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Helping Weak Students – Three Decades of Research on Student Support in Southern Africa

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Abstract

'Access' and 'equity' are terms which can be found in the higher education development plans of most countries in Africa. The challenge of widening access, while at the same time maintaining standards, is one which the southern African region has been grappling with for the last 30 years. The new imperative to open previously closed doors to South African students of all races at the end of apartheid produced a number of models of student support from which lessons can be learned.

The review covers initiatives in Botswana, Lesotho, Mozambique, Namibia, South Africa and Swaziland and focuses on one case study - a well documented Science and Mathematics Foundation programme at the University of the North in South Africa. This annually selects 150-250 students from disadvantaged education backgrounds with special aptitude tests which show they have potential for further studies, despite weak paper qualifications. Students are admitted into an integrated preparatory foundation year before entering degree programmes. Tracer studies reveal that ex-foundation students, previously judged to be too weak to be admitted to degrees, consistently out-perform others in the subsequent years of degree studies. By the beginning of the new millennium, virtually every university and technikon in South Africa had created a student support system.

The paper emphasizes that the nexus between students and research is essential to prove the impact of interventions such as those described and concludes by showing how specially designed programmes can also contribute to equity issues.

Introduction

The expansion of tertiary education to create graduates to spearhead economic development has been a constant theme throughout Africa for decades. This paper focuses on ways that the countries of southern Africa have tried to increase student intakes in the fields of Science and Mathematics. These become the future scientists, engineers and technologists expected to take a leading role in economic transformation. Secondary education was judged to be a poor preparation for such students and the small numbers entering science faculties and high attrition rates meant that innovative schemes had to be devised to increase the number and quality of graduates. For the sake of brevity, the above are described collectively as ‘science graduates’.

Models of Intervention

There are essentially two ways to tackle the inadequate supply of science graduates (Figure 1). The first is to improve the quality of teaching at secondary level through better pre-service and in-service training of teachers. However, this is a long-term strategy: given the many challenges at secondary level such as increased enrolment, low appeal of teaching as a profession and lack of resources for teaching science, this strategy may not be successful.

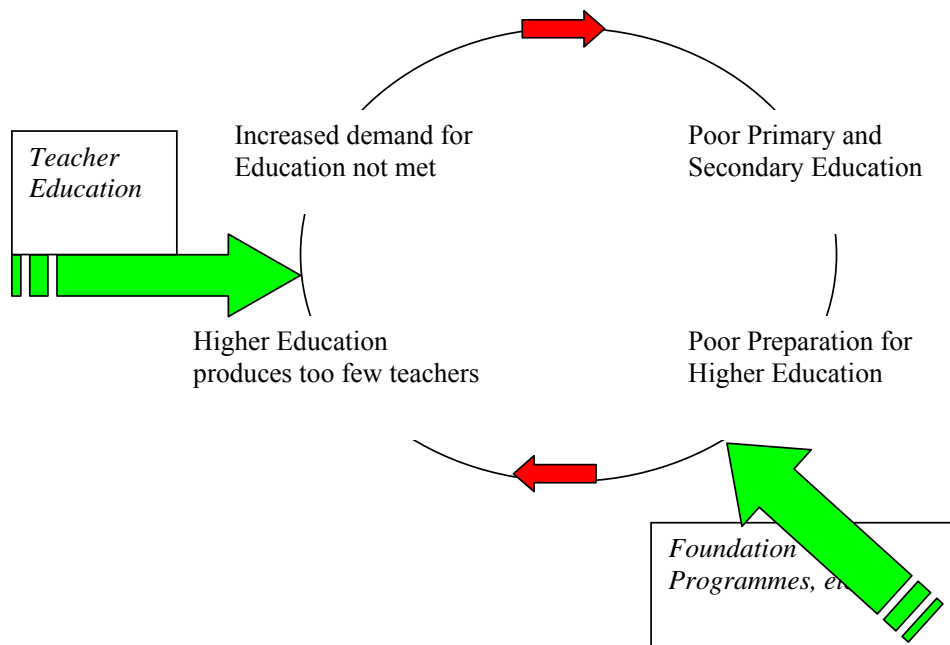


Figure 1: *The self-perpetuating cycle of poor education and two interventions to break it – Teacher Education (pre-service and in-service) and Foundation Programmes of various designs.*

The second strategy is for special interventions by the universities themselves. These are medium term (5-15 years) and have taken a number of forms and names – academic support, pre-entry science, access, foundation, and extended programmes.

