CHAPTER 4

THE POLICY DIMENSIONS AND THEIR DETERMINANTS

4.1 INTRODUCTION

In this chapter the movement from élite to mass tertiary education receives further analysis. The government expenditures for the universities, the CATEs and the technikons, and the colleges of education receive detailed treatment, as well as the question as to whether or not there has been underinvestment in technical education. Tertiary education enrolments are related to the downward phases of the business cycle. University enrolments and degrees and diplomas are contrasted to CATE and technikon enrolments and diplomas and certificates. Within university enrolments, arts, science, and engineering enrolments are compared; within the CATEs and the technikons technical enrolments are compared to overall enrolments. Total university awards are compared to engineering awards and these in turn to technical certificates and diplomas.

Considerable attention is devoted to the colonial, Third World, and specifically South African biases in favour of an academic education. Human capital theory and its shortcomings receive detailed analysis. The recommendations of the various commissions on engineers, technicians, and teachers are dealt with, especially in terms of the manpower shortages and the policy results. Government concern about potential surpluses of university graduates and the steps taken to avert them receive considerable attention. So do unemployment and underemployment of university graduates. Finally, Hypotheses 2-7 are tested, as well as the last part of Hypothesis 1.

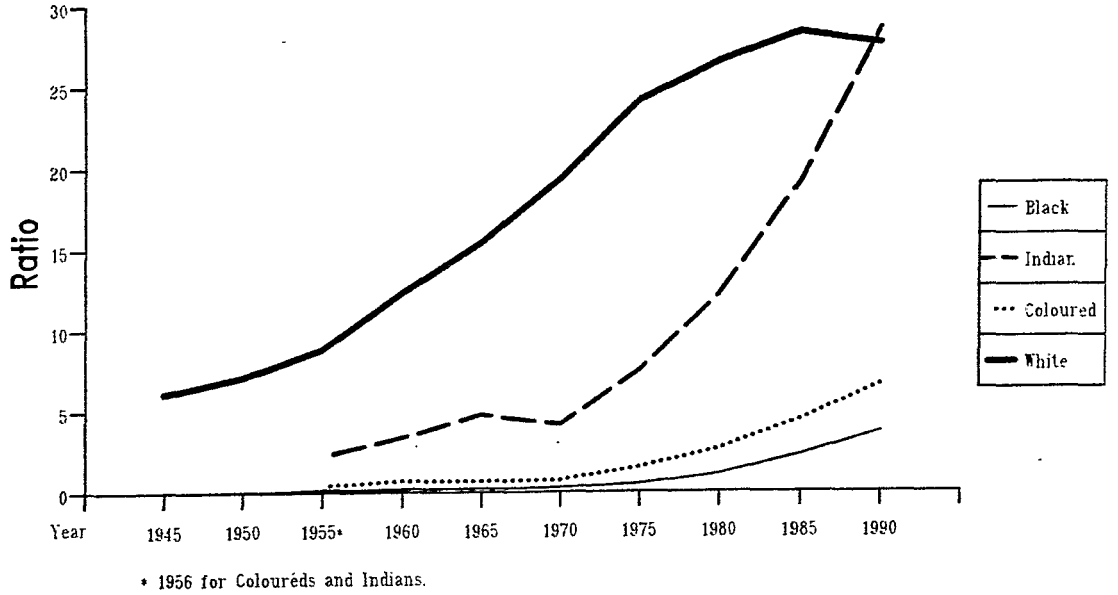
4.2 MASS UNIVERSITY EDUCATION

Hypothesis 2 states that the expansion from élite to mass tertiary education will lead to greater dependence on government funding and increased need for control, co-ordination, and national standards. Table 4.1 shows that for the whites the ratio of university students per 1 000 population has increased from 7,1 in 1952 to 28,3 in 1985, a nearly four-fold rise. For the coloureds the ratio has risen from 0,4 in 1956 to 4,5 in 1985, an eleven-fold increase (Table 4.2). In the case of the Indians, it has increased from 2,3 in 1956 to 19,1 in 1985, an eight-fold rise (Table 4.2). This is largely due to their insecurity as a minority, like the Jews and the Palestinians in the Diaspora. They all view tertiary education, especially university, "as a crucial portable asset and the best insurance for a potential crisis" (Moodley,1980:226). Although the blacks lag behind the other population groups, their ratio has risen from 0,04 in 1952 to 2,3 in 1985, a fifty-seven-fold rise (Table 4.3). Figure 4.1 provides information for all of the population groups. Such ratio increases as well as in absolute numbers testify to the popularity of university education amongst all of the population groups. They also demonstrate that university education has ceased to be a preserve of the children of the wealthy or of the upper class. South Africa has been in the world context in the vanguard of the movement from élite to mass university education.

4.3 GOVERNMENT CURRENT EXPENDITURES

Concomitant with the rise of mass university and tertiary education has come a greater reliance on the government for operating costs. Whereas in 1945 what later became the CATEs and the technikons received 50,4% of their current funds from the government in 1982 the percentage had risen to 83,3. The proportion coming from student fees has shrunk from 35,1% to 11,4%, respectively (Table 4.4). For the universities for the whites the dependence on government for current expenditures has risen from 41,7% in 1952 to 79% in 1980. Whilst in 1952 student fees were 27,4% of the operating expenses, by 1980 they had shrunk to 16,5% (Table 4.10). In per capita terms government current expenditures rose from R203 in 1952 (R230,8 in 1963) to R3 390,9 in 1984-1985 (Tables 2.10 and

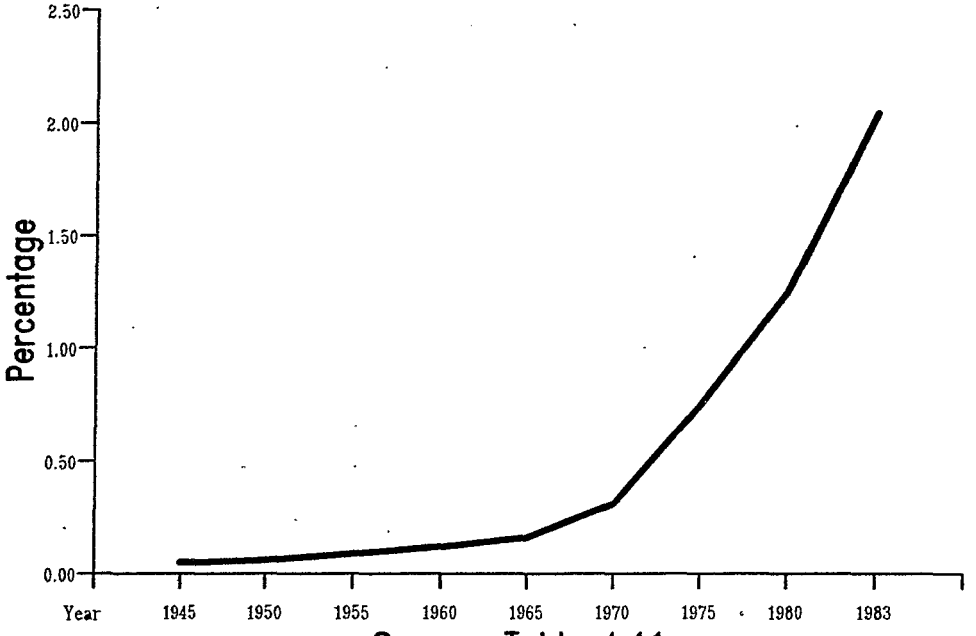
Figure 4.1 The Ratio of the Number of University Students per 1,000 Population



* 1956 for Coloureds and Indians.

Sources: Tables 4.1 – 4.3.

Figure 4.2 Government Expenditures on Tertiary Education as a Percentage of the G.D.P. at Constant 1975 Prices



Source: Table 4.11.

4.10). For the other population groups the data are not quite comparable, but they leave no doubt about a similar trend. Coloured university current income from the government rose from R371 104 in 1962-1963 to R20 873 000 in 1984-1985, an increase of 5 524,6% (Table 4.5).In per capita terms it rose from R302,1 in 1963-1964 to R1 915,1 in 1984 (Tables 2.11 and 4.5). In the same period Indian university current income from the government increased from R518 279 to R26 061 000 or by 4 928,4% (Table 4.6),which comes to a per capita increase from R250,9 in 1963-1964 to R1 764,8 in 1984-1985. In the period 1945-1959 black university current income from the government increased from 56,3% to 75,6% (Table 4.8). In absolute numbers it rose from R16 935 in 1945 to 80 364 000 in 1984-1985 or by 237 171,9%. In per capita terms it rose from R120,1 (R562,4 in 1963) to R2 302,8 (Tables 2.13 and 4.8).

The overall current expenditures by the central and provincial governments are provided in Table 4.11 and in Figure 4.2. There are some gaps in the data. Thus, the data underestimate the total government expenditures. To compensate for this, it will be noted that the calendar year is used in the table, but all of the non-white institution expenditure data are for the fiscal year (1 April-31 March), except for the black universities prior to 1960. White college of education income from the government is also given on a fiscal year basis, but calculated on a yearly basis. This is also the case with the white universities since 1981. There remains, however, some unknown underestimation of the total government expenditures.

From Table 4.11 it is evident that current expenditures have risen by 38 421,5% since 1946 or by 1 038,4% annually. This is nearly eight times the increase in the G.D.P. at current prices (5 001,2%) or by 135,2% annually and more than 107 times the increase (357,7%) in the G.D.P. at constant prices or by 9,7% annually. What is more significant is that there has been an increase of government funding in terms of the G.D.P., rising from 0,18% in 1946 to 0,69% in 1983 at current prices or from 0,05% to 2,04% in constant 1975 prices, respectively. Especially noticeable has been the steady increase since 1958. This may be seen in Figure 4.2.

Hypothesis 2 has thus been substantiated. The part about greater dependence on government funding and increased need for control, co-ordination, and standards has already been confirmed in Chapter 3. The very fact that there has been greater dependence on government funds has enabled many more students to attend tertiary education institutions than would have been the case otherwise.

4.3.1 OVERINVESTMENT OR UNDERINVESTEMENT?

What is more difficult to determine is whether or not the government current expenditures have been adequate. In South Africa public spending in general is less than in some other countries. For instance, in 1976-1977 the government spent 4,1% of the G.N.P. on education, which was 15% of the total public spending. For the German Federal Republic the percentages were in 1975, 5,2 and 10,6, Japan in 1976, 5,3 and 17, and Canada in 1977, 8 and 33,2, respectively (Work Committee on Education Financing, De Lange Commission (1981:2.) South African tertiary education expenditure data are comparable with French expenditures. In 1960 France spent 0,2% and in 1970, 0,6% of its G.N.P. on tertiary education. Sweden spent 0,3% and 0,9% of its G.N.P., and Britain spent 0,5% and 1,2%, respectively (Premfors, 1980:309). There are too many variables peculiar to each country to be able to make valid comparisons. The Work Committee on Education Financing of the De Lange Commission concluded that there are no clear cut empirical grounds for determining the optimum level of expenditures on education, or the optimum share of government expenditures (1981:6.) Moreover, there is no satisfactory theory explaining government expenditures over time (Seeber & Dockel,1978:340). All that is certain is that government current expenditures may be expected to increase at rates greater than the growth of income (350). This has occurred.

It is possible, however, to consider whether or not there has been overinvestment or underinvestment for certain types of education in terms of particular areas or occupations. Hypothesis 3 states that governments will underinvest in technical education. This is connected with a number of assumptions and the human capital theory. These will be dealt with later. To test this hypothesis at its face value CATE and technikon

expenditures on a per capita basis will be compared with university per capita current expenditures. Here again there are some gaps in the available data.

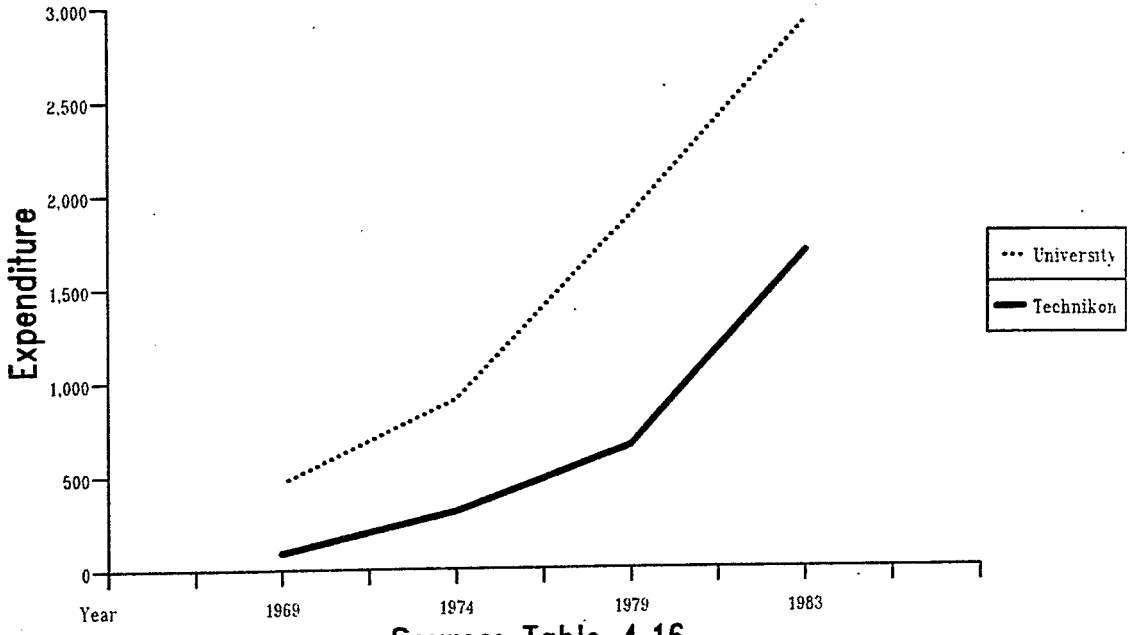
White CATE per capita expenditure was R88,3 in 1969 or 19% of the university per capita expenditure of R463,9 (Table 4.16). By 1983 technikon per capita expenditure had risen to R1 679,7 or 57,6% of the university per capita expenditure of R2 916,2. This may also be seen in Figure 4.3.

Coloured technikon per capita expenditure was R1 954,3 in 1982 or 69,7% of the university per capita expenditure of R2 803,4 (Table 4.17). In 1984 it was R5 485,2 or 286,4% of the university per capita expenditure of R1 915,1. In the case of the Indians, the CATE per capita expenditure was R106,4 in 1969-1970 or 24,6% of the university per capita expenditure of R433,1 (Table 4.18). In 1984-1985 the technikon expenditure was R2 604,8 or 147,65% of the university per capita expenditure or R1 764,6. This may also be seen in Figure 4.4.

Finally, black technikon per capita expenditure was R3 662,5 in 1980-1981 or 220,5% of the university per capita expenditure of R1 661,2 (Table 4.19). In 1984-1985 it was R3 161 or 137,3% of the university per capita expenditure of R2 302,8.

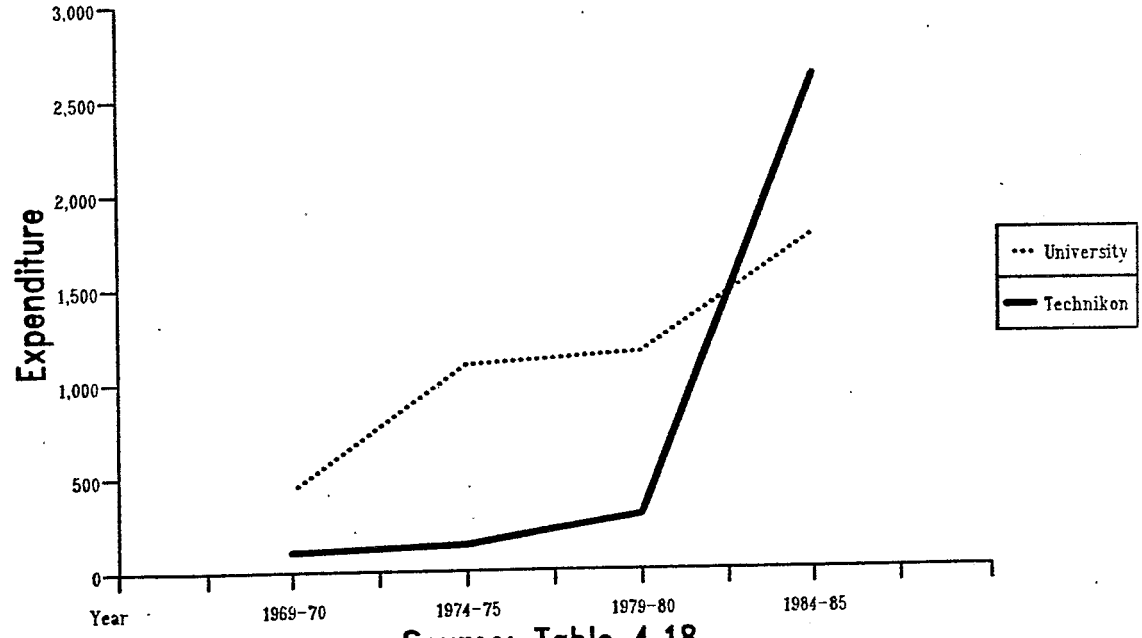
It is thus evident that for all of the population groups the gap between CATE and technikon per capita expenditures and university per capita expenditures is narrowing and for the coloureds, Indians, and the blacks has been closed and reversed. This does not contradict Hypothesis 3, but rather reveals that there was underinvestment for a long time. It may be reformulated for future application as follows: Increasing perceptions by the government and society of the need for technical education will lead to increased investment for it and the gap between it and university investment narrow and eventually disappear.

Figure 4.3 Per Capita Government University and CATE and Technikon Expenditures for the Whites



Source: Table 4.16.

Figure 4.4 Per Capita Government University and CATE and Technikon Expenditures for the Indians



Source: Table 4.18.

4.4 ENROLMENTS AND THE BUSINESS CYCLE

Hypothesis 4 states that in "bad" economic times tertiary education enrolments will decline. If this were so, the key indicator would be a correlation between first-year enrolment and the upward and downward points of the business cycle. The enrolment the year following the beginning of the downward turn is used. This is the time when enrolment should decline.

The year 1952 is the first one for which complete university enrolment data are available for the whites. It also coincides with the third post-World War II downward phase of the business cycle (Table 4.12). In 1953 and 1956 university enrolments declined, but in 1959 and 1961 enrolments increased. In 1966, 1968, and 1972 enrolments rose, but in 1975 declined as predicted. In 1982 enrolment rose again (Table 2.1). The white college of education first-year enrolment data are available for a ten-year period (1963-1972) only. In 1966 and 1972 there was a decline in enrolments, but not in 1968 (Table 2.1).

Coloured first-year university enrolment data are limited to a few years and thus no conclusions may be drawn. Their CATE and technikon enrolments increased in 1968, 1972, 1975, and 1982. The college of education enrolments decreased in 1966, 1968, and 1975, but rose in 1972 and 1982 (Table 2.2).

Indian university enrolment data are also quite limited. In all three instances in 1966, 1968, and 1982 enrolments rose as did technikon enrolment in 1982 (Table 2.3). The college of education enrolments rose in 1972 and 1975, but declined in 1982.

Black university enrolment data are also limited to a few years. In 1966 enrolment declined, but it rose in 1968, 1972, and 1982. The technikons are so new that no valid conclusions may be drawn. The college of education enrolments decreased in 1982, but increased in 1968, 1972, and 1975 (Table 2.4). Thus, in only two out of the eight cases did enrolments decrease as predicted.

In 33 1/3 of the cases of the white universities, none in Indian, and 25% of the cases of the black universities enrolments behaved as predicted. The college of education enrolments followed the prediction in 66 2/3% of the cases of the white institutions, 60% of the cases of the coloured, 33 1/3% of the cases of the Indian, and 25% of the cases of the black institutions. Coloured and Indian technikon enrolments provided no supporting evidence at all.

Hypothesis 4 may thus be regarded as lacking in significant supporting evidence. Some potential students do not enrol in "bad" economic times whilst others enrol for a variety of reasons, including an inability to secure employment. It isa case of contradictory patterns of behaviour. The discussion of individual values in Chapter 5 provides additional information on the factors influencing university enrolments. One may thus conclude that tertiary education enrolments are not normally economically determined to any marked degree.

4.5 AUTONOMY AND STRATIFICATION

Tertiary education institutions are within broad guidelines autonomous in the sense of deciding whom to admit and how many. They also decide their own curricula. They are quite stratified. At the top of the academic prestige pyramid are the universities and below them the technikons and the colleges of education, with the technical colleges at the bottom. The exact ranking of the technikons and colleges of education is somewhat uncertain and fluid. Until quite recently there was little integration; that is, the possibility of transferring from one type of institution to another type.

4.6 UNIVERSITY, CATE, AND TECHNIKON IMBALANCES

Hypothesis 5 states that the continuing university prestige will cause CATE and technikon enrolments and diplomas and certificates to lag behind university degrees and diplomas. To operationalise the part about university and CATE and technikon graduates, university degrees and diplomas will be contrasted with technical certificates and diplomas. The overriding prestige of universities has already been indicated in

Chapter 2 in terms of the secondary school graduates going to university and the overall enrolment increases.

