends (Greyling, 1977; Higgins, 1970; Koen, 2000). For example, the latter study endeavoured to track the impact of public sector restructuring on employment in certain fields and to establish how graduates from a particular institution felt they were treated in the labour market. The results indicated that many graduates experienced discrimination because of the previous negative image of the institution. A related finding was that the institution had to restore confidence in its academic image.

Employer perception studies appear to be a recent addition to institutional research, rather than a longstanding feature. The justification for employer perception studies relates to the labour market relevance of the knowledge and skills currently being acquired and to indications that many graduates do poorly

in workplace competency tests. The justification also relates to efforts to obtain feedback on the usefulness and quality of graduates produced by higher education institutions. This research has tended to stress the quality of qualifications and student competence (Van den Berg, 2000) and has shown that

- graduates have unrealistic expectations;
- employers desire clusters of knowledge, skills and competencies that graduates lack (Griesel, 2002);
- graduates in scarce skill fields lack interpersonal, leadership and communication skills (Koen, 2004); and
- employers in some fields prefer experienced graduates (Koen, 2001).

Another indirect institutional data source with a more limited population focus relates to studies on scholarship holders. The studies include one on UCT students (Hendry, 1995), one on Kagiso bursary holders (Lundall & Deedat, 1997), one on DAAD scholarship holders (Mouton, 1998) and one on the skills and labour market impact of CSD, FRD and NRF scholarship recipients (Koen, 2001). An interesting dimension of these studies – simply because it does not feature in other recent graduate research – is that incomplete population lists led Mouton (1998) to use snowball sampling techniques to supplement the initial population lists. A further interesting feature is that the studies by Hendry (1994) and Lundall and Deedat (1997) provide opportunities to compare the results of graduate and dropout students who received the same funding support.

Profession and policy-related studies

The research trends identified above are also found in several case study journal publications on employment patterns in specific professions. A feature of profession and policy-related studies, which clearly sets them apart from institutional studies, involves the specification of a hypothesis or set of hypotheses for investigation. This yields a more defined focus than in institutional studies and provides for firmer conclusions.

Profession and policy-related research is methodologically more uneven than national graduate and institutional studies. Indicative of its greater methodological diversity, profession-based research draws on a broad range of population registers maintained by professional bodies (Louw, Bosch & Venter, 2002), higher education institutions, the HSRC/SAQA and business organisations to construct sampling frames (Bruwer & Fox, 1996). Furthermore, whereas national graduate and institutional studies rely heavily on postal surveys, Wilson et al. (1999) use

documentary analysis of advertisements over two decades (1976–1996) in three newspapers to determine what skills employers look for among human and social science graduates. Also indicative of the greater diversity in research methodology are case studies based on a combination of survey and interview data in a specific profession (Baartman, 1998; Brown, 1995a) and the debate on the validity of research designs (Brown, 1995b; McKendrick, 1995).

What distinguishes this growing collection of journal articles based on small-scale case studies is the more detailed exploration of the link between curriculum training and job placements and the fit between higher education output and labour market inputs. While it is not feasible here to list the ways in which this is covered in the literature, the link is differently addressed in a number of studies in education, psychology and social work (Geyser & Wolhuter, 2001; Ramrathan, 1999; Baartman, 1998; Hunter et al., 2001; Richter et al., 1998; Wilson et al., 1999; Brown, 1995a, b; McKendrick, 1994; Matlhabe, 2002). All implicitly point to a growth in vocationally oriented courses, changing curricula at universities and increased curriculum efforts to increase the relevance of university education for professional employment. Another feature of these studies, which show some overlap with institutional studies, involves an examination of contextual factors such as the regional labour market and the implication of job cuts in the public sector for professional employment and for structural labour market changes.

The conclusions from some of these studies also confirm the findings of institutional employer and recruiter perception studies (Maharasoia & Hay, 2001; McKendrick, 1994; Louw et al., 2002). For example, as shown above with respect to the findings of institutional studies, Louw et al. (2002) suggest that a distinct disparity is evident between employer estimates about the ideal profile of MBA graduates and the actual profile. Another finding from the same study, which supports institutional restructuring initiatives, reveals that employers desire closer involvement with business schools (Louw et al., 2002). For instance, several institutions currently have Chairs in particular schools, which are funded by business and whose brief includes strengthening partnerships between higher education and industry. A further example is the tendency to employ staff from business to provide supplementary tutor training, career advice and specialist courses in management and accounting, for example.

Accordingly, the focus of what can be grouped as distinctly national policy-oriented research is on solving key problems and re-engineering and improving the fit between higher education outcomes and the interests of the business community. The rationale for this focus has shifted historically but, in a nutshell, it relates to

the need to satisfy employer and government expectations and to increase recognition of the vital role of higher education in national development.

What stands out about some of these policy initiatives is the co-ordinating role that primarily parastatal research and government advisory bodies have played in trying to align different interests, and the reliance on results from small-scale studies to plot policy trajectories. Two recent examples of such (social dialogue) policy-focused investigations exist.

Firstly, in 1993, an HSRC symposium called *Africa Insight 2001 Dialogue with the Future* specifically addressed the employability of BA graduates. This initiative resulted from concern about rising unemployment among BA graduates during the early 1990s and the publication of National Manpower Commission (1992) data indicating an oversupply of humanities graduates. Another reason for the symposium was the fact (highlighted earlier) that human and social science graduates in South Africa take longer to find jobs than graduates in science, engineering and technology, and in business and commerce. Despite the symposium title, almost all the research papers focused only on employment in South Africa (Beerlall & Naidoo, 1993; Edey & Molin, 1993; Godsell, 1993; Khotseng, 1993; Mauer, 1993; Niebuhr, 1993; Van Aardt, 1993), with some also presenting only institutional findings (Beerlall & Naidoo, 1993; Edey & Molin, 1993).

These contributions were essentially twofold. Informed by survey results reflected in six papers, the contributions questioned the thesis that the analytical and reasoning skills BA graduates attain equip them for a wide range of jobs. Furthermore, the tendency of BA graduates to find employment in jobs for which they are overqualified was regarded as a waste of valuable qualified human resources.