This paper focuses on university interventions – their characteristics and evidence for their success. A common feature is that they offer an alternate route into higher education for students who fail to gain the necessary grades in the school leaving examination. These university innovations are markedly different from bridging or cramming courses which revise the secondary school syllabus for students to retake the school leaving examinations before they can apply for university entry.

Pre-Entry Science Courses

The first started in Botswana in 1977 as a 7-month upgrading programme for all students wishing to enter the Science Faculty at the National University. The model was later copied in Swaziland, Lesotho and Mozambique (Thijs, 1993). Pre-Entry Science Courses (PESC) provided mathematics and science upgrading and emphasized hands-on laboratory experiences. These courses were carefully integrated with language and communication skills development. There were also strong career guidance and counseling elements. Annually, several hundred students went through these programmes, the majority being recommended for science degree studies on completion (see Cantrell, et al, 1993).

While this model produced well-prepared students for degree studies over many years (18 years in the case of PESC Botswana) it had several faults. Firstly, neither the school system, nor the science faculty was changed by this intervention. Secondly, it was difficult to prove whether the pre-entry programmes were successful since there was no control group which entered degrees directly with which to compare. Pre-entry programmes in these countries were eventually phased out as secondary education was deemed to have improved sufficiently.

Academic Support Programmes

Moving from the 1970s to the 1980s, the historically white universities in South Africa started to admit black students into regular degree programmes from disadvantaged education backgrounds. For many, the pace and content were too difficult and a number of academic support programmes (ASP) were established to provide extra tutorials and assistance alongside their normal studies (see NARSET, 1997). However, these were of limited success since the students felt stigmatized and found the extra workloads excessive.

This period was important in creating a new and innovative field called Academic Development (AD) which advocated a holistic approach and the transformation of the

whole institution to meet the demands of post-apartheid South Africa. In other words, the institution must also change and adapt to the characteristics of incoming students. As the AD movement gathered momentum, it led to the creation of a national association called the South African Association for Academic Development (SAAAD) which later evolved into the Higher Education Learning and Teaching Association of Southern Africa (HELTASA) <http://associated.sun.ac.za/heltasa/index.html>. Most universities set up Academic Development Centers which coordinated ASP and later redesigned student support into one of two models – either foundation or extended programmes. These replaced ASP and both were adopted and proved successful over the following two decades.

Foundation Programmes & Extended Curricula

By way of introduction, Figure 2 shows the difference between the two models. Foundation programmes are generally one year long with their own curriculum (and often own staff) and prior to a normal degree programme. Extended programmes spread ('extend') year 1 content over two years, thus slowing the pace, supplement theory with extra hands-on experiences in science laboratories and provide tutorial support.

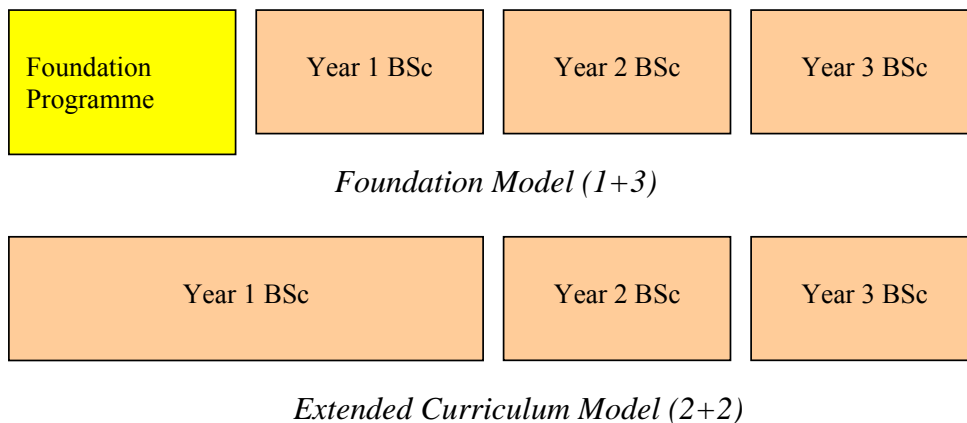


Figure 2: The two student support models for weaker students. The Foundation Programme model has a different curriculum, while in the Extended Programme model the normal curriculum is stretched over two years.

