

## *Cavestone or Deadweight? Inefficiency, Duplication and Inequity in South Africa's Tertiary Education System, 1910-93*

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### 1.0 INTRODUCTION

South Africa's tertiary educational institutions do not presently figure prominently in the upper reaches of published international rankings. Sadly, this contrasts with a somewhat more illustrious past in which at least one of its universities was ranked amongst the top twenty in the world. In this paper we attempt to recount aspects of this relative decline, identify its patterns and causes, and seek to identify institutions that might, under appropriate policies, become world-class institutions in the twenty-first century.

To this end we have collected, assembled and analysed data on the principal sectors of South Africa's tertiary educational system, including universities, technical training institutions, and teacher training colleges. We examine the following inputs into the educational process: student numbers, size of lecturing staff and real expenditure on tertiary education by type of tertiary education, both in absolute terms and on a real per student basis. In addition, our concern extends to the output of the tertiary educational system, as measured by degrees, diplomas and certificates issued. Such output is reported in both absolute terms, and in terms adjusted for the quality of the output. The efficiency of the tertiary educational system in transforming student enrolments into qualifications is examined and the cost per **qualification** is estimated. Finally, where appropriate, we consider the quantity of research output generated by the tertiary educational system.

Earlier work has identified significant inequalities and inefficiencies within South Africa's schooling system.\* These earlier findings showed that, in terms of both the quality of inputs and the quality of output produced, South Africa's schooling system over the 1910-93 period divided into two main parts: one for **whites** and that for blacks. Although even the best part of the schooling system that for whites, was of limited quality, the black schooling system was a **frankly** cheap and nasty affair over the entire 1910-93 period.

The results that emerge from the present study are somewhat more differentiated. First, we find that for universities the distinction between the white universities, and universities designated for other race groups, is not in terms of the quality of inputs as measured by student-lecturer ratios, or by expenditure per student. Indeed, real expenditure per student for universities was **higher** in the black universities than it was for whites. Nevertheless, our findings show that the quality of output of black universities in terms of both the degrees they issued and their research output lay considerably below that of the universities designated white. In effect the black university system proved expensive and nasty, rather than cheap and nasty.

Only the teacher training college system emulates the results we found for South African schooling. Here again, inputs as well as outputs of the teacher colleges prove to be of considerably lower quality for blacks than for whites.

In technical training, the differential between whites and blacks emerges primarily in the form of poor access to such **training** by blacks, rather than in the form of poor inputs into black technical training as measured by student-lecturer ratios and real per student expenditure. A more general finding to emerge **from our** data on technical education in South Africa is that significant under-investment in technical forms of human capital has been maintained over the sample period, and for all population groups.

Once again therefore, the findings of the present paper point to the presence of significant inequities and imbalances in the inputs and in the outputs of the South **African** educational system – in this instance tertiary education

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\* See Fedderke et al (2000,1999).

## 2.0 METHODS, SOURCES AND CLASSIFICATORY CONVENTIONS

For purposes of precision and consistency we have followed the classificatory conventions deployed by the South African authorities during both the **pre-Apartheid** and Apartheid periods. We consider it important to record the information under these contrived rubrics since the system of racial estates and statutory race classification had profound implications for the **administration** of educational matters and for the distribution of educational resources and **opportunities**. The post-Apartheid dispensation **formally** ushered in by the 1994 **elections** marks a significant regime-type transition and the material that we have assembled in this way should enable one to gain a better descriptive and analytical purchase on current and future educational developments.

With respect to white education, much of the data goes back to 1910, and our principal source until 1960 has been the Union Statistics for 50 Years and subsequently the Central Statistical Services Reports. For other race groups data is of more limited coverage. While on occasion the series run through to the early 1930's, often coverage is more limited. Again, the initial source for the data was the Union Statistics for 50 years, though in this instance the source required substantial supplementation. **Sources included Reports of the Auditor General**, sources published by the Department of Bantu Education (**DBE**) - later Department of Education and Training (**DET**) - *Annual Reports from 1953 through to 1993*, and the *Departments of Coloured and Rehoboth Affairs* and *Indian Affairs*, later the reports of the *Houses of Representatives and Delegates*. statistics for the **TBVC**<sup>2</sup> administrative instances disappear and then sometimes re-enter the DBE and DET data series. For purposes of coherence and continuity we have reconstructed this data to cover all those territories which originally fell under the jurisdiction of the governments of first the Union and then the Republic of South African and which have, **since** 1994, been reincorporated. **Our** data is thus comprehensive and covers during the Apartheid period the Republic of South Africa, the non-independent ("self-governing") administrative entities as well as the TBVC "**states**".<sup>3</sup> Note that the statistical records kept by these latter instances were of an uneven and often appallingly bad quality.

The latter point is a general one that applies to many of the data sources we employed. The data quality is variable at best, and state institutions did little to maintain consistency and quality of data publication over long stretches of South Africa's history since Union. In this context several general sources proved to be of considerable value to our endeavour. These included the *Annual Surveys* published by the Institute of Race Relations, and E.G. Malherbe's *Education in South Africa* (Malherbe 1977).

## 3.0 THE SOUTH AFRICAN TERTIARY EDUCATIONAL SYSTEM: THE ROLE OF UNIVERSITIES

The historical development of South Africa's university system mirrors that of wider society. While in the pre-1948 era in principle the universities were not racially segregated, access to universities by other race groups was severely curtailed, for economic if no other reasons. Post-1948 South Africa saw a two-fold development. First was the exclusion of Black, Coloured and Asian (**BCA**) students from universities they previously had access to at least in principle. Secondly and simultaneously a series of new universities individually ear-marked for specific racial and ethnic groupings came to be founded.

Thus we saw the foundation of the universities detailed in Table 1, with their associated racial **categorization**, and the year of foundation.

<sup>2</sup> We follow the standard acronym for the **Transkei**, Boputhatswana, **Venda**, Ciskei set of territories, **recognized** as "independent" by the South African state.

<sup>3</sup> Where adjustment for the TBVC states was not possible, we note this in the discussion that follows.

Table 1: South African universities, their date of foundation, and their racial grouping<sup>4</sup>

University	Date of Foundation	Historical Racial Grouping <sup>5</sup>
University of South Africa <sup>6</sup>	1877	All Races
University of Cape Town	1918	White
University of Stellenbosch	1918	White
University of the Witwatersrand	1922	White
University of Pretoria	1930	White
University of Natal <sup>7</sup>	1949	White
Rhodes University	1949	White
University of the OFS	1949	White
Potchefstroom University for CHU	1951	White
University of the Western Cape	1959	Coloured
University of Port Elizabeth	1964	White
Rand Afrikaanse University	1967	White
<b>Fort Hare</b>	<b>1969</b>	<b>Black</b>
University of the North	1969	Black
University of Zululand	1970	Black
University of Durban-Westville	1971	Asian
University of Transkei	1976	Black
<b>MEDUNSA</b>	<b>1976</b>	<b>Black</b>
University of Venda	1981	Black
Vista University	1981	Black
University of Bophutatswana	1988	Black

Racial classification of university attendance makes less sense for the South African university sector prior to 1948 and effectively even a later date such as 1960, than it does for primary and secondary education. This is because the student bodies at these tertiary institutions included students of all races (though the number of BCA students were relatively small compared to their white counterparts). In effect, universities were less clearly “white” or otherwise racially defined, though the differential quality of schooling provided for South Africa’s racial groups was such as to ensure that access to university education by BCA students remained limited.

Moreover, statutorily racial categorization ceases to be functional after the democratic transition of 1994. For this reason, while we detail the history of the South African university system, over the full 19 10-93 period, the data series to be presented below will contain a racial breakdown of the data series only for a portion of the full sample. We will also detail below that a racial classification of the university system in terms of student numbers during the course of the 1980’s becomes increasingly tenuous. Increasingly during the course of the 1980’s students of races other than white came to enter universities that continued to be **officially** classified as white. At the same time, statistical services in South Africa continued to aggregate students purely by race, thus making it increasingly difficult to obtain estimates of BCA students that attended “white” universities. While such a phenomenon could also be argued to have been present in

<sup>4</sup> Note, many of the institutions existed in a different format prior to their incorporation by way of acts of enablement. We note only the date of the official act of parliament enabling the universities. For blacks, only one such institution predates the 1960’s. Fort Hare existed as a University College from the mid 1930’s.