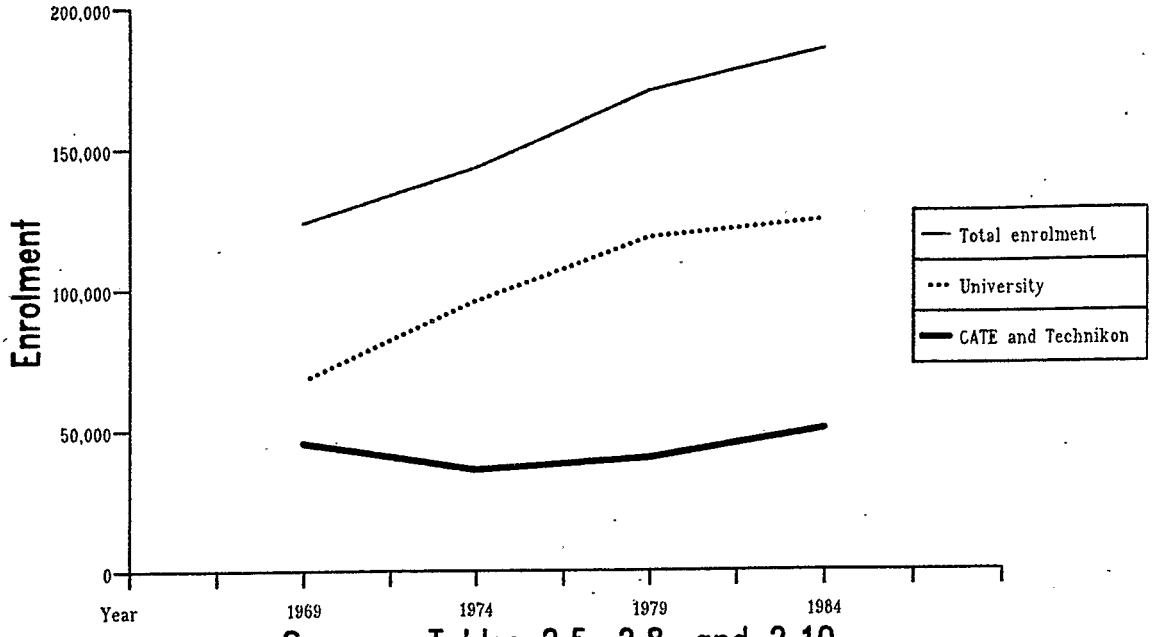
Total white university enrolments in terms of all tertiary institution enrolments have risen from 54,9% in 1969 to 67,3% in 1984. In the same period the proportion of CATE and technikon enrolments of all tertiary institution enrolments declined from 36,8% to 27,1% (Tables 2.5, 2.8, and 2.10). This is illustrated in Figure 4.5. In the same period for the coloureds the percentage of university enrolments increased from 39,5 to 61,6, and the CATE and technikon enrolments percentage rose from 9,3 to 12,8 (Tables 2.6, 2,9, and 2.11). This is illustrated in Figure 4.6. In the case of the Indians, university enrolments increased from 37,3% to 77,5% of all tertiary education institution enrolments. Their CATE and technikon enrolments declined from 52,7% to 17% (Tables 2.6, 2.9 and 2.12). This is illustrated in Figure 4.7. For the blacks in 1969 university enrolments were 35,2% of all tertiary institution enrolments and increased to 64%. The technikon proportion rose from 1,3% to 4% (Tables 2.7, 2.9, and 2.13). This is illustrated in Figure 4.8.

Thus, not only have CATE and technikon enrolments lagged behind university enrolments, but their proportions of tertiary education institution enrolments have declined for the whites and the Indians. Especially rapid has been the Indian decline. The coloured technikon proportion rose, but only slightly. Although the black technikon enrolments have shown rapid increases, this is due to the newness of the two technikons. In view of the past performance of the other population groups, it is uncertain how long they will continue to increase in relation to their total tertiary education institution enrolments. On the whole, the part on enrolments in Hypothesis 5 has been confirmed.

4.6.1 IMBALANCES WITHIN IMBALANCES

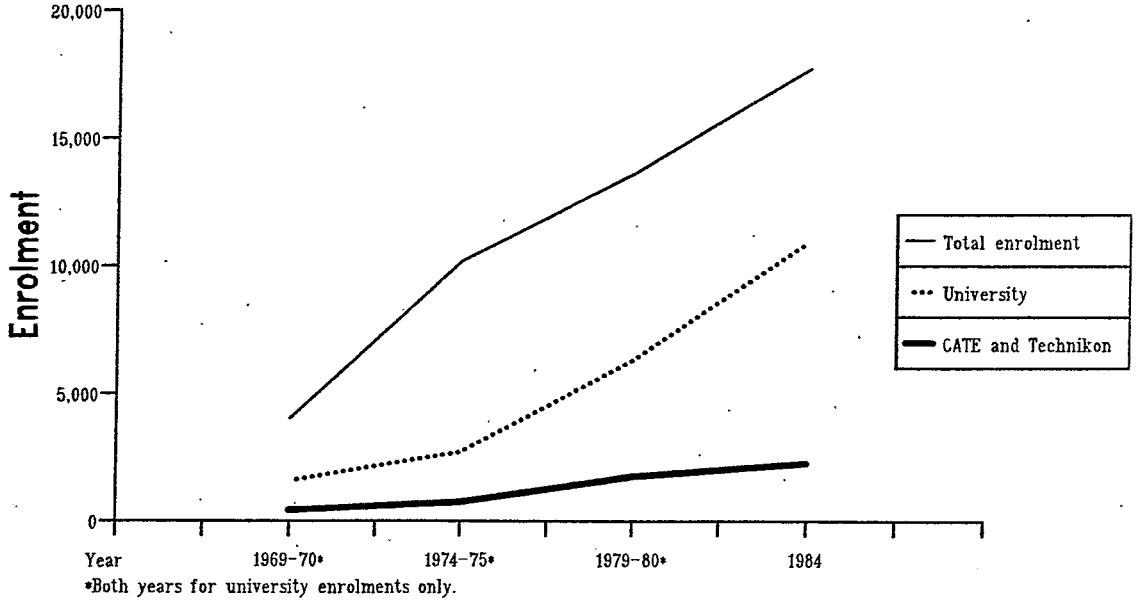
It is necessary to examine university enrolments in the arts, which includes the social sciences, in science, and in engineering, as well as CATE and technikon enrolments. The arts and science enrolment data are considered in general terms and the engineering and technikon data in detail.

Figure 4.5 White University and CATE and Technikon Enrolments in Relation to Total White Tertiary Institution Enrolments



Sources: Tables 2.5, 2.8, and 2.10.

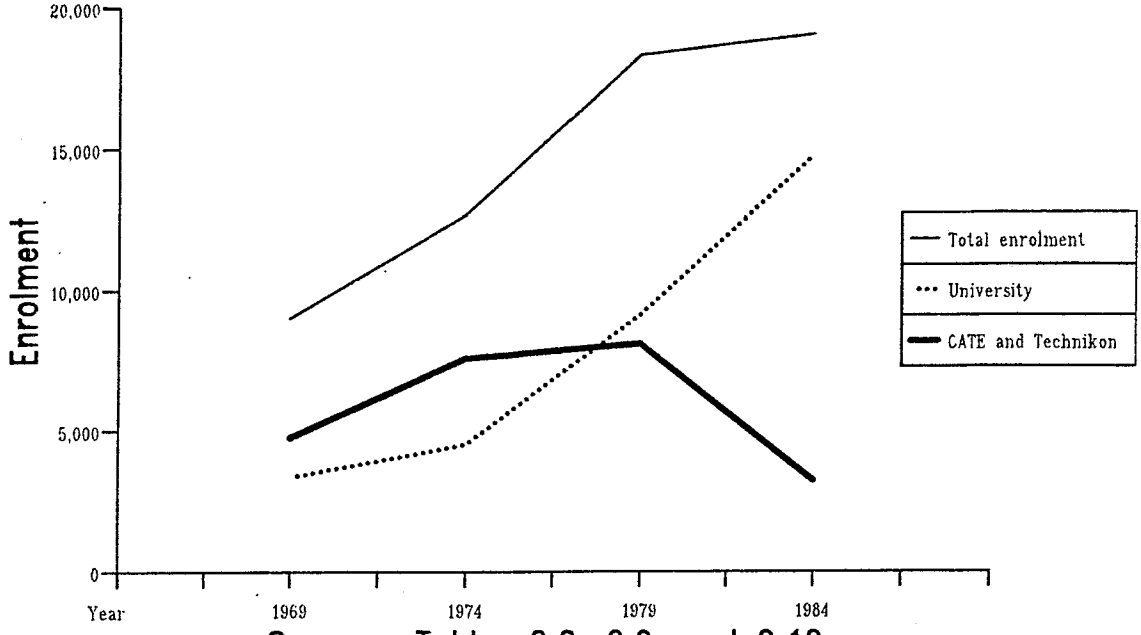
Figure 4.6 Coloured University and CATE and Technikon Enrolments in Relation to Total Coloured Tertiary Institution Enrolments



*Both years for university enrolments only.

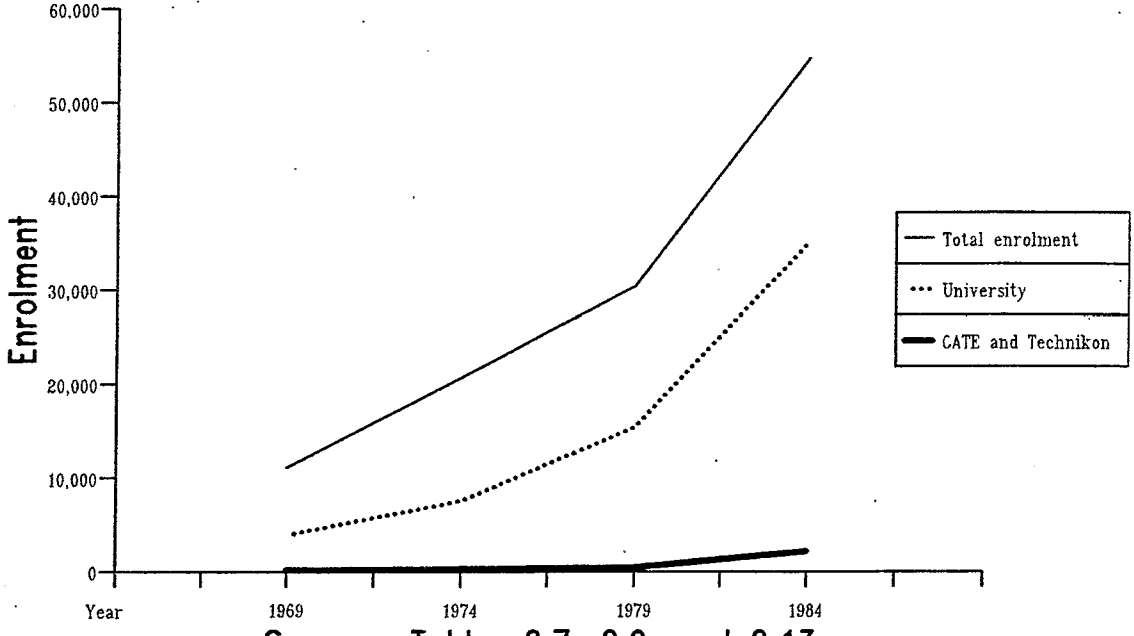
Sources: Tables 2.6, 2.9, and 2.11.

Figure 4.7 Indian University and CATE and Technikon Enrolments in Relation to Total Indian Tertiary Institution Enrolments



Sources: Tables 2.6, 2.9, and 2.12.

Figure 4.8 Black University and CATE and Technikon Enrolments in Relation to Total Black Tertiary Institution Enrolments



Sources: Tables 2.7, 2.9, and 2.13.

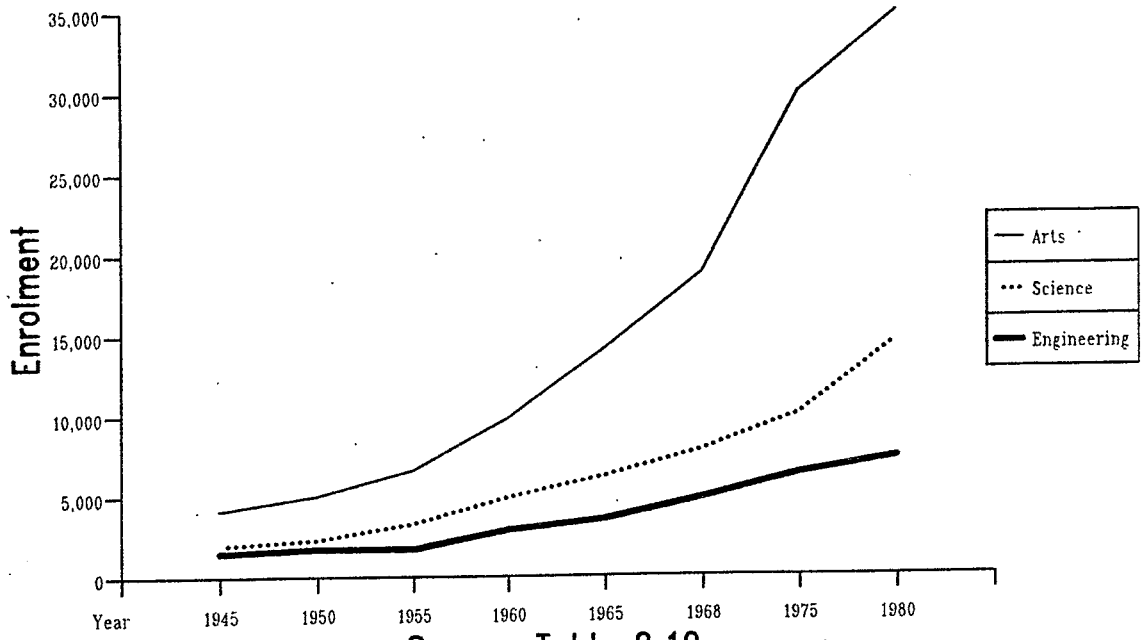
For the whites in the period 1952-1980 arts enrolment grew from 5 152 to 34 901 or by 577,4% (Table 2.10). Science enrolment grew from 2 858 to 14 640 or by 412,2%. The mean annual growth was 20,6% and 14,7%, respectively. Not only has science enrolment grown by a smaller percentage, but its proportion of the arts enrolment declined from 55,5% to 41,9%. Engineering enrolment grew from 1 696 to 7 328 or by 332,1%, which is even less than the growth in science enrolment and comes to 11,9% annually. The overall growth in enrolment was 527,5 or 18,8% annually. Science and engineering enrolments are declining as proportions of arts and overall enrolments. This is illustrated in Figure 4.9.

In the case of the coloureds their arts enrolment in the period 1956-1980-1981 grew from 254 to 2 100 or by 726,8% and science enrolment from 80 to 434 or by 442,5% (Table 2.11) The mean annual growth rates were 30,3% and 18,4%, respectively. The proportion of science enrolment of the arts enrolment declined from 31,5% to 20,7%. Engineering enrolment increased from 2 to 124, which would translate into an impressive percentage increase (6 100), but it has to be seen within the context of almost no enrolment at first. In 1980-1981 the engineering enrolment was 5,9% of the arts enrolment. The overall growth was from 501 to 8 654 or 1 627,3%, which comes to 67,8% annually. This is illustrated in Figure 4.10.

The Indian arts enrolment increased from 593 to 4 834 in the period 1956-1980 or by 715,2%; science enrolment grew from 124 to 1 394 or by 1 024,2%. The annual rates were 29,8% and 42,7%, respectively (Table 2.12). This is a case of the reverse happening and thus the proportion of science enrolment to arts enrolment grew from 20,9% to 28,8%. Engineering enrolment showed the same tendency as in the case of the coloureds, rising from 10 to 190, and constituting in 1980, 4,2% of the arts enrolment. Overall enrolment increased from 996 to 10 019 or by 905,9%, which comes to 37,7% annually. This is illustrated in Figure 4.11.

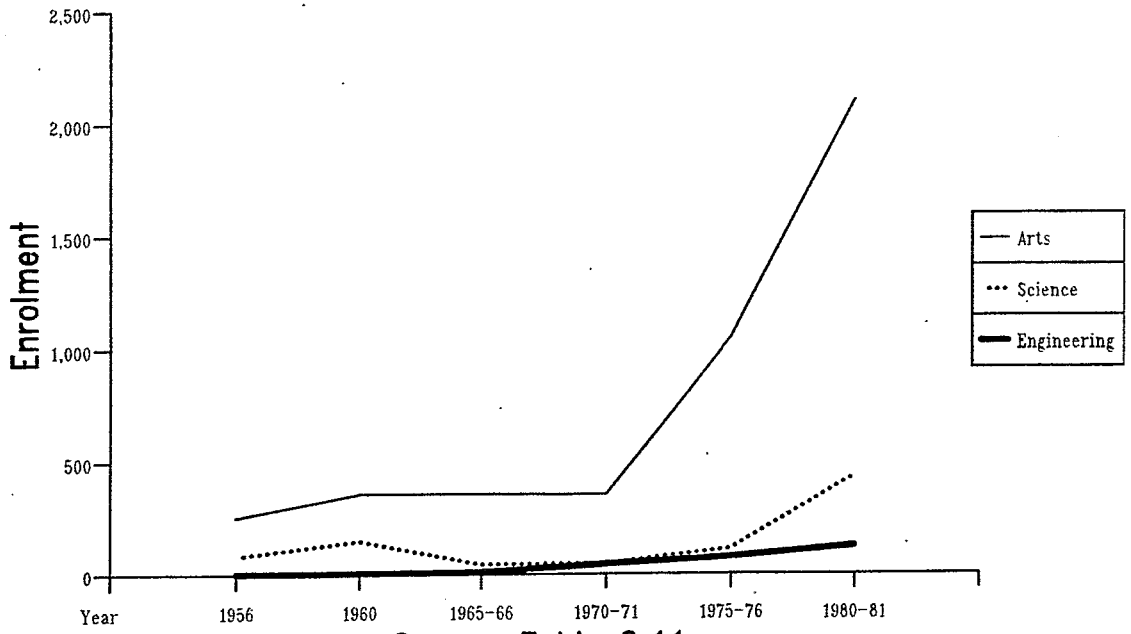
Finally, in the case of the blacks in the period 1962-1980 the arts enrolment grew from 1 196 to 6 997 or by 485% and the science enrolment from 162 to 1 930 or by 1 091,4% (Table 2.13). The mean annual increases

Figure 4.9 Arts, Science, and Engineering Enrolments of White University Students



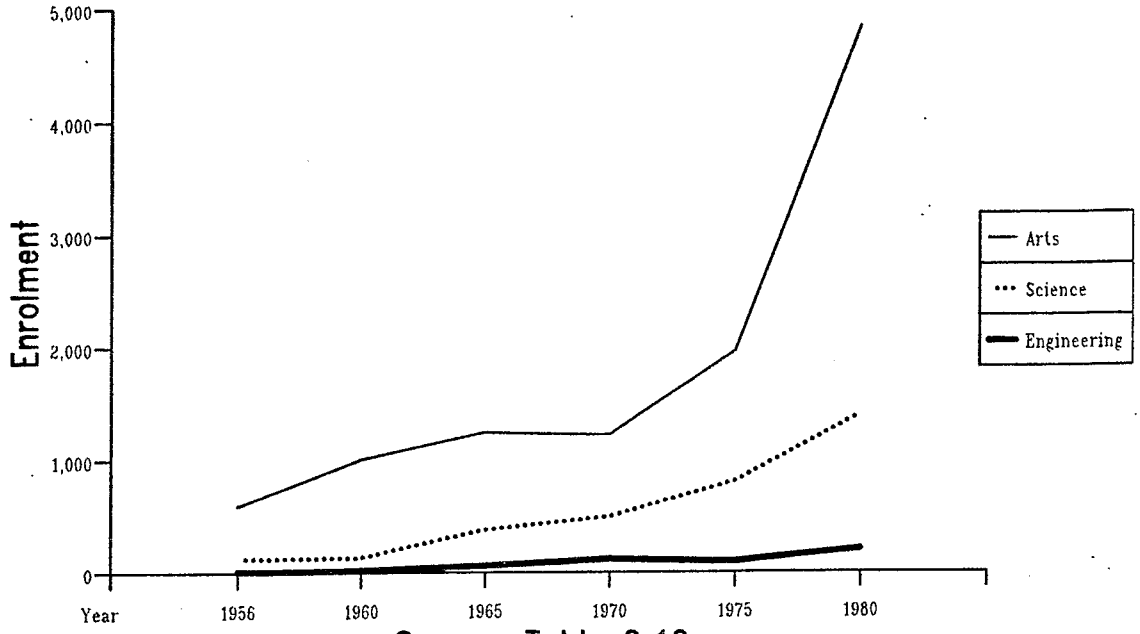
Source: Table 2.10.