The problem the symposium papers identified was that employers desired more practical skills and wanted human and social science education to become more skill and outcome oriented. A related problem was race-based labour segmentation. Here the specific problem, also illuminated in institutional research at the time, was that the number of white humanities students was declining and that black humanities graduates were struggling to find work. In support of the view that a BA had little market value, a common argument was that the economy required more 'rounded' high-skill and practically focused employees and fewer discipline-based employees. However, in the rapidly changing world of work where job descriptions are less related to single-function jobs, some papers also argued that BA graduates with high-level analytical and reasoning skill were able to add considerable value to their jobs and acknowledged that large numbers of BA

graduates found jobs in a broad range of fields.

Secondly, nine years after the HSRC symposium referred to above, the Council on Higher Education (CHE) organised a colloquium entitled *Building Relationships between Higher Education and the Private and Public Sectors and Contributing to their High-Level Person Power and Knowledge Needs*. The colloquium brought together prominent business figures, government ministers, senior higher education personnel and policy researchers, and featured five commissioned papers (Bhorat & Lundall, 2002; Brown et al., 2002; Griesel, 2002; Kruss, 2002; Wolfson, 2002). The papers covered a diverse range of issues, which included the following:

- International partnership models (Brown et al., 2002)
- Factors impeding registration of patents (Wolfson, 2002)
- What national household survey data collected between 1995 and 1999 indicate about graduate employment (Bhorat & Lundall, 2002)
- Employer perception of the skills that University of Natal graduates require to add value in workplaces (Griesel, 2002)
- What different sectors (such as business and professional associations) expect from higher education institutions (Kruss, 2002)

A feature of the colloquium was that it dealt largely with a set of issues that also surfaced in 1998 and in 2000 in Round Table discussions held by the business-friendly Centre for Development Enterprise (CDE) under the heading *The Future of South African Universities: What Role for Business?* The implication of these discussions was that institutions were being asked to move closer to business organisations, and vice versa, in order to increase their mutual relevance to one another. The discussion is evidence of an increased societal emphasis on the appropriateness of the skills and competencies that graduates acquire.

While the general ‘business ties’ and ‘economic relevance of education’ arguments can no doubt only benefit higher education institutions, graduates and the country as a whole, the problem that has been highlighted in this section is that a range of different studies draw the same general analytic conclusions about ‘characteristic mismatches’ of graduates. As shown below, considerable content overlap occurs in several surveys. In some respects, this type of general finding means that government, institutions, professional bodies and academics do not have a strong empirical base for understanding graduate labour dynamics or for considering educational and employment strategies.

Common research themes in national and institutional graduate studies

Regarding the conceptual framework and content of graduate studies, Figure 1 (see below) presents descriptive variables that most commonly represent the causal chain examined in national and institutional higher education graduate studies and that also commonly feature in other research.

The variables typically start with biographical factors such as race, gender and age, and with academic factors such as type of degree. This informs the analysis of returns, which is typically structured by race, gender and type of degree. Next, questionnaires typically ask the following questions:

- What job are you employed in?
- Are you employed full time or part time?
- Are you on contract or are you permanently employed?

In further analysis, these data are linked to overemployment and underemployment. Another standard feature of such analysis involves questions on time-to-employment and frequency of job change. Conversely, unemployment questions typically include questions such as:

- Why are you unemployed?
- How long have you been unemployed?
- What have you done to secure a job?

Also common are questions that probe job search mechanisms and whether respondents thought that equity factors or educational background made the greatest difference to their employment situation.

Table 1 further highlights themes that tend to feature in studies. National and institutional studies are shown to typically include questions such as:

- How much do you earn?
- Are you earning enough?
- To what extent do you use the knowledge and skills you acquired while studying in your current job?
- Is your current job appropriate to your level of education?
- How highly do you rate the value of your degrees/diplomas?

Many graduate studies also include questions on socio-economic status factors such as the educational levels of parents, parents' job type and geographic location.

Career guidance, overseas migration and generational mobility occasionally feature as research themes. Here, questions deal mainly with the main source of