<sup>5</sup> Note that the historically black universities were designated for different ethno-linguistic groupings. Historically white universities were divided into English medium and **Afrikaans** medium universities. For a fuller description of these distinctions see Malherbe (1977).

<sup>6</sup> Previously known as the University of the Cape of Good Hope – changed to University of South Africa in 1916.

<sup>7</sup> The University of Natal is distinguished from other historically white universities in having always had a medical school with an exclusively black (here including Asian) enrolment.

the schooling system, at the university level the extent of the problem appears to have been more extensive. Since the net result **would be** potentially serious bias in some of the central time series to be presented below (for instance to the student-lecturer ratio), we make some attempt to assess the severity of the bias in the discussion that follows. We shall argue that it is possible to make relatively accurate adjustments to student numbers.

We also note that while the South African university system is generally based on residential universities, UNISA offers distance education at a university level, and incorporates the single largest student body in the university system as a whole. While we have data on UNISA available, and on occasion report briefly on its implications, we focus on the residential universities in our analysis. UNISA as a distance educator simply belongs into a somewhat different category to the other universities included in our time series.

The series that we consider in the discussion that is to follow include the total student numbers, the total academic lecturing staff, hence student-lecturer ratios, total real expenditure and per student expenditure, total degrees issued, as well as the proportion of degrees issued in what we term core scientific disciplines. We choose the mathematical and **natural** sciences as a means of providing a quality measure of the education offered, because of their clearly identifiable objective performance standards, and their centrality to the process of economic growth – see the discussion below. Again, wherever possible data series will be presented in terms of racial breakdown.

### 3.1 Student Numbers

In Figure 1 we present the time series on student numbers in the South African university system. While data on student numbers are available as far back as 1910,<sup>8</sup> a racial breakdown of student numbers becomes possible only after the late 1940's. However, the student body in South African universities prior to 1950 was in any event predominantly white, making the unavailability of a racial breakdown of student numbers less limiting.

The time series further show that white students as a proportion of the total student body began to fall rapidly only from the mid-1970's onward. This accords well with the findings of Fedderke et al (2000), in which pupils in the black schooling system began to show dramatic increases **during** the course of the 1970's.<sup>9</sup> The rising proportion of BCA students in the total student body comes mainly from black students, suggesting that the increased through-put of the black schooling system had a knock-on effect on university institutions, with rapidly accelerating student numbers during the course of particularly the 1980's. By contrast, the accelerating growth of student numbers during the course of the 1960's is attributable to white students.”

One data limitation that will be encountered below, is that while student numbers in the black university system could be obtained both for universities in the former TBVC states, as well as those internal to South

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<sup>8</sup> This is consistent with the information presented in Table 1. A number of the institutions constituted as universities at the dates indicated in Table 1, previously existed as university colleges – in the case of the University of Cape Town from early in the 19<sup>th</sup> century.

<sup>9</sup> See Fedderke et al (2000) Figure 2.

<sup>10</sup> We have already mentioned that the “white” universities came to attract increasing numbers of BCA students during the course of the 1980's and 1990's. As a consequence, we undertook two alternative adjustments to the student numbers attributed to the “white” university system, in order to determine the severity of any bias **that** is likely to result from this classification problem in the data. While the adjustments reveal that the 1980's and 1990's did indeed see an increase in the number of BCA students in the universities designated “white”, the magnitude of any bias from this undercount of student numbers at “white” universities is not severe. Secondly, it emerges that most of the additional BCA enrollments were on the part of Coloured and **Asian** students rather than Black students. In the discussion that is to follow, we will refer to the BCA-adjusted “white” series wherever it is appropriate to do so. Details of the adjustment are available from the authors on request.

**Africa**, it is not possible to obtain lecturing staff series for the TBVC institutions.” In Figure 1 we therefore report both the number of students enrolled in all black universities, as well as the number of students enrolled at black universities not in TBVC states. It is clear from the evidence that **the** proportion of black students enrolled in TBVC universities rose during the course of the 1980’s and early 1990’s.

### 3.2 Lecturers

As for the student data, the time series for lecturing **staff** reflect the preponderance of the white university system until well into the 1960’s. A divergence between the total university lecturing staff series and the lecturing staff at white universities only emerges during the course of the **1960’s**, with the establishment of the newer universities designated for use by various ethnic groups. See the data contained in Figure 2. The rapid growth in white student numbers during the course of the 1960’s is mirrored **in** a rapid growth in lecturing staff at white universities, though this growth effectively comes to a halt during the course of the 1970’s.

Subsequent growth in lecturing staff is predominantly in the BCA university institutions, and for the black universities notable increases in lecturing staff only emerge from the early **1980’s**, though this coincides with the sharp increase in student enrollments in the black universities – see Figure 2.<sup>12</sup>

### 3.3 Student-Lecturer Ratios

Data on student and **lecturing** staff numbers allow us to compute the student-lecturer ratios reported in **Figure 3**.

The most striking feature of the evidence contained in Figure 3 is that the student-staff ratios show relatively little variation across race groups. Indeed, during the course of the 1960’s and 1970’s the **student-staff** ratios at the BCA institutions lay below that maintained in the white university system. Moreover, this is true even where (as in Figure 3) we employ the uncorrected white university student enrollment figures (which do not count the students of other races attending these universities). Where the adjusted student **enrollments** for white universities are employed, there is a further though marginal upward adjustment in the student-lecturer ratio at white **universities**.<sup>13</sup> Thus the point that student-lecturer ratios at BCA institutions over the course of the 1960’s and 1970’s were if anything better than at white institutions strengthens.

This pattern only changes after 1980, when the **student-staff** ratio of all parts of the university system begins to demonstrate an upward trend. During the course of the **1980’s** the student-staff ratio of both the Coloured and **Asian** universities is of essentially the same order as of the white universities, though there also appears to be greater cyclical variability in Asian and Coloured student-lecturer ratios. However, the strongest change during the course of the 1980’s is evident in the black university system. Consistent with the preceding evidence of rising student numbers in black universities, the student-staff ratio in black universities rises dramatically during the **1980’s**, to approximately double that which prevails in the white university system.

<sup>11</sup> Despite repeated attempts to obtain information from the institutions concerned (as well as the University of Durban-Westville, and the University of the Western Cape), we have found it impossible to obtain any meaningful information for any of the series presented on universities in this paper. Our only source therefore proved to be **official** publications, which for many years and many BCA institutions proved to be of very poor quality. This may itself be interpreted as an indicator of the capacity that is at the disposal of this part of the university system.

<sup>12</sup> Readers should note once again that lecturer numbers proved impossible to obtain for universities in TBVC states. The data on lecturers in Black universities are thus in **non-TBVC** territories. Unfortunately we were not able to correct the total staff numbers for all black universities given the apparent unwillingness or incapacity of these institutions to make the relevant data available to us.

<sup>13</sup> The full evidence is available from the authors.

There are three immediate and important implications that emerge from the evidence provided by student-lecturer ratios. *First*, the low student-lecturer ratios in BCA-universities during the pre-1980 sample is likely to be influenced by the poor performance of the BCA-schooling systems, detailed in Fedderke et al (2000). Thus the ability of the BCA-tertiary education system to attract **sufficient** student intake is likely to have suffered from a supply-side constraint, making it difficult to attract students in sufficient numbers.

*Second*, it becomes likely that student-staff ratio for universities may well not be a reliable indicator of quality of learning **environment**,<sup>14</sup> particularly since we know the student intake to have been poorly prepared for tertiary education. This is **thus** quite unlike the case for the South African schooling system, where pupil teacher ratios were found to show strong variation across the racially defined schooling systems (see Fedderke et al 2000), and this variation was found to exert strong influence on educational **attainment** (see Fedderke et al 1999).

A *third* implication of this evidence is that the development of separate university systems for the distinct ethnic groupings of South Africa's population was an extraordinarily inefficient use of scarce resources. Universities are notoriously expensive in terms of start up costs. To develop entirely new universities with a student body generally poorly prepared, and with very low student-staff ratios, may well have prevented the already existent universities from improving their quality, and to take advantage of economies of scale in incorporating BCA students into their historic student body.