Figure 4.10 Arts, Science, and Engineering Enrolments of Coloured University Students



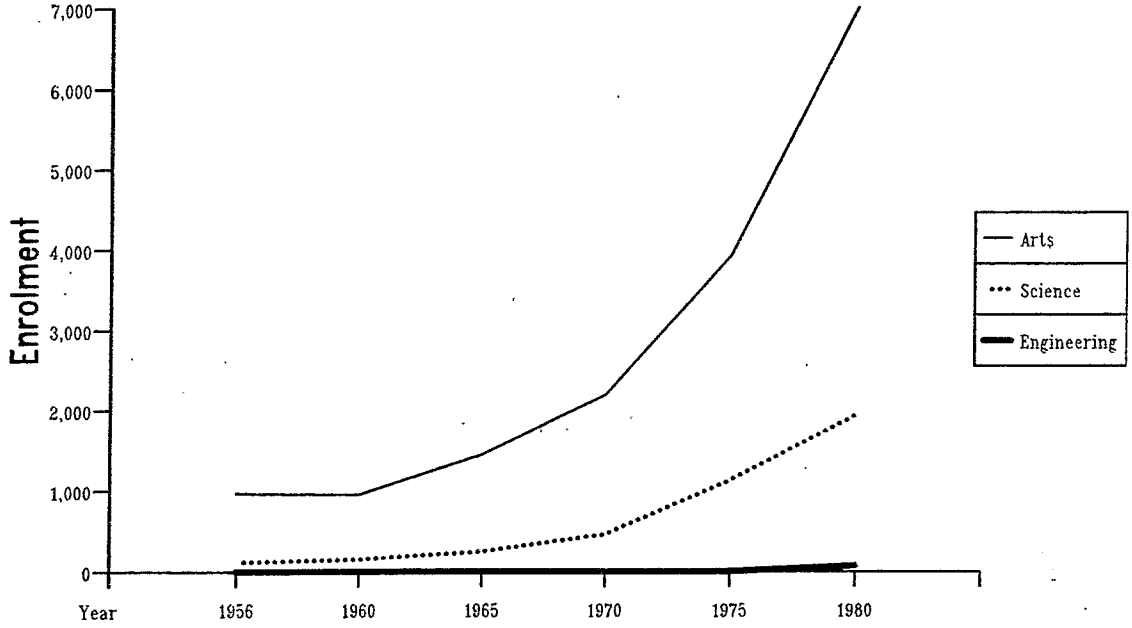
Source: Table 2.11.

Figure 4.11 Arts, Science, and Engineering Enrolments of Indian University Students



Source: Table 2.12.

Figure 4.12 Arts, Science, and Engineering Enrolments of Black University Students



Source: Table 2.13.

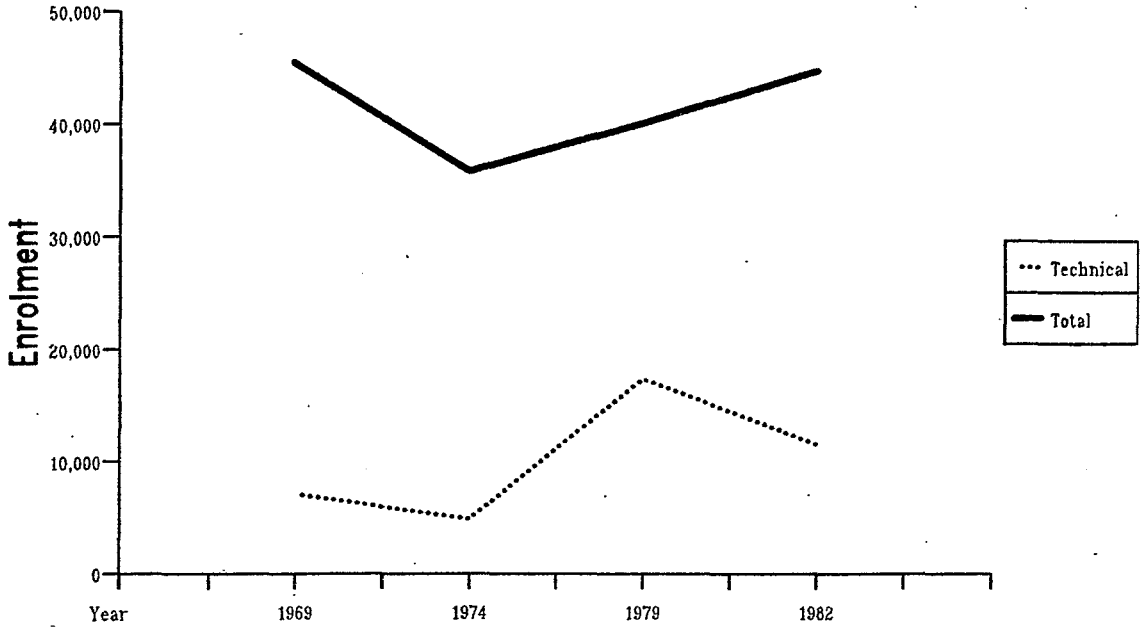
were 26,9% and 60,6%, respectively. The proportion of science to the arts enrolment also followed the trend evident amongst Indians and rose from 13,5% to 27,6%, respectively. Engineering enrolment rose from 1 to 73 and in 1980 constituted only 1% of the arts enrolment. Overall enrolment increased from 2 053 to 18 512 or by 801,7%, which comes to 44,5% annually. This is illustrated in Figure 4.12.

For the coloureds, Indians, and the blacks the increase in engineering enrolment must be seen within a very narrow base at first. In the case of the coloureds their engineering enrolment of the arts enrolment is only 6,8%, whereas for the whites it is still 21%. The Indian engineering enrolment is only 4,2% of the arts enrolment and for the blacks it is only 1%. Even the Indian science enrolment of 28,8% is still substantially below that of the whites declining enrolment of 41,9%.

Finally, what is so striking about the engineering enrolment statistics is that they do not follow what some economists have called "cobweb fluctuations" with recurrent shortage-surplus cycles every four to five years (Freeman,1976:112-113). Enrolments increase until there are surpluses on the market. This in turn triggers a decline in enrolment and eventually there are shortages. Then enrolments rise again. The South African case indicates that there are chronic shortages of engineers. The only noticeable exception has been the case of civil engineering students whose second-year enrolment declined from 723 in 1975 to 282 in 1979 (Van Pletzen,1981:38). The building and construction industry was then economically depressed and this resulted in a student reaction to market forces, as well as a decline of loans and bursaries from potential employers (Terblanche,1981:49).

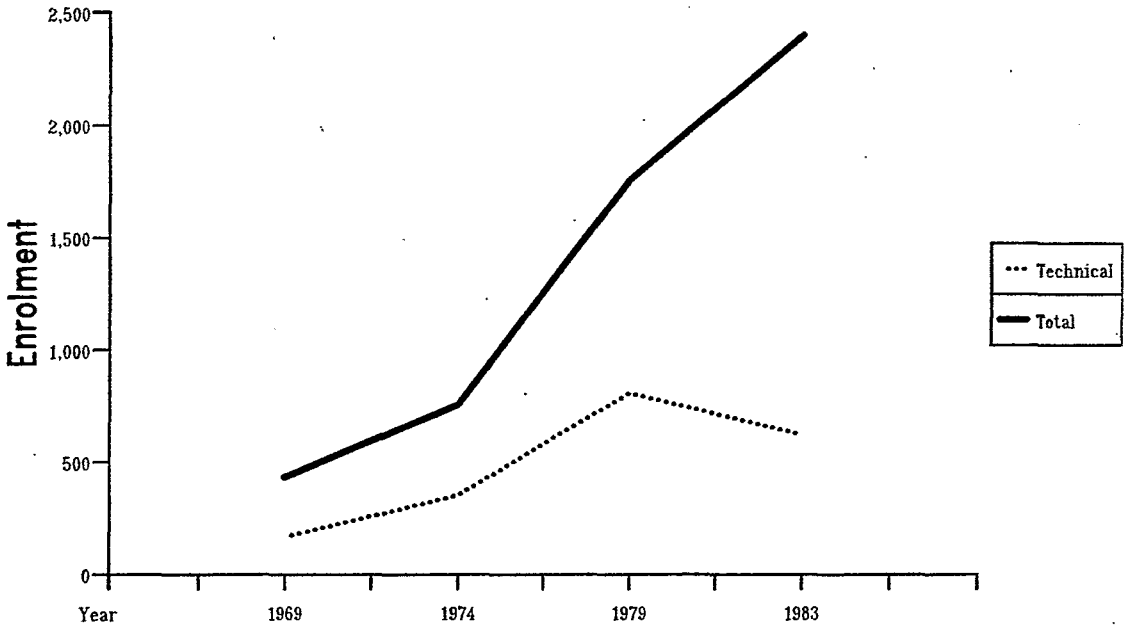
Equally noticeable is the small number of women studying engineering. There are signs, however, that this is slowly changing. For the whites the enrolment has grown from 5 in 1952 to 162 in 1980 (Table 2.10). Amongst the coloureds and the Indians it is only since the early 1980s that there have occurred significant enrolments (Tables 2.11 and 2.12). In the case of the blacks it is only since 1976 that women are beginning to study engineering (Table 2.13). The potential is there, however. A 1978 study of Standard 10 mathematics and physical science women

Figure 4.13 White Technical Enrolments in Relation to Total White CATE and Technikon Enrolments



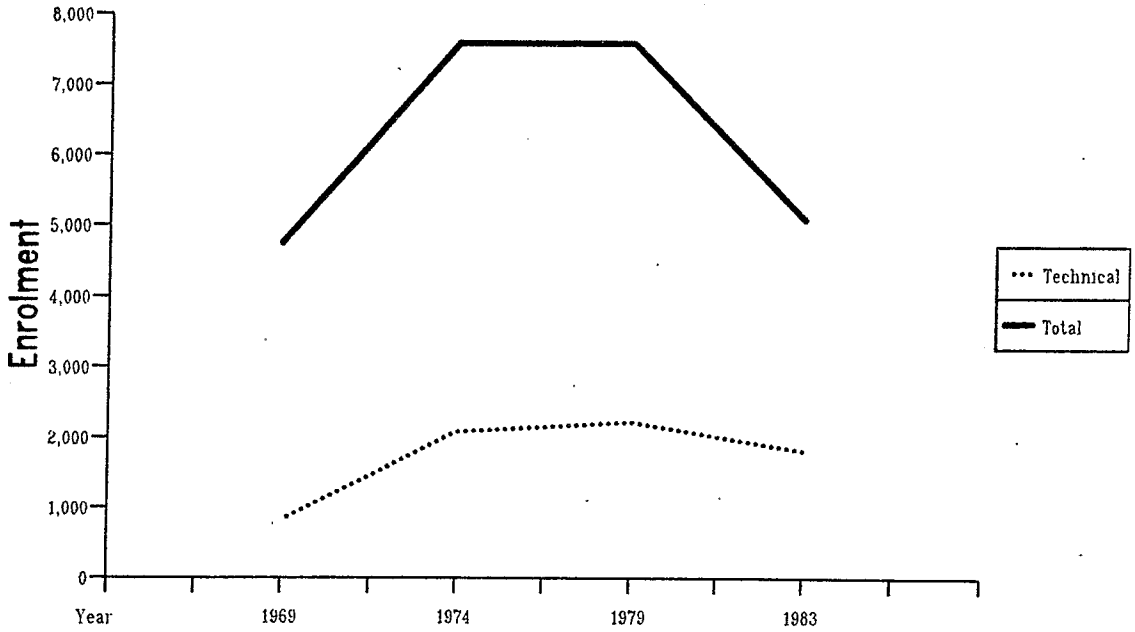
Source: Table 2.5.

Figure 4.14 Coloured Technical Enrolments in Relation to Total Coloured CATE and Technikon Enrolments



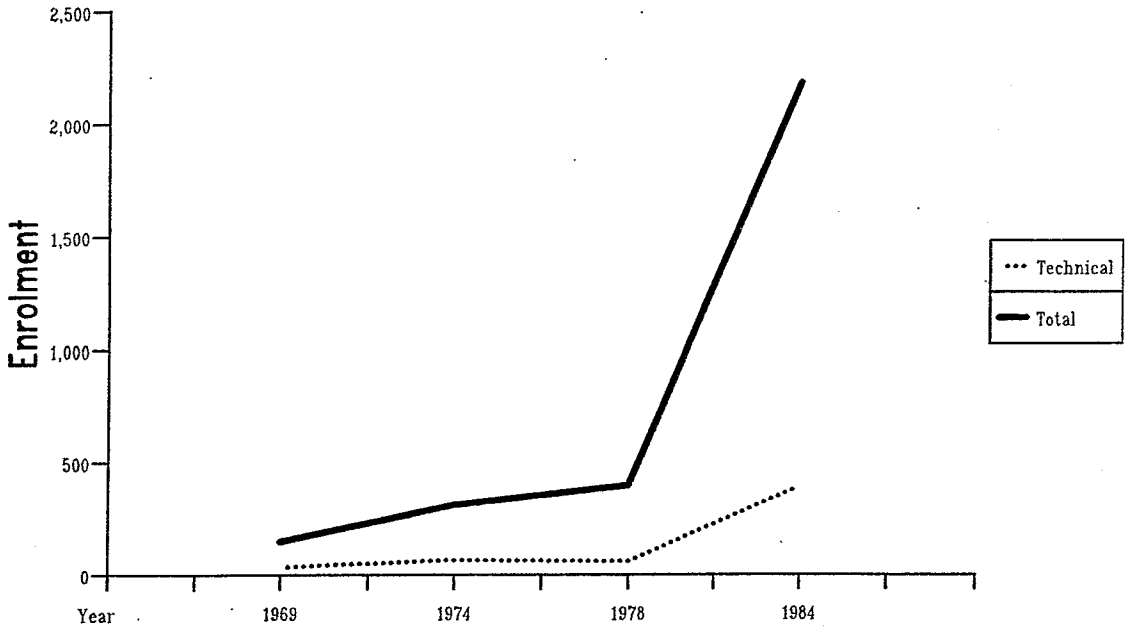
Source: Table 2.6.

Figure 4.15 Indian Technical Enrolments in Relation to Total Indian CATE and Technikon Enrolments



Source: Table 2.6.

Figure 4.16 Black Technical Enrolments in Relation to Total Black CATE and Technikon Enrolments



Source: Table 2.7.

students who passed them with exemption found that on the basis of scholastic and psychological tests 58,2% of those continuing their studies had the ability to get an engineering degree (National Manpower Commission,1984:53.) The factors working against more women becoming engineers are explored in Section 4.18 dealing with women in the labour force.

4.7 CATE AND TECHNIKON ENROLMENTS

In the case of the CATEs and technikons for the whites, men's technical enrolment has grown from 6 955 to 10 726 in 1982 or by 54,2%, which comes to 4,2% annually (Table 2.5). This is illustrated in Figure 4.13. Whilst this is below the 11,9% annual growth in university engineering enrolment growth, it must be seen in the context of highly fluctuating and sometimes declining overall technikon enrolments. Women's enrolment has grown even more, from 162 to 793 or by 389,5%, which comes to 30% annually. In 1969 technical enrolment was 15,7% of overall enrolment and in 1982 it was 25,8%. Overall enrolment declined from 45 465 to 44 649 or by 1,8%, which comes to 0,1% annually.

Coloured men's technical enrolment has increased from 374 in 1972 to 614 in 1983 or by 64,2%, which comes to an annual increase of 5,8% (Table 2.6). This is illustrated in Figure 4.14. As far as women are concerned, it is only since 1983 that there is a significant enrolment. Technical enrolment in 1972 was 47,4% of the total enrolment, but by 1983 had decreased to 25,5%. Overall enrolment increased from 789 in 1972 to 2 404 in 1983 or by 204,7%, which comes to 18,6% annually.

Indian men's technical enrolment has increased from 819 in 1969 to 1 812 in 1984 or by 120%, which comes to 8% annually (Table 2.6). This is illustrated in Figure 4.15. Here it is important to note that there has been a steady rise in the number of post-Standard 10 enrolment. Virtually all of the technical enrolment is now of this nature. No data are available on the number of women in technical programmes. Technical enrolment was in 1969, 17,2% of the total enrolment and in 1983, 35,7%. Overall enrolment declined from 4 752 in 1969 to 3 236 in 1984 or by 31,9%, which comes to 2,1% annually.

Black men's technical enrolment rose from 35 in 1969 to 384 in 1984 or by 997,1%, which comes to 66,5% annually (Table 2.7). This is illustrated in Figure 4.16. Here post-Standard 10 enrolment has been included from one technical college until 1978 in order to provide a comparable time perspective. Women are only now beginning to enrol in technical programmes. Technical enrolment was in 1969, 23,8% of the overall enrolment and in 1984, 17,9%. Overall enrolment increased from 147 to 2 180 or by 1 383%, which comes to 92,2% annually.

Except for the coloureds and the blacks, technical enrolments in the CATEs and technikons have grown faster than overall enrolments. This is also true of the proportions of technical enrolments of the total enrolments. There are, however, wide fluctuations in technical and total enrolments. Only white women are in significant numbers in technical programmes.

4.8 TECHNICAL ENROLMENTS AND THE BUSINESS CYCLE

May the fluctuations in technical enrolments be economically determined more so than in the case of university, college of education, and overall technikon enrolments? Hypothesis 6 states that in "bad" economic times CATE and technikon technical enrolments will decline. This seems plausible because technical studies are more applied and thus dependent upon the prevailing economic conditions. Using the data in Table 4.12 for the last three downward phases of the business cycle in 1971, 1974, and 1981 and relating them to the enrolments the following years, in the case of the whites the prediction holds true in 1982 only (Table 2.5). Coloured enrolment behayed as predicted in 1975 and 1982, but Indian in 1982 only (Table 2.6). For the blacks the prediction holds true in 1972, but not in 1975 and 1982 (Table 2.7). Thus, in 33 1/3 of the cases of the white Indian, and black CATEs and technikons and in 66 2/3 of the cases of the coloured tne enrolments behaved as predicted. Hypothesis 6 also lacks significant supporting evidence for the same reasons as in the case of Hypothesis 4.

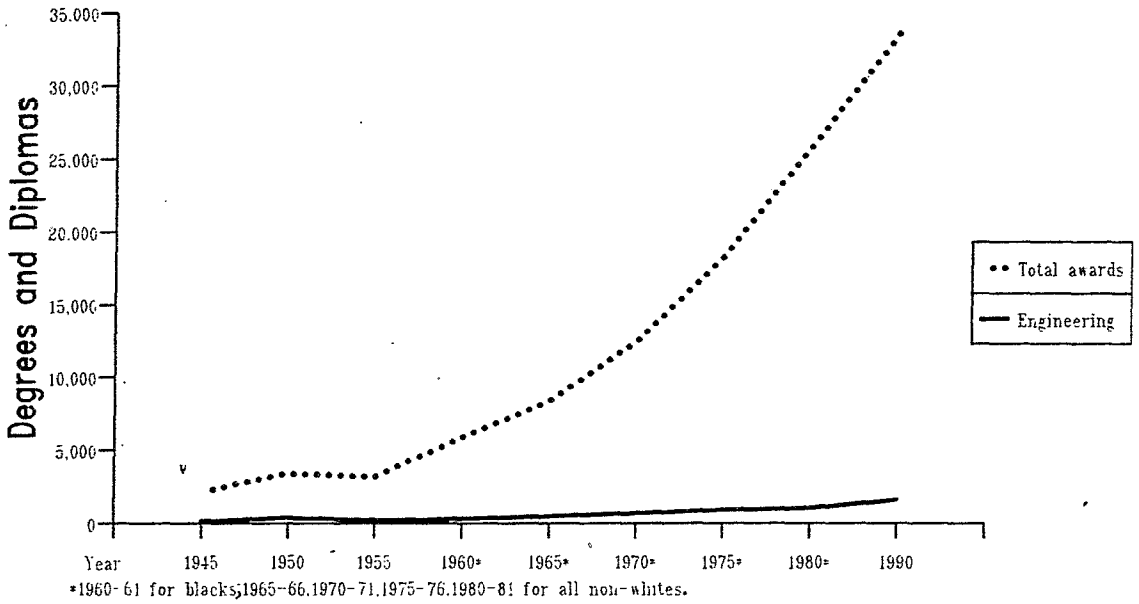
4.9 DEGREES AND DIPLOMAS

4.9.1 UNIVERSITY DEGREES AND DIPLOMAS VS. ENGINEERING AWARDS

It is also necessary to compare engineering degrees and diplomas to the total number of degrees and diplomas awarded. The year 1956 is a convenient beginning point, for since then the awards are by population group. In 1956 there were for the whites 224 awards and in 1980, 1 031 or an increase of 360,3%, which comes to a mean annual increase of 15% (Table 4.15). In the same period total awards rose from 3 931 to 22 065 or by 461,3%, which comes to 19,2% annually. In 1956 engineering awards constituted 5,7% of all the awards and in 1980, 4,7%. These developments are illustrated in Figure 4.17. In a sense this is not surprising in view of the declining proportion of engineering enrolment to total enrolment. Women engineering graduates are evident amongst the whites and the coloureds, but not the other population groups.

The coloureds show a rise from 1 award in 1961 to 16 in 1979-1980. The numbers are too small for any meaningful analysis. In the case of the Indians there has also been an increase from 3 in 1958 to 14 awards in 1982. The blacks got 4 awards in 1971-1972 and 5 in 1979-1980 (Table 4.15). Since 1981 the data for the coloureds and the blacks are not separated. If one takes the 1945 award data for all of the population groups, engineering awards increased from 164 to 1 376 in 1983 or by 739%, which comes to a mean annual rate of 19,4% (Table 4.16). In the same period the number of total awards rose from 2 167 to 25 626 or by 1 082,6%, which comes to an annual increase of 28,5%. In 1945 engineering awards constituted 7,6% of all awards, but in 1983 only 5,4%. Thus, engineering awards for the whites and for all of the population groups reveal a smaller growth rate than all awards, as well as a declining proportion.

Figure 4.17 Engineering and University Degrees and Diplomas Awarded to All Population Groups



Source: Table 4.15.