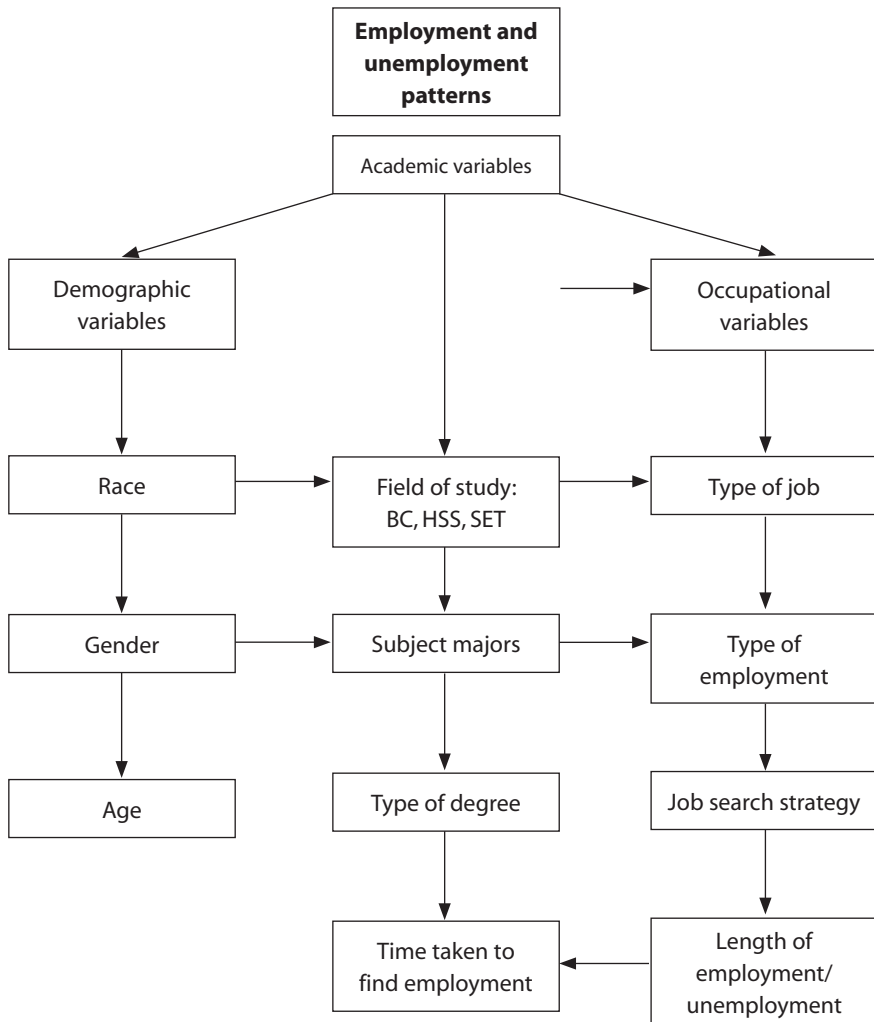


Figure 1: Grouping of variables examined

advice about higher education study, whether graduates intend to move abroad for study or work purposes, and the reasons for this, whether graduates are likely to return to South Africa and whether brothers or sisters previously attended a higher education institution. Among these features, the migration focus is longstanding in institutional questionnaires administered at English-speaking white universities.

More recently, however, questions on migration have also been put to coloured, black and Indian graduates, given the increasing signs that movement abroad is less race specific than before.

Table 1: Other common and occasional themes in national and institutional graduate studies

Common themes	Occasional themes
Current income Is current income sufficient?	Career guidance Was any offered? (Yes/No) If so, by whom?
Further study At which institution? For what qualification? Why?	Type of career guidance Value of career guidance
Value of study Nature of fit between study and current job Value of degree to present employment Suitability of qualification to current job	Migration Intention to study abroad Intention to work abroad Intention to return to SA
Socio-economic status (SES) Parental/Guardian income Parental/Guardian employment Parental/Guardian education level	Generational mobility Parent/Guardian educational level Highest qualification of siblings

Concerning further study, in line with the sharp rise in postgraduate qualifications in South Africa since the 1980s, questions typically focus on what additional qualifications graduates enrolled for, where they registered, and why and how further study was linked to career opportunities.

Graduate employment patterns

Beyond the thematic similarities in terms of sampling populations, distinct differences exist with respect to the period covered in the different studies and the employment and unemployment results. The most recent national studies conducted by the HSRC sampled graduates who exited from institutions between 1991 and 1998 (Moleke & Albertyn, 1999; Moleke, 2003). As in the case of

scholarship tracer studies, almost all of these graduates had more than three years' labour market experience and were employed when sampled.

In contrast to national and scholarship/financial aid studies, institutional studies typically sample respondents within a few months of their final examinations, at a point when many have not yet succeeded in entering the labour market. At universities, the questionnaires are typically made available when graduates collect their graduation gowns. The graduates are then asked to complete the questionnaires or, in some cases, to complete them at a later stage and return them through the post. This methodological approach is partly informed by cost considerations. However, the effect is that there are few examples of detailed institutional graduate studies that relate employment patterns to labour market change.

A comparison of the different study types indicates a crucial difference in results because national graduate studies measure employment and unemployment patterns once these patterns have largely stabilised, while institutional graduate studies measure employment and unemployment patterns when these patterns are likely to fluctuate widely. As demonstrated below, initial fluctuations also mean that national graduate studies are likely to show a higher level of permanent employment than institutional studies. Conversely, recent institutional studies reveal a higher incidence of contract and temporary employment compared to national graduate studies. On the other hand, census, household, labour force, and earnings and expenditure surveys capture results for both new labour market entrants and established workers and provide results that tend to moderate differences between national and institutional graduate studies.

The results, indeed, show the kind of differences we may anticipate from the difference in labour market participation time. The results indicate the kind of outcomes we may anticipate from international studies. Successive national graduate studies have provided a wealth of empirical evidence that reveals that graduate employment rates in South Africa have remained high since the 1960s. A consistent South African result pattern shows that graduates are securing jobs in shrinking job markets. This finding applies as much to arts and social science graduates as it does to graduates who exit with general qualifications in business and commerce and natural sciences.

Although annual growth in graduate numbers of close to 7% over the past four decades has outpaced economic growth of about 2%, a stream of studies based on data traced from the 1960s (Erens & Louw, 1976; Terblanche & Ebersohn, 1980; Moleke & Albertyn, 1999; Moleke, 2003) confirms that jobs for graduates are

plentiful and that graduate unemployment two years after departure from a higher education institution is low. Among this research, the HSRC study concluded that in 1996 – two to four years after graduation – only 2.9% of graduates were still unemployed (Moleke & Albertyn, 1999).

As indicated before, historically, *national graduate studies* also tend to show that race and gender play a role in labour outcomes:

- Survey data indicate that white graduate unemployment rates increased from 1% in the 1960s to 2% during the 1970s and 3% during the 1990s (Terblanche, 1969; Ebersohn, 1972; Terblanche & Ebersohn, 1980; Moleke & Albertyn, 1999; Moleke, 2003). Conversely, unemployment rates for black graduates were always higher and increased at a faster rate from about 3 to 4% in the 1960s to 8% during the 1990s. For example, Terblanche and Ebersohn (1980) indicate that 1% of white graduates were unemployed compared to 4% of African graduates, while Moleke and Albertyn (1999) identify much higher unemployment rates among black graduates.
- Regarding gender, national graduate studies further point to widening unemployment gaps between men and women, as female unemployment has increased to a larger extent than male unemployment over the past three decades. Initial graduate studies indicate little difference in employment outcomes for men and women from arts backgrounds, but show that male graduates fared substantially better than their female counterparts from business and science fields (Terblanche, 1969). Thirty years later, Moleke and Albertyn (1999) similarly found that male-female outcomes differed by 8% across study fields, particularly in agriculture where men were twice as likely as women to access jobs. Moleke (2003) linked these gender differences strongly to the racial background of graduates and reaffirmed a finding of the 1999 study, namely that initial graduate employment differs sharply by type of institution and favours graduates from historically white institutions.