In effect, what begins to emerge is a picture of a university system for the BCA population groups that was neither qualitatively good, nor resource efficient, and which may well have damaged the global development prospects of South Africa's tertiary educational system by preventing capacity deepening in the best parts of the system. We will present further evidence to corroborate this finding in sections that follow.

### 3.4 Real Per Student Expenditure

We have already seen that a fairly standard measure of the quality of learning environments, the student-lecturer ratio, fails to detect quality differentials between the white and BCA university systems. This is again true of a second standard measure of the quality of educational processes provided by real per student expenditure. Once again this measure fails to indicate a quality differential between BCA and white universities.

Figure 4 reports the absolute level of real expenditure on the various sections of the university system. It is clear that real absolute expenditure on historically white universities dominates expenditure for the sector. By comparison, total absolute real expenditure on black universities in 1993 still lagged behind total absolute expenditure on white universities by a factor of approximately 3 : 1.

Nevertheless, expenditure on the black university system was subject to sharp proportional increases during the course of the 1980's – approximately doubling from 1980 through 1985. Corresponding to this sharp upturn in real expenditure on black universities, historically white universities experienced an equally sharp, and in total absolute magnitude greater decline in real expenditure over the same period. The first implication to emerge from the expenditure figures is thus of a reallocation of funding in the university system of South Africa during the course of the 1980's.

The pattern that emerges from the per student expenditure figures is perhaps even more startling. Figure 5 illustrates. For historically white universities, real per student expenditure has remained essentially constant over the full 1910 to 1993 period, though the 1980's and early 1990's have seen some decline from the height of per student expenditure achieved during the course of the 1970's.<sup>15</sup> For all other racial groupings

<sup>14</sup> The ratio of students to lecturers does not control in any way for the quality of the lecturing staff employed in the respective sets of institutions. Ideally, the ratio should be appropriately weighted for the quality of lecturing input. Unfortunately, no ready statistics were available to enable such a quality adjustment.

<sup>15</sup> Per student expenditure is BCA adjusted for white universities.

in the university system, per student **expenditure** during the course of the 1960's and 1970's was higher than for the white university system, though the 1980's has seen convergence between the expenditure figures for the various sections of the university system.<sup>16</sup> The black university system did not differ from Coloured and Asian universities in this respect. For black universities real per student expenditure consistently lay above that for the white university system during the 1960's and **1970's**, and it is only the sharp increase in student numbers at black universities during the **1980's** that drives down per student expenditure below that of other parts of the university system."

A number of explanations account for these data patterns ■ and a number of implications follow. First, the high per student expenditure figures in the BCA-universities can be accounted for in terms of the start-up costs of any new university system. Again consistent with our suggestions emerging under the discussion of the student-lecturer ratio, the **difficulty** likely to have been experienced by the BCA universities is the recruitment of a suitable student body. Thus, the investment in **infrastructure** and in the **human** capital required to start up a new set of universities was for a small student body, who were in consequence funded to a disproportionately high level on a per capita basis. Only during the course of the 1980's does a quality differential come to be indicated by per student expenditure levels at universities.

The implication of this evidence is once again that the educational system imposed by the apartheid ideology was wasteful of scarce resources.

The resources expended in developing an entirely new university sector in parallel with an already existing system might have been far more efficiently employed in expanding the capacity of the existing system, with the associated economies of scale that might have been realized in the process. As it was, the educational system was starved of a large body of resources, that might have been more appropriately employed in improving the quality of the primary and secondary schooling system feeding the universities.

This point strengthens when one comes to consider the quality of the education offered by the BCA universities.

### 3.5 Measurement of Output: Degrees Issued by Universities

Absolute output measures of the university system suggest a steady and, since 1960, sometimes steep increase in the total degrees granted by universities — see Figure 6. The evidence is once **again** consistent with that obtained from student and lecturer numbers — the white universities dominate the university system in output terms as much as in input terms, despite the growing degree output of black universities particularly during the course of the 1980's.

While the absolute output of degrees suggests that black universities were expanding their output in line with the increasing numbers of students entering the system, absolute numbers of degrees do not yet control for the quality of the output being generated by the black university system. A number of pieces of evidence suggest that the quality of output to emerge from the black universities was not comparable to that of the white university system over our sample period.

*First*, in Figure 7 we report the proportion of total degrees issued by the various university systems that emerge in the natural and engineering sciences (**NES**).<sup>18</sup> For the white and Asian university systems, the

<sup>16</sup> The volatility of the Coloured and Asian per student expenditure figures is explained by the fact that student numbers are for the University of the Western Cape and Durban-Westville respectively. Thus student numbers are relatively small, increasing the proportional impact of larger capital expenditures.

<sup>17</sup> It is worth noting that funding of universities within and without the TBVC-system does not appear to have differed significantly, though the nominally independent states appear to have spent a little more on their universities than South Africa on its equivalent black universities.

<sup>18</sup> We choose NES degrees for the following reasons: the mathematical sciences have as clearly **identifiable** objective performance standards as any subject available to university students. Application of subjective standards of assessments are therefore minimized. Moreover, we consider the mathematical sciences to be foundational to a wide range of cognitive activities and vocational skills. Lastly, mathematics (**and** science)

proportion of NES degrees falls from a high point of 20% in the mid 1960's, to a little under 10% in the early 1990's.<sup>19</sup> While the black university system initially had a similar proportion of NES degrees conferred, during the course of the 1980's at precisely the time when student enrollments were expanding rapidly, the NES proportion fell rapidly, and by 1993 had reached a low of 2%.<sup>20</sup> While the trend for both systems has been downward, the performance of the black universities in producing science graduates is far poorer than that of the white university system. Moreover, while the strong increase in student numbers in the black university system in the early 1980's was matched by an increasing conferral of degrees – see Figure 6 – this was clearly achieved by an expansion of students reading toward “soft” rather than science degrees.<sup>21</sup> Figure 7 demonstrates a sharp decline in the proportion of science graduates precisely at the point at which both student numbers and total degrees conferred were experiencing sharp growth.

This evidence carries two immediate implications. The black university system, while beginning to absorb increasing numbers of black students emerging from the black schooling system, was unable to translate the increased enrollment into NES graduates with the same facility as the rest of the university system. While this may point to the poorly prepared student intake that the black university system had to contend with, it is also indicative of a low capacity within the black university system to generate NES graduates.

Second, we consider the ratio of degrees, conferred in each year to the total student body in the racially categorized university systems. Figure 8 reports, and Figure 9 repeats for the NES degree category. Both ratios serve as proxies for the throughput of the relevant university system, viz. the ability of the university system to translate its intake of students into graduates. The most striking implication of the evidence of Figures 8 and 9 is that the white and black university systems have significantly different throughput rates. For white universities approximately 17% of the total student body in 1993 was receiving a degree, and the

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was used as the central indicator of the quality of the educational system in the Hanushek and Kim (1995) growth study – and proved a more significant predictor of long run economic performance than the quantity of education. See also the discussion in Fedderke et al (2000). Clearly, there is an unavoidably “subjective” aspect to the decision to include or exclude degrees as NES degrees. Two problems, in particular should be noted. First, new degree programmes reflecting the development of new areas of science and technology, such as the emergence of computer science render intertemporal comparisons problematic. One is not necessarily, from year to year, measuring exactly the same thing. Second, there are, again unavoidably, “gray areas”, where it is not always clear to what extent the degree programme should really be regarded as falling within the realm of the natural and engineering sciences. To counter this, we elected to be highly restrictive in what we included. Thus we excluded all degrees conferred in the field of commerce, even though some may have required a reasonably high level of mathematical skill. Similarly, we excluded degrees awarded in medicine and dentistry as they are, essentially, degrees in the traditionally “noble professions” rather than degrees that pertain directly to the development of natural scientific research capacity and the development of technological applications. We thus included all degrees designated as engineering degrees and awarded through faculties of engineering. We included, too, all degrees in the natural sciences including the biological sciences. Included, too, were fields such as computer science and agricultural science where it was clear that the content of the degree reflected either a programme in agricultural engineering or the study of agriculture as a rigorous, scientific discipline. Thus degrees awarded by agricultural faculties in genetics or molecular biology would have been included. We excluded, however, degrees that carried a designation such as B.Sc. or M.Sc but where there was reason to believe that the designation was, for our purposes, misleading. Thus B.Sc. or M.Sc. degrees in nursing, for instance, would have been excluded. We did, however, include degrees in fields such as land surveying where the higher-level mathematical requirements were evident.