4.9.2 TECHNICAL CERTIFICATES AND DIPLOMAS

The present award hierarchy dates from 1981 (De Stadler,1982:23; Committee of Technikon Principals,1984). The National Technical Certificate 4 is a post-Standard 10 technical college award. It takes one year (one semester of study and one semester of in-service training). The NTC 5 and 6 take two and three years, respectively. The National Diploma for Technicians takes three years of study plus two years of practical training or experience. At technikons there are the National Diploma, which takes three years on a sandwich basis, the National Higher Diploma after four years, the National Diploma in Technology after five years, and the National Laureatus in Technology after one additional year of study and research. A bachelor of science in engineering degree takes four years, except at the University of Durban-Westville where it takes five years plus one year of practical training.

Technical certificates and diplomas for all of the population groups have increased from 743 in 1969-1970 to 1 399 in 1983-1984 or by 88,3%, which comes to an annual increase of 5,9% (Tables 4.13 and 4.15). This rate of increase is much lower for university engineering degrees and diplomas. As far as the numbers are concerned, in 1969 there were awarded 646 engineering degrees and diplomas as opposed to 743 technical certificates and diplomas in 1969-1970. In 1983 there were 1 376 engineering degrees and diplomas as opposed to 1 445 technical certificates and diplomas in 1982-1983. In 1969-1970 the certificates and diplomas constituted 115% of the degrees and diplomas awarded and in 1982-1983, 105%. These proportions are significant in view of the required minimum ratio of technicians to engineers. This should be at least 3:1 (Straszacker Commission (1969: Part I,35.) Thus, the part of Hypothesis 5 on awards is also confirmed.

Some comparative statistics on engineers and technicians indicate that South Africa is producing fewer of these people per capita than many other countries. In 1958 there were in the country 41 engineers per 100 000 population, but in Britain 153, in Canada 254, and in the United States 417 (1956) (Straszacker Commission (1969:Part II,303.) In the

late 1970s there was only 1 woman engineer for every 650 engineers, but 1 in 60 in France and the German Federal Republic, and 1 in 50 in the United States, and 1 in 5 in the Soviet Union (Goode Commission (1978:79.) In 1959, 10,5% of the South African engineers were trained abroad (National Bureau of Education and Social Research,1960:Part Four,35). In 1977 in Taiwan there were graduated 341 engineers per 1 million population, but in South Africa it was only 195 per equivalent number of white population (Rautenbach,1981:84). The engineering technician figures were 876 and 424, respectively. The South African rate of training of technical persons was nearly half of those of Taiwan and Israel (Subcommittee on Technical and Vocational Education, De Lange Commission (1981:10.) About 15% of the technicians were trained abroad (Goode Commission (1978:29.)

4.10 ECONOMIC REWARDS

Although the social prestige of universities is great, it remains to be determined whether or not this translates into economic rewards for its graduates vis-a-vis other tertiary education graduates. For white men the median annual income as employees has been as follows in rands (Terblache,1971:16; Boshoff,1972:35-37; De Klerk,1975:14,1976:6; Goosen, 1981:17,19; Van Pletzen,1984:14-16):

Occupation	1960	1971	1975	1981	1984
Engineer	3 430	7 590	10 880	25 130	35 112
Teacher	2 600[1]	6 250	8 490	11 720	19 220
Technician	2 190	4 833	8 693	12 845	15 250

[1] In education.

These earnings correspond to university, college of education or some university, and the CATE and technikon graduates. It is noteworthy that in 1975 and 1981 the technician salaries exceeded those of teachers. In 1960 the median annual salary for twenty-six professional occupations was R1 860 or R330 below that of a technician (Terblanche,1971:25;

Boshoff,1972:13). In 1970 the median annual salary of men with bachelors degrees was R5 566 or only R733 more than for technicians.

For the white women graduates the differences between the median annual salaries of teachers and technicians or technical assistants are even smaller, as the following data illustrate (Terblanche,1971:25; Wolmarans,1974:12,14; Urtel & Smith,1978:9;Faurie,1981:41):

Occupation	1960	1973	1976	1979	1981
Teacher	1 300[1]	3 345	5 917	5 990	7 665
Technician	910	3 308	5 800	5 810[2]	8 420[2]

[1] In education.

[2] Technical assistant.

It is thus evident that technicians earn almost as much as teachers and sometimes even more than university graduates. If monetary rewards alone were the determining factor far more would study to become technicians than is the case.

Engineers also earn more than the average university graduate. In 1971 their median annual salary was R7 590, whereas for all professions it was R7 415 (Boshoff,1972:13). Comparing them in terms of the profitability of twenty-four professions, engineers ranked fifth in 1971, 1973, 1977 and 1981, third in 1975, and sixth in 1979 (Goosen,1981:42). They thus usually rank within the upper fifth of the professions.

Data for most of the other population groups are too sketchy to be of much use, but in the case of the Indians they indicate the same pattern. In 1975 men's annual salaries for engineers were R7 250, teachers R6 260, and technicians R4 000 (De Klerk,1975:12-13; Wolmarans,1979:20,28, 33,44; Faurie,1981:11,23,33). In 1977 the salaries were R9 000, R6 500, and R5 250, respectively.

The last part of Hypothesis 1, about university prestige persisting for a longer period than the economic rewards of its graduates alone would

justify, is thus confirmed for the whites at least. It probably holds true of the other population groups as well.

4.11 BIASES IN FAVOUR OF ACADEMIC EDUCATION

4.11.1 COLONIAL AND THIRD WORLD

The biases in favour of an academic education have already been noted in Chapter 2. The causes of this are deep rooted and multi faceted. Its roots go back to the arrival of Europeans in Africa or for that matter in many other parts of what is now called the Third World. The colonists saw themselves as a separate and superior race to the natives. An élitist tradition developed, linking academic schooling to the governing élite. Prior to at least the 1960s the blacks aspired to posts like those held by the whites and an education similar to them. Gearing their education to their traditional rural environment was viewed as perpetuating their inferior status (Lillis & Hogan,1983:92). This notion of what constitutes valid school knowledge has been difficult to break. Vocational and technical education are seen as "an illegitimate extension of the concept of 'education', and vocational schools are similarly viewed" (92).

Many of the Third World countries have a majority of the people without completed primary school education, but growing numbers of unemployed and underemployed university educated people (Irizarry,1980:338). This is due to a mismatch of education programmes in relation to economic development. The traditional academic type of education is preferred over manual, technical, and scientific education. The governments' discriminatory fiscal support in favour of tertiary education and their excessive employment of university graduates, which in turn stimulates demand for more tertiary education, is another significant contributing factor (338-339). The whole curriculum is based on values and skill orientations leading students to becoming job seekers rather than seeking self-employment or entrepreneurial ventures (343).

Their economies have failed to modernise and diversify (341). They are still dependent upon advanced industrialised countries and thus offer few employment opportunities in industry. The services sector is, however,

excessively developed. This is where the posts offering social mobility are concentrated -- law, medicine, teaching, administration, and sales (349). Pressure is exerted upon governments to increase employment in these areas. Since there are few posts in relation to applicants, there is a scramble to get higher education credentials. There is the paradox that such underdeveloped countries as Argentina, Colombia, and South Korea have surpluses of technical persons, for their dependent economies do not provide the necessary research and development that is done in the developed countries (350-351).

Ronald Dore, an educationist, has put what he calls the "qualification escalation" into a theoretical perspective and postulated that the later development starts (in world perspective)

> the more widely education certificates are used for occupational selection;
>
> the faster the rate of qualification inflation;
>
> and the more examination-oriented schooling becomes at the expense of genuine education (1975:72).

The first point means that there will be a greater urge to catch up and more emphasis upon the meritocractic ideal of equality of opportunity. Thus, there will be greater demand for education, especially for schooling at the level at which valid job certificates are thought to be produced (77). The higher the "education qualification the better one's chances of getting some job" (5).

These problems have been recognised within an Africa-wide context. In 1953 the Nuffield Foundation and the Colonial Office in a study of black education concluded that the "aim of education must be to prepare Africans to live well in their own country, and the system of education must not represent a pale reflection of that given in England...." (1953:67). In 1961 the United Nations Economic Commission for Africa

sponsored conference on African education advocated increased technical and vocational education to keep abreast of recent technological progress and development requirements (1961:Chapter V,21.) That this has not yet been realised was evidenced in 1976 when the Lagos Conference of education ministers declared that there is a need to "provide a new form of education so as to establish close ties between the school and work; such an education, based on work and with work in mind, should break down the barriers of prejudice which exist between manual and intellectual work...." (Declaration of the Lagos Conference,1977:49).

4.11.2 SOUTH AFRICAN PROBLEMS

South Africa is a part of the Third World as well and thus these biases in favour of academic education have also manifested here. They have interacted with some more typically South African factors against the widespread acceptance of vocational and technical education. These may be grouped under political, socio-economic, educational, guidance, and the outlook of the policy makers within the education system. It is for analytical purposes only that they are separated here.

4.11.2.1 Political

As has already been mentioned, the policy initiated by Dr. Verwoerd was that the blacks should serve their own community; that is, there is a black economy which black education should serve. One economist aptly concluded that this policy "caused a waste of trained labour, retarded the acquisition of skills and, in general, postponed the adjustment of the black man to modern industrialism" (Steenkamp,1980:71).

4.11.2.2 Social

Closely connected with the political factor was the prevailing social attitude that skilled trades are for the whites only whilst the blacks should do unskilled labour only (Malherbe,1969:24). This has its roots in the colonial period when the whites regarded themselves, more so than today, as a separate and superior race to the blacks. They saw themselves as "being prepared for leadership in all fields: hence a disinclination

to make obvious arrangements for those who are fitted only for the more menial work of the community" (Malherbe,1977:406).

4.11.2.3 Economic

Within the more narrowly defined economic sphere there was the statutory colour bar and job reservation. The Native Building Workers' Act, No. 27 of 1951 banned black artisans in the building industry in the white areas. The Industrial Conciliation Act, No. 28 of 1956 gave the Minister of Labour the authority to reserve on the recommendation of the Industrial Court any occupation in any area for the members of any population group. Only twenty-nine work determinations were made and applied to trades of lesser importance and in some parts of the country only. Many exemptions were granted and only 2,9% of the potential labour force was affected (Wiehahn Commission (1979:Part 1,77.) The last job reservation is to be repealed in 1986 when the Mines and Works Act, No. 27 of 1956 will be amended to permit the blacks in certain posts in the mining industry (Anon.,1985d:1).

The worst effect of job reservation was that it "prevented an earlier realization of the need to prepare the black man for occupations above the unskilled and lower semi-skilled échelons by provision of more general education and job training" (Steenkamp,1980:75). The traditional or conventional colour bar has always been far more important than its statutory counterpart, for it is based on deep rooted cultural norms about the proper rôle of the non-whites vis-a-vis the whites. The fear of possible competition by black trade unions is one such traditional belief.

4.11.2.4 Educational

In 1966 there was a survey of Form IV and V (the equivalent of Standards 9 and 10) Soweto students which revealed the prevalence of biases in favour of an academic education. Of the boys, 65,7% and of the girls, 73,7% wanted a professional post (Turner,1969:8). For both, the favoured posts were teacher (23,4%), physician (20,6%), social worker (15,3%), lawyer (5,6%), and engineer (3,5%). For the boys alone it was teacher (19,9%) and physician (16,7%); for the girls the favoured oc-

cupations were social work (11,3%) and nursing (9,5%) (8). One fifth (20,4%) of the students said that they disliked a job where there is heavy manual labour and dull and meaningless work (14). When they were asked about the first job that they will get, their responses were more realistic in terms of the likely outcome, with 23,8% of the boys and 40,6% of the girls saying it will be a professional job (9). Of their brothers and sisters who had left school with Form III or higher qualification only slightly more than 11% had professional jobs (10).

It may be maintained that this is partly a reaction to historical developments -- the desire to acquire the same status as many of the whites have and the closing of alternative education and occupational channels. Many who might have become technicians and engineers entered universities and colleges of education. It is only recently that significant steps have been taken to train the blacks for technical occupations. By 1980 there were 45 technical schools, but all of them were in rural areas. In that year the first black urban technical high school was created (Chisholm,1983:362). In the same year out of the 351 secondary schools only 5 were technical (Anon.,1981a:21). As indicated in Chapter 2, the first black technikon was created in 1979 by a number of large corporations and is still funded by them. Of all the non-white universities, the University of Durban-Westville remains the only one with a faculty of engineering. The University of Fort Hare has a two-year pre-engineering programme.

For the non-whites there is the problem of acculturation to a Western technological society. This process is faster for some than for the others -- the Indians as opposed to the blacks. They are all trying to acquire the same level as the whites.

In this connection there is the problem of weaknesses in mathematics, especially amongst the blacks. The Subcommittee on Technical and Vocational Education of the De Lange Commission concluded that children from a traditional rural type of culture or which still has strong remnants of such values lack a sufficient background of concrete experiences to develop the necessary concepts of science and mathematics (1981:15.) A study by the Human Sciences Research Council (HSRC) of the blacks'

mathematical ability noted that the emphasis on the axiomatic-deductive approach in the way that mathematics is taught as well as in the content matter leaves to parrot-learning and the inability to apply what has been taught (Van den Berg,1978:39). This is further compounded by having to learn through the medium of a second language (Afrikaans or English) (40). The black languages are not yet advanced enough for scientific and mathematical terminology; large numbers, for instance, become long and unwieldy descriptions (11).

The Work Committee on the Teaching of the Natural Sciences, Mathematics and Technical Subjects of the De Lange Commission identified some other problems in the teaching of these disciplines to all of the population groups. It noted that the new 1969 syllabuses are too theoretical, conceptual, and rigid, the unavailability of highly qualified teachers to teach in a sufficiently stimulating manner, the inadequate laboratories, especially in the non-white schools, and the fact that mathematics and the natural sciences are more demanding than other disciplines (1981:31-32.) At the tertiary level there is the lack of professional status of natural and physical scientists and mathematicians as opposed to engineers, engineering and medicine are financially more rewarding, and the quality of the teaching leaves much to be desired (35.)

4.11.2.5 Vocational Guidance

The vocational guidance system, especially at the school level, is inadequate. In 1948 the De Villiers Commission noted that until recently there was no systematic effort to determine student goals and needs (1948:19.) By and large teachers do not know the students and know even less of what happens when they leave school. What advice of a vocational nature is given is based on the belief that the bright ones should go to high schools and the dull ones to vocational schools (204-205.)

In 1980 the National Manpower Commission on High-Level Manpower in South Africa estimated that there is only one guidance teacher per 600 white students. For the other population groups the situation is even worse and ratios of 1:3 000 or more are common (1980:66.) There is

also conflict between teaching and counselling roles, with career guidance forming a small part of the total guidance (Behr,1984:54). Little contact exists with employers and the Department of Manpower.

The Work Committee on Guidance of the De Lange Commission noted that there are no requirements with regard to the qualifications or the training for school guidance personnel (1981:25.) It concluded that the school guidance teacher "has little influence on the pupils' choice of their field of study or occupation"(12.)

Although the Department of Manpower offers career guidance and job placement services, cross-referral and linkage between schools and universities on the one hand and the department on the other hand is very limited (Watts,1980:11). Systematic sources of career information are almost non-existent (National Manpower Commission on High-Level Manpower in South Africa (1980:66.)

A 1977 survey of the Indian school guidance system revealed serious shortcomings. This survey also provided much needed statistics on what is happening. Only 4,3% of the teachers were responsible for guidance only, with 84,9% being subject and guidance teachers (De Klerk & Nieuwenhuis,1982:14). The ratio of guidance teachers to secondary school students was 1:204, which is better than the officially recommended ratio of 1:250 (35). However, virtually half (49,6%) of the guidance teachers devoted only one to five periods to group guidance per week (40). Nearly two-thirds (66,2%) said that they had no time for individual interviews during official school hours (69). Nearly half (48,5%) of the high school students had no interviews with their guidance teachers, and 26,4% had only one interview (107). Problems of choosing a vocation were not discussed by 67% of them (112). Of the guidance teachers (professional counsellors and teachers without formal guidance education), only 28,8% had training in guidance (53).

At the university level there are also some problems. The Van Wyk de Vries Commission noted that arts, science, and commerce students without any specific career in mind have the greatest difficulty in "securing reliable information on suitable careers" (1974:245.) A 1975 survey of all

who got a degree, certificate, or diploma in 1974 or early 1975 as to who was most important in influencing one's choice of courses and/or career found that 7,2% listed teachers or the school advisory service, 3,1% the university advisory service, 2,5% other advisory services, for a total of 12,8% (Erens & Louw,1976:8). Nearly half (46,4%) said no one (8). When they were asked to rate their teachers or the school advisory service, 51,6% rated it from could be better to non-existent, with only 33,8% rating it adequate. University advisory service was rated adequate by 47,3%, but 34,3% rated it from could be better to non-existent (12). The Work Committee on Guidance of the De Lange Commission came to the conclusion that the best provision is made at the white universities, although it is inadequate even there, then at the Indian, and finally at the coloured and the black universities where the vocational guidance system is totally inadequate (1981:27.)

4.11.2.6 Inertia within the Education System

There is one additional factor which is so obvious that it is usually not even mentioned. Nearly all of the government officials and educationists have received an academic education. For people socialised within such a system, it is difficult to understand technical and vocational education and be sympathetic to it. It is easy to pay lip service to the need for change, but it is another matter to make the necessary changes within the education system. Professor J.P. de Lange correctly observed that there is a strong tendency to continue with a given system and to make adjustments "only under pressure of long established new needs" (1984:5).

Professor W.L. Rautenbach, a member of the Subcommittee on Technical and Vocational Education, in a memorandum for it summarised many of the problems and noted their interaction. It is worth quoting at length:

> The present system of education is to a large extent responsible for this situation [shortages of skilled manpower which retard socio-economic development]. It is dominated by an academic value system which is more concerned with knowing than doing. Universities have expanded too fast and in an unbalanced way, leading to

an oversupply of graduates in some fields and serious under-supply in other fields. Differentiation between academic, technical and vocational fields at secondary level is ineffective and many students at secondary and tertiary level are in academic streams for which they have little aptitude or liking. This results in bottlenecks in the educational system, high drop-out rates, lowering of standards, general inefficiency and an output not in line with the needs of the country. Practically no action is taken to cope with the problems of rapid cultural change and rapid expansions of education takes [sic] place without due consideration being given to the type and quality of the output of the system or the training of the teachers (1981:62).

4.12 EDUCATED MANPOWER

Hypothesis 7 states that fears of surpluses of university graduates, especially in the arts, on the one hand and shortages of certain types of manpower on the other hand, will lead to government efforts to redress the balance. To operationalise this, engineering, technician, and teaching personnel shortages will be analysed. Since there are and have been shortages of highly skilled manpower in general, it is first necessary to deal with the beliefs which led to the considerable expansion of tertiary education (National Manpower Commission (1984:25-26.)

4.13 HUMAN CAPITAL THEORY

Until the late 1970s the prevailing thinking was based on what is called human capital theory. It was closely linked to the manpower needs for the economic development of the country. This was well expressed by J.H. Viljoen, Minister of Education, Arts and Science, on 19 April, 1951, when he maintained that investment in university education "will yield rich dividends both to the donor and to the people in the form of higher production, a greater income, greater competence in our industries, agriculture and public administration, better human relationships and a richer spiritual life" (Hansard, Senate,1951,cols.2016). He did note, however, that since the government is expected to contribute more and more to the maintenance of universities it will have to pay more attention

to seeing that the "correct training is given in the interest of the people" (2026).

On 27 February, 1967, Senator J. de Klerk, another education minister, was already using some of the terminology of human capital theorists when he maintained that education "is an investment for human potential" (Hansard,1967,cols.2020). It is "one of the most profitable production factors, because it provides trained people" (2021). Education is "directly linked to economic growth and therefore to the progress of the country...." (2022). There are still too many who do not obtain admission to university.

On 3 June, 1976, Dr. P.G.J. Koornhof, Minister of National Education, stated that it can be "proved statistically that the money and service expended on education are among the most important and most profitable long-term investments a State can make" (Hansard,1976,col.7999). It is the function of the universities "to make sure that the country, with regard to its human resources, does not slacken in any way" (Koornhof,1977:1).

Although human capital theory goes back to Adam Smith, it was not until the early 1960s that economists rediscovered and developed it further. Theodore W. Schultz was one of the first ones to develop the idea that what is called "consumption constitutes investment in human capital" (1961:1). The increases in the national output have been large compared with the increases in land, man-hours, and physical capital. The major explanation for this is investment in human capital. Citing the American case, Schultz maintained that the stock of education (years of education and cost involved) rose about eight and a half times between 1900 and 1956, whereas the stock of reproducible capital rose four and a half times, both in 1956 prices (11). Between 36% and 70% of the hitherto unexplained rise in earnings of labour "is explained by returns to the additional education of workers" (13). He calculated that the rate of return on the investment in education in 1958 was 11% a year for college and university graduates (12). Schultz later conceded that no one has yet developed a satisfactory procedure for identifying the benefits accruing to the students and to the others (1963:55). He also admitted that a point

may be eventually reached where additional expenditure for education will be pure consumption (a zero return). This appeared to him "very remote presently...." (1961:12).

Another economist, Gary S. Becker, concurred with Schultz and elaborated on two points. First, those investing large amounts in themselves receive relatively large profits (1967:13). Second, unemployment rates tend to be negatively related to the level of the skill acquired (1962:10).

4.13.1 CRITIQUES OF HUMAN CAPITAL THEORY

Since the early 1970s human capital theory has been under increasing criticism. Ivar Berg, a sociologist, questioned the tendency to consider only income, or the rate-of-return of education. Earnings reflect ability more than educational achievements (1971:32). There has been an educational upgrading of work opportunities, with resulting displacement of people at the other end who must compete for posts once held by people of lesser educational qualifications (69). The notion that education changes people gains at least as much supporting as disconfirming evidence (103).