Compared to these results, *institutional research* outlines the following common trends:

- Graduate unemployment at graduation (within three months of writing final examinations) is fairly high. On average, it is about 10% higher than what the results of national studies suggest. Results from Natal University over a ten-year period from 1985 show a consistent 12 to 25% of graduates looking for jobs. Results from Rhodes University for 1998 to 2001 indicate that 12 to 14% of undergraduates were unemployed at graduation, compared to 5 to

10% of postgraduates (Rhodes University, 1999; 2000; 2001). Results from the University of the Western Cape (UWC) indicated that 10 to 16% of graduates who finished between 1996 and 1998 were unemployed from 1998 to 2000 (Koen, 2000). However, the pattern of relatively high unemployment is not uniform. Results for University of Durban-Westville (UDW) graduates from 1992 showed an unemployment rate of 3% and revealed that a further 6% were looking for a job (Beerlall & Naidoo, 1993).

- Many students first access temporary jobs. The proportion averages around a third of commerce students in most studies (Rhodes University, 2000; Shaw, 1995; Koen, 2003). The temporary job phenomenon also extends to areas where demand for professionals is saturated: arts, social work, teaching and public administration.
- Generally, 75 to 90% of graduates think that their studies prepared them adequately for their current jobs. This finding applies across different periods to graduates from different institutions and implies that graduates generally believe that they are well suited to the jobs they find (Cape Technikon, 1999; UDW, 1993a, b).

At the same time, *results from case study journal articles* confirm the broad trend that humanities students, women and black students take longer to find employment. As in the case of national graduate studies and institutional studies, these findings provide evidence that demographic, political, social and economic forces have conspired to create a significant gap between market needs and the provision of job opportunities for black and female graduates. The findings also suggest significant provincial variation in employment in certain sectors. For example, the traditional pattern in education and social work is one of an over concentration of professionals in urban locations. This is consistent with the lifestyle preferences of professional employees, the stronger base of some professions in some provinces, and the saturation of employment opportunities in some metropolitan centres (McKendrick, 1994; Maharasoa & Hay, 2001). This urban overconcentration is disturbing because population statistics suggest that 35 to 40% of South Africans live in rural areas and also because considerable employment opportunities exist for professionals in these areas.

Some journal articles highlight patterns that are at odds with national data. For example, Ramrathan (1999: 166) suggests that whereas national graduate studies and other public data implied that employment opportunities had almost dried up in education, graduates from particular institutions were nonetheless succeeding in

finding education jobs during job cuts in the public sector. Contrary to expectations, Wilson et al. (1999: 137) also found a trend in newspaper advertisements in favour of generalist rather than specialist skills or qualifications in the late 1990s. While their article did not deal with the characteristics of the sampled employers, this finding is consistent with employment data indicating no immediate solution to the shortage of specialist skills in a broad range of fields. It is, however, at odds with indications from employer perception studies that employers emphasise core skills.

Published papers based on national household, labour force and income surveys further confuse the employment picture. For example, by recycling the same secondary data, Bhorat and Lundall (2002), McCord and Bhorat (2003) and Bhorat (2004) have suggested that graduate unemployment is higher than generally believed. Using data from the October Household Survey (OHS) series, the thesis outlined in Bhorat and Lundall (2002) and McCord and Bhorat (2003) is that tertiary education unemployment rose from 6 to 12% nationally from 1995 to 1999, i.e. doubled in four years. Bhorat (2004) further indicates that the pattern of rising unemployment from 1996 onward is also reflected in the 2002 September Labour Force survey. This survey suggested an unemployment rate of 15%. As outlined in Bhorat (2004), tertiary unemployment is concentrated among Africans because the expertise of African tertiary-educated workers is still in fields of low labour demand, rather than in fields where the labour market is experiencing a skills deficit.

Validation of these contrasting data through external sources is difficult. One problem is that no comparable cross-sectional dataset covers the same period. The closest dataset of national cross-sectional studies in terms of labour market participation involves the last two HSRC graduate studies (Moleke & Albertyn, 1999; Moleke, 2003). The first study indicated that about 3% of graduates were unemployed. The second noted and advanced the argument put forward by Bhorat (2004), but provided no aggregate unemployment figure. Most other survey data suggest fluctuating unemployment of less than 10% among graduates. For example, the 2001 census puts unemployment among those with degrees at 8%. The results from the past two March Labour Force surveys point to national graduate unemployment of about 5%, but surprisingly – given the economic growth context – imply that business and commerce graduates have greater difficulty accessing jobs than humanities and social science graduates. Regarding other differences, the 2004 March Labour Force survey suggests a 0.2% difference between men and women and an 8% difference between blacks and whites.

Shortcomings in graduate research

Because of the kind of omissions identified due to the content similarity and limited focus in graduate studies, the need exists to address numerous other shortcomings in the data on graduates that are currently available from national studies and to highlight areas that have not been properly dealt with. These shortcomings include the following:

- The absence of clear definitions of what an unemployed graduate is. There is extensive evidence from graduate and non-graduate studies that students who earn an income still identify themselves as unemployed. Evidence also exists that students involved in further study (sometimes because they did not find employment) list themselves as unemployed (and have been counted as such). Yet, no standard definition is available – only the narrow ('official') or expanded ('unofficial') definition used in surveys. Instead, the trend in national graduate and institutional graduate studies is to rely on respondent judgements as to whether they are employed or unemployed.
- Measurements of time-to-employment consistently fail to recognise that many graduates are employed while studying and that they are not new labour market entrants. Studies of graduates at UWC, for example, persistently show that large numbers of full-time and part-time students combine study and full-time employment. The failure to separate findings for full-time and part-time students who work while studying and those who do not, means that time-to-employment is not reflected accurately.
- To date, graduate labour market studies in South Africa have not substantively examined the training, career aspirations, career options and career choices of students and of graduates in a single study. There have also been no large-scale studies examining the links between curriculum emphases, the skills that graduates acquired and employer evaluation of the usefulness of higher education training.
- An agenda and direction for graduate research need to be established because current knowledge is limited by the absence of data on a number of crucial issues. For example: in South Africa, graduate employment results have rarely been divided for undergraduate and postgraduate students, mainly for sampling reasons. The lack of involvement of graduates in rural areas is a source of grave national policy concern in education, health and the general public sector, yet little information is available on this non-involvement. As a result, little is known about the employment and labour market value of a

master's and doctoral qualification and about the role of graduates in rural employment.