It should be pointed out that the poor organization of the data kept, including the failure through many years of the relevant education authorities to provide aggregates of degrees awarded made the task of segregating and aggregating degree-types by year especially difficult.

<sup>19</sup> The higher proportion of NES degrees in the total student body is attributable to the impact of Coloured and Asian students present in the white university system, but classified in terms of their racial categories. In this instance the bias could not be corrected for.

<sup>20</sup> The Coloured University occupies an intermediate position between these two extremes.

<sup>21</sup> Indeed, a number of the campuses of Vista University, which is the single largest black university, do not offer any science subjects.



trend for the white university system was upward." By contrast, black universities while sharing an upward trend in the total degree throughput rate since the early 1980's, had reached a throughput rate of only 10% in 1993, significantly below that of white universities. In the case of the throughput of NES degrees black universities reported close to 0.002 in 1992, while white universities reported 0.01. Particularly the NES throughput ratio could be argued to be unhealthy for both the white and the black university systems. Nevertheless, black universities were not able to translate the increasing student intake of the 1980's into a higher throughput of NES degrees. To the extent that one accepts that NES degree output is central to the labour market needs of a modern economy, therefore, the quality of black university output during the course of the 1980's and early 1990's was low. Moreover, trends in the NES throughput ratio suggest that matters were not improving over time.

We have already seen in earlier sections of this paper that the BCA university system proved expensive in terms of real per student expenditure. What the evidence of the present section has demonstrated is that the education provided was also of poor quality. The implication is thus that BCA universities were expensive in at least two distinct senses. The first is in terms of direct student expenditure: BCA universities required a greater input of scarce **resources** in order to produce the same output of students. But second, the high per student expenditure in BCA universities also translated into a lower quality human capital output than that being produced in white universities. Thus the opportunity cost implications of the development of the BCA university system are substantial. Considerable resources devoted to the production of low-grade human capital at the expense of reduced opportunities for developing better and cheaper human capital production in the already existent university system.

Once again, therefore, it is arguable that the opportunity cost of the resources deployed in the black university system not only made for an expensive tertiary educational system, but that the tertiary educational system came to produce low-quality output in addition to being wasteful. The resources absorbed by the development of a less than successful duplicate university system, could arguably have been deployed more successfully elsewhere in the educational system: in schooling or the rest of the university system.

**Thirdly**, Figure 10 notes the **real** expenditure per degree conferred in the **different** parts of the university system. All sections of the university system saw an increase in the cost per degree produced over the course of the 1980's.<sup>23</sup> However, the increase has been the most dramatic in the black university system, to the extent that the cost per degree in the black university system in 1993 had reached 1.5 the level maintained in the white universities.

There is a final but perhaps also most important indicator of the **differential** quality of South African universities. Universities are distinguished from other forms of tertiary educational institutions by virtue of the expectation that they be engaged not purely in teaching activity, but that they contribute to the advancement of knowledge through the publication of original research. In Figure 11 we report both the absolute level of research unit output of the racially **categorized universities**,<sup>24</sup> as well as their per lecturer research unit **output**.<sup>25</sup> The evidence confirms the suggested quality differential that we have already

<sup>22</sup> We note the sharp increase in the degree throughput for Coloureds (University of the Western Cape) in the mid 1980s. We are disinclined to believe this to be a reflection of higher effectiveness of the learning environment at UWC, however. Note that the proportion of NES degrees over the same period falls sharply, suggesting a move to "soft" degrees as a means of increasing throughput. In any event, so rapid an institutional transformation should stretch the credulity of anyone acquainted with institutional inertia, and seems more likely to be achieved through falling standards, than through **genuine** improvement of the learning environment.

<sup>23</sup> Perhaps reflecting the poorer preparation of students entering the university system across the board -- see also the discussion of the mathematics preparation of pupils from white as well as black schools in Fedderke et al (2000) Figure 13.

<sup>24</sup> The data are courtesy of C. Borresen, University of Natal **Research** Office, University of Natal, Durban.

<sup>25</sup> Readers should bear in mind that publication units are not quality adjusted. This is particularly serious since a publication of an article in a South African journal with very low impact factor would be ranked as equivalent to an article in a leading international journal with maximal impact rating. In economics, for

established as existing between the “white” universities and BCA universities. Not only is the absolute level of research output in white universities considerably higher than in BCA universities, but this is translated into considerably higher per capita research output also.

However, we note that even the best part of the university system in South **Africa** has at the very least manifested declining quality over time. First, the white university research output has ceased to increase in absolute terms from the late **1980’s**, and in per lecturer output terms the output declined through to the early **1990’s**, though it has since stabilized. Furthermore, the per lecturer output of approximately 0.6 publication **unit** per annum can be questioned as to its adequacy.

The declining per lecturer and static absolute levels of research output during the late 1980’s and 1990’s may well be attributable to the increased resources devoted to the development of the BCA university system. In the preceding discussion, we have already suggested that the expenditure on BCA universities proved to be an expensive way of obtaining relatively low quality degree output. The evidence on research output, suggests that an additional cost may well have been a declining capacity of the front **ranking** research universities in South Africa to continue to fulfill their vital research **function**. The reallocation of funds to the development of the BCA university system therefore had opportunity costs not only in terms of foregone development opportunities in the **already** existent university system, but potentially also in preventing the resourcing of growing research capacity in the South **African** university system.

In a broader developmental context, it raises the important question of whether it is desirable for a society to concentrate solely on devoting resources to a broad based mass tertiary educational system premised on the lowest common quality denominator. Or whether it is not desirable to have at least some tertiary education devoted to the production of both high quality degrees, as well as world quality research. If the latter route is chosen (and the experience of the East Asian countries may be taken to at least suggest that it is not entirely **unfruitful** – as long as the right type of output is **emphasized**), the implication would be for the identification of a small number of core institutions, properly funded, and with appropriate incentive structures designed to encourage greater attention to research activity.

Finally, in this regard it is possible to identify a strong inter-institutional difference in terms of research output between white **universities**.<sup>26</sup> Table 2 and Table 3 report both the absolute and the per lecturer research output by individual South African university. The evidence suggests the presence of a three tier structure to the university system:

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*instance, an article in **Econometrica** carries no more status than a review note in the South African Journal of Economic and Management Sciences.* Moreover, research collaboration is **penalized** on a pro rata basis by the national publication unit system. Collaboration with Nobel Prize winning economists therefore comes to be ranked below single-handed review articles. Finally, the national register of approved journals excludes a number of leading journals, while rating obscure South African magazines as legitimate **fora** for research.

<sup>26</sup> Readers should bear in mind that publication units are not quality adjusted.

Top Ranked: Per Lecturer	Mid Ranked: Per Lecturer	Bottom Ranked: Per Lecturer
Cape Town RAU Wits	Stellenbosch Natal Rhodes Pretoria Free State Potchefstroom	Port Elizabeth UNISA Durban-Westville Western Cape <b>Zululand</b> Vista

Top Ranked: Absolute Output	Mid Ranked: Absolute Output	Bottom Ranked: Absolute Output
Wits Pretoria Cape Town	Stellenbosch Natal UNISA RAU Free State	Rhodes Potchefstroom Western Cape Durban-Westville Port Elizabeth North MEDUNSA Vista <b>Zululand</b> <b>Fort Hare</b>

Such a structure might provide some guidance as to how a functional differentiation between universities might come to be structured. The three-tier system might be identified with "ivy league" research universities, state universities or liberal arts colleges, and finally community colleges. Our concern here is not to identify which university should **fulfill** which of these functions. Nor is it to denigrate any one of the three functions. We are arguing instead that the existing capacity within the university system is not such as to place all universities on an equal footing, and that it may therefore be sensible to develop the existing structures into institutions that **fulfill** different pedagogical functions, all of which are important.

In concert with the earlier evidence presented on the South African university system, therefore, the implication of the present section is that the black university system proved not only to generate output that was of poor quality, but that it proved to be poor output that was expensive. While the poor preparation of pupils passing through the black schooling system is sure to have played its role, the poor design and implementation of a duplicate black university system intended to run in parallel with the white, is likely to have contributed not insignificantly in its own right.

