

► funded according to the new formula for the first time in 1998.

Many universities are already facing serious difficulties. Michael Smout, pro vice-chancellor of Rhodes University in Grahamstown, north-east of Port Elizabeth, points out that the (as yet undetermined) allocation of university subsidies for 1997, the last to be made under the old system, will be critical for the future of research. "If funding levels are cut next year, we will be unable to replace obsolete equipment and maintain library subscriptions to journals," he says.

The commission recommends that teaching funds should be allocated on the basis of fixed subsidies per degree place in each discipline, varying according to the costs of training a student in that discipline. The state would set the national total of subsidized places in each discipline, and

individual institutions would negotiate a share of these places for a three-year period.

This contrasts sharply with the present funding system, in operation since 1982, under which funding is based on a formula incorporating student enrolment and success rates, but with different weighting for arts and science-based courses and undergraduate and postgraduate students, as well as research output.

The lack of limits on the number of students in different disciplines has led to undirected growth over the past 15 years, concentrated in the arts and social sciences. This has been exacerbated by the fact that universities have been free to spend their subsidies as they wish. Bengu says his aim is not to curtail university autonomy, but simply to make universities accountable to government for different categories of funding.

The commission proposes that universities and technikons should be administered under one system, and financed in the same manner. But it leaves open the question of whether some differentiation between the two should remain.

Universities are being cautious about the planned reforms. Hugh Amoore, for example, registrar of the University of Cape Town (UCT), says that the government needs to provide more details about the new funding formula before it can be adequately assessed. He also warns that the proposed system will require a sophisticated infrastructure to implement it properly.

Ian Scott, director of academic support at UCT, adds: "Whether the government will have the political will to implement these recommendations in a sensible manner is another matter." □

Education reforms struggle against apartheid's legacy

NO-ONE envied Sibusiso Bengu when he was appointed minister of education in May 1994. The mild-mannered vice-chancellor of the University of Fort Hare, President Nelson Mandela's *alma mater*, took on responsibility for redressing what was widely perceived as apartheid's most invidious legacy — its education system.

Two-and-a-half years after his appointment, Bengu's progress has indeed been slow. For example, no curriculum reforms have been introduced in the syllabuses for mathematics, biology and physical science — even though this is widely recognized as essential if the country is to improve its scientific performance. This has been a source of frustration to scientists, many of whom worked hard to formulate proposals.

Admittedly, Bengu's task is enormous and complex. Almost 30 per cent of South Africa's population of 40 million are school pupils, and 18.5 per cent of the national budget is spent on them. His department, which also includes responsibility for higher education, is the biggest spender in the government.

One of Bengu's problems is that, unlike some of his cabinet colleagues, he has not been able to surround himself with competent officials. Those attending the launch of the Academy of Sciences of South Africa earlier this year were dismayed by the performance of a top civil servant in the department, who gave a talk presenting a vision of a new education system which some described as almost completely incoherent.

Bengu and the rest of the government are now pinning their hopes for educational reform on a bill that he has presented to parliament, and which is likely to be passed before the current session ends later this month.

The situation concerning education in mathematics and science is not encoura-

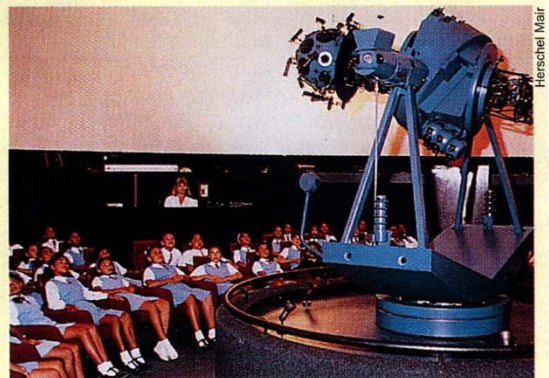
ging. A major problem is that only 33 per cent of African pupils choose mathematics as one of their six required subjects in their final (matriculation) year, in contrast to 73 per cent of whites. The figure for physical science is even worse, with only 12 per cent of Africans taking the subject, compared with 50 per cent of white pupils.

Furthermore, pass rates for African students in maths are less than a third of those for whites, coloureds and Indians, while pass rates in physical science and biology are around half those for the other population groups. The reason for this discrepancy is that, as mathematics is a prerequisite for taking physical science, those studying the latter are already a select group, and a higher percentage pass.

In contrast, biology is studied by a greater proportion of African and coloured pupils (more than 80 per cent) than whites (55 per cent). But the syllabus is dominated by rote-learning, and does not include molecular biology. Evolution is not studied either, reflecting the influence of creationists on the education policy-makers of the former regime.

Enrolments and pass rates are affected by several factors, the most important being the availability of qualified teachers. A third of African teachers in maths and biology are either unqualified or under-qualified, as are a quarter of those in physical science. Most significantly, half of the African teachers in general science fall into this category.

General science combines biology and physical science, and is offered for the first two years of secondary schooling. But poor teaching in black schools at this level



Future projections: curriculum reforms are vital.

clearly mitigates against the choice of physical science as a matriculation subject, while the biology syllabus, dominated by rote-learning, is often found to be more manageable by pupils.

Attempts by central government to eliminate wide disparities in pupil-teacher ratios between the provinces means that the Western Cape government is being forced to lay off 6,000 teachers this year to bring its ratio in line with the national average of 35:1 in secondary schools, and 40:1 in primary schools.

Generous redundancy packages have been offered. But, ironically, one effect is that many science and maths teachers, who are in demand in the private sector, are leaving education altogether, as a condition of the packages is that they do not re-enter government service, at national or provincial level.

Bengu says that he "doubts" that this is taking place, as the government has the right to refuse any individual application for a severance package. But he concedes that the process is being implemented by the provincial education departments, and admits that he is not intervening in the process in any way. □