Space prevents a more detailed comparison of the two models and my focus turns to one case study which documents the more common foundation year approach. By 2001 a South African directory listed 15 technikons and 23 universities with foundation programmes in Science, Engineering and Technology (College of Science, 2001). This remarkable spread of student support systems was largely as a result of democratic elections in 1994 and the widening of access to all races (an equity issue – see later).

Case Study: UNIFY

One of the largest and most successful foundation programmes in South Africa was UNIFY (UNiversity Foundation Year) at the University of the North (UNIN) - recently renamed the University of Limpopo. A detailed account of project design and organization is beyond the scope of this paper. Its goal was to substantially increase the number and quality of students entering the science faculties. The entry route is summarized in Figure 3. The majority of 150-250 students admitted annually were too weak on paper to qualify for direct entry into the science faculties, though some chose to come through the foundation even though they had direct entry qualifications.

Through a four-year research project, a reliable and fair selection mechanism was developed to assess potential, rather than achievement (using normal school leaving examinations would have neglected their disadvantaged school education). The product was a combination of Science, Mathematics and English aptitude tests that have high predictive validity for later degree performance (Zaaiman, 1998).

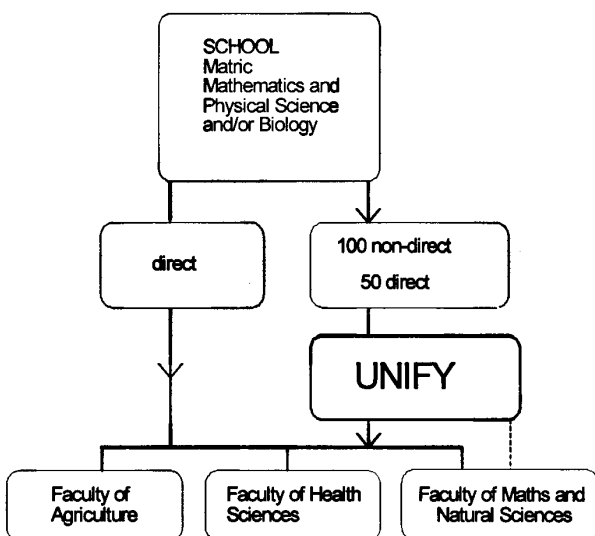


Figure 3: *The position of UNIFY (attached to the Faculty of Mathematics and Natural Sciences) in the student access route for UNIN's three science faculties.*

Annually 110-120 students who passed UNIFY were recommended to enter Year 1 of the Science degree programmes at UNIN. A pass in UNIFY was accepted as an alternative entry qualification since most would not qualify on the basis of school performance.

Various tracer studies (summarized in Zaaiman, 1998) show that UNIFY students consistently out-performed direct entry and repeating students (Figure 4). Not only is this shown in pass rates, but some ex-UNIFY students were 'top of the class' in mainstream courses. For example in 1996, 3 of the 5 chemistry prizes were awarded to ex-UNIFY students in various undergraduate courses.

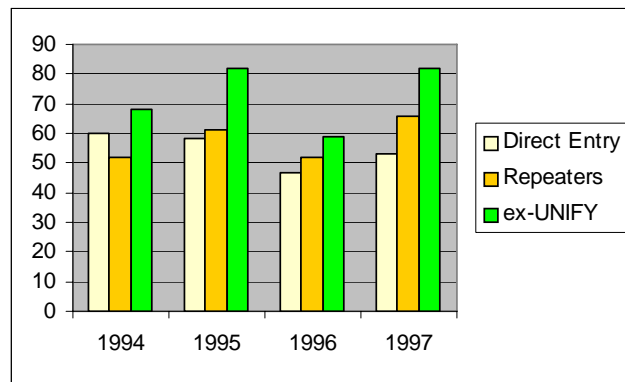


Figure 4: The end of 1st Year pass rates (averages over a number of Faculty of Mathematics and Natural Sciences courses) for Direct Entry (first time direct entry), Repeaters (Direct Entry repeaters of Year 1) and ex-UNIFY students in four consecutive years (Zaaiman 1998, p 102 and UNIFY files).