Table 2: Absolute level of publication unit output by university, 1984-95.

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Cape Town	619	767	850	912	882	758	797	830	831	774	794	702
Fort Hare	15	29	37	34	28	32	43	22	29	33	29	22
Free State	251	284	290	372	296	253	300	315	301	331	322	298
Medunsa	54	33	45	45	43	35	27	53	29	36	38	52
Natal	337	392	398	401	468	501	479	521	477	614	553	556
North	11	9	12	25	28	29	42	34	31	43	50	72
Potch	77	95	134	173	227	200	242	199	231	193	191	171
Pretoria	304	419	477	658	658	710	767	706	747	753	706	750
RAU	112	136	174	213	231	286	283	270	364	349	306	316
Rhodes	101	118	132	129	158	163	174	171	160	156	157	175
Stellenbosch	254	407	494	492	455	461	458	465	487	482	617	589
UDW	23	58	56	62	66	75	80	100	107	90	126	127
UNISA	128	173	183	260	267	265	333	366	395	426	408	407
UPE	86	116	93	106	126	98	82	108	107	71	91	82
uwc	16	29	51	45	46	65	47	66	82	121	127	144
Vista	10	10	12	26	23	38	34	47	59	59	59	49
Wits	988	914	1008	1003	1026	935	1004	820	861	769	866	789
Zululand	11	17	16	21	28	31	20	32	40	36	49	45

Table 3: Per Capita Publication Unit Output by University, 1989-94

UNIVERSITY	1989	1990	1991	1992	1993	1994	Rank1989	Rank1994
Wits	1.17	1.09	0.78	0.83	0.74	0.84	1	3
Cape Town	1.04	0.98	0.93	0.93	0.89	0.91	2	1
RAU	0.92	0.82	0.71	1.03	1.00	0.89	3	2
Natal	0.68	0.59	0.58	0.49	0.65	0.56	4	5
Rhodes	0.59	0.56	0.49	0.47	0.43	0.47	5	6
Stellenbosch	0.55	0.49	0.45	0.51	0.50	0.65	6	4
Pretoria	0.51	0.50	0.43	0.47	0.48	0.45	7	7
Free State	0.41	0.43	0.41	0.37	0.40	0.39	8	8
Potch	0.40	0.45	0.35	0.41	0.36	0.36	9	9
UPE	0.38	0.29	0.34	0.33	0.22	0.28	10	10
Medunsa	0.26	0.14	0.23	0.07	0.16	0.12	11	15
UNISA	0.24	0.25	0.24	0.25	0.23	0.25	12	11
UDW	0.20	0.19	0.21	0.22	0.18	0.24	13	12
Vista	0.15	0.10	0.11	0.11	0.09	0.09	14	17
UWC	0.14	0.09	0.11	0.13	0.20	0.22	15	13
Zululand	0.14	0.08	0.12	0.14	0.12	0.16	16	14
North	0.10	0.11	0.08	0.08	0.11	0.10	17	16

### 3.6 Conclusions and Evaluation

The implication is thus that the interpretation of the data for the university system of South Africa requires a different approach from that appropriate for schooling, and also carries different implications from the schooling system. In particular:

1. Standard quality measures of inputs into the educational process, such as student lecturer ratios and real per student expenditure do not carry an unambiguous implication that the quality of black universities was poorer than white universities – though they are more expensive.
2. The exception is provided by the student-lecturer ratio of black universities during the course of the 1980's and 1990's.
3. While input measures do not serve to differentiate between white and black university systems, our output measures do so discriminate. The proportion of natural and engineering science (NES) degrees for black universities lies well below that of the rest of the university system. Moreover, passthrough rates of students suggest that the black university system is far weaker at transforming student **enrollments** into the successful completion of degrees – and more so for NES degrees than for degrees in general. Lastly, real per degree expenditure in black universities was approximately 1.5 times that in white universities.
4. The research output of South African universities is strongly differentiated, not only between BCA and white universities. But white universities also demonstrate strong quality differentials amongst themselves.
5. Since the per capita expenditure on students in black universities **ranged** from parity to four times that spent in the white university system, the implication is thus of a university system of considerable inefficiency and wastefulness.

Therefore, while the finding of the present paper is that the data of the university sector should be interpreted **differently** from the schooling system data presented in Fedderke et al (2000), the findings are consonant with those of Fedderke et al (1999). For the university system as much as for the schooling system the finding is that resources were inefficiently and wastefully deployed. While the schooling system was **characterized** by strong inequality in terms of resourcing and poor incentive structures, which in turn led to poor **performance** of scholars in the black schooling system, in the university system we have a **well-resourced** set of black universities, that nevertheless perform badly.

The difference between the two systems is that the black schooling system was cheap and nasty – the black university system was (and is) expensive and nasty.

#### **4.0 APPLIED TRAINING**

##### **4.1 Apprenticeship Contracts**

Discussion of the tertiary educational system of South Africa frequently centres on the training provided by academic institutions such as universities. Academic training, and the university system as a whole is undoubtedly of central importance to the long **run** development of South Africa, both in terms of the prospects for long **run** economic growth, and development in terms of wider conceptions of human development. However, academic training provides only one aspect of the human capital needs of a modern **economy**. The experience provided by the development of economies such as Germany and Japan amongst others,<sup>27</sup> suggests that the provision of formalized training in applied and practical trade skills may be of central importance also. Modern economies require a wide and diverse range of skills, and practical as well as rational-critical analytical capacity are important. Given that South Africa is a middle income country, with a population at relatively diverse levels of economic and human capital development, and an economy that is only partially modernized, such imperatives may be all the more pressing.

For this reason we extend our examination of post-secondary training opportunities in South Africa to apprenticeship contracts registered with the Department of Manpower. Such a series is consistently available over the 1926-97 period, though it proves difficult to provide a racial classification of the contracts registered.

We have seen that the South African university system has been subject to rapid and sustained expansion over the course of the 1980's and 1990's, though there are indications that the absolute expansion of the system has not been accompanied by adequate quality assurance of output. The evidence to emerge from apprenticeship contracts in South Africa is even more disturbing. In Figure 12 we report the absolute number of apprenticeship contracts registered. While rising through to the mid-1970's subject to some cyclical variation, the *absolute* number of apprenticeship contracts in South Africa has been declining at least since 1985. Moreover, the per capita ratio and the ratio of contracts to GDP reported in Figure 13 show that the production of the sort of human capital generated by apprenticeships has been in long term decline since the 1950's.

One reason for this decline may be that modern economies require a smaller proportion of its labour trained in practical skills. However, given the middle income status of South Africa, and the relative preponderance of manufacturing and mining activity in aggregate output even in the 1990's, such an explanation is unlikely to have much purchase. A second possible explanation of these trends is that the payoff to academic university training is **sufficiently** high to have generated a flow of school leavers to universities rather than into trades. Again while this may provide some insight, the continued existence of a large body of unskilled workers in the South African workforce (with little formal training of any sort) suggests that this too is at best but a partial explanation. Indeed, the evidence raises the question of why training of the sort offered in apprenticeships is not used more frequently in order to raise the productivity of labour in South Africa. Concerns have often been expressed about the productivity of South African labour. Yet direct intervention to raise labour productivity seems rarely to address training of an applied, practical sort – and the national debate surrounding productivity has rarely suggested that more extensive and formal recourse to apprenticeships might be useful.

This suggests a third reason why apprenticeship **training** in South Africa has been in long term decline. We have argued repeatedly that human capital production in South Africa has been poorly managed in virtually all of the dimensions that we have touched upon. Apprenticeship training may well be just one more item to add to this list. One might wish to question whether South Africa's level of economic development might not make a greater focus on formal training in applied practical skills required in trade applications, of at

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<sup>27</sup> See the discussion in Landes (1998).

least equal **importance** to formal academic training. In Germany, for instance, training offered in *Technische Hochschulen* has long been at least partly responsible for the high productivity and quality of the German labour force. In South Africa, paying greater attention to labour productivity may require not only focus on the quality of the schooling system, but also an attempt to improve the training that labour receives in the applied skills it requires in the workplace.