- A conceptual weakness in many graduate tracer studies is that the research has long punted the idea that supply and demand mismatches and skills shortages lie at the heart of South Africa's slow economic development. It has, however, not addressed a question that Muller (1984) posed in response to the 1980 National Manpower Commission finding that high-level skill shortages characterised most professions. Muller asked: Why did increased higher education inputs and outputs, occasional caps on student growth to avoid or slow oversupply, and bleak economic conditions throughout the 1990s not combine to shrink vacancy rates in a large number of high-skill professions? Put differently, given that annual graduation rate increases of close to 7% since the 1960s have consistently outpaced annual economic growth rates of about 2% over the same period, what happened to graduate surpluses in some occupations; what new skills did underemployed graduates gain and what career directions did they pursue?

Here, the essential shortcoming is probably that the policy focus in tracer studies has produced research that is often not integrated with other economic data. Indeed, it is significant that no systematic analysis has been done on what census data reveal about graduate employment patterns. Bearing this in mind, and also remembering the content focus of tracer studies outlined earlier, it is evident that a limited cluster of issues have been addressed and that the focus of graduate studies should be expanded.

Conclusion

This paper sought to describe the state of research on graduates in South Africa. The core issue that the paper addressed was the value of the research material obtained from graduate tracer studies.

The discussion indicated considerable diversity in the type of studies conducted, but also considerable conceptual overlap in the research agenda of many. The discussion also presented a case for concluding that some similarity exists in the results across different studies and suggested that some definitional issues require clarification.

The thrust of the discussion further signalled the need to compile more regular national longitudinal data. This crucial need is evident from the small number of

national studies conducted over the past seven years. During this time, South Africa identified the creation of a knowledge economy as the key to its future economic growth and development, and emphasised the importance of training postgraduate students and of institutional efficiency in the training of graduate students. A need therefore exists to determine the impact of postgraduate training in the labour market and also to measure it over an extended period. In this regard, the discussion did not once mention longitudinal graduate cohort studies – because, in a nutshell, there are none. However, since cohort or other forms of longitudinal studies hold immeasurable analytic advantages, a basis for data matching should be established in order to gain an improved understanding of graduate labour market outcomes.

In this context, something also needs to be done about the time differences between national and institutional studies, and the implications of these differences for employment data. The available data indicate that little is actually known about time-to-employment for different groups of graduates, because the data have not been consistently split in terms of study types.

Above all, it is evident that while there has been some shift in both institutional and policy research, little is known about the lives of graduates. For example, in other contexts, questions on material possessions have yielded fascinating insights into the aspirations and material accumulation designs of graduates and also into the size of the workplaces graduates are employed in. For example, as described by Mayanja (2001), arts graduates from Makerere University in Kampala, Uganda are more likely to work in large workplaces than science graduates. The value of these data is that they in turn cast light on differences in the workforce size in different employment sectors and different types of industry.

Graduate tracer studies should accordingly explore a wider range of issues and accumulate more extensive knowledge about graduates in order to improve the value of this research for various stakeholders. While such a research agenda could be pursued in different forms (for example through regional or national co-ordination among higher education institutions or in conjunction with professional bodies), a need seems to exist for graduate researchers themselves to design an appropriate research programme in order to determine what knowledge (and financial) investments are necessary and to generate more diverse knowledge about graduate outcomes. This calls for efforts to determine more systematically the scope of existing knowledge about graduates and to develop a research agenda to fill knowledge gaps.

Who should initiate such a research programme? The HSRC clearly has a leading role to play, given the focus of some of its research programmes and its long involvement in such studies. SAQA is also an obvious role-player because of its control of the National Learner Records Database, while the Council for Higher Education (CHE) and organisations like Higher Education South Africa (HESA) have clear vested interests in view of the assumed link between quality on the one hand, and graduate performance in the labour market and the economic productive function of higher education training on the other hand.

The wrong response would be to persist with the current pattern of conducting research, which to a large extent simply reifies existing knowledge.

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Paper Two

Challenges Facing the Education, Training and Employment of South Africa's Scientific Labour Force

The core issues

The development of South Africa's scientific labour force forms part of a larger project of human resource development at universities, technikons, science councils, government departments and research agencies. This paper examines the state of high-level knowledge production at universities and technikons as from 2000. We address this in three stages, by describing

- the state of master's and doctoral training,
- the quality of the academic workforce, and
- the state of research output.¹

Regarding research output and staffing patterns from 2000 to 2003, the analysis shows both good news and bad news. The former concerns a recent rise, after a period of virtual stagnation, in research output (partly due to an increase in the number of accredited journals), and in contract research income. The bad news, due to factors such as emigration, staff cuts and rationalisation, relates to a sluggish employment growth picture at higher education institutions among permanent research/instruction professionals, which actually decreased at technikons from 2000 to 2003, while only increasing marginally at universities.

Further bad news relates to a 4% brain drain in the number of permanent academics with doctorates at universities. Excluding data for the North-West University, this means that the total number of permanent research/instruction

professionals at universities with doctorates decreased by 335 from 2000 to 2003. On the other hand, technicians recorded only a 1% rise (n=56) over this period in the number of permanent academics with doctorates.