Another sociologist, Raymond Boudon, hypothesised that when the number of people desiring more education exceeds the number in similar situations who would have sought it earlier, the status expectations with a given educational level decline (1974:161). People thus over time demand more and more education (183). This is what he called the "aggregation paradox" (198). Every one has a definite advantage in securing as much education as possible -- the higher the educational level, the more favourable the status. "But as soon as all individuals want more education, the expectations associated with most educational levels tend to degenerate, and this has the effect of inciting people to demand still more education in the next period" (198).

An economist observed that the rapid growth of education enrolments should have led to a more rapid growth of the economy. If anything, the opposite has happened in the United States at least

(Thurow,1974:386). Like Boudon, he concluded that as "the supply of educated labor increases, individuals find that they must improve their education simply to defend their current income position" (416).

Ronald Dore, an educationist, suggested that there might be a declining positive correlation between education enrolments and growth rates and even the appearance of negative correlations (1975:86). At the micro economic level the rate-of-return analysis assumes that everybody is paid what he is worth, but how does one know whether the enhanced earning power is because of education or something else? This something else might be intelligence, wealthy parents, or institutional mechanisms which automatically give good posts in bureaucratic organisations to those with educational certificates (93-94).

The most penetrating and comprehensive critique came from Fred Hirsch, an economist. He maintained that there are social limits to growth. Hirsch argued that additional demands for goods and facilities are in their nature attainable only by a minority (1978:172). What individuals want, society cannot get. This is the same thing as Boudon's "aggregation paradox." Education is one example of this (106). If it is enjoyed in its own right, it is capable of indefinite expansion, but not as an instrument for securing top posts (59). People with relatively high educational qualifications enjoy attractive professional and social opportunities. This induces a strong demand for such qualifications (5). Thus, "the utility of expenditure on a given level of education as a means of access to the most sought after jobs will decline as more people attain that level of education" (3). The competition for positional goods creates a potential misallocation of resources, activities, and social waste (5). There are other aspects of Hirsch's theory which will be dealt with in Chapter 6.

Finally, human capital theory suffers from a lack of historical perspective. It ignores the considerable unemployment and underemployment of university graduates in Weimar Germany (Dreijmanis,1978:256-257) and in Italy since 1880 (Barbagli,1982:9), and is thus largely ahistorical.

Just as human capital theory provided much of the theoretical justification for the expansion of tertiary education, so one may argue its critics have provided the government with a justification to curtail its expansion and/or redress the balance at least in favour of technical and vocational education. The government has not yet made reference to the critics of human capital theory, preferring to concentrate on the examples of surpluses of unemployed university educated people in Western Europe and other parts of the world. In a sense this is not surprising when long cherished beliefs are found wanting. Moreover, the government was still upholding human capital theory when it was already under severe challenge.

As far as the underinvestment hypothesis (Number 3) is concerned, it makes the same assumptions as human capital theory --that education is mainly responsible for the enhanced earning power of individuals, that technical personnel are needed, and that investment in them will pay good dividends. The latter two points hold true of engineers and technicians. Dore's point about not being able to separate the enhanced earning power from intelligence, wealth, or some other variable holds true for all educated persons. Leaving the enhanced earning power aside, it may be said that investing in engineers and technicians pays dividends in the sense of advancing a country's economic development, assuming, of course, that their education will be utilised. It is thus more profitable to invest in those areas of education where there are labour shortages rather than where there are labour surpluses.

This theorising abroad found reinforcement in South Africa at about the same time. In 1977 a study of the labour market for educated persons noted that the education level of the manpower supply is rising. Supply creates its own demand. It has very little to do with the post itself. Employers seem to assume that a higher level of formal education will lead to higher productivity, but this is an unproven assumption (Vermaak, Jacobs & Terblanche,1977:30). Another economist concluded that the contribution of education to economic growth is difficult to determine, for isolating the effect of education "is an almost impossible task," because economic growth is a function of many variables, such as capital stock, propensity to save, technology, and expectations (Marais,1984:75-76).

The rate of return approach is not necessarily a good indicator of productivity.

4.14 EDUCATION AND ECONOMIC DEVELOPMENT

Various government commissions have used human capital theory and related it to economic development by maintaining that by promoting education economic development will be advanced. The De Villiers Commission maintained that the aim of education "should be conceived of in terms of both the needs of the individual and the demands of society" (1948:21.) The Van Wyk de Vries Commission argued that every white person should be educated to his intellectual capacity (1974:235.) Just as Education Minister De Klerk had done in 1967, it also rejected the notion that there be stricter university admission standards, for too many who might succeed would then be denied an opportunity. The commission deplored the fact that too little attention has been devoted to "education as an instrument for our country's economic progress" (169.) The Straszacker Commission came to the same conclusion about university admission; that is, it is better to have comparatively high failure rates and still produce a large number of graduates than to reduce the failure rate by pre-selection alone (1969:Part II,162.) Finally, the De Lange Commission stated as its Principle 4: "The provision of education shall be directed in an educationally responsible manner to meet the needs of the individuals as well as those of society and economic development, and shall, inter alia, take into consideration the manpower needs of the country" (1981:15.)

The HSRC, following the rate-of-return analysis of the human capital theorists, calculated for 1960 and 1970 the private yield on investment in education (after tax income) and found that for the whites, coloureds, and the Asians up to Standard 7 it was higher than 100% (Smuts & Terblanche,1974:39). For Standard 10 graduates in 1960 it was 59% for the whites, 32% for the coloureds, and 31% for the Asians. In 1970 the percentages were 55, 28, and 28, respectively. If one had a bachelor's degree or a bachelor's honour's degree in 1960 the rate-of-return came to 27% for the whites, 25% for the coloureds, and 22% for the Asians. In 1970 the percentages were 29, 20, and 22, respectively (39.) The

declining rate-of-return is consistent with the law of diminishing returns. The HSRC concluded that "an investment in education can be regarded as a very profitable one...."(41). Many other HSRC studies have come to the same conclusion (See those cited in Section 4.10).

Legislation has also reflected the need to consider the needs of the individual and those of the economy. The National Education Policy Act, No. 39 of 1967, Section 2 (f) states that education "shall be provided in accordance with the ability and aptitude of and interest shown by the pupil, the needs of the country, and that appropriate guidance shall, with due regard thereto, be furnished to pupils." The same point is expressed in the Education and Training Act, No. 90 of 1979, Section 3 (d) dealing with black education. The National Policy for General Education Affairs Act, No. 76 of 1984, Section 2 (1) (d) (iv) has emphasised the manpower aspects:

> the provision of education shall be directed in an educationally responsible manner at the needs of the individual and those of society, and the demands of economic development, and shall take into account the manpower needs of the Republic.

This is an almost verbatim repetition of Principle 4 of the De Lange Commission.

4.15 COMMISSIONS ON ENGINEERS AND TECHNICIANS

A standard government practice is to appoint commissions of enquiry and then to enact many of their recommendations into law. There have been four investigations dealing specifically with engineers and technicians. A number of common themes run through their reports -- the education of technical personnel needs to be improved and more encouraged to enrol, better vocational guidance is necessary, and the status of engineers and technicians needs to be improved. There is much repetition, which indicates that earlier recommendations have not been implemented or have failed to achieve the desired results.

The De Villiers Commission in 1948 recommended the creation of vocational and academic high schools and the replacement of the matriculation exemption by a specific university entrance examination (1948:38,41.) A much more widely conceived and extended programme of technical and vocational education was recommended for the whites and the non-whites (133,252.) It complained that the secondary school's content of courses was "still dominated by university entrance requirements" (17.) Its critique of the vocational guidance system has already been noted.

In 1960 the predecessor of the HSRC, the National Bureau of Educational and Social Research, did a survey of the training and employment of scientists and engineers. There had been an earlier survey in 1951. Both surveys revealed shortages (1960:Part Four,28-35; Olckers, 1953:38-40).

The Straszacker Commission recommended the training of more engineers, especially at the Afrikaans-medium institutions, encouraging more women and non-whites to become engineers and technicians, increasing the proportion of first-year engineering students who graduate, and the registration of engineers (1969:Part II,151,154, 161-162, 152.)

Finally, in 1978 the Goode Commission dealt with technicians and recommended the introduction of a diploma in technology, the doubling of the number of engineers and the trebling of the number of technicians, encouraging more women and non-whites to become technical personnel, the registration of technicians and technologists, and the changing of the name of the colleges of advanced technical education (1978:22,64,80,91,99.)

Other commissions have addressed various aspects of engineering studies. The Holloway Commission urged the improving of the pre-university training for engineers (1953:134). The Van Wyk de Vries Commission recommended the reciprocal granting of credits and recognition of qualifications between universities and the CATEs (1974:224.) It also expressed the hope that one day "parents will take the same pride in sending their children to a college for advanced technical education as they do in sending them to university" (170.)

4.15.1 POLICY RESULTS

Vocational and academic high schools came as a result of differentiated education in 1972. Registration of engineers started in 1968 as a result of the Professional Engineers Act, No. 81 of 1968, comprising certification followed by a licence to practice. According to A.A. Venter, Minister of Local Government, Housing and Works, on 4 February, 1985, this act will be amended to provide for the registration of technicians and technologists as well (Hansard,1985,col.579). The National Diploma for Technicians on a full-time basis came in 1957. Up to then it was only on a part-time basis. The National Technical Certificates 4, 5, and 6 were introduced in 1980 (Klopper,1981:94). In 1981 came the National Diploma in Technology and the National Laureatus in Technology and the already mentioned hierarchical division of certificates and diplomas. The change of name from CATE to technikon came in 1979. Since 1978 universities admit students in some cases to master of science studies on the basis of qualifications obtained at the CATEs and the technikons (Behr,1984:135). Finally, in 1983 the technical institutes were upgraded to technical colleges.

There has not yet been the doubling of the number of engineering graduates and the trebling of the number of technician graduates advocated by the Goode Commission. More women and non-whites have entered engineering and technical studies, but not as many as were hoped. One may thus say that as far as changes of a structural or administrative nature are concerned the commission recommendations have been largely implemented, although with considerable delay at times. Changes of an attitudinal nature have come far more slowly. When they have come, they have been mainly due to a combination of factors other than government efforts.

4.16 INCREASING PROPORTIONS OF AFRIKANERS IN ENGINEERING

A good case in point is the steady rise in the proportion of the Afrikaners enrolled in engineering at university. In 1945, 14,5% of the engineering students were enrolled at Afrikaans-medium universities and 85,5% at English-medium universities (Union Education Department,1948:46). In

1982 the percentages were 54,8 and 45,2, respectively (Department of National Education,1984:143). There are, of course, some Afrikaans-speaking engineering students at English-medium universities and vice versa, but they are relatively few and would not change the increasing trend of the Afrikaners to study engineering. Almost as many now study engineering as they constitute their proportion (56,7% in 1980) of the white population.

It may be seen as part of a shift in study preferences amongst the Afrikaners (Cloete,1984; Coetzee,1984). Until the 1930s men still constituted a majority in the colleges of education. At university there was a strong preference for law, medicine, and theology, in this order. Women studied social work or nursing. In the 1940s and 1950s economics and commerce became more popular, but business was still associated with the Anglophones and the Jews. These shifts are related in turn to the increasing industrialisation and urbanisation of the country.

4.17 COMMISSIONS ON TEACHERS

The status and shortages of teachers have also received considerable attention from the government. Already in 1948 the De Villiers Commission noted that teachers have inadequate renumeration and uncertain status -- called a profession but not on a level with other professions in terms of the respect that the other professions can command. It proposed the registration of teachers (1948:191.) In 1969 the Gericke Commission repeated the need for a higher status for the teaching profession (1969:25-26.) In 1979 the Department of National Education appointed a committee to investigate the status of the white teachers. It sent a questionnaire in 1980 to a representative sample and discovered that renumeration was the number one cause of teacher dissatisfaction (1981:4.5). Two firms of consultants were then hired to evaluate their posts. Their basic premise was that teachers' salaries should be comparable to those of equally well qualified persons in posts of comparable complexity. They found that the median annual salary of white men teachers in public primary and secondary schools in the arts in 1980 was R11 406. In the public sector in 1981 with equivalent qualifications and

doing comparable work one would get an estimated annual salary of R15 423 (5.22). For women teachers the figures were R8 671 and R10 432, respectively (5.23). These differences also held true for those teaching the natural sciences and commerce and administration.

The Work Committee on Recruitment and Training of Teachers of the De Lange Commission noted the lack of competitive salaries, the tendency towards excessive bureaucratic control, appointment of professionally unqualified persons, unfavourable publicity when conditions of service are negotiated, and the position of women as factors affecting recruitment (1981:26-27).) It concluded that if the teaching profession were highly valued by the government and the public and if the conditions of service were favourable, the supply would probably exceed the demand (53.)

On 3 June, 1976, Dr. Koornhof, Minister of National Education, made an appeal to men to consider teaching as a profession and pledged that the National Party Government and the people of South Africa will look after their interests and "see to it that they are happy in the teaching profession and that it will be worth while for them" (Hansard,1976,col.8000).

4.17.1 POLICY RESULTS

The registration of full-time teachers became obligatory as of 1978 with the enactment of the South African Teachers' Council for Whites Act, No. 116 of 1976. It thus took thirty years to achieve statutory recognition of teaching as a profession. The blacks got this in 1980 as a result of the coming into force of the Education and Training Act, No. 90 of 1979. In 1982 came the registration of natural scientists with the passage of the Natural Scientists' Act, No. 55 of 1982. As far as teachers' salaries are concerned, they have traditionally lagged behind those of many other professions. Notwithstanding Dr. Koornhof's 1976 pledge the situation has changed little, as the earlier mentioned 1980 survey indicated.

4.18 WOMEN IN THE LABOUR FORCE

Teaching is one of the few professions in which women constitute a majority (Table 4.20). Partly because of this their salaries are low. This is a general phenomenon in occupations in which women predominate. Society has stereotyped them into certain occupations which are considered compatible with the rôle and status of being a woman -- nursing, teaching, and secretarial work. Occupations requiring independent, competitive, and assertive behaviour are viewed as "less womanly" and can cause a dilemma for women adhering to the traditional occupational differentiation (Van Rooyen,1982:13). The virtual non-participation by women in vocational and technical occupations has been largely due to this stereotyping. The Wiehahn Commission noted inadequate qualifications in mathematics and science, a lack of interest in technical work, and the inadequacy of vocational guidance programmes for women (1982:Part V,611.) A 1965 survey in the United States asked a representative sample of people which professional occupations they disapproved of for women. Business executive, engineer, lawyer, architect, physician, scientist, and professor were given in this descending order (Behr,1976:16). Although a South African survey might reveal a different ranking order, it is probably true to say that there is also some bias against women in these professions. Women thus enter a few professions in large numbers and form a relatively non-competitive segment of the labour market.

Two surveys in 1976 and 1978 of women university graduates of their work commitment and career orientation revealed that 77,6% of the married ones are not prepared to accept full career involvement and family creation (Wessels,1981:7). They prefer to work later or choose part-time work. Of the highly career oriented (18,3% of the married and 36,1% of the single ones), only 44,5% desire a long-term full-time career combined with marriage and child rearing or on its own (8,11). Of the sample surveyed, 65,2% were in traditional women fields, such as nursing, teaching, and librarianship (32). The non-traditionalists were in atypical occupations, such as science, mathematics, technology, medicine, law, pharmacy, and business. Their work or career commitment was

greater than amongst those in the traditional occupations (38). Only highly career-orientated women will choose non-traditional occupations (39). The main choice is still between working or not working, rather than a "free choice among a variety of work fields" (39).

4.19 TEACHER SHORTAGES

The Work Committee on Recruitment and Training of Teachers of the De Lange Commission concluded that for the whites the shortages of teachers range from slight to critical in some secondary school subjects (1981:53.) For the coloureds there is a slight shortage of pre-primary school teachers, a moderate one for primary school teachers, and a serious shortage of men for secondary schools (75.) In the case of the Indians there are moderate to serious shortages for primary and secondary school teachers in certain subjects (67-68.) For the blacks there are the most serious shortages of teachers (44.)

A later study by the National Manpower Commission came to a different conclusion. It found that for the whites, coloureds, and the Asians "in general there is no shortage worth mentioning" (1984:211.) There are certain problems, but mainly in science and mathematics. For the blacks the situation is "still causing concern...."(211.)

Fortunately, there are since 1969 surveys by the Department of Labour and its successor department of the number of teachers for each population group and the number of vacancies. Since 1973 all surveys were done on a sample basis. Table 4.20 provides the information. It is clearly evident that overall there are no shortages of Indian teachers. Indeed, the Department of Internal Affairs in 1984 informed the University of Durban-Westville that it should reduce its intake of student teachers from 260 in 1984 to 100 in 1985, for it is expected that by 1990 there will be a surplus of Indian teachers (Behr,1984). In 1969 men constituted 70,1% of the teaching profession, but in 1983, 55,8%. In this period men teachers increased by 41,4% and women teachers by 163,3%.

For the whites there has been an increase in the shortage of teachers, but in 1981 it was only 1,6% of the total number of teachers. What this

means in actual practice is that 1,6 teachers are short per 100 teachers. The percentage of men teachers has declined from 40,3 in 1969 to 31,4 in 1983. In this period men teachers increased by 21,3% and women teachers by 78,7%.

In the case of the coloureds there was a sudden shortage from 1979 to 1981 of 2,5%. In 1969 men teachers constituted 53,1% of all the teachers, but in 1983 only 37,8% or a drop by 15,3%, the highest for any population group. Men teachers increased by 23,7%, which is almost the same as for the whites, and women teachers by 114,9%. It would thus appear that there is a shortage of men teachers. Unfortunately, the 1983 figures are for all of the population groups and thus cannot be disaggregated. On 20 June, 1984, F.W. de Klerk, Minister of Internal Affairs, declared that the shortage of coloured and Indian teachers was nil, but that there were 801 coloured and 448 Indian teachers who were not properly qualified (Hansard,1984,col. 1743).

For the black teachers in 1981 there were 1 984 vacancies or 3,1%, which may be considered a moderate shortage. By 1983 the number had decreased to 1 725 for all of the population groups; in 1981 it was 3 711. By 1984, 4 516 vacancies were expected. Even if the 1983 and 1984 vacancies are totalled it still comes to 2 971 for each year. One may thus agree with the Work Committee on Recruitment and Training of Teachers that there are moderate shortages of black teachers since the early 1980s. Black men teachers in 1969 constituted 49,9% of all of the teachers, but by 1983 only 33,8%. Men teachers increased by 62,1% and women teachers by 216,1%, the highest increases for any population group.

What these statistics indicate is that the estimates of the Work Committee on Recruitment and Training of Teachers were wide off the mark. It reveals the pitfalls of manpower forecasting by demonstrating how market conditions can dramatically change around in a few years from apparent shortages to no shortages at all. They also reveal that for all of the population groups there has been an increasing feminisation of the teaching profession, with women constituting the majority of teachers for all of them, excepts in the case of the Indians. Efforts to attract more

men to the teaching profession have not succeeded. Despite the poor salaries increasing numbers of women become teachers.

This has been essentially a quantitative analysis. If the qualitative dimension is considered, the situation is then vastly different, especially in the case of the coloured and the black teachers. The Work Committee on Recruitment and Training of Teachers of the De Lange Commission found in 1980 that only 3,3% of the white teachers and 12,8% of the Indian teachers did not have at least a teacher's diploma (1981:23.) In the case of the coloured teachers in 1979, 61,9% were without at least a teacher's diploma, and for the black teachers in 1980 the percentage was 85,3 (78,48.)

4.19.1 TEACHER SHORTAGES IN MATHEMATICS AND THE SCIENCES

There is general agreement that the serious teacher shortages are in mathematics and the physical and natural sciences. In 1958 there was a shortage of 259 mathematics teachers and 269 physical science teachers (National Bureau of Education and Social Research,1960:Part Four,15). Unfortunately, according to the Work Committee on Natural Sciences, Mathematics and Technical Subjects of the De Lange Commission, supply and demand data and projections for the future are unavailable (1981:73.) The causes of the shortages are, however, known. It listed the low status of teachers amongst the whites, low salaries, promotion of experienced teachers to administrative posts, and the fact that prospective teachers regard these subjects as very difficult, which is due in part to the way they have been taught by underqualified teachers (66-67.) Here it may be added that there is also stiff competition between engineering and these subjects for much of the same pool of students.

In the period 1970-1980 there was no appreciable increase in the percentages in Standards 9 and 10 who took mathematics, except for the whites. For the Indians it was 76,9% in 1970 and 76,5% in 1980, for the coloureds 47,5% and 48,8%, and for the blacks 33,4% and 34,5%, respectively. For the whites the percentage rose from 52,7 to 67,5 (18.)

Underqualification of teachers remains a major problem. The Work Committee on Natural Sciences, Mathematics and Technical Subjects found that in the years 1977-1980, 31% of the white mathematics teachers, 37% of the biology teachers, and 41% of the physical science teachers were underqualified. For the Indians the percentages were 93, 60, and 84, respectively, and for the blacks 90, 80, and 92, respectively (63.) The Department of National Education in 1980 came up with even higher percentages. It found that of the white men teachers in Standards 8-10, 51% in mathematics, 57% in biology, and 48% in physical science had less than the minimum necessary tertiary education in the subject that they taught (1981:3.3). In the case of women teachers, the percentages were 47, 44, and 59, respectively (3.4). Even at the university level there are problems in these areas. If the minimum qualification at the lecturer level is a master's degree, then in 1980 of the white men lecturers 24% in mathematics, 23% in the natural and physical sciences, and 56% in engineering did not have this qualification (3.5).