#### 4.2 Technikons

South Africa introduced a system of tertiary technical training in the form of Technikons that are analogous to the Polytechnics of the UK in 1978. While this form of training had a predecessor in the form of Advanced Technical Colleges (as opposed to Technical Colleges, which are properly classified as secondary education), data on this form of training is difficult to obtain prior to 1974. Indeed, even for Technikons after 1978 data is exceptionally **difficult** to obtain particularly as regards the output of diplomas and certificates. This is true regardless of what part of the Technikon system is referenced – white, black, or Coloured\* & Asian.<sup>29</sup>

The data presented below is thus truncated more severely than any other data series collected for the present study. For student numbers and lecturing staff, data covers only the 1974-93 period. While diploma and certificate output is only available from 1986 onward.

Figure 14 reports student enrollments in Technikons. The evidence makes it clear that student **enrollments** in technical tertiary training was dominated by the white race group – **indeed** black enrollments had still not reached white levels in 1993 even in absolute terms. The second notable feature concerning student numbers is that black students enrolled in Technikons designated for the black race group (**Black**), were a relatively small proportion of the total number of black students enrolled in all Technikons (**BlackToT**). To the extent that black students have therefore entered tertiary technical training, it has been primarily through the auspices of Technikons designated for other race groups. Moreover, the increase in black student numbers has occurred considerably later than that for other forms of tertiary education.

For lecturing staff the dominance of the white race group in technical tertiary education is similarly pronounced – see Figure 15. Moreover, technical tertiary institutions show very little increase in **any** staff category except the white, even through to the early 1990's.

While the student-lecturer ratio for white and Asian Technikons increased from sub-10 to 15: 1 levels during the course of the 1980's, the increase in black and Coloured student-lecturer ratios is considerably more dramatic: from sub 5: 1 in the 1970's to above 30: 1 in the 1990's. Figure 16 illustrates. Despite these increases in student-lecturer ratios, however, we note that ratios remained below those maintained in South Africa's university system. While the student-lecturer ratio for universities in aggregate was approaching 35: 1, only black and Coloured Technikons had similar ratios – and in absolute terms these Technikons were a small proportion of the total. Relatively speaking, therefore, tertiary technical **training** in South Africa was relatively well endowed in terms of lecturing inputs, when compared with the university system.

The pattern already noted above with regard to tertiary technical **training**, continues with respect to real expenditure patterns. Figure 17 illustrates that real expenditure on white training dominates the tertiary technical training system, with all other racial categories being negligible by comparison. However, Figure 18 which reports real per student expenditure shows that the difference between race groups does not arise in terms of discrimination in the funding per student by race. Indeed, in the early 1980's real expenditure on black students far outstripped that of other race groups – which is again attributable to the capital start-up costs associated with the development of Technikons for blacks.

What the data suggests instead, is that inequality between white and black students arose simply in the form of **access** to technical tertiary training. Black student numbers remained relatively small even into the 1990's, unlike the expansion of black student numbers in universities, and teachers colleges (see below).

<sup>28</sup> This refers to the Peninsula Technikon.

<sup>29</sup> This refers to the **M.L.Sultan** Technikon.

This restricted access is likely to have been due to both the restricted number of institutions dedicated to black training under Apartheid structures, and the fact that white Technikons restricted access to black students for considerably longer than white universities did.

A second implication to emerge is that much as for the university system, the development of parallel Technikons for various race groups proved expensive in real per student expenditure terms – and it remains to be seen whether the high developmental costs proved justified in terms of the quality of output achieved in terms of diploma and certificate output. At the very least, the suspicion has to be that the resources might have been more usefully deployed in deepening capacity in already existent institutions.

While the absolute level of output of Diplomas & Certificates by Technikons is again dominated by the white Technikons in South Africa – see **Figure 19** – evidence for a clear quality differential between white and BCA Technikons is considerably less clear than it is for universities. **Figure 20** reports the proportion of Diplomas and Certificates awarded by Technikons in Mathematics and Science related disciplines. The surprising result is that the white Technikons performed worse than any other racial category – with consistently approximately 4% of Diplomas and Certificates being in the Math and Science category. For both black and Coloured Technikons the proportion is on average twice as high, and for Asians even greater. Thus the quality differential that emerged between black and white schooling and university education, is at least not evident in the same dimension for Technikon education.

This conclusion remains in place also in terms of the throughput measures for total Diplomas & Certificates (see **Figure 21**), and the Math & Science Diplomas & Certificates (see **Figure 22**). For both throughput measures, the white Technikons are by no **means** more effective than the BCA Technikons. Indeed, in terms of the total Diplomas & Certificates and the Math & Science Diplomas & Certificates the black Technikons demonstrate better throughput rates than the white.

Only in terms of the real expenditure per degree (**Figure 23**) do white Technikons fare better than the Coloured and Asian Technikons, though again black Technikons were more efficient in their resource use than white Technikons during the early 1990's.

The picture that emerges for Technikons, therefore, is that the main form of inequality between races is one of exclusion. White students had greater access to tertiary technical education than did black students in particular. Moreover, in terms of the data series collected for the present study, a quality differential between white and BCA **institutions** is **difficult** to detect. In this sense, therefore, technical tertiary training in South Africa is distinct in terms of its characteristics from other parts of the tertiary training system.

## **5.0 TEACHER TRAINING**

The single most available form of tertiary education available to wide sections of South Africa's **population** was teacher training. This is particularly true of the BCA racial groupings, which were excluded from other forms of tertiary education for much of the twentieth **century**.<sup>30</sup> As a consequence teacher training must occupy an important and central role in any attempt to understand the development of tertiary education in South **Africa**.

An advantage attaching to any analysis of teacher training is that data is somewhat more **comprehensively** and consistently available than that for other sections of the tertiary training system in South Africa. Hence, the historical picture that emerges is of a somewhat more comprehensive and accurate nature than that which is available for other forms of tertiary **training**. There are some exceptions to this quality of data finding, however. First, Hendrik Verwoerd **centralized** "**Bantu**"-**education** under the Department of **Native** Affairs during the course of the 1950's. Data in a number of dimensions on black teacher training came to be execrably kept in subsequent years, making the collation of complete and accurate time series difficult. This appears to have been partly as a result of incompetence in the department, and partly as a means of

<sup>30</sup> In the discussion of the university system in South Africa, we have already seen that the exclusion was effective well into the **1950's**, in the sense that the student body **until** that time was **virtually** exclusively white rather than BCA in nature.



dissimulating the extent of utterly inappropriate social engineering that was taking place. The process of dissimulation is further evident from the fact that the Department of Coloured (and Rehoboth) **Affairs** under **P.W.Botha** in the early 1960's briefly came to record expenditure on education under an item entitled the Slave Compensation **Fund**.<sup>31</sup>

### 5.1 Student Teacher Numbers

In Figure 24 we report student teacher numbers, disaggregated by race.

Student teacher numbers in South Africa appear to reflect the differential level of socio-economic development of the various race groups in South Africa. While student teacher numbers for the White, Coloured and Asian racial groups **appear** to have peaked, and are now on a downward trend in absolute terms after long periods of **expansion**,<sup>32</sup> for the Black race group student teacher numbers continued to expand rapidly into the 1990's.

Once again the expansion of black teachers in training in the late 1970's and the **1980's** reflects the expansion of secondary education on which we have remarked on a number of occasions in this paper already. A positive implication of the evidence is that to the extent that the teachers in training actually qualify with an appropriate quality of training, and that such teacher output is actually employed in the public schooling system, pupil-teacher ratios that have remained high in the formerly black schooling system (see again Fedderke et al 2000) should come to adjust to more acceptable levels than were evident in the early 1990's over time.

What is also evident from Figure 24, however, is that the classificatory mire that official records come to be caught in through the constant inclusion and exclusion of homelands in official statistics, which we have already remarked on in Fedderke et al (2000) with regard to schooling, continues to apply to teachers colleges. Official student teacher numbers after 1976 fail to reflect further increases until the early 1980's. One interpretation of this is that student teachers enrolled in the **TBVC** territories were excluded from the official statistics. In order to correct for this potential bias, it is possible to include student teacher numbers in the **TBVC areas**.<sup>33</sup> While the correction does increase student teacher numbers, it does not alter the apparently static enrollment over the course of the late 1970's. We therefore suggest that this pattern is not simply a function of the classificatory vicissitudes associated with South Africa's homeland system. Instead, the explanation is more likely to lie with the level of political instability that **characterized** the second half of the 1970's.

