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# Information Technology Education: A New Experience in a New South Africa

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**Abstract**

South Africa has changed a great deal since it's first democratic general election was held in 1994. A policy of corrective action has forced many organizations to change the composition of their employees, especially the management core. The demand for trained information technologists from the traditionally deprived communities has forced many training institutions to adapt totally new approaches to their training programmes. Students who can barely speak any international language, from communities where electricity is an absolute luxury, must be moulded carefully into becoming highly skilled information technologists. This challenge has been met by many different institutions in many possible ways. The Port Elizabeth Technikon has certainly grasped this immense challenge in introducing some unique initiatives. These initiatives include: bridging programmes, slowstream curricula, peer support groups, etc. Bridging programmes concentrate on bridging the gap between a traditional inferior schooling education to tertiary education. Slowstream curricula stretches a normal three year diploma to four or five years, including preparatory courses such as communication and life skills. Peer support is implemented through additional tutorial periods which are conducted by senior students from the same cultural background. These new demands and initiatives have continuously threatened to lower the standard of education. This paper will provide a brief glimpse of the challenges that face all institutions providing education in information technology.

**Keywords**

Bridging programmes, industry cooperation, information technology, peer support, schoolnet, slowstream curricula

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# 1 INTRODUCTION

It is easy to talk about and motivate the need for trained information technologists when the training of such a group could be considered straightforward, due to the student body having all been exposed to a world of technology while at school. A world where electricity is taken for granted. In South Africa, where we are only now starting the long process of healing the scars of the apartheid system, we must introduce and train students for a career in information technology, irrespective of their previous learning experiences. We cannot wait for the school system to start producing technology literate students. That process will take many years when one considers that first year students are coming out of a system where 46% of urban households are not connected to a electricity supply grid. Where 25% of urban households do not have access to a piped water supply. (SEF, 1995)

Students come to our institution from a school environment where the science and mathematics teachers do not all have formal training. We have had students who had to teach themselves mathematics. There simply was no teacher. A school environment where the teacher pupil ratio could be as high as 1:80 but seldom lower than 1:40. Where there is not enough seating for all the pupils in the class. An environment where two schools share one building, where the one school uses it during the day and the other during the late afternoon and at night. These are factors over which the pupils have had no control.

In the Eastern Cape Province where our technikon is situated, 44% of the population is younger than 15 years. This is the second highest in the country. The elderly form 6% of the population, which is the highest in the country. Out of a population for the province of 7.9 million, 88% of the population is Black. (SAIRR,1994) As the Black population is regarded as the disadvantaged sector economically, socially and politically, and taking into account the youthfulness and the illiteracy rate, these factors will put pressure on existing educational facilities as well as the planning and provision of future facilities.

The province has a total school enrollment of 1 959 781 pupils in 5759 schools. The number of pupils who wrote their final school examination between 1984 and 1993 increased by 196% from 167 842 to 497 030. The number who passed increased by 113%, although the proportion who passed decreased from 68% to 49%. (SAIRR, 1994)

The results for 1992 indicated that only 80 black students out of a total of 1581 had obtained a formal qualification in Information Technology/ Computer Science, taking the total of all the technikons and universities. (SAIRR,1994) The challenge will be to dramatically change this ratio using innovative methods to bridge the educational disadvantage of the student.

## 2 ACADEMIC DEVELOPMENT PROGRAMME

This program is more generally referred to as a bridging program. The Technikon initiated such a program in 1989, in recognition of the fact that many students are under prepared for tertiary education. This being especially true for the non-white education systems created by the apartheid system. One of the many problems facing higher education is to provide access for an increasing number of Black students. This is not an easy task as a large number of students from disadvantaged educational backgrounds have school symbols which will not give them access via the usual selection procedures, while many are totally under prepared for tertiary education.

In general, students for bridging are identified on the basis of their school marks. If they do not gain automatic entry into a mainstream course, it is recommended that they follow the bridging route. The only requirement being a pass in both Mathematics and Science at school. Special slowstream curricula is available to those students wishing to follow a career in the humanities.