As far as salaries are concerned, for the white men teachers in public primary and secondary schools in 1980 the median salary in basic and applied natural sciences (a category which includes mathematics and the physical sciences) was R11 357. In the business sector in 1981 one with equivalent qualifications and doing comparable work would get an estimated R21 172 or almost double the teacher's salary (5.22). For the women teachers the figures were R8 947 and R12 861, respectively (5.23). This is far below of what men earn, but still substantially above what women get as teachers.

4.20 ENGINEER AND TECHNICIAN SHORTAGES

The engineer and technician numbers and shortages are given in Table 4.21. Earlier data indicate a similar situation. In 1958 there were 6 100 engineers and 686 vacancies plus 229 filled by inadequately qualified persons or a total of 915, which comes to 8,9% and 15%, respectively. In 1965 there were 7,143 engineers and 1 000 vacant or inadequately filled posts, which comes to 14% (Straszacker Commission (1969:Part II,301.)

The ratio of engineer to technician was 1:1,58 in 1951, which is low, for in Europe it is 1:3 or 1:4 and in the United States the average is 1:5,2, indicating that engineers are used in posts which can be filled equally well by technicians (Olckers,1953:40). The Straszacker Commission concluded that about a third of the engineers are not employed to the best advantage since they perform routine clerical duties (1969:Part II,35.) The ratio had improved to 1:2,9 in the years 1973-1975 (Goode Commission(1978:27.)

The shortage or vacancy rate of engineers has fluctuated from 5,7% to 10,8%, but there has been very little change since 1958 when comparable data are available. Since 1977 a raising method has been used and thus the subsequent numbers are somewhat lower and not quite comparable. Yet, the engineer shortage rate has always been higher than the technician shortage rate. Both rates are much higher than for teachers.

This might seem to indicate that the government has been ineffective in its various measures to increase the number of engineers and technicians. Such conclusion would, however, have only partial validity. The demand for engineers and technicians has been consistently high. The government has at least succeeded in keeping the shortage rates fairly constant. Keeping the status quo from further deterioration has been no mean achievement under circumstances where more engineers and technicians are needed just to keep the old shortage rates.

4.21 GOVERNMENT CONCERN ABOUT THE SURPLUSES OF EDUCATED PEOPLE

It was not the theorising abroad and in South Africa about the relationship between education and socio-economic development but the developing surpluses of unemployed university educated people in Western Europe and North America since the late 1960s, the increasing university enrolments in this country, the continuing shortages of engineers and technicians, and the rising number of senior certificate holders and matriculants, most of them with an academic education, that caused concern. De Lange expressed this concern well when he wrote that it "is a form of societal madness (it goes beyond educational madness) when

80% of all White Standard Ten pupils reach Standard 10 in an academic course. It is form of total madness if more than 99% of all black Standard 10 children reach Standard 10 in an academic course" (1982:36). Not long before he wrote it on 21 May, 1980, T.N.H. Janson, Minister of National Education, warned that the expansion of universities "will land us in trouble before we realise it. We have provided ample opportunities for Whites to be trained at universities" (Hansard,1980,col.6913).

School boycotts in 1976 and 1980 at the non-white schools, especially black schools, the continuing skilled manpower shortages, and the dissatisfaction amongst the white teachers were other important factors leading to increasing government concern about the future direction of education. This led to a cabinet decision in 1980 to request the HSRC to conduct a comprehensive investigation of education in the country. It was the first time that education for all of the population groups was examined. Some have seen this as a part of "restructuring the ideological discourse" which is at "once a product of and an element in the restructuring of the state" (Buckland,1982:15,18). It may also be seen as a shift from explicit appeals to a white nation or race to a technocratic rhetoric of efficiency and rationalisation (Mann,1984:6). The very fact of securing expert advice from outside the government may be seen as an attempt to obtain greater legitimacy for the government's reform efforts. More will be said about this in Chapter 6.

4.21.1 DE LANGE COMMISSION

The Work Committee on Education Principles and Policy of the De Lange Commission reflected the government's concern about the connection between education and manpower needs. It maintained that education must be linked to the needs of society, manpower, and economic development. If this is not done "in a new system for the RSA, we may within twenty years be faced with the same situation [unemployed school graduates] in this country" (1981:63.) The Subcommittee on Technical and Vocational Education proposed revising the university subsidy formula in "such a way that only students with good probability of success can enter ...." (1981:34.) It also advocated quotas for subsidy to universities in dis-

ciplines where drastic overproduction takes place or can shortly take place.

The Main Committee of the De Lange Commission echoed the lack of linking education to economic development when it noted that

> there is strong evidence to suggest that inadequate harmonization in industrialized countries has led to large-scale unemployment among school leavers, serious financial problems in the provision of education and highly unrealistic demands for university education (1981:19.)

If the increasing numbers of those who have completed Standard 10, especially amongst the non-whites, are taken into account, "then it is not too far-fetched to expect that the country can well be faced with unemployment among those with a purely 'academic' background." (138.)

The solution lies in linking education to the manpower needs and the socio-economic development of the country. Principle 4 has already been noted. A complete restructuring of primary and secondary education was proposed. There would be six years of basic education (Levels 1-6, which corresponds up to present Standard 4), followed by three years of junior intermediate education where students would be introduced to a wide spectrum of possibilities, including career-oriented education, which is defined as technical and vocational education (109,141,138.) In the senior intermediate Levels 10-12 career oriented education would be extended, with possible stimulation of study in directions where manpower needs exist (118.) Career guidance would be essential for this new system to succeed (169.) Students would have to be streamed "to suit their individual abilities and the needs of the country ...." (126.) Therefore, an urgent investigation into the "range of acceptable canalization mechanisms...." was proposed (129.)

Finally, the De Lange Commission recognised that the "dominance of the university entrance examination will have to be decreased drastically

before career-oriented education can come into its own" (139.) The present university funding formula will also have to be restructured "in order to reduce pressure on student recruitment with a view to more rational canalization of learners towards preparatory career education instead of present one-sided and excessive movement towards academic preparatory education" (220.)

What the De Lange Commission omitted was some kind of indication as to what proportion of students should receive an academic as opposed to a technical and vocational education. Fortunately, the commission's chairman has provided these percentages. According to him, no more than 35%-40% of the white students should end up with an academic matriculation and at present no more than 20% of the black students (De Lange,1982:36). The rest are to be channelled into technical and vocational education. There is no indication, however, as to how he arrived at these percentages. They may or may not be the correct ones in terms of the desired objectives. In any case, it would reduce white enrolment in the academic stream by half and black enrolment by nearly 80% -- a truly remarkable achievement if it can be realised.

4.21.2 SCIENCE COMMITTEE OF THE PRESIDENT'S COUNCIL

Aside from the already mentioned government studies, there is further evidence that the government is well aware of the situation as far as the future manpower needs are concerned. The Science Committee of the President's Council invited the National Institute for Personnel Research to prepare a report on various types of education. In 1983 it submitted a confidential report. It was made available to the author for research purposes. The report is somewhat vague and ambiguous, but it does advocate the ideal of a technologically-based society (1983:9). In a discussion of the ends of technology it argues that technology is for everybody. It cautions that the acceptance of such a society is likely to be limited to the extent that the ends of technology are perceived to be inconsistent with central values (10). Stated another way, if one is "handed a tool to do another man's dirty work, the tool becomes an instrument of discontentment" (10). This seems to be a warning not to perceive any one population group as the primary supplier of labour.

It goes on to maintain that in order to gain support from such a technology-based socio-economic order "appropriate structures and styles of organisation are called for in the spheres of education, work, and public administration" (10-11). In education the focus of attention should be on the less developed sectors of the population rather than "on the already over-extended few at the upper end of the educational and socio-economic spectrum" (24).

4.21.3 POLICY RESULTS

So far legislation has been enacted enshrining the eleven principles of the De Lange Commission in the National Policy for General Education Affairs Act, No. 76 of 1984, Section 2 (1) (d).The proposed option of government subsidisation of private schools, the take over of the Joint Matriculation Board by the Committee of University Principals, and the creation of three certification councils, mentioned in Chapter 2, are direct policy results. So is the proposal to grant black university rectors and technikon principals membership on the existing committees. The new university funding formula, dealt with in Chapter 3, is also an outgrowth of the commission's recommendations. It is too soon to say what the results will be in the long term. In terms of Hyphothesis 7 the government has tried to redress the balance between university graduates in general and shortages of technical and teaching personnel and thus the hypothesis has been substantiated.

4.22 LABOUR MARKET PROBLEMS OF UNIVERSITY GRADUATES

Unemployment is a self-evident concept, but not yet underemployment. Probably no government in the world has accepted it in the sense of providing statistics on highly educated but underemployed persons. Broadly, one may say that there are two types of underemployment. A person may work part-time for lack of work and thus his capacity is underutilised. On the other hand, a person may be working full-time and still be underemployed because he is overqualified for the post and does not use his education or training. Simply put, it is "the discrepancy between the educational attainments of workers and the educational requirements of their jobs" (Rumberger,1981:294). Even this

definition has still considerable ambiguity in it and is difficult to apply in practice. Nonetheless, it is this latter type of underemployment that will be analysed.

4.22.1 UNEMPLOYMENT

Unemployment of university graduates in South Africa is low by American and Western standards. A 1967 survey of white bachelor degree recipients in 1966 found that 1,7% were unemployed (Terblanche,1969:2). In 1970, 0,3% of the white men graduates and 1% of the white women graduates were unemployed (Ebersohn,1972:68). In 1978 the percentages were 0,5 and 1,2, respectively. For the Asian graduates the percentages were 4,7% and 2,6%, and for the black 0,8% and 7,3%, respectively (Terblanche & Ebersohn,1980:6,21). The higher rates for the black graduates are apparently due to their lack of knowledge of where to find posts (National Manpower Commission (1984:49.)

In 1968 in the United States the unemployment rate of college and university graduates was 0,7%, but by 1972 it was 11,7%, more than double the national average of 5,1% unemployment (Freeman,1976:21). The unemployment of arts graduates was even higher in 1972 -- 15,7%. These high rates have persisted (Dreijmanis,1978:259). This is a phenomenon which affects most advanced industrial countries -- an insufficient demand for highly educated labour (Rumberger,1982:1). The educational attainments of the unemployed in the United States in the 1970s achieved parity with the employed population, indicating that the unemployed are not lacking in educational skills (16).

The 1967 survey of the 1966 white graduates found, however, that men not educated for a specific occupation experienced the greatest difficulty in securing employment -- 29% of the arts, 15,4% of the natural science, and 10% of the commerce graduates, as opposed to 5,8% of the engineering graduates (Terblanche,1969:4). For women the percentages were 27,8, 26, and 28,6, respectively (5). Both cited too few opportunities for employment for their qualifications -- 34,6% of the men and 37,7% of the women graduates (6). Central, provincial, and local governments were the biggest employers of graduates -- 36,1% of the men and 43,3% of the

women graduates (10-11). If women in education are included it comes to 53% working directly or indirectly for the government. The high percentages employed by the government are significant in that they create some dependency and condition one to expect the government to absorb university graduates.

The earlier mentioned 1975 survey of the 1974 and 1975 award recipients found that 43,1% of all the graduates found employment easily, but only 21,2% of the bachelor of arts and science recipients (Erens & Louw,1976:16). In short, unemployment is low, but some experience considerable difficulties in securing employment, especially the arts graduates. Their opportunities are to be found mainly in the public sector (National Manpower Commission on High-Level Manpower in South Africa (1980:53.)

4.22.2 UNDEREMPLOYMENT

The number one reason for the dissatisfaction of new graduates is their belief that their employers disregard their qualifications and underestimate their personal ability -- 34,6% of the white men and 40,4% of the women graduates believed this in 1967 (Terblanche,1969:20). The most dissatisfied are men with arts degrees; women with such a background were the second most dissatisfied group (17). Moreover, both ranked public service at the bottom in terms of work satisfaction (18).

A 1978 study of first degree recipients revealed that of the white men in the arts, 48,7% in the public service and 51,8% in private employment believed that their education is used little or not at all. For all of the graduates the percentages were 21,5 and 28, respectively. For women in the arts the percentages were even higher -- 52,4 and 56,6 in the public service and private employment and 22,3 and 39,4 for all of the graduates, respectively. For the non-white men in all disciplines 15,4% and 21,5%, believed that little use was made of their education in the public service and private employment, respectively. In the case of women the percentages were 7,3 and 40, respectively (Terblanche & Ebersohn,1980:35-36).

Another indicator of underemployment was provided by the same survey when the graduates were asked whether or not the employer required a bachelor's degree. Amongst the white men, 73,2% in the public service and 58,3% in the private sector said that a degree was a requirement for the post that they held (38). For the white women graduates the percentages were even lower -- 55,3 and 55, respectively (39). For the non-white men the percentages were 50,9 and 62,8, and for the non-white women graduates 61 and 80, respectively (40).

The post held is another and even better indicator of underemployment. The same survey indicated that 3,6% of the white men and 12,7% of the white women were in clerical posts (6). For the Asians the percentages were 2 and 13,3, and for the blacks 16,4 and 4,5, respectively (21). Although some of their posts might conceivably require a degree, the vast majority probably do not. In 1976, 17% of the white graduates with a bachelor of arts degree and 13% with a bachelor of science degree were teaching, but without a teacher's diploma (National Manpower Commission on High-Level Manpower in South Africa (1980:53.) They were thus in temporary posts. Yet, teaching is the most disliked career according to a 1968 survey of University College, Durban students. It came first with 29,1% (Higgins,1970:39). Nearly a third (31,1%) indicated that they considered teaching, but it was an ideal occupation for only 12,6%, whereas in medicine it was the reverse -- 13,6% contemplated it but it remained an ideal for 28,1% (37-38). Thus, despite the low regard for teaching and the lack of proper credentials, significant percentages of the arts and science graduates are in teaching, probably due to not being able to find anything more suitable. In the case of the Indians a survey in the middle 1970s of those in Natal predicted an oversupply of teachers (Greyling,1977:120-121). A majority of the students wanted to study medicine, failing that accounting or law (125).

What emerges is considerable dissatisfaction on the part of the arts graduates with their employment, with many maintaining that no degree is required by their employers for their posts. Despite the low opinion of teaching, significant percentages of the arts and science graduates are in temporary teaching posts, as well as in clerical posts.

There are those who maintain that graduates have little knowledge of the world of work and thus may have "unrealistically high expectations" (Terblanche,1969:22; Terblanche & Ebersohn,1980:37). It is probably true to some extent that some have too high expectations and may have underestimated their employers' requirements for university degrees. What is significant, however, is that numerous graduates, especially in the arts, feel that they are underemployed. Even if it were demonstrated that this is without foundation, it would not wish away people's perceptions. If they believe something to be true and act upon it, it matters little whether or not it is objectively true. That this feeling is the strongest amongst the arts graduates is to be expected. Their education is not directed to any specific occupation and is broadly historical and/or philosophical in nature. Such a background creates a questioning and critical frame of mind. It lives up to or should to what Dr. Koornhof once said the primary function of education should be -- "to unsettle their minds, widen their horizons, inflame their intellect, teach them to think straight, if possible, but to think nevertheless" (1977:3). It should thus not be surprising that the arts graduates would find difficulty in adjusting to the world of work after primarily experiencing the world of ideas.

The fact remains, however, that underemployed workers are more dissatisfied, have poorer mental health, and poorer work performance than others (Rumberger,1982:11). Berg's search of the literature on productivity, absenteeism, and turnover yielded little "concrete evidence of a positive relationship between workers' educational achievements and their performance records in many work settings in the private sector" (1971:104). Indeed, the opposite is the case, with education "more often than not an important factor accounting for dissatisfaction among workers in many occupational categories and is related to dissatisfaction in a considerable variety of work experiences and employer policies" (17). There is also the potential for political discontent amongst highly educated and frustrated people. This aspect is dealt with in Chapter 6.

Finally, within the context of Hypothesis 7 it may be said that there has not yet been a significant number of unemployed university graduates. Underemployment, especially of the arts graduates, has been far more

significant. The potential, however, for further confirming evidence may be there in the future.

4.23 CONCLUSION

Hypotheses 1 (last part), 2,3,5 and 7 have been confirmed. University education has moved from élite to mass, with increasing dependence on government for current expenditures. Whilst it is impossible to determine the optimum level of expenditures on education, there is evidence that CATE and technikon education as a whole have been underfunded in relation to university education. The continuing prestige of universities has caused CATE and technikon enrolments and graduates to lag behind university enrolments and graduates. Tertiary education enrolments have not been affected by economic recessions to any marked degree and therefore Hypotheses 4 and 6 have not been substantiated.

The biases in favour of an academic education are deep rooted, going back to colonial times. Within the contemporary South African context, political, socio-economic, and vocational factors have reinforced the already existing biases. The government has attempted to deal with the labour market shortages of technical and teaching personnel by various measures, basing them on the human capital theory and the need for economic development.

Since the late 1970s there has been increasing concern about the potential surpluses of educated people, culminating in the De Lange Commission and its report for the restructuring of the education system. Underemployment of university graduates has emerged as a far more serious problem than unemployment.

TABLE 4.1

THE RATIO OF THE NUMBER OF WHITE UNIVERSITY STUDENTS TO THE WHITE POPULATION

Year	Students	Population (1 000s)	Students per 1 000 population [1]
1945	14 222	2 343	6,1
1946	19 994	2 380	8,4
1947	19 962	2 434	8,2
1948	19 728	2 505	7,9
1949	18 856	2 567	7,4
1950	18 438	2 608	7,1
1951	18 849	2 649	7,1
1952	19 187	2 696	7,1
1953	20 063	2 752	7,3
1954	20 486	2 803	7,3
1955	25 033	2 840	8,8
1956	27 336	2 885	9,5
1957	29 775	2 933	10,2
1958	32 137	2 983	10,8
1959	35 095	3 035	11,6
1960	37 934	3 080	12,3
1961	40 003	3 117	12,8
1962	42 066	3 170	13,3
1963	45 681	3 238	14,1
1964	48 177	3 323	14,5
1965	52 351	3 398	15,4
1966	57 034	3 481	16,4
1967	60 340	3 564	16,9
1968	65 027	3 639	17,9
1969	67 837	3 728	18,2
1970	73 001	3 776	19,3
1971	77 103	3 924	19,6
1972	84 606	4 012	21,1
1973	90 205	4 092	22,0
1974	95 879	4 172	23,0
1975	102 658	4 256	24,1
1976	106 014	4 347	24,4
1977	111 343	4 396	25,3
1978	117 714	4 442	26,5
1979	118 206	4 485	26,4
1980	120 402	4 538	26,5
1981	120 912	4 603	26,3
1982	120 704	4 674	25,8
1983	124 589	4 748	26,2
1984	124 313	4 807	25,9
1985	138 670	4 900	28,3
1990	165 900	5 751	28,8
	(158 777)[2]		(27,6)

[1] Author's calculations.
[2] Author's projection.

Sources: Central Statistical Services (1983, 1984); Garbers (1960); Van Rensburg (1974); Table 2.10.

TABLE 4.2

THE RATIO OF THE NUMBER OF COLOURED AND INDIAN UNIVERSITY STUDENTS TO THEIR POPULATIONS

Year	Coloured			Indian		
	Students	Population (1 000s)	Students per 1 000 Population[1]	Students	Population (1 000s)	Students per 1 000 Population[1]
1956	501	1 310	0,4	996	429	2,3
1957	607	1 355	0,5	1 218	440	2,8
1958	704	1 401	0,5	1 318	452	2,9
1959	822	1 450	0,6	1 516	463	3,3
1960	1 048	1 500	0,7	1 602	476	3,4
1961	1 270	1 554	0,8	1 855	488	3,8
1962	1 072	1 607	0,7	2 410	503	4,8
1963	1 144	1 663	0,7	2 066	517	4,0
1964	1 197	1 723	0,7	2 460	531	4,6
1965	1 214	1 782	0,7	2 618	548	4,8
1966	1 297	1 844	0,7	2 916	566	5,2
1967	1 378	1 905	0,7	3 037	584	5,2
1968	1 477	1 966	0,8	3 438	601	5,7
1969	1 595	2 020	0,8	3 362	622	5,4
1970	1 518	2 074	0,7	2 668	642	4,2
1971	1 714	2 132	0,8	3 369	650	5,2
1972	2 065	2 189	0,9	3 788	678	5,6
1973	2 586	2 246	1,2	4 240	697	6,1
1974	2 719	2 300	1,2	4 505	716	6,3
1975	3 587	2 357	1,5	5 490	735	7,5
1976	4 301	2 404	1,8	6 471	753	8,6
1977	4 741	2 463	1,9	7 098	773	9,2
1978	5 634	2 529	2,2	8 128	790	10,3
1979	6 315	2 572	2,5	9 116	806	11,3
1980	6 975	2 621	2,7	10 019	824	12,2
1981	8 158	2 671	3,1	11 679	838	13,3
1982	8 654	2 715	3,2	12 165	853	14,3
1983	9 397	2 765	3,4	13 577	870	15,6
1984	10 899	2 817	3,9	14 769	887	16,7
1985	12 914	2 900	4,5	17 300	905	19,1
1990	17 900 (23 881)[2]	3 613	5,0 (6,6)	17 300 (29 845)[2]	1 045	16,6 (28,6)

[1] Author's calculations.
[2] Author's projection.

Sources: Central Statistical Services (1983, 1984); Van Rensburg (1977); Tables 2.11-2.12.