In the discussion that follows, we will continue to note explicitly the effect of adjusting for the inclusion of the TBVC states. Throughout patterns in the data change little due to these adjustments – but readers should bear in mind that the quality of the data collected from TBVC sources is invariably more dubious **than** that from South African sources.

### 5.2 Lecturing Staff in Teachers Colleges, and the Student-Lecturer Ratio

In Figure 25 we report the number of teaching staff at teaching colleges for the different racial **groupings**.<sup>34</sup> Patterns of development here are much the same as they are for student numbers. The most notable features

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<sup>31</sup> Short of serendipity researchers have little in their armory to be able to extract information **from** large volumes of indexed material given such classificatory practices.

<sup>32</sup> This may well be a reflection of high opportunity costs of entering the teaching profession for these racial groups in terms of both earning potential and status. Again this carries worrying implications for the teaching profession and schooling in South Africa.

<sup>33</sup> Full results are available from the authors.

<sup>34</sup> Note that for blacks it was not possible to obtain data for lecturing staff at teaching colleges over the 1965-78 period. The only data that was reported was for the total teaching **staff** employed in both secondary schooling and teachers colleges, collectively. One means of filling the gap is to extrapolate over the 1965-78 period on the total teaching **staff** available. Unfortunately this is misleading in the current context. The period in question was one of very rapid expansion in secondary schooling (see the discussion

of these are the peaking in the lecturing staff at teachers **training** colleges particularly for white teacher training colleges in the mid-1980's and a subsequent downward trend, and the rapid expansion in lecturing staff at black teachers training colleges during the 1980's. It is also noteworthy that teacher training in the TBVC territories became an increasingly important component of black student teacher training, particularly during the early 1990's. Nevertheless, even in the early 1990's the majority of teacher **training** continued to take place within South **Africa**, rather than in the "independent" homeland areas.

A second notable feature here is that the absolute level of lecturing **staff** at white teachers colleges is disproportionately high given white student numbers. Note that Figure 24 shows a convergence of student numbers in white, and Coloured teachers colleges, yet lecturing staff at Coloured teachers colleges remains at less than half that of white institutions. Similarly for black teachers colleges, student numbers were four times that at white teachers colleges in the early **1990's**, and yet lecturing **staff** amounted to at most twice that of white teachers **colleges**.<sup>35</sup>

The collective implication is thus that the finding on student-teacher ratios for teacher colleges is likely to diverge from that found for universities, and to conform more closely to the schooling system. This is precisely the finding that emerges from Figure 26. The student lecturer ratio in white teachers colleges is less than 10: 1 in the early **1990's**, while that for black teachers colleges hovers at the 20: 1 level.<sup>36</sup> Indeed, the only racial group that comes close to white student-lecturer ratios is the Asian.

Nevertheless, it is worth noting that the student-lecturer ratio for black teachers colleges have come off the peaks reached in the early 1980's (of **around 25:1**), and the student-lecturer ratio for black teacher colleges is nowhere as disastrous as that for black schooling (which in the early 1980's was still at between 50: 1 and 60: 1). The main cause for concern here is the differential that is present between the white and black teachers colleges and the implication of both inequity and of inefficient resource usage that this implies.

Trends in the student-lecturer ratio are not **difficult** to account for given the evidence already presented. While student **numbers** in white teachers colleges have been in relatively long-term decline (see Figure 24), lecturing staff has only begun adjusting during the course of the 1980's. The consequence for white teacher colleges has been a steadily falling student-teacher ratio since the early 1960's. For black teachers colleges it is the surge in school leavers that translates into higher student numbers for all tertiary education in the 1980's and the lagged response in the lecturing staff at tertiary institutions that drives **the** ratio for black teachers colleges.

### 5.3 Real Per Student Expenditure

We have already noted that in terms of student-lecturer ratios teachers colleges show greater similarity with South Africa's schooling system than with South Africa's university system. This pattern is continued for real expenditure and per student expenditure. Figure 27 and 28 illustrate.

Real per student expenditure for whites shows a steady upward trend through to the 1970's, though it subsequently demonstrates a downward trend from the early 1980's. The only race group that has been able to match this real per student expenditure is the Coloured & Asian composite racial category. Again this pattern is strongly reminiscent of that found for schooling. The strongest approach of real per student

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in Fedderke et al **2000**), and this is likely to have led expansion in the tertiary sector. This is certainly evident from the discussion of the university sector in South Mica above, and that of student numbers in teachers colleges. As a consequence we interpolated over the intervening time period, and this explains the excessively smooth curve in lecturing **staff** for black teachers colleges over this time period. We note that it is not possible to adjust the lecturing staff on the basis of the data contained in Fedderke et al (**2000**), since the black lecturing **staff** is for both primary and secondary schooling.

<sup>35</sup> We have no means of establishing whether white teachers colleges came to accept BCA **enrollments** during the course of the **1980's**, as was found to be the case for the university system (see the discussion above). However, since the teacher colleges were more directly under the control of the state, the probability of this occurring is limited.

<sup>36</sup> Note that adjusting for the TBVC territories makes very little difference to **this finding**.

expenditure to white levels takes place during the course of the **1980's**, suggesting that the limited self-rule afforded by the tri-cameral parliamentary constitutional system does appear to have resulted in a more equitable allocation of expenditure between at least some racial **groupings**.<sup>37</sup>

By contrast, real per student expenditure on black student teachers continued to be approximately at a third of the **expenditure** for white student teachers – even in the early **1990's**, and regardless of whether the TBVC territory adjustment was undertaken. See Figure 28. Moreover, in the 1970's the divergence was more extreme: with real per student expenditure for whites standing in a ratio of approximately 10: 1 to that for black students.

#### 5.4 Measurement of Output: Teachers Diplomas Issued

Output of teacher diplomas shows the same differential between black and other race groups emerging, as was found for student enrollments. For whites, Coloureds and Asians the emergent pattern is one of a plateauing of diploma output during the course of the **1970's**, and in the case of whites, a declining level of teacher diploma output through the course of the 1990's. By contrast, the output of teachers diplomas from black teachers colleges shows a strong increase through the course of the **1970's**, **though** there is some evidence to suggest that the output of diplomas reached (a somewhat volatile) steady state during the course of the 1980's. **Figure 29** demonstrates.

Unfortunately adjustments to black teacher diploma output for TBVC states proves to be **difficult** to achieve. It is therefore **difficult** to establish whether the **stabilization** of teacher diploma output **during** the course of the late 1970's is due to the shift of output to TBVC states, or whether the plateauing of diploma output represents a genuine trend in the data. However, we have already noted that the inclusion of TBVC states does not bring with it a large adjustment in student enrollments and lecturer numbers. It is thus unlikely that the trend in diploma output would be materially affected by the inclusion of the TBVC states. Nevertheless, the discussion that is to follow must therefore be qualified in terms of any conclusions that are drawn with respect to the output of black teachers diplomas applies only to institutions within South Africa.

It is noteworthy that the distinction between universities and teachers colleges already commented on continues to emerge with respect to the output of teachers colleges. In Figure 30 we report real expenditure per diploma in teachers colleges. Much as for the schooling system, for Coloureds & Asians real expenditure per diploma adjusted to white levels during the course of the late 1970's and the 1980's. By contrast, the real expenditure per diploma for black teachers lagged behind, with the ratio of real expenditure per diploma for whites **and** Coloureds & Asians in 1993 standing in a ratio of approximately 2: 1 to that for black teachers diplomas.

The anomaly with respect to real expenditure per diploma relates to the period prior to 1960, when expenditure per black teacher diploma appears to have been high relative to the rest of the teacher college system. One possible explanation for this anomaly may be that the 1950's saw a development of a system of black teachers colleges, similar to that experienced for universities during the 1960's and **1970's**, with the associated capital start-up costs. Growth in black student teacher numbers during the course of the 1960's in turn then eroded the initially high expenditure on black teachers diplomas.

