

# **“We cross night”: Some reflections on the role of the ESKOM Expo for Young Scientists as a means of accommodating disadvantaged learners into the field of Science and Technology**

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*This article critiques the role of the ESKOM Expo for Young Scientists as a particularly salient node in the constitution of young learners' identity as prospective participants in the field of science and technology. The ESKOM Expo is seen as a particularly exciting means of providing access to the niche area of science and technology. Yet this attraction camouflages a number of pitfalls that learners have to negotiate. Looked at as a vehicle of accommodation of the scientific and technological aspirations of the young people involved in this research, the ESKOM Expo reveals itself to be problematic in various ways. Positioning itself within a postcritical ethnographic framework, this article considers these issues at two levels: a) the disjuncture between the bureaucratic institution of the expositions and the intuitiveness and spontaneity evident in the learners' preparation for the exposition; b) issues of language and representation that tend to marginalise learners from working class backgrounds. It is argued that the institution of the ESKOM Expo, while undoubtedly useful as a means of opening up young learners' horizons of science and technology, is still not sufficiently flexible, both at a conceptual and an organisational level, for it to be the vehicle of technological empowerment it is intended to be.*

## **Introduction – Theoretical and methodological framework**

As a science and technology educator and researcher interested in the experiences of young people who continue to learn science and technology in various relatively deprived contexts (see Vithal & Alant, 2005), I align myself with research that is concerned with unearthing the inequities in science and technology education. I concur with Barton (2001, 899) who works in “high poverty areas” in the US, when she argues that the foundation for making sense of science and technology education lies in situating one's work within a critical and a political framework. This position derives from the belief that science and technology educators can play a role in contributing towards community empowerment, social action, democracy and social justice (Lee & Roth, 2003).

The above concerns all justify the adoption of a conceptual and methodological framework such as critical ethnography. As Pignatelli (1998, 403) points out, “critical ethnography regards research as action taken in the interests of those who are rendered marginal by the dominant culture and often relies upon narrative knowledge as a way to speak to issues of power and equity”. This remark brings into focus the question of voice. I deliberately evoke the notion of “voice as portraiture” (Chapman, 2005) and adopt a “voice with positionality” for the construction of the narratives that are used in exploring the hegemonic practices of the ESKOM Expo for Young Scientists. As Madison (2005, 14) reminds us, “positionality is

vital because it forces us to acknowledge our own power, privilege, and biases just as we are denouncing the power structures that surround our subjects”.

The question of positionality is crucial, as it places the research within what has been referred to as a post critical ethnography. By taking an activist stance in advancing the “politics of positionality” (Madison, 2005, 7), this article aligns itself with postcritical ethnographies rather than classic or conventional (also referred to as traditional) ethnographies. The following reasons can be advanced. Firstly, the subject matter of this article, namely the position of individuals from disadvantaged backgrounds taking part in institutional, corporately sponsored competitions, is fundamentally political. Secondly, although I acknowledge critical ethnography’s “transformative research practice” (Hyttén, 2004), I concede Noblit’s (2004) point regarding the “paradigmatic conflict” inherent in critical ethnography’s historical origins. As he puts it “critical theory in some ways is the ultimate product of modernity, and ethnography is the ultimate product of colonialism” (Noblit, 2004, 193).

Critical ethnography regards research as action taken in the interests of those who are rendered marginal by the dominant culture and often relies upon narrative knowledge as a way to speak to issues of power and equity. This use of narrative will therefore be apparent in the “voiced” narration of the individual whose experiences are reflected in this article. In a narrative analysis the researcher examines data and reports results by constructing one or more stories that are held together by common themes or plots: a narrative is a “discourse form in which events and happenings are configured into a temporal unity by means of a plot” (Polkinghorne, 1995).