Regarding the state of master's and doctoral training, on the enrolment side the analysis shows significant gains in respect of enrolment (+14 000 master's and doctoral students) and qualification (+1 839 master's and doctoral graduates). A relatively new feature is that the positive picture is somewhat inflated by international students who in 2003 constituted 13% of master's and 23% of doctoral enrolments. Because many of these international students are black and concentrated at research universities, they overstate the equity gain picture at the doctoral level and tend to benefit from reasonably strong research training, while graduating sooner than local students. Another negative dimension from a research point of view, but positive from a professional labour market outlook, is that only a third (32%) of master's students at universities are registered for a research qualification. This compares with close to two-thirds who achieve a professional market-related qualification involving minimal research, or who do not complete their degree because they choose to exit with a postgraduate diploma.

Furthermore, on the negative side, case study research at some institutions indicates that the incidence of dropping in and out of study programmes increased compared to pre-1995 data and that time-to-completion for graduates remains high. For example, one study showed that the annual completion rates of master's students annually varied between 21 and 24%, but that the number of non-completions increased by 45% from 1 968 in 1991 to 2 859 in 1999. Factors shaping this include personal factors like high age levels, family responsibilities, income levels, inadequate undergraduate education, motivation levels and work commitments, and institutional factors like poor supervision, a lack of suitably qualified supervisors, small scholarships and inadequate institutional support. Influencing variables also extend to the following:

- Insufficient individual and institutional research capacity
- Inadequate research supervision
- Underqualified and inexperienced supervisors
- Ad hoc research projects divorced from research programmes
- Inadequate (if any) integration of postgraduate courses with research programmes of departments

Collectively, these factors suggest that the key challenges facing the promotion of South Africa's scientific workforce are research development, research capacity

building and stronger co-ordination of research activities. Institutions need to continue to tap contract research income, but also have to link research training to contract research income.

At the structural level, dedicated training in research organisations and science councils is required to especially increase quantitative research skills, dedicated and increased funding for research training, increased ranking mechanisms to promote competition and a commitment from higher education institutions to promote quality research training at master's, doctoral and post-doctoral levels.

At the student level, research development and capacity building require a transition from quantitative expansion to qualitative consolidation through increased supervision investment.

At the higher education staffing level, academics need to become more involved in research and in publishing and need to do more to socialise and integrate students into research communities. They need to play a more direct role in identifying candidates for whom specific targeted interventions are likely to make a decisive difference with respect to completing their study, and they require increased institutional support to do this.

At the institutional level, there is a need to build on research differentiation and to assist institutions in building pockets of strength. The challenge also involves retaining academics with doctorates at universities, employing more academics with doctorates and expanding the body of general research knowledge. All these call for increased resource sharing between higher education institutions and other development agencies. By all accounts, the significant increase in temporary academics at higher education institutions is a consequence of stringency, which is not conducive to sharp improvements in the state of high-level scientific labour. The tendency rather signals that higher education institutions do not have sufficient resources to dramatically alter the employment balance of high-level scientists. It also suggests a need to shift away from orthodox training mechanisms and to explore creative ways of combining and pooling capacity nationally or within the continent, and a need to create distinct areas of research strength.

At the national level, the challenge could for example be met by creating expertise networks in specific domains that concentrate on PhD training, research development and capacity training. Concentrations of research strength should be established in certain fields of study and at certain institutions, or targeted study abroad could be pursued to expand expertise and facilitate the increased establishment of international research networks.

In consequence, as outlined in key science and education policy documents as well as in the national HRD strategy, the analysis also suggests that cross-organisation (and in cases cross-country) co-ordination of strategies and resources is necessary to fundamentally alter the state of high-level knowledge production. This especially applies with respect to innovation and knowledge development in the natural sciences, which generally shows much slower enrolment and qualification increases than the human sciences. High-level knowledge production calls for

- a concerted effort to improve the overall quality of undergraduate education to better prepare students for research activities;
- an expansion of targeted funding for full-time PhD and research master's students because most awards do not cover study fees, research costs and cost of living expenses;
- strategies to delay retirement among senior academics;
- strategies to retain academics with doctorates;
- increased incentives and opportunities to promote 'qualification creep' among permanent full-time employed academics;
- an expansion in staff development and attraction schemes that focus specifically on the recruitment and retention of doctoral graduates;
- stronger staff accountability measures to ensure speedy throughput; and
- an increase in the number of foreign staff to help promote academic renewal and research training.

State of master's and doctoral training

Viewed against the background of South Africa's history, there are currently three salient features of master's and doctoral training:

- Increasing student numbers
- A concomitant rise in the number of professional master's programmes and non-research master's qualifications
- The high incidence of part-time study

The most recent available data indicate a steady increase in the number of local and international students enrolling for high-level study, as well as in the number of graduates. For example, Table 2 shows that master's students at universities increased by more than 10 000 from 2000 to 2003, while doctoral students at these institutions increased by 2 400 over the same period. Table 3 reveals a similar pattern at technikons between 2000 and 2003. In this case, the annual rate of

increase – which contributed to a doubling in the enrolment of master's students – is greater, but occurred from a lower base. Table 4, on the other hand, shows variable graduation performance, but generally indicates a sharp increase in labour market output.