Unfortunately no data is available to control for the quality of the output of the racially classified types of teachers colleges. The only additional measure at our disposal is given by the ratio of diplomas conferred to the total student body in teachers colleges. Figure 31 illustrates. The ratio serves as a proxy for the throughput of the relevant teacher college system, viz. the ability of the teacher colleges to translate its intake of students into graduants. Again what proves noteworthy is the divergence between white and Coloured & Asian teachers colleges on the one hand, and black teachers colleges on the other. For both the white and Coloured & Asian categories the throughput of students into graduants appears to have stabilized

<sup>37</sup> Note that this hypothesis is also consistent with the finding of Fedderke et al (1999) that the institutional capacity of users of educational systems to influence policy makers is of significance in determining the quality or effectiveness of inputs into the educational process.

at the 30% level since the 1950's.<sup>38</sup> Given the three year teacher diploma structure, this suggests a very high throughput rate for teachers colleges — and one that is approximately twice that of the university system.

By contrast, black teachers colleges proved to have a low throughput during the course of the 1950's, a characteristic that lends some credence to the explanation offered for the high real expenditure per diploma offered above: viz. that the black teachers colleges were in start-up mode during this period. While the 1960's and 1970's saw throughput rates in black teachers colleges of similar magnitudes to the white colleges, the trend in the black throughput rate has been steadily downward since 1976, and since the late 1980's has fallen sharply below that of white colleges. Black teachers colleges have thus shown a declining capacity to translate the rapidly expanding student intake into rising diploma output.

Again therefore, it is arguable that the black teachers colleges have represented a use of resources associated with relatively high **opportunity** cost. The duplicate teachers colleges for black students have simply been less effective in translating their inputs into outputs than the established white teachers colleges.

## 6.0 CONCLUSIONS

Our analysis rests on data collected for South Africa's tertiary education system over the 1910-93 period. This data set is more comprehensive than any other we have encountered in the literature both in terms of the time period that it covers, as well as in the range of variables collected on inputs and outputs into tertiary **education**.<sup>39</sup>

The findings confirm the presence of strong inequalities between race groups in South Africa's tertiary education. In the case of South Africa's universities, such inequalities emerged not in the form of the quantity of inputs, but simply in terms of the incapacity of black universities to transform inputs into appropriate quality outputs in the form either of degrees or research. By contrast, quality technical education was simply denied to blacks. Only teacher-training colleges reproduce the patterns we observed for schooling: poor inputs translating into poor output in black teacher colleges.

South Africa therefore faces a legacy of poor human capital production not only at primary and secondary levels, but in its tertiary educational institutions as well. Addressing such problems requires a searching examination not only of the nature of the present educational structures South Africa has inherited from its past, but the will to grapple with the problems that such institutions carry within them. This might require a careful audit of universities to establish which are genuine candidates for world-class university status, which might better serve the region as first-rate or at least good Technikons or middle-rank state universities or liberal arts colleges, and which might best serve as good quality community colleges. Any policy that attempts to address such issues will need to engage not only with an examination of data. It will need also to address structures of expectation. University based research is expensive and demands economies of scale and concentrations of expertise and resources. Not all tertiary institutions need to aspire to become, or need to remain, research universities. For some the glamour is necessarily false. Indeed, the importance and value of good Technikons and excellent undergraduate liberal arts colleges needs to be **re-**

<sup>38</sup> Coloured & Asian teachers colleges show a relatively high throughput rate in the 1970's -but this is perhaps due to the political unrest of the time, which could be anticipated to lower **enrollments**, while students close to diploma completion could be anticipated to have a higher propensity to remain in the colleges.

<sup>39</sup> Acknowledgment here ought to be made of the three Bulletins published by the Bureau for Educational Research in 1939, 1940 and 1947. They constitute the only attempt, until now, to draw together data on education in South Africa that aims to be comprehensive both in historical coverage and in the range of indicators recorded. They express a clear awareness of the need to present a 'global' picture of South African education in line with the best international practices of the time. They are sensitive, especially, to the need for both continuity and **commensurability** and for the need to aggregate fragmented data-sets into larger, coherent and more manageable wholes. Clearly, prior to 1939, education data in South Africa was maintained in often fragmented and frequently inscrutable **and** inaccessible forms.

affirmed. After all, the United States of America has dozens of genuinely outstanding liberal arts colleges, such as Amherst, Smith and **Haverford**, to name only a few. And its good community colleges are legion. To this end, the wider politics and cultural assumptions that have come to **characterize** the South **African** tertiary system will need to be engaged with and, in many instances, challenged. For the **tertiary** system currently is a deadweight structure, rather than a capstone to South Africa's educational system.

It might also require a careful and thorough revisiting of the way in which tertiary education is funded so as better to encourage both efficiency and the enhancement of capacity. To this end, for instance, the encouragement of ever-greater levels of private endowment might, in the service of excellence, be desirable. Again one is obliged to refer to the extraordinary success of the American system in marshalling private resources and harnessing them where necessary to government funds. Specifically, South Africans need to **recognize** that privately endowed universities – whether research universities or liberal arts colleges – need not necessarily exclude the poor and needy. At their best, such institutions have “need blind admissions policies. Research funding might also need to further “select for” only the most **infrastructurally** capacious institutions. Whatever the detailed outcomes, the present system of poor to mediocre institutions in which none is excellent and in which all have insufficient specificity of focus and purpose needs to be changed.

## REFERENCES

- Bophutatswana, Department of Education. Annual Report. Various Years.
- Ciskei, Department of Education. Annual Renort. Various Years.
- Fedderke,J. de Kadt,R. and Luiz,J.** 1999. 'Production of Educational Output: time series evidence from socio-economically heterogeneous populations - the case of **South Africa** 1910-1993'. Forthcoming, Econometric Research Southern Africa Working Paper No. 7, [www.wits.ac.za/economics](http://www.wits.ac.za/economics) under Research and ERSA Working Papers.
- Fedderke,J. de Kadt,R. and Luiz,J.** 2000. 'Uneducating South Africa: the **failure** to address the 1910-1993 legacy'. International Review of Education. Forthcoming, Econometric Research Southern Africa Working Paper No. 2, [www.wits.ac.za/economics](http://www.wits.ac.za/economics) under Research and ERSA Working Papers.
- Hanushek. E.A. aud Kim. D. 1995. Schooling, **Labor** Force Quality, and Economic Growth. NBER Working Paper 5399.
- Landes,D. 1998. The Wealth and Poverty of Nations. London: Little, Brown aud Co.
- Malherbe,E.G.** 1977. Education in South Africa vol. 2, 1923-75. Cape Town: Juta & Co.
- RSA, Auditor-General. Annual Report. Various Years. Pretoria.
- RSA, Bureau of Statistics. Statistical Yearbook. Various Years. Pretoria.
- RSA, Buro of Statistics. South African Statistics. Various Years . Pretoria.
- RSA, Central Statistical Services. South African Statistics. Various Years . Pretoria.
- RSA, Department of Bantu Education. Annual Report. Various Years. Pretoria.
- RSA, Department of Coloured and Rehoboth Affairs. Ammal Report. Various Years. Pretoria.
- RSA, Department of Education, Cape. Ammal Renort. Various Years. Pretoria.
- RSA, Department of Education, Natal. Ammal Report. Various Years. Pretoria.
- RSA, Department of Education, OFS. Ammal Report. Various Years. Pretoria.
- RSA, Department of Education **Transvaal**. Ammal Report Various Years. Pretoria.
- RSA, Department of Education and Culture. Annual Report. Various Years. Pretoria.
- RSA, Department of Education and Training. Annual Reuort. Various Years. Pretoria.
- RSA, Department of Indian **Affairs**. Annual Reuort. Various Years. Pretoria.
- RSA, Department of National Education. Annual Report. Various Years. Pretoria.

SAIRR (South **African Institute** of Race Relations). Race Relations Survey. Various Years. Johannesburg:

**SAIRR**.

Transkei, Department of Education. Annual Report. Various Years.

Union of South Africa, Bureau of Census and Statistics. Union Statistics for Fifty Years. Pretoria.

Union of South **Africa**, Union Office of Census and Statistics. Official Yearbook of the Union. Various Years.  
Pretoria.

Union of South **Africa**, Department of Education. Annual Report. Various Years. Pretoria.

**Venda**, Department of Education. Annual Report. Various