TABLE 4.3

THE RATIO OF THE NUMBER OF BLACK UNIVERSITY STUDENTS TO THE BLACK POPULATION

Year	Students	Population (1 000s)	Students per 1 000 population[1]
1945	282	7 728	0,04
1946	317	8 530	0,04
1947	328	8 708	0,04
1948	318	8 893	0,04
1949	343	9 084	0,04
1950	382	9 282	0,04
1951	392	9 487	0,04
1952	399	9 700	0,04
1953	384	9 920	0,04
1954	369	10 148	0,04
1955	1 581	10 386	0,2
1956	1 829	10 633	0,2
1957	2 035	10 890	0,2
1958	2 235	11 158	0,2
1959	1 871	11 437	0,2
1960	2 237	12 077	0,2
1961	1 830	12 416	0,2
1962	2 053	12 764	0,2
1963	2 079	13 123	0,2
1964	2 346	13 491	0,2
1965	2 636	13 869	0,2
1966	2 928	14 259	0,2
1967	3 306	14 659	0,2
1968	3 840	15 070	0,3
1969	3 916	15 493	0,3
1970	4 225	15 918	0,3
1971	5 183	15 922	0,3
1972	6 366	16 415	0,4
1973	7 071	16 924	0,4
1974	7 563	17 451	0,4
1975	9 076	17 995	0,5
1976	10 781	18 543	0,6
1977	10 848	16 918	0,6
1978	12 567	16 251	0,8
1979	15 390	16 776	0,9
1980	18 512	17 003	1,1
1981	20 385	17 479	1,2
1982	24 037	17 258	1,4
1983	29 692	17 741	1,7
1984	34 898	18 238	1,9
1985	42 872	18 900	2,3
1990	43 100 (99 292)[2]	26 776	1,6 (3,7)

[1] Author's calculations.
[2] Author's projection.

Sources: Central Statistical Services (1983, 1984); Van Rensburg (1977); Table 2.13.

TABLE 4.4

TECHNICAL COLLEGE, CATE, AND TECHNIKON CURRENT INCOME[1]

Year	Government	%	Other Donation	%	Student Fees	%	Interest	%	Other	%	Total
1945	351 741	(50,4)	24 943	(3,6)	245 305	(35,1)	4 177	(0,6)	23 116	(3,3)	698 260[2]
1946	392 627	(50,1)	28 863	(3,7)	290 395	(37,1)	3 356	(0,4)	24 945	(3,2)	783 238
1947	538 310	(57,1)	34 262	(3,6)	341 003	(36,2)	4 875	(0,5)	18 548	(2,0)	945 260
1948	576 475	(56,1)	36 012	(3,5)	362 052	(35,2)	7 235	(0,7)	31 515	(3,1)	1 028 605
1949	622 022	(57,0)	41 254	(3,8)	390 509	(35,8)	6 389	(0,6)	21 608	(2,0)	1 091 860
1950	654 055	(57,0)	38 823	(3,4)	416 147	(36,2)	9 356	(0,8)	26 206	(2,3)	1 148 245
1951	659 964	(54,7)	38 248	(3,2)	427 156	(35,4)	10 376	(0,9)	44 450	(3,7)	1 206 218
1952	737 916	(56,5)	46 419	(3,6)	458 148	(35,1)	13 192	(1,0)	31 885	(2,4)	1 306 783
1953	874 009	(57,5)	45 589	(3,0)	499 936	(32,9)	13 678	(0,9)	34 947	(2,3)	1 521 318
1954	893 405	(56,5)	70 907	(4,5)	533 885	(33,8)	12 236	(0,8)	59 912	(3,8)	1 581 486
1955	923 662	(55,5)	63 570	(3,8)	547 023	(32,9)	17 501	(1,1)	27 823	(1,7)	1 665 880
1956	915 992	(54,8)	51 378	(3,1)	570 540	(34,1)	11 043	(0,7)	31 310	(1,9)	1 671 557
1957	853 555	(53,5)	41 982	(2,6)	558 278	(35,0)	10 696	(0,7)	32 061	(2,0)	1 595 667
1958	846 348	(52,1)	45 724	(2,8)	598 409	(36,9)	9 505	(0,6)	31 808	(2,0)	1 623 657
1959	1 086 147	(59,5)	62 910	(3,4)	599 888	(32,9)	10 104	(0,6)	20 270	(1,1)	1 826 765
1960[3]	2 042 288	(60,2)	106 066	(3,1)	1 130 231	(33,3)	18 251	(0,5)	67 741	(2,0)	3 393 463
1961	1 973 397	(58,4)	80 824	(2,4)	1 159 701	(34,3)	10 948	(0,3)	62 419	(1,9)	3 380 307
1962	1 966 479	(57,2)	107 389	(3,1)	1 162 330	(33,8)	8 879	(0,3)	76 472	(2,2)	3 441 078
1963[4]	2 000 186	(64,1)	36 954	(1,2)	972 592	(31,2	6 274	(0,2)	89 690	(2,9)	3 119 077
1964	2 081 492	(62,0)	69 097	(2,0)	1 053 181	(31,4)	6 446	(0,2)	74 732	(2,2)	3 356 036
1965	2 122 965	(61,9)	55 854	(1,6)	1 137 253	(33,2)	5 542	(0,0)	105 183	(3,1)	3 428 612
1966	2 441 058	(62,8)	55 065	(1,4)	1 179 356	(30,4)	9 897	(0,3)	122 290	(3,2)	3 885 376
1967	2 701 435	(65,3)	85 521	(2,1)	1 193 622	(28,8)	29 367	(0,7)	118 550	(2,9)	4 138 687
1968	3 011 977	(66,1)	58 846	(1,3)	1 190 519	(26,1)	45 970	(1,0)	226 506	(4,5)	4 556 125
1969	4 015 633	(64,9)	313 720	(5,1)	1 382 457	(22,3)	80 854	(1,3)	345 270	(5,6)	6 190 177
1970	4 614 214	(65,5)	150 715	(2,1)	1 551 346	(22,0)	148 538	(2,1)	386 852	(5,5)	7 043 078
1971	6 072 662	(63,7)	379 561	(4,0)	1 749 220	(18,4)	171 011	(1,8)	409 059	(4,3)	9 528 899
1972	7 577 067	(70,0)	338 524	(3,2)	2 049 489	(18,9)	206 957	(1,9)	447 650	(4,1)	10 816 639
1973	9 140 690	(70,0)	538 355	(4,1)	2 256 712	(17,3)	226 908	(1,7)	552 449	(4,2)	13 044 525
1974	10 973 034	(72,2)	274 578	(1,8)	2 929 965	(19,3)	267 809	(1,8)	673 602	(4,4)	15 203 096
1975	13 348 604	(74,4)	362 002	(2,0)	3 191 811	(17,8)	310 861	(1,7)	649 876	(3,6)	17 935 393
1976	15 464 541	(75,5)	444 677	(2,2)	3 405 908	(16,6)	358 974	(1,8)	735 294	(3,6)	20 492 428
1977	17 009 077	(72,8)	276 400	(1,2)	4 281 094	(18,3)	613 773	(2,6)	745 825	(3,2)	23 367 332
1978	21 418 244	(76,2)	926 055	(3,3)	4 119 727	(14,7)	509 952	(1,8)	1 100 900	(3,9)	28 110 212[5]
1979	26 065 594	(80,0)	203 220	(0,6)	4 224 068	(13,0)	624 903	(1,9)	1 449 226	(4,5)	32 567 011
1980	35 166 882	(81,4)	183 678	(0,4)	5 566 819	(12,9)	677 206	(1,6)	1 610 011	(3,7)	43 204 596
1981	47 554 190	(83,3)	322 307	(0,6)	6 953 759	(12,2)	1 101 495	(1,9)	1 128 715	(2,0)	57 060 466
1982	63 392 780	(83,3)	434 975	(0,6)	8 659 420	(11,4)	1 858 569	(2,4)	1 754 810	(2,3)	76 100 554
1983	79 536 839				12 848 271		5 727 000		7 321 229		132 573 939[6]

[1] Technikons and their predecessor institutions.

[2] The total income numbers include small amounts of surplus or deficit. Because of this and due to rounding, the percentages do not always come to one hundred.

[3] Since 1960 it is in rands and prior to that it is in pounds.

[4] Since 1963 the numbers refer to the institutions for the whites only.

[5] Due to a typographical error, the total income is the author's calculation.

[6] The RSA Technikon data are unavailable and thus the numbers are only approximate. In the total numbers are also included such items as sales, redemption of the principal, and other things.

Sources: Union Education Department (1948); Department of Education, Arts and Science (1950-1967); Department of Higher Education (1968-1970); Department of National Education (1972-1984); Department of Education and Culture Administration, House of Assembly (1985); Orange Free State Technikon (1985).

TABLE 4.5

COLOURED TECHNIKON, COLLEGE OF EDUCATION, AND UNIVERSITY CURRENT INCOME FROM THE GOVERNMENT

Year	Technikon	Colleges	University
1962-63			371 104
1963-64			345 619
1964-65			567 896
1965-66			502 822
1966-67			589 279
1967-68			683 796
1968-69			715 848
1969-70			828 583
1970-71			918 783
1971-72			1 124 703
1972-73			1 296 153
1973-74			1 839 834
1974-75			2 788 000
1975-76		4 088 826	4 006 000
1976-77		4 585 819	4 794 989
1978-79		4 867 770	5 570 992
1978-79		4 973 104	6 385 164
1979-80			8 034 991
1980-81			10 796 993
1981-82			13 645 000
1982-83	4 276 000	12 411 700	24 260 490
1983-84	7 626 000	10 350 800	22 317 000
1984-85	12 457 000	13 078 000	20 873 000

Sources: Controller and Auditor General (1962-1984); Department of Treasury (1982-1984); Hansard (1980).

TABLE 4.6

INDIAN CATE AND TECHNIKON, COLLEGE OF EDUCATION, AND UNIVERSITY CURRENT INCOME FROM THE GOVERNMENT

Year	CATE and Technikon	Colleges	University
1963-64			518 279
1964-65			656 037
1965-66			821 649
1966-67			948 025
1967-68		243 700	1 058 000
1968-69	528 000	248 464	1 258 317
1969-70	505 500	222 314	1 456 092
1970-71	544 900	436 110	1 697 803
1971-72	652 900	406 638	2 366 331
1972-73	653 900	392 000	3 369 364
1973-74	1 018 000	414 000	4 041 704
1974-75	1 072 000	334 000	4 920 637
1975-76	1 420 000	492 000	5 591 636
1976-77	1 462 000	632 000	6 733 712
1977-78	1 682 000	870 000	6 894 082
1978-79	2 041 000	930 000	8 146 902
1979-80	2 359 000	2 216 000	10 492 182
1980-81	3 478 000	2 405 000	12 713 675
1981-82	5 890 000	4 225 000	16 071 682
1982-83	5 579 000	3 735 000	19 023 517
1983-84	5 677 000	4 162 000	23 200 000
1984-85	8 429 000	5 260 000	26 061 000

Sources: Department of Treasury (1967-1984); Department of Indian Affairs (1971-1981); Department of Internal Affairs (1982-1984); Mahabir (1977).

TABLE 4.7

BLACK TECHNIKON AND COLLEGE OF EDUCATION CURRENT INCOME FROM THE GOVERNMENT

Year	Technikon[1]	Colleges
1945-1946		150 877[2]
1946-1947		
1947-1948		230 048
1948-1949		265 559
1949-1950		289 822
1950-1951		
1951-1952		347 790[3]
1952-1953		406 677
1953-1954		
1954-1955		449 355
1975-1976		1 317 000
1976-1977		
1977-1978		
1978-1979		1 363 924
1979-1980		2 078 116
1980-1981	505 423	8 089 971
1981-1982	8 861 487	5 381 130
1982-1983	21 596 452	8 085 878
1983-1984	6 891 000	13 803 000
1984-1985	9 004 000	18 097 000

[1] The Mangosuthu Technikon is funded from private sources and is thus omitted.

[2] Prior to 1960 it is in pounds.

[3] For the Orange Free State it is an estimate from 1951-1955. It is also an estimate for Natal for 1951-1952.

Sources: Controller and Auditor General (1975-1985); Department of Treasury 1954, 1982-1984); Department of Finance (1985); Eiselen Commission (1951); Department of Education and Training (1984); Cape Province, Department of Treasury (1945-1954); Natal Province, Department of Treasury (1945-1954); Orange Free State, Department of Treasury (1945-1954); Transvaal Province, Department of Treasury (1945-1954).

TABLE 4.8

BLACK UNIVERSITY CURRENT INCOME

Year	Government	%	Other Donation	%	Student Fees	%	Interest	%	Other	%	Total
1945	16 935	(56,3)			6 745	(22,4)					30 065
1946	17 408	(55,4)			7 782	(24,8)					31 439
1947	21 577	(54,3)			9 050	(23,0)					39 366
1948	23 832	(61,5)			8 706	(22,5)					38 763
1949	25 825	(57,8)			9 048	(20,2)					44 720
1950	31 267	(75,8)			8 051	(19,5)					41 273
1951	32 174	(66,8)			9 205	(19,1)					48 184
1952	43 596	(69,1)	1 110	(1,7)	10 342	(9,5)	3 503	(5,6)	3 948	(6,3)	63 066
1953	87 490	(80,6)	1 100	(1,0)	14 809	(13,6)	2 363	(2,2)	1 394	(1,3)	108 533
1954	91 014	(81,6)	2 316	(2,1)	14 152	(12,7)	1 232	(1,1)	2 803	(2,5)	111 517
1955	89 379	(77,6)	7 472	(6,7)	13 449	(11,7)	1 499	(1,3)	3 114	(2,7)	115 183
1956	87 155	(79,8)	3 192	(2,9)	15 916	(12,7)	1 676	(1,5)	3 252	(3,0)	109 189
1957	86 632	(77,8)	5 884	(5,3)	14 678	(13,2)	2 221	(2,0)	1 881	(1,7)	111 296
1958	90 221	(76,1)	4 799	(4,1)	17 095	(14,4)	1 932	(1,6)	2 072	(1,8)	118 600
1959	120 141	(75,6)	5 316	(5,3)	19 196	(12,0)	1 766	(1,1)	3 467	(2,2)	158 983
1960-61[1]	657 917										
1961-62	870 278										
1962-63	1 010 925										
1963-64	1 169 151										
1964-65	1 427 875										
1965-66	1 544 947										
1966-67	1 888 916										
1967-68	2 002 155										
1968-69	2 220 684										
1969-70	2 825 180										
1970-71	3 541 845										
1971-72	4 965 160										
1972-73	5 177 020										
1973-74	6 766 000										
1974-75	8 576 000										
1975-76	10 699 000										
1976-77	12 080 000										
1977-78	15 982 000										
1978-79[2]	17 680 000										
1979-80	18 354 000										
1980-81[3]	30 752 000										
1981-82	40 097 000										
1982-83[4]	54 954 900										
1983-84	64 868 000										
1984-85	80 364 000										

[1] Prior to 1960 it is in pounds.
[2] Transkei and Bophuthatswana have been excluded as of this date.
[3] Venda has been excluded as of this date.
[4] Ciskei has been excluded as of this date.

Sources: Union Education Department (1948); Department of Education, Arts and Science (1950-1960); Department of Bantu Education (1964-1978); Department of Education and Training (1979-1985).

TABLE 4.9
WHITE COLLEGE OF EDUCATION CURRENT INCOME FROM THE GOVERNMENT

Year	Income
1945-1946	308 713[1]
1946-1947	330 863
1947-1948	384 447
1948-1949	437 352
1949-1950	476 058[2]
1950-1951	389 185
1951-1952	518 475
1952-1953	614 402
1953-1954	697 091
1954-1955	830 212
1955-1956	918 760
1956-1957	1 025 291
1957-1958	1 216 736
1958-1959	1 437 137
1959-1960	1 515 651
1960-1961	3 401 467
1961-1962	3 903 916
1962-1963	4 451 874
1963-1964	5 025 423
1964-1965	5 352 971
1965-1966	6 137 189
1966-1967	6 606 171
1967-1968	7 080 660[3]
1968-1969	7 728 302
1969-1970	9 692 505
1970-1971	11 739 955
1971-1972	13 019 789
1972-1973	14 255 361
1973-1974	17 314 021
1974-1975	17 249 122
1975-1976	21 573 422
1976-1977	22 702 381
1977-1978	25 378 807
1978-1979	31 032 496

[1] Prior to 1960 it is in pounds.
[2] For the Transvaal it is an estimate.
[3] For the Orange Free State it is an estimate as of this date.

Sources: Cape Province, Superintendent-General of Education (1947-1969); Director of Education (1970-1984); Department of Treasury (1945-1985); Natal Province, Director of Education (1948-1984); Department of Treasury (1945-1985); Orange Free State, Education Department (1946-1984); Department of Treasury (1945-1985); Transvaal Province, Education Department (1951-1984); Department of Treasury (1945-1984).

TABLE 4.10

WHITE UNIVERSITY CURRENT INCOME

Year	Government	%	Other Donation	%	Student Fees	%	Interest	%	Other	%	Total
1945	640 794	(41,7)	101 207	(6,6)	645 252	(41,9)	76 645	(5,0)	74 639	(4,9)	1 536 827[1]
1946	861 468	(41,3)	104 157	(5,0)	937 868	(45,0)	80 094	(3,8)	101 116	(4,9)	2 084 703
1947	1 001 522	(44,0)	136 607	(6,0)	969 048	(42,5)	87 106	(3,8)	84 523	(3,7)	2 278 806
1948	1 016 032	(43,3)	136 069	(5,8)	965 650	(41,0)	85 787	(3,6)	148 681	(6,3)	2 348 219
1949	1 136 374	(47,5)	108 333	(4,5)	928 740	(38,8)	101 624	(4,3)	116 974	(4,9)	2 392 045
1950	1 313 119	(49,1)	186 398	(7,0)	911 654	(34,1)	89 269	(3,3)	176 382	(6,6)	2 676 822
1951	1 433 490	(47,9)	173 113	(5,8)	947 193	(31,7)	92 940	(3,1)	343 524	(11,5)	2 990 260
1952[2]	1 947 595	(55,5)	175 858	(5,0)	961 706	(27,4)	95 191	(2,7)	327 736	(9,3)	3 507 409
1953	2 409 510	(64,5)	119 900	(3,2)	1 039 191	(27,8)	34 637	(0,9)	135 606	(3,6)	3 735 467
1954	2 533 986	(64,3)	144 684	(3,7)	1 189 848	(30,2)	42 768	(1,1)	31 197	(0,8)	3 942 483
1955	2 541 621	(63,4)	91 258	(2,3)	1 291 551	(32,2)	51 501	(1,3)	30 886	(0,8)	4 006 817
1956	2 682 060	(62,4)	92 808	(2,2)	1 418 951	(33,0)	63 475	(1,5)	38 194	(0,9)	4 297 568
1957	2 968 342	(62,7)	97 084	(2,1)	1 554 565	(32,8)	77 211	(1,6)	34 545	(0,7)	4 733 847
1958	3 114 258	(61,6)	99 778	(2,0)	1 709 676	(33,8)	82 564	(1,6)	44 101	(0,9)	5 052 884
1959	4 340 477	(66,7)	102 528	(1,6)	1 919 393	(29,5)	96 435	(1,5)	12 322	(0,2)	6 503 923
1960[3]	9 059 638	(65,3)	228 378	(1,6)	4 285 628	(30,2)	193 736	(1,4)	78 226	(0,6)	14 191 120
1961	9 829 061	(65,5)	223 879	(1,5)	4 592 890	(30,6)	211 313	(1,4)	94 622	(0,6)	15 002 315
1962	10 018 192	(63,6)	525 660	(3,4)	4 872 505	(30,9)	236 841	(1,5)	93 756	(0,6)	15 746 954
1963	10 544 193	(62,2)	617 263	(3,6)	5 404 815	(31,9)	237 553	(1,4)	97 048	(0,6)	16 950 615
1964	12 873 049	(63,0)	733 494	(3,6)	5 958 536	(29,2)	244 894	(1,2)	618 120	(3,0)	20 428 093
1965	14 284 051	(62,8)	758 974	(3,3)	6 683 366	(29,4)	313 257	(1,4)	721 617	(3,2)	22 761 245
1966	16 646 977	(62,6)	937 691	(3,5)	7 698 200	(28,9)	451 544	(1,6)	783 740	(2,9)	26 608 965
1967	18 883 626	(63,0)	1 019 334	(3,4)	8 371 886	(27,9)	495 853	(1,7)	983 369	(2,3)	30 000 469
1968	23 345 625	(65,8)	1 111 878	(3,1)	9 259 983	(26,1)	633 275	(1,8)	1 155 342	(3,3)	35 462 005
1969[4]	31 471 698	(70,6)	1 042 741	(2,3)	10 003 411	(22,4)	661 496	(1,5)	1 072 651	(2,4)	44 580 942
1970	41 718 818	(71,9)	925 017	(1,7)	10 806 926	(19,4)	960 072	(1,7)	1 294 868	(2,3)	55 714 024
1971	51 319 508	(75,0)	876 764	(1,3)	13 406 697	(19,6)	1 175 882	(1,7)	1 332 461	(2,0)	68 448 890
1972	56 868 044	(73,9)	1 033 144	(1,3)	15 275 852	(19,9)	1 278 473	(1,7)	1 917 749	(2,5)	76 918 002
1973	69 710 895	(75,6)	1 227 880	(1,3)	17 919 436	(19,4)	1 190 785	(1,3)	2 022 841	(2,2)	92 516 112
1974	86 667 686	(76,3)	1 917 679	(1,7)	21 407 640	(18,9)	1 607 680	(1,4)	2 261 719	(2,0)	113 588 295
1975	130 309 694	(80,4)	1 383 944	(0,9)	24 958 036	(15,4)	2 394 047	(1,5)	2 612 726	(1,6)	162 185 994
1976	154 051 497	(79,7)	1 546 732	(0,8)	31 547 544	(16,3)	2 881 371	(1,5)	2 823 839	(1,5)	193 593 883
1977	170 350 341	(78,2)	2 073 544	(1,0)	37 594 883	(17,3)	2 995 707	(1,4)	3 276 610	(1,5)	217 827 936
1978	190 155 919	(77,4)	2 645 759	(1,1)	43 621 394	(17,8)	3 647 758	(1,5)	4 172 913	(1,7)	245 753 867
1979	222 206 901	(77,8)	3 558 233	(1,3)	50 979 643	(17,9)	4 134 490	(1,5)	4 529 884	(1,6)	285 452 926
1980	272 770 321	(79,0)	4 793 007	(1,4)	56 850 880	(16,5)	3 981 424	(1,2)	5 827 631	(1,7)	345 448 361
1981-82	337 951 937										
1982-83	401 090 039										
1983-84	363 330 000										
1984-85	421 532 000										

[1] The total income numbers include small amounts of surplus or deficit. Because of this and due to rounding, the percentages do not always come to one hundred.