Table 2: Headcount of master's and doctoral students, 2000–2003 and rate of annual increase at universities

Headcount	2000	2001	2002	2003
Master's	29 473	31 912	36 282	39 839
Doctoral	5 822	6 238	7 455	8 112
% Annual increase	2000	2001	2002	2003
Master's		+8%	+14%	+10%
Doctoral		+7%	+19%	+9%

Table 3: Headcount of master's and doctoral students, 2000–2003 and rate of annual increase at technikons

Headcount	2000	2001	2002	2003
M Tech	1 644	2 362	3 086	4 112
D Tech	133	185	247	267
% Annual increase	2000	2001	2002	2003
M Tech		+45%	+31%	+33%
D Tech		+40%	+34%	+8%

Table 4: Headcount of master's and doctoral graduates, 2000–2003 and rate of annual increase at universities

Headcount	2000	2001	2002	2003
Master's	5 704	6 056	6 667	7 182
Doctoral	821	784	963	1 024
% Annual increase	2000	2001	2002	2003
Master's		+6%	+10%	+8%
Doctoral		-5%	+23%	+6%

Seen in terms of equity goals and with respect to fields of study, key quantitative features of DoE HEMIS data on master's and doctoral students and graduates in 2003 reveal the following:

- At universities 56% of master's and 60% of doctoral enrolments were male, while 42% of master's and 56% of doctoral enrolments were also white. Compared to the situation four years earlier, this indicates significant equity gains. White males no longer constitute a majority of doctoral students, having slipped to 25% (n=2 002), but importantly they still constitute a majority among doctoral students in the natural sciences. Another key data feature is that white females at 31% (n=2 519) currently outnumber white males among doctoral students and also register a higher total than the combined total (n=2 469) for doctoral students among African males (n=1 712) and African females (n=757). In consequence, the data suggest that white females are most likely to be mainly responsible for growth in the general scientific labour force in the short term, and that white males are most likely to contribute significantly to growth among natural scientists.
- The above conclusions are further underlined by the fact that international students account for a large number of black students involved in master's and doctoral study. At doctoral level, 23% (n=1855) at universities and 13% (n=34) at technikons were international students in 2003, while an overall 13% (n=6212) of university and technikon students at the master's level were international students. Up to 70% of these students are black and come from an African country other than South Africa. Consequently, local black (African, coloured and Indian) students account for between 30 and 35% of doctoral students. This is considerably lower than the 44% suggested relative to the proportion of white students (56%).
- 58% of doctoral students, compared to 64% of master's students, were registered in the human sciences at universities. A 62% increase was noted in doctoral registrations in the human sciences at universities between 2000 and 2003, while a 20% increase in doctoral registrations in the science, engineering and technology (SET) fields occurred over this same period. These differential doctoral registrations compare with a 38% increase in registrations in the human sciences and a 34% increase in SET fields at master's level at universities. The same differential growth pattern in favour of human sciences is also evident in the case of technikons, where SET fields only accounted for 14% of master's enrolments in 2003.

- One-third of master's graduates (n=2 356) exited from universities with a research qualification, compared to one-fifth (n=34) from technikons. This confirms the basic postulates that professional labour market training is the desired outcome for many master's students. It also draws attention to another somewhat 'negative' feature of master's and doctoral training, namely the high incidence of part-time study.
- While limited data are available on the precise number of students involved in part-time study, this factor often lies at the heart of dropout, non-completion and delayed completion, and is not conducive to the kind of research socialisation most needed to promote induction into research communities and networks. For these reasons it is evident that strategies directed at speeding up doctoral throughput in particular, must address the need for full-time study opportunities.

Quality of the academic workforce

While a considerable amount of attention was recently focused on ageing among academics, the standout feature of the 2003 data (when compared to earlier periods) concerns the sluggish growth rate among permanent academics and the decline in the number and percentage of academics with doctorates at universities (see Table 6). The implication is that experienced academics are being replaced by less experienced and less well-qualified academics (probably with concomitant lower research output implications).

Table 5 shows a relatively static employment picture from 2000 to 2003 in the permanent academic workforce at universities and technikons. This picture denotes the balance of employment changes across different institutions. At universities, it actually involved an increase in permanent research/instruction professionals at 12 institutions, and a decrease at 9 institutions. Importantly, those expanding their permanent academic workforce included all the major research universities barring the University of the Witwatersrand (-61) and Free State (-59). On the other hand, institutions that recorded net decreases in their permanent academic workforce were mainly historically black institutions targeted for mergers (Durban-Westville -52, Transkei -81, Vista -28, the North -252, North-West -26, and Zululand -21). One probable associated implication is that a large number of African staff departed.

The implications of these figures are, firstly, that headcount permanent academics at universities and technikons increased by less than 1% over the period

concerned. Secondly – as analysed by Stumpf (2004) – because full-time equivalent (FTE) student enrolment increased by 24%, the student:lecturer ratio also increased from 33:1 to 42:1. Thirdly, the data suggest a reasonably high turnover among permanent academics. However, the national picture does not seem to confirm conventional labour market expectations that high turnover involves younger staff members replacing older ones. As indicated below, age data suggest that more academics are now 55 years and older.

Table 5: Permanent research/instruction professionals at universities and technikons in 2000 and 2003

Permanent research/ instruction professionals	2000	2003	Change
Universities	11 220	11 263	+43
Technikons	3 722	3 713	-9
Total	14 942	14 976	+34
Student numbers	2000	2003	Change
Universities	387 361	487 741	+100 380
Technikons	202 792	230 052	+ 27 260
Total	590 093	717 793	+127 700

Viewed in terms of quality, Table 6 outlines recent changes in the distribution of permanent academics who have obtained their doctorates. One implication of these data is that permanent research/instruction professionals at higher education institutions decreased from 31% of permanent academics in 2000 to 29%. A sub-analysis of 2003 employment data further indicates the following:

- Since 2000, permanently employed women increased by 3% at universities and by 2% at technikons.
- Permanently employed black academics at universities increased by 4% and their colleagues at technikons by 7%.
- At universities, 82% of professors, 67% of associate professors, 38% of senior lecturers, and 13% of lecturers had a PhD.
- At universities, 36% of professors were aged 55 years and older, while 21% of associate professors, 18% of senior lecturers and 6.5% of lecturers also fell in this age group. Compared to the 2000 data, the number of professors aged 55 years and older increased by 3%, while associate professors and senior

lecturers in this age category each increased by 5%. This suggests that there is again greater stability in retirement patterns.

Table 6: Number and proportion of academics with PhDs

	2000		2003		Change	
	Total	%	Total	%	Total	%
Universities	4 469	40.9*	4 134**	37.3	-335	-3.6
Technikons	202	5.4	258	6.9	+56	+1.5
Total	4 671	31.2	4 392	29.3	-279	-2.1

* Excluding data for the North-West University.