The core component of the bridging course is organized and administered at an institution level, with the core being of a sufficiently flexible nature to allow students access into most of the science and engineering courses offered. The course consists of Mathematics I, which is a credit subject, Physics, Technical English, Chemistry or Technology and Life Skills. The course is run over six months, with the option of extending it to a year.

The Technikon has made available seven dedicated classrooms to accommodate the students and eight offices to accommodate personnel involved with these courses. Other facilities such as the computer laboratories, are shared with students enrolled for other courses. All the necessary administrative assistance from the formal infrastructure is provided for these courses.

The government does not provide funding to support bridging courses. For 1996 an amount of R1.3 million in direct cost is required to present this course to 300 students. Of this amount the Technikon needs to source R1.1 million in external funding.

Before this program was initiated, 0% of all academically disadvantaged students passed all their first level subjects, while their overall subject success rate was only 26%. For 1995, these figures are still only 7% and 35% respectively, with a drop out rate of 63%. A dramatic improvement has been achieved for the academically disadvantaged students through the bridging program where 53% pass all their first level subjects, with a subject success rate of 84%. The drop out rate for this group is only 10%. What is more significant is the fact that these results are better than the overall student success rate of the Technikon where first year successes are 45%, subject success 75% and the drop out rate 42%. What is also remarkable is the fact that most of the bridging students have inferior marks to those students from the same academically disadvantaged background who went directly into the mainstream. These statistics clearly prove that the bridging students have a distinct advantage over all other students at our institution.

Many bridging programmes are successful in preparing students for the first year of the mainstream studies and then fail in the succeeding years. This has not been the case in this instance where the graduation rate for the bridging students has been 59%, which again is higher than the Technikon norm or that of any other group, be it ethnic or education system.

Not only has the success rate been improved, but students of quality have emerged from the system. In 1993, a student who came through the bridging route won the prize for developing the best Information Technology project. This project was entered in a national competition for all universities and technikons where it came second. Another student obtained the highest marks for Mathematics I out of all the Science and engineering students on campus, in spite of a poor symbol for mathematics at school. A number of students have obtained distinction in their studies and have been awarded bursaries.

## 3 SLOWSTREAM

Students who enroll for the Information Technology diploma/degree slowstream curriculum will complete the 5 first level subjects over two years. These students are considered to be better prepared for tertiary training than those doing the full bridging course and will therefore do only three bridging subjects over the first year. These subjects being Communication in English, Commercial Calculations and Life Skills. In addition two course credits, Technical Programming I and Information Systems I are taken in the first year. Just over 20% more time is allocated to these two course credits than is the case for the students in the mainstream. The remaining three first level course credits are taken in the second year.

The first group of 10 enrolled in 1994. Only 30% of this group passed, while 1995 has been more promising with 55% of the group of 20 passing.

Funding for the bridging component of this course is provided by the bridging grants as discussed earlier.

## 4 PEER SUPPORT

A Peer Support Scheme has also been introduced whereby senior students will assist first year bridging and mainstream students in subject areas which have a traditionally high failure rate. These peer supporters are selected, if possible, from senior students who have completed the bridging course. Because the home languages of the students at the Technikon are fairly equally divided, more than 30% each, between Afrikaans, English and Xhosa, the peer supporters are also selected in accordance with the need of a specific language group, in order for peer supporting to take place in the home language.

The students are selected on the basis of their motivation, communication and academic ability. Peer supporting is a skill and unless proper training is provided and the process of peer supporting is properly monitored, it will fail. The students therefore complete a 5-day course in preparation of this task Thereafter the peer supporters are continuously monitored to identify and rectify problems that may occur.

The training and supervision of the peer supporters is undertaken by a Peer Support Coordinator. Prior to the appointment of this person, the responsibility of the peer supporters was shared amongst members of faculty, which proved to be totally unsuccessful due to a lack of peer support training, communication problems, poor coordination and a lower priority being assigned to this task by individual members of the faculty.

Although the drop out rate of students attending peer support groups is high, between 60% and 90%, students who remain within the system have indicated that they have benefited from this support group. Reasons for leaving the support group is given as; general problems are discussed and not my own; due to the intense nature of the course we do not have free time; peer supporters cannot explain the work in the way the lecturers can. On the other hand some students leave when it becomes clear to them that peer supporters are not there to do the problems for them.