Two other aspects merit attention. Firstly, mainstream staff was able to spot ex-UNIFY students despite large classes through their commitment to work and willingness to participate in classroom discussion. An unexpected effect was that ex-UNIFY students often took up student leadership roles and served on the Student Science Councils.

Equity Issues

Mention has already been made of the equity issues in South Africa: by the mid-1990s the university selection mechanisms were required to create student populations which reflected the ethnic mix of the country. To illustrate how Foundation Programmes can address equity, I turn to some data from Namibia.

Namibia has only one national university and one polytechnic. Not only does the demand for scientists and technologists far exceed supply, the intake procedures of tertiary institutions raise questions of ‘fairness’ (equity) since until recently they provided little or no entry opportunities for marginalized groups and excluded the majority of school leavers from further study by selecting students from a few advantaged schools.

To illustrate the constraints of admission practices, the 2004 graduation statistics from the Faculty of Science at the University of Namibia (UNAM) are highlighted (from Cantrell, 2004). Graduation speeches hailed the significant increase in B.Sc graduates (nearly

twice that of the previous year). Even so, there were only 57 Namibian graduates. The following details emerge:

<p>Fact 1: only 30% of Namibian B.Sc students graduated in 4 years (the minimum time), 44% took 5 years, 19% took 6 years, 5% took 7 years</p> <p>Fact 2: three good schools in the northern half of the country produced 89% of the future graduates</p>

The figures speak for themselves – most (70%) students failed to complete their science degrees in four years. In addition, only three schools supplied 89% of the BSc intake from the populated northern part of the country.

By the year 2000, access programmes in the rest of southern Africa were already exploiting the large pool of students with potential for further studies, but lacking paper qualifications. The same untapped pool existed in Namibia. For example – which student has the greater potential for further studies – the one who attended a well-resourced school in the capital and attained a C grade in physical science, or the one from a rural school who attained an E with no dedicated laboratory or qualified physical science teacher? Yet, using UNAM's selection mechanism, the latter was barred from tertiary education.

How might a well-designed Foundation Programme have affected these graduation figures? Firstly, the number of students graduating would have been much higher had there been a Foundation Programme for a large number of students. Secondly, based on the data from UNIFY, many of these would have done well in their subsequent degree studies and would have graduated in minimum time. Thirdly, many more schools would have been able to supply students for university studies. What a morale booster that would have been for teachers and students alike. Fourthly, some of the foundation students may well have been from minority groups such as the San (bushman) who had no educated leadership to represent their views.

As a post-script, it can be reported that there is now a Foundation Programme running at the University of Namibia's northern campus.

Conclusions

The conference focus on the nexus between students and research has been interpreted here as research on student admissions and progression. Data from one Foundation Programme (UNIFY) in South Africa has been used to prove the worth of the innovation. Through a well designed tracer study and two control groups (direct entry and direct entry repeaters) it has been possible to show how a special programme for so-called 'weak' students can reverse such problems and create a large pool of good science graduates for the expanding economy.

In the same project, another research endeavor created a reliable selection mechanism which spotted potential for further study since school leaving examination results could not be used if equity issues were to be addressed. The notion that disadvantaged schooling background can be corrected through access programmes is perhaps new for many readers. Many educational systems simply accept that there are good and bad schools. However, where graduates are in short supply, to waste this valuable source of students is unnecessary when a variety of remedies are proven to work.

The various programmes reviewed here have accumulated much data on student intakes, foundation performance and subsequent degree progression. This was necessitated by donors providing external funding and requiring regular reports on their impact. In closing, I appeal to all higher education institutions to give priority to the collection and analysis of student data (entry, progression, graduate tracer studies, etc) so that the impact of their programmes can also be reliably assessed.

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