AVAILABILITY AND (NON-) USE OF TECHNOLOGY IN AND FOR MATHEMATICS EDUCATION IN POOR SCHOOLS IN SOUTH AFRICA

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In South Africa where poverty defines the lives of the majority, technological resources are not just limited and unequally distributed in schools, but also their availability does not necessarily translate into use. The paper explores issues related to accessibility and (non-) use of technology for mathematics learning and teaching in poor schools in South Africa. A suggestion is made to consider poverty and economic conditions as legitimate and relevant concerns in research on technology in and for mathematics education.

INTRODUCTION

In South Africa, educational resources are not only seriously limited but also unequally distributed. While historically white schools are well resourced and wealthy, the conditions in black townships, in rural areas and in the informal settlements remain poor. Many black schools still do not have basic resources such as water, electricity, textbooks, sufficient classrooms and furniture. While the use of technology is becoming more visible in the school curriculum, particularly in the Further Education and Training phase, there are still many students in black schools who have never owned, touched or seen a graphic calculator or computer.

One way of dealing with inequity in provision and distribution of resources is by giving poor schools more resources. In this paper, drawing on my experiences as a learner, teacher, teacher educator and researcher in black schools in South Africa I argue that provision of technological resources in schools in and of itself has a potential of being discriminatory because of the infrastructure that the school needs to have in order to be provided and be able to use them. I specifically focus mainly on computers, as there is presently more focus on the use of computers for mathematics teaching and learning. I begin by answering the question "who has access?" Through this I highlight the fact that it is poor schools that do not have access. I then outline the infrastructural constraints on the use of computers in schools. These discussions provide a context for the conclusion that research in technology in and for mathematics education needs to consider poverty and economic conditions as legitimate and relevant concerns.

WHO HAS ACCESS?

The first school register of needs in South Africa was conducted in 1996 to measure the infrastructural needs of South African schools. The second, SRN2000, provides an up-to-date picture of the extent to which schools have access to computers and to essential infrastructure such as electricity and telephone lines to make computer access possible.

In 2000 24,4% of schools in South Africa indicated that they had access to computers that were used for any purpose from administration to teaching and learning. This means that

just over 70% of South African schools, mainly in the more rural provinces, do not have any computers. The percentage of schools which reported the existence of computers for teaching and learning increased from 8,7% in 1996 to 12,3% in 2000. Even though the number of computers in schools has increased substantially between 1996 to 2000, this increase is concentrated in a small number of schools in urban areas. According to the school register of needs data, there are significant provincial variations, with Gauteng and the Western Cape, the wealthier provinces in South Africa, respectively reporting 58,6% and 54,8% of schools without computers for teaching and learning. On the other hand 95% of schools in the poorer provinces, Eastern Cape and Limpopo, were without computers for teaching and learning (SRN, 2001). While the above data clearly shows how the wealthier provinces are advantaged, it does not show how many of the schools in black areas in Gauteng and the Western Cape have access to computers. This is an important question to ask in a country such as South Africa with a history of racial inequality.

The nature of the process with which computers have been brought into schools is also very interesting. In many instances private companies donate computers to schools as part of their corporate social investment responsibility. These donations are not made in consultation with the school to find out their computer needs. Recently the City Press newspaper (February 02, page 4) published a story in which a secondary school in Ga-Rankuwa, near Pretoria, was complaining about the 22 computers donated by Denel, an arms manufacturing company in South Africa. The headmaster of the school described the computers as "worthless junk that can only perform the job of a typewriter". He argued in anger that it is very wrong for big companies to use black schools as dumping grounds when they want to clear out their warehouses of useless material (Sowaga, 2003). There are many such stories in black schools in South Africa. These 'donations' are usually a public event that seems more like a public relations exercise than a concern for meeting a need. They are not accompanied by technological support or training. Educator training is critical especially as the literature has observed that 'computer density does not accurately reflect the uses of educational technology' (Vendatham & Breeden, 1995: 33 – 35). Having technological resources without technological support, training and a sustainability plan is like having a system of arteries and no veins. It is pointless - as good as having no technological resource at all.

The existence of computers in the school system should not be taken as a measure of computer use for teaching and learning. There are a number of factors that can contribute to non-use of computer equipment; these include equipment obsolence, lack of access to curriculum support and technical maintenance and lack of motivation or fear among school managers and teachers to use the equipment.

One of the most unrecognised reasons for non-use is the conception of a resource that exists in poor schools. This conception is informed by the poverty conditions that the schools find themselves in; where there is lack, scarcity or shortage of resources. In these contexts resources are seen as a 'possession' that should be protected and taken care of rather than "stock that should be drawn on or used". In the context of large scale poverty there is a fear that using the resource will lead to it being depleted and thus the

'possession' being lost. It is not unusual therefore to find computers locked into a room with high security and teachers and students not having access. This is not only a situation with computers but also with textbooks, calculators and other educational resources supplied by the government. There are of course other schools which cannot even be provided with computers because of the lack of infrastructure, such as electricity and telephones.

LACK OF INFRASTRUCTURE

The provision of electricity is an important precondition for the implementation of ICT infrastructure at a school. Between 1996 and 2000, there was a significant increase in the number of schools supplied with electricity, from 41,8% in 1996 to 57,1% in 2000. 3,6% of schools reported the use of solar energy (SRN, 2001). The proportion of schools without electricity and the time taken to supply it will limit the access of students to ICT in those schools. There are also other factors that must be taken into account such as the extent to which school buildings are wired for electricity to the appropriate rooms, and the quality of the power supply.

As with the supply of electricity, the availability of telephone lines also play a role in the extent to which schools are able to offer their students and teachers access to mathematics learning and teaching resources on the internet. In 1996 59,5% of all schools nationwide had no telephones, in 2000 this had declined to 35,5% of schools with no access to any form of telecommunications (SRN, 2001). This sharp decline in the number of schools that do not have access to any form of telecommunications can be attributed to the increasing accessibility of mobile telephones. The statistic therefore presents an underestimate of the actual number of schools that must still be provided with land-line access for computer linking to the internet.

Lundall and Howell (2000) argue that among the more severe constraining factors limiting the growth of computer use in schools is the lack of funding, limited classrooms and lack of available staff. In addition, the question of security to prevent damage to or loss of computer infrastructure and a lack of sustainable business plans for computer facilities in schools threatens the medium to long term prospects for the use of computers in poor schools.

IN CONCLUSION

While there has been extensive research and development in technology in and for mathematics education, none has considered poverty and economic conditions as relevant concerns. For latest reviews see the handbook of international research in mathematics education (English, 2002). Most of this research explores the epistemological or pedagogical benefits of using technology in mathematics education without paying attention to who gets a fair deal. A relevant question to ask here is how concerns of poverty and economic conditions might affect research findings or undermine existing work in this area? Some conjectures will be made during the presentation concerning recent developments.

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