It is the responsibility of the faculty to fund and maintain the peer support operation. The lack of suitable funding has meant that the number of students per peer supporter has varied between 8 and 20 from one year to the next.

## 5 SCHOOLNET

Schoolnet is the name of the project which has as its prime objective the connecting of disadvantaged schools to the Internet through the Technikon. In achieving this goal, secondary objectives are possible, which include; the creation of an interest in the field of information technology in school children who in many instances live in houses which do not have electrical power; opening the world to children who have never been more than 20-30km from their home and inter school projects with schools in other countries.

The project works on the basis that a school with a suitable computer infrastructure is firstly provided with a modem and the technical support to setup the connection. One or more staff members from the school are also trained to maintain and manage the Internet connection at the school. The only cost to the school is the R30 monthly rental of the telephone line from the telecommunications provider. No cost is attached to the telephone calls to the Technikon.

Each school who is given free Internet access to the Technikon, must connect two other schools to the Internet through the Technikon. They must also provide technical support and training for the staff of their 'adopted' schools. Should they fail to do this, their free connection to the Technikon will be cut.

For those schools who do not have a computer infrastructure, old computer hardware and software is sourced from industry and installed at no cost to the school. The average size of the laboratories installed is 15 PC's. This is done in cooperation with the local chapter of the Computer Society of South Africa. Technical support and training is provided to the point where the school can function independently. The school has the responsibility of providing the room, furniture and power. In Africa technology is never old, somewhere someone will be able to make good use of it.

At present 12 schools are connected. The major constraint in connecting more schools is the non-availability of old PC equipment from industry.

## 6 MATHEMATICS WORKSHOPS

On Friday afternoon and Saturdays, 40 to 60 school children from disadvantaged schools are brought to the Technikon to work on mathematics packages in the computer laboratories. This is done at no cost to the children or their schools. Not only does this dramatically improve the mathematics marks of these disadvantaged children by up to two symbols but it also serves the purpose of creating in the children an awareness of computer technology while also introducing the children to the world of information technology.

## 7 INDUSTRY COOPERATION

Duplicating training centres to present information technology courses are both expensive to establish and maintain. The problem is still greater when one considers that for training to remain relevant and effective it is necessary to continuously update or replace the hardware and software components. Very rarely would one therefore find an institution duplicating such a facility as a satellite training centre.

For many students however the costs of travel and accommodation make it impossible for them to attend these hands-on courses in another city or town. With this in mind the Technikon established a satellite training centre in 1990 in East London, a city 300km from the main campus in Port Elizabeth. This was made possible with the kind cooperation of Mercedes Benz, who provided the Technikon with a fully equipped computer centre consisting of two computer laboratories, two lecture rooms and two offices. Existing buildings at the main factory were converted for this purpose. The Technikon provided the training staff who operate totally independently from Mercedes. The support from Mercedes has been excellent over the past six year period. Their staff regularly present lectures to the students while they also provide technical assistance when required. They also judge the computer projects every year and present a prize to the winning team. From their perspective, Mercedes consider this a service to the community.

On average there are 50 students at this training centre. Because of the small classes, students get more personal attention. We find that those students who come from the Mercedes Benz campus to the main campus in order to follow a post graduate course, tend to be more mature and capable of working independently. They come from a production environment and find the campus hostel lifestyle irritating.
These students follow the same curriculum as the students at the main campus and also write the same examination. They only go to the main campus on the day of their graduation.

Being in an industrial area, it is accessible to the poorer communities. There was for instance a group of three disadvantaged students who use to walk up to two hours a day to and from this campus. They successfully completed the course and all have thriving careers, which they admit would not have been possible if the campus had not come to the people.

## 8 REFERENCES

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## 9 BIOGRAPHY

Dr Eugene du Preez is at present Dean of the Faculty of Computer Studies at the Port Elizabeth Technikon. He has been a staff member of this institution for 16 years. Prior to this he spent one year as a Scientific Programmer at a University. His first employer was the Ford Motor Company where he was employed for eight years. The first 4 years were spent as an engineering programmer in Product Engineering and the last 4 as a analyst programmer for engineering systems in the Computer Centre.