** Excluding data for the North-West University, which in 2003 employed 28 permanent research/instruction professionals with PhDs.

Conclusion

The data discussed above suggest both opportunities and challenges for developing the scientific labour force at higher education institutions. While it does not offer a historical or sociological cast of explanation for the state of the academic workforce, or for the state of postgraduate training, and while it does not provide a raft of ideas to expand the science workforce, it suggests that the main challenges relate to

- consolidating quality student training;
- promoting the retention of academics with doctorates; and
- improving the equity balance within the academic workforce.

The key opportunities involve the use of the existing structural base at higher education institutions and in research organisations, as well as developing mechanisms to consolidate and expand research training for students and academics.

In a context of resource constraints, what is needed to address these challenges and to realise the opportunities, are practical decisions about ways in which higher education institutions, science councils, research organisations, government departments and the private sector can pool resources together to develop research capacity in the country, and on the continent. What is also needed at higher education institutions is ways to balance the demands of teaching, contract

research, publications and committee work with the responsibility of providing good quality research training to senior students.

Note

- 1 The analysis is based on HEMIS data (DoE, 2005) that are used to describe general trends over a four-year period. In some cases, the data appear to be inconsistent. For example, they show that Medunsa reported 164 permanent research/instruction professionals in 2001 and 414 in 2002, while the University of the North reported 594 permanent research/instruction professionals in 2000, 112 in 2001, and 342 in 2003. These inconsistencies generally do not impact on the picture we present, but indicate that other question marks may surround the accuracy of some of the data higher education institutions reported to the DoE.

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Appendix of additional tables

Table A: Number and percentage of master's and doctoral students in 2003 at universities

	Master's	%	Doctorate	%
Human sciences	25 611	64	4 702	58
Natural sciences	14 224	36	3 410	42
Total	39 839	100	8 112	100

Table B: Headcount number and percentage of master's and doctoral student enrolments by major field of study in 2003 at universities

	Master's	%	Doctorates	%
SET	14 063	35	3 381	42
Business and Commerce	7 533	19	460	6
Education	3 684	9	896	11
Other humanities	14 655	37	3 375	41
Unknown	4			
Total	39 839	100	8 112	100

Table C: Master's and doctoral enrolment at universities in 2003 by race

	African	%	Coloured	%	Indian	%	White	%
Master's	17 079	43	2 250	6	3 763	9	16 707	42
Doctorate	2 469	31	434	5	676	8	4 521	56

Table D: Master's and doctoral enrolments at universities in 2003 by gender

	Male	%	Female	%
Master's	22 241	56	17 558	44
Doctorate	4 876	60	3 224	40

Table E: Graduations at universities

Master's	2003
Non-research	4 826
Research	2 356
Total	7 182

Table F: Headcount of master's and doctoral graduates at universities, 2000–2003 by general field of study

Master's	2000	2001	2002	2003
Human sciences	4 033	3 774	4 564	4 749
Natural sciences	1 671	2 282	2 103	2 433
Total	5 704	6 056	6 667	7 182
Doctorate	2000	2001	2002	2003
Human sciences	501	356	505	523
Natural sciences	320	428	458	501
Total	821	784	963	1 024

Table G: Headcount of master's and doctoral students at technikons, 2000–2003 by general field of study

M Tech	2000	2001	2002	2003
Human sciences	881	1 432	2 086	3 017
Natural sciences	764	930	1 000	1 095
Total	1 644	2 362	3 086	4 112
D Tech	2000	2001	2002	2003
Human sciences	29	59	89	100
Natural sciences	104	126	158	167
Total	133	185	247	267

Table H: Headcount number of permanent research/instruction staff at universities, 2000 and 2003

	2000	2003	Change
Cape Town	673	779	+106
Durban-Westville	397	345	-52
Fort Hare	179	190	+11
Free State	576	517	-59
Medunsa	169	413	+244
Natal	932	1 058	+126
North	594	342	-252
North-West	210	184	-26
Port Elizabeth	242	267	+25
Potchefstroom	462	531	+69
Pretoria	1 449	1 524	+75
Rand Afrikaans	341	432	+91
Rhodes	282	334	+52
Stellenbosch	768	809	+41
Transkei	251	170	-81
UNISA	1 048	1 090	+42
Venda	269	268	-1
Vista	658	430	-228
Western Cape	406	448	+42
Witwatersrand	951	890	-61
Zululand	263	242	-21
Grand total	11 220	11 263	+43

Table 1: 2002 age data: Academics under and over 45 years of age

	Under 45	%	45 and older	%
Professors	318	16	1 644	84
Associate professors	414	34	816	66
Senior lecturers	1 445	51	1 403	49
Lecturers	2 760	71	1 112	29
Junior lecturers				1

Charlton Koen: Contribution to South African Higher Education Studies

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Farewell My Friend

I am not angry, even though I think I should be,
For I do not know, at whom, or what should I be.
Should I at your Maker, or you, or death be angry?
Should I at your hurried and shocking departure be?
For, you, you so hurriedly vanished,
And now, this state leaves me anguished.

Can't explain my moans and groans since you've gone,
They're aches and pains that've become my daily life,
Bleeding empty feeling I have inside, Oh! So strange!
Getting to terms with your death? But time will tell,
You may have gone, but your image forever remains.
But, why, why should we be robbed of our best brains?

Like death, you lived with peasants and kings alike,
Though, unlike it you loved and cared for them all.
Like death, you treated them all equally and well,
But, unlike it, you loved and cared for them all.
Like death, you came and made your presence felt,
But, unlike it, yours was not as cruel.

The lives you've touched have now a window shut,
The seat you've occupied has now been left empty,
The life of which you were so fond, is now wandering,
Confused! For, your death has left a void and dull pain.
But, slowly, and surely, darkness gives way to light,
Pain heals, and Life must give way to Death.

In loving and fond memory of Charlton Koen (1964-2005)
Mahlubi Mabizela (06 July 2005)

Education, Science and Skills Development Research Programme



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