[2] From 1952-1959 the percentage calculations are those of the author.

[3] Prior to 1960 it is in pounds.

[4] Since 1969 the percentage calculations are those of the author.

Sources: Union Office of Census and Statistics (1950-1951); Bureau of Census and Statistics (1953-1957); Department of Education, Arts and Science (1958-1967); Department of Higher Education (1968-1970); Department of National Education (1972-1984); Department of Treasury (1984).

TABLE 4.11

GOVERNMENT CURRENT EXPENDITURES ON TERTIARY EDUCATION AS A PERCENTAGE OF GROSS DOMESTIC PRODUCT AT CURRENT AND CONSTANT 1975 PRICES (MILLIONS RAND)

Year	Expenditure	Current G.D.P.	Constant G.D.P.	Column 2 % of Column 3	Column 2 % of Column 4
1946	1 602 366	1 751	6 607	0,18	0,05
1947	2 175 704	1 932	6 828	0,23	0,06
1948	2 319 250	2 136	7 308	0,22	0,06
1949	2 550 101	2 290	7 500	0,22	0,07
1950	2 387 626	2 662	7 945	0,18	0,06
1951	2 991 893	2 909	8 316	0,21	0,07
1952	3 750 186	3 116	8 610	0,24	0,09
1953	4 068 100	3 537	9 014	0,23	0,09
1954	4 797 972	3 808	9 553	0,25	0,10
1955	4 473 422	4 025	10 027	0,22	0,09
1956	4 710 496	4 339	10 582	0,22	0,09
1957	5 125 265	4 583	10 986	0,22	0,09
1958	5 487 964	4 711	11 221	0,23	0,10
1959	7 062 416	4 993	11 716	0,28	0,12
1960	15 141 310	5 304	12 210	0,29	0,12
1961	16 569 734	5 592	12 733	0,30	0,13
1962	17 818 574	5 966	13 449	0,30	0,13
1963	19 602 851	6 637	14 440	0,30	0,14
1964	22 959 320	7 309	15 409	0,31	0,15
1965	25 413 623	7 989	16 328	0,32	0,16
1966	29 120 426	8 688	17 031	0,34	0,17
1967	32 653 370	9 715	18 202	0,34	0,18
1968	39 055 217	10 496	18 987	0,37	0,21
1969	51 017 505	11 799	20 154	0,43	0,25
1970	65 212 428	12 908	21 203	0,51	0,31
1971	79 927 691	14 245	22 340	0,56	0,36
1972	89 588 909	16 104	22 825	0,56	0,39
1973	110 245 144	19 918	23 618	0,55	0,47
1974	132 579 479	24 472	25 222	0,54	0,53
1975	193 176 182	27 454	25 846	0,70	0,75
1976	222 506 939	30 800	26 309	0,72	0,85
1977	248 605 069	34 120	26 330	0,73	0,94
1978	284 126 753	39 645	27 067	0,72	1,05
1979	291 706 784	47 415	28 116	0,62	1,04
1980	376 678 265	61 900	30 179	0,61	1,25
1981	470 332 426	70 579	31 586	0,67	1,49
1982	618 405 756	79 862[2]	31 223[2]	0,77	1,98
1983	617 256 839	89 333	30 242	0,69	2,04

[1] Prior to 1960 it is in pounds.
[2] As of 1982 the G.D.P. numbers are provisional.

Sources: Anon. (1981b, 1985b); Tables 4.4-4.10.

TABLE 4.12

THE TURNING POINTS OF THE BUSINESS CYCLE

Upward Phase			Downward Phase		
November, 1939	-	July, 1946	August, 1946	-	April, 1947
May, 1947	-	November, 1948	December, 1948	-	February, 1950
March, 1950	-	December, 1951	January, 1952	-	March, 1953
April, 1953	-	April, 1955	May, 1955	-	September, 1956
October, 1956	-	January, 1958	February, 1959	-	March, 1959
April, 1959	-	April, 1960	May, 1960	-	August, 1961
September, 1961	-	April, 1965	May, 1965	-	December, 1965
January, 1966	-	May, 1967	June, 1967	-	December, 1967
January, 1968	-	December, 1970	January, 1971	-	August, 1972
September, 1972	-	August, 1974	September, 1974	-	December, 1977
January, 1978	-	August, 1981	September, 1981	-	March, 1983
April, 1983	-				

Sources: Smit & Van der Walt (1982); Van der Merwe (1984).

TABLE 4.13

DIPLOMAS AND CERTIFICATES AWARDED TO TECHNICIANS OR IN TECHNICAL FIELDS

Year	Certificates	Diplomas	Total
1-11-1969 - 31-10-70	202	541	743
1-11-1970 - 31-10-71	170	567	739
1-11-1971 - 31-10-72	186	781	971
1-11-1972 - 31-10-73	438	514	962
1-11-1973 - 31-10-74[1]	1 141	1 026	2 167
1-11-1974 - 31-10-75	737	500	1 237
1-11-1975 - 31-10-76	672	1 070	1 742
1-11-1976 - 31-10-77	1 035	777	1 812
1-11-1977 - 31-10-78	1 154	710	1 864
1-11-1978 - 31-10-79	1 146	711	1 857
1-11-1979 - 31-10-80	1 084	811	1 895
1-11-1980 - 31-10-81	1 072	667	1 739
1-11-1981 - 31-10-82	1 305	856	2 161
1-11-1982 - 31-10-83	619	826	1 445
1-11-1983 - 31-10-84	620	779	1 399

[1] Includes new trimester engineering diplomas introduced in 1972.

Sources: Department of Higher Education (1970); Department of National (1972-1984); Department of Education and Culture Administration, House of Assembly (1985).

TABLE 1.14

TEACHER DIPLOMAS AND CERTIFICATES AWARDED BY THE COLLEGES OF EDUCATION

Year	Whites	Year	Coloureds	Asians	Year	Blacks
1945[1]	1 454					2 083[2]
1946	1 150					1 365
1947	1 099					1 791
1948	1 016					1 720
1949	1 103					1 928
1950	1 210					2 076[3]
1951	1 211					2 021
1952	1 237[4]					
1953	1 317					
1954	1 567					
1955	1 854	1955-56	717[5]	108[6]		
1956	2 206	1956-57	677	126		
1957	2 226	1957-58	737	177		
1958	2 232	1958-59	698	138		
1959	2 477	1959-60	800	174		
1960	2 749	1960-61	841	168		
1961	2 662	1961-62	804	192	1961-62	1 308[7]
1962	2 933	1962-63	808	303	1962-63	1 437
					1963-64	1 535
					1964-65	1 750
		1965	674		1965-66	1 772
		1966	778		1966-67	1 908
		1967	793	335	1967-68	2 169
		1968	895	527	1968-69	2 042
		1969	869	459	1969-70	2 966
		1970	1 102	481	1970-71	3 412
		1971	1 372	382	1971-72	3 683
		1972	1 548	267	1972-73	4 182
		1973	1 992	221	1973-74	4 864
		1974	2 053	263	1974-75	5 544
1975	2 344	1975	2 085	146	1975-76	6 852
		1976	2 057	174	1976-77	6 785[8]
		1977	2 282	176	1977-78	7 452
		1978	1 715	239	1978-79	7 460[9]
		1979	2 296	351	1979-80	6 514
		1980	1 856	267	1980-81	5 644[10]
		1981	1 738	368	1981-82	5 779
		1982	2 347	595	1982-83	5 417[11]
		1983	1 749	543		

1 For the Transvaal the numbers refer to those completing their studies, except for the blacks after 1961.
2 The Orange Free State data are missing for the years 1945-1949. The numbers for the Cape Province refer to the year beginning in June and ending in May.
3 For the Orange Free State the numbers refer to those completing their studies in 1950 and 1951.
4 Natal data are missing.
5 For Natal it is the calendar year.
6 For the Transvaal the numbers for the years 1955-1963 and since 1957 and for Natal for the years 1960-1963 refer to the year beginning in June and ending in May.
7 Only government and government subsidised institutions are included.
8 Transkei has been excluded as of this date.
9 Bophuthatswana has been excluded as of this date.
10 Venda has been excluded as of this date.
11 Ciskei has been excluded as of this date.

Sources: Cape Province, Superintendent-General of Education (1947-1964); Natal Province, Director of Education (1918-1964); Orange Free State, Education Department (1946-1964); Transvaal Province, Education Department (1951-1964); Department of Bantu Education (1963-1978); Department of Education and Training (1979-1984); Department of Education and Training (1979-1984); Department of Education and Culture (1984); Department of Education and Culture Administration, House of Representatives (1985); Hansard (Afrikaans), (1968); Mahabir (1977).

TABLE 4.15

DEGREES AND DIPLOMAS AWARDED BY THE UNIVERSITIES

Year	Whites			Coloureds			Asians		Blacks		
	Total	Engineering		Year	Total	Engi= neering	Total	Engi= neering	Year	Total	Engi= neering
		Men	Women								
1945[1]	2 167	164									
1946	2 186	180									
1947	2 898	281									
1948	3 088	343									
1949	3 580	403									
1950	3 421	408									
1951	3 448	330									
1952	3 098	269									
1953	3 056	223									
1954	3 204	286									
1955	3 169	212									
1956	3 931	224									
1957	4 554	228	1								
1958	4 690	279			61		68	3			
1959	4 855	289	1		72		97				
1960	5 517	311			59		106		1960-61	166	
1961	5 895	334	1		63	1	130	1	1961-62	221	
1962	6 522	375		1962-63	87	1	159	1		187	
1962	6 976	392	1	1963-64	125		198[2]			246	
1964	7 786	441		1964-65	98	1	207	4		213	
1965	7 752	478		1965-66	103		262	2		228	
1966	8 316	460		1966-67	128		275	4		263	
1967	8 283	463		1967-68	153		343	10		302	
1968	8 971	488	3	1968-69	111	1	401	8		301	
1969	10 314	636	4	1969-70	157		402	6		377	
1970	11 283	679	1	1970-71	165		486	6[3]		459	
1971	12 415	682	1	1971-72	162	2	435	8		478	4
1972	13 238	747	3	1972-73	216	3	474	8		700	
1973	13 904	789	3	1973-74	278	5	546	14		728	
1974	14 988	814	2	1974-75	326	3	599	9		887	
1975	16 320	891	5	1975-76	360	5	629	8		964	
1976	18 113	922	7	1976-77	475	11[3]	740	15		783	4
1977	20 088	1 061	8	1977-78	569	3	902	8		1 056	6
1978	21 140	1 018	8	1978-79	625	5	1 113	15		1 170	4
1979	21 603	1 075	6	1979-80	781	16	1 329	7		1 250	5
1980	22 965	1 011	20	1980-81	883	6	1 404	8		1 431	21[4]
1981[5]	24 299	1 195		1981-82	426		783	4		1 352	29
1982	24 482	1 190		1982-83	517		792	14		1 520	
1983	25 626	1 376									
1990	27 830	1 410			1 820		2 260			1 000	
	(26 699)	(1 926)[6]			(2 010)[6]		(2 199)[6]			(3 506)[6]	

[1] Until 1950 the numbers under the whites include all population groups.
[2] Since 1963 it includes the awards made by the University of Durban-Westville.
[3] Includes one woman.
[4] Coloureds and blacks in 1981 and 1982.
[5] Since 1981 the numbers under the whites include all population groups and thus the numbers in the other columns do not necessarily reflect the total number of awards for each population group.
[6] Author's projections.

Sources: Union Education Department (1918); Department of Education, Arts and Science (1950-1967); Department of Higher Education (1968-1970); Department of National Education (1972-1984); Department of Education and Culture Administration, House of Assembly (1985); Department of Coloured Affairs (1965-1970); Department of Coloured and Rehoboth Matters (1971-1981); Department of Internal Affairs (1982-1984); Department of Indian Affairs (1971-1980); Department of Bantu Education (1963-1978); Department of Education and Training (1979-1985); National Manpower Commission (1984); National Bureau of Educational and Social Research (1960); Hansard (Afrikaans), (1961); Van Rensburg (1974, 1977).

TABLE 4.16

PER CAPITA GOVERNMENT CATE AND TECHNIKON AND UNIVERSITY CURRENT EXPENDITURES FOR THE WHITES

Year	CATE & Technikon Expenditures	University Expenditure	CATE & Technikon Enrolments	University Enrolment	Per capita CATE & Technikon	Per capita University
1969	4 015 633	31 471 698	45 465	67 837	88 3	463,9
1970	4 614 214	41 718 818	51 513	73 001	89,6	571,5
1971	6 072 662	51 319 508	50 445	77 103	120,4	665,5
1972	7 577 067	56 868 044	49 180	84 606	154,1	672,2
1973	9 140 690	69 710 895	48 180	90 205	189,7	772,8
1974	10 973 034	86 667 686	35 827	95 879	306,3	903,9
1975	13 348 604	130 309 694	36 826	102 658	362,5	1 269,4
1976	15 464 541	154 051 497	37 089	106 014	417,0	1 453,1
1977	17 009 077	170 350 341	40 829	111 343	416,6	1 530,0
1978	21 418 244	190 155 919	38 154	117 714	561,4	1 615,4
1979	26 065 594	222 206 901	40 028	118 206	651,2	1 879,8
1980	35 166 882	272 770 321	41 060	120 402	856,5	2 265,5
1981	47 554 190	337 951 937	41 491	120 912	1 146,1	2 795,0
1982	63 392 780	401 090 039	44 649	120 704	1 419,8	3 322,9
1983	79 536 839	363 330 000	47 353	124 589	1 679,7	2 916,2
1984		421 532 000		124 313		3 390,9

Sources: Tables 2.5, 2.10, 4.4, and 4.10.

TABLE 4.17

PER CAPITA GOVERNMENT TECHNIKON AND UNIVERSITY CURRENT EXPENDITURES FOR THE COLOUREDS

Year	Technikon Expenditure	University Expenditure	Technikon Enrolment	University Enrolment	Per capita Technikon	Per capita University
1982	4 276 000	24 260 490	2 188	8 654	1 954,3	2 803,4
1983	7 626 000	22 317 000	2 404		3 172,2	
1984	12 457 000	20 873 000	2 271	10 899	5 485,2	1 915,1

Sources: Tables 2.6, 2.11, and 4.5.

TABLE 4.18

PER CAPITA GOVERNMENT TECHNIKON AND UNIVERSITY CURRENT EXPENDITURES FOR THE INDIANS

Year	CATE & Technicon Expenditures	University Expenditure	CATE & Technikon Enrolments	University Enrolment	Per capita CATE & Technikon	Per capita University
1969-70	505 500	1 456 092	4 752	3 362	106,4	433,1
1970-71	544 900	1 697 802	5 298	2 668	102,9	636,4
1971-72	652 900	2 366 331	5 588	3 369	116,8	702,4
1972-73	653 900	3 369 364	6 590	3 788	99,2	889,5
1973-74	1 018 000	4 041 704	6 978	4 240	145,9	953,2
1974-75	1 072 000	4 920 637	7 578	4 505	141,5	1 092,3
1975-76	1 420 000	5 951 636	8 241	5 490	172,3	1 084,1
1976-77	1 462 000	6 733 712	8 664	6 471	168,7	1 040,6
1977-78	1 682 000	6 894 082	8 108	7 098	207,4	971,3
1978-79	2 041 000	8 146 902	7 584	8 128	269,1	1 002,3
1979-80	2 359 000	10 492 182	8 099	9 116	291,2	1 151,0
1980-81	3 478 000	12 713 675	8 248	10 019	421,7	1 269,0
1981-82	5 890 000	16 071 682	7 663	11 679	768,6	1 376,1
1982-83	5 579 000	19 023 517	5 899	12 165	945,8	1 563,8
1983-84	5 677 000	23 200 000	5 082	13 577	1 117,1	1 708,8
1984-85	8 429 000	26 061 000	3 236	14 769	2 604,8	1 764,6

Sources: Tables 2.6, 2.12, and 4.6.

TABLE 4.19

PER CAPITA GOVERNMENT TECHNIKON AND UNIVERSITY CURRENT EXPENDITURES FOR THE BLACKS

Year	Technikon Expenditure	University Expenditure	Technikon Enrolment	University Enrolment	Per capita Technikon	Per capita University
1980-81	505 423	30 752 000	138	18 512	3 662,5	1 661,2
1981-82	8 861 487	40 097 000	400	20 385	22 153,7	1 967,0
1982-83	21 596 452	54 954 000	867	24 037	24 909,4	2 286,0
1983-84	6 891 000	64 868 000	1 275	29 692	5 404,7	2 184,7
1984-85	9 004 000	80 364 000	2 180	34 898	3 161,0	2 302,8

Sources: Tables 2.7, 2.13, and 4.7.

TABLE 4.20

TEACHER SHORTAGES BY POPULATION GROUP

Year	Whites			Coloureds			Asians			Blacks		
	Men	Women	Vacancies	Men	Women	Vacancies	Men	Women	Vacancies	Men	Women	Vacancies
1969	16 740	24 844	130	8 928	7 901	158	3 984	1 696		18 649	18 756	
1971	18 388	31 915	3 509	9 468	7 498	155	4 327	2 037		22 252	23 506	
1973	15 447	30 008	112	8 052	11 591	2	4 488	2 187	12	26 915	29 559	
1975	23 725	33 334	146	12 484	10 722	193	4 634	2 506	2	36 774	41 373	715
1977	20 366	37 308	311	9 956	16 331	103	4 829	2 885		28 607	37 633	872
1979	25 155	40 191	574	10 966	19 091	2	4 957	3 424	13	27 555	39 423	576
1981	20 047	42 434	984	10 931	18 665	743	5 344	4 132		22 993	40 975	1 984
1983	20 302	44 390		11 043	18 157		5 635	4 465		30 237	59 279	1 725

1 South West African has been included for the years 1969-1975.
2 The shortages are not comparable to those of the previous years as use has been made of a raising method.
3 Transkei and Bophuthatswana have been excluded as of this date.
4 Venda has been excluded as of this date.
5 Ciskei has been excluded as of this date.
6 Vacancies for all population groups, with another 4,516 expected within one year.

Sources: Department of Labour (1969-1977); Department of Manpower (1979-1983).

TABLE 4.21

THE NUMBER OF ENGINEERS AND TECHNICIANS AND THEIR SHORTAGES

Year	Whites		Coloureds		Asians		Blacks		Vacancies	%
	Men	Women	Men	Women	Men	Women	Men	Women		
1969										
Engineers	10 732	11			10				1 167	10,8
Technicians	24 775	1 448	289	36	124	2	665	20	1 854	6,8
1971										
Engineers	13 737	29	3		101		2		1 165	8,1
Technicians	27 352	2 084	303	36	218	3	1 135	72	416	1,3
1973										
Engineers	12 297	15	13		26		1		1 196	9,7
Technicians	30 584	3 106	544	22	345	43	941	17	2 486	8,1
1975										
Engineers	16 311	172	10	8	36	1	12		1 126	6,9
Technicians	43 446	3 475	906	124	740	50	2 296	92	2 510	5,8
1977[1]										
Engineers	15 171	56	10		32		6		867	5,7
Technicians	49 912	4 050	1 820	192	1 474	84	2 053	73	2 159	4,3
1979[2]										
Engineers	15 851	59	44		50		7		1 500	9,5
Technicians	52 053	3 975	1 710	125	1 395	69	1 777	82	3 510	6,7
1981										
Engineers	17 408	76	142	1	67		30		2 621	15,0
Technicians	51 913	3 308	2 070	43	2 192	75	2 267	131	7 440	10,7
1983[3]										
Engineers	17 355	118	117		84		39		1 617[5]	9,3
Technicians[4]	20 631	839	1 459	61	955	11	1 234	45	1 373[6]	6,7

1 The shortages are not comparable to those of the previous years as use has been made of a raising method.
2 Transkei and Bophuthatswana have been excluded as of this date.
3 Venda and Ciskei have been excluded as of this date.
4 These are diploma technicians and thus not comparable to earlier technicians.
5 Another 292 expected within one year.
6 Another 928 expected within one year.

Sources: Department of Labour (1969-1977); Department of Manpower (1979-1983).