## Background<sup>1</sup>

The Centre for Development and Enterprise (CDE) Report (2004) indicates that despite the energetic effort and commitment that the government has put into initiatives, whether it is in policy or in private sector supported programmes, to improve science and mathematics education in South Africa, little has been achieved. Achievement is measured in terms of the number of learners that enroll for Mathematics at higher grade level as well as the number of candidates that matriculate with higher grade Mathematics. Measured by this criterion, South African learners, in particular African learners, are still lagging behind. Indeed, the failure to improve Mathematics and Science education is seen as the most significant obstacle to African advancement in South Africa. Against this background, the CDE Report recommends, amongst other things, that we need to ensure that no child with potential and aptitude in Mathematics and Science should be denied opportunity. Furthermore, the Report makes an appeal to the private sector, non-governmental organisations (NGOs) and international donors to review their support to initiatives that support the development of Science and Mathematics education in the country. This should be done so as to align initiatives with what the Report singles out as “the country’s top educational priority at the start of the 21<sup>st</sup> century”.

This article highlights the role of science and technology expositions as potential contributors to a nation-wide strategic intervention in Science and Mathematics education, focusing mainly on the ESKOM Expo for Young Scientists. This emphasis can be justified on the basis of ESKOM’s particularly privileged relationship with government initiatives in the advancement of Mathematics and Science. The Department of Science and Technology entered into a three-year agreement with the ESKOM Expo for Young Scientists to use the expositions “to unearth the science talent and potential of particularly learners from disadvantaged schools” (Mangena, 2005). This agreement had as one of its primary concerns the need to increase the number of African disadvantaged learners reaching the finals of the exposition.

This article draws on the experiences of a learner, Sibusiso Nene<sup>2</sup>, from the Hammarsdale area, some 40 km west of Durban in KwaZulu-Natal. These experiences have been documented through a combination of data sources, established by myself, the learner, and, on occasion, by individuals (in

1 The government policies and documents dealt with in this article, as well as all ESKOM material and websites, refer to the period prior to 2006.

2 This article is dedicated to the memory of Sibusiso Nene who passed away on 30 January 2009.

particular journalists) who interacted with him. Importantly, the data also includes references to other learners, all from the Hammarsdale area, who over a period of time, came to participate in the ESKOM expos alongside Sibusiso Nene. In a sense, then, the significance of Sibusiso Nene lies in the fact that he spearheaded the participation of a group of learners in the ESKOM expos, acting as a role model for them. The data sources concerning Sibusiso Nene and the other learners include reflective diaries, press articles, video recordings, photographs and interviews. This varied research approach, deriving from a relational theoretical framework (Bourdieu, 1991; Callon, 1986; Latour, 1993), allows for a reflexive exploration of the learners’ artefact-mediated activity (Susi & Ziemke, 2001; Rambusch & Ziemke, 2005).

The institution of the ESKOM Expo for Young Scientists, while undoubtedly useful as a means of opening up learners’ horizons of science and technology, proved not to be sufficiently flexible, both at a conceptual and an organisational level, to be the vehicle of scientific and technological empowerment it was intended to be - especially from the point of view of the disadvantaged learner. The Expo is seen as a particularly exciting means of providing access to the niche area of science and technology. Yet this attraction camouflages a number of pitfalls that the learners have to negotiate. The learners are continually reinventing themselves, in the process not only “voicing”, but, crucially, also “silencing” their experiences. This has been particularly evident in the experiences of the learners this article refers to, and calls into question the assumed claim that expos are a vehicle for access into science and technology. In short, they exclude even as they claim to be inclusive.

## Overview of the ESKOM Expo for Young Scientists

The ESKOM Expo for Young Scientists is an exposition or science fair in which learners from around South Africa submit their science and technology projects. The regional expositions start in July and end in the first week of September. The Expo brands itself as the vehicle “through which the South African youth can demonstrate their inventiveness and innovation in the fields of science and technology”. It has categories for primary school learners and high school learners in Grades 8-9 and 10-12. The approximately 25 categories, arranged by topic, cover a wide spectrum, ranging from Engineering, Physics and Chemistry to Medical Sciences and health care, and also include eco-tourism and socio-psychological services.

The gold medal winners of the 26-28 regional Expos are invited to compete in the national finals, which are held in October at the University of Pretoria. At the national competition, exhibitors are awarded gold, silver and bronze medals. Out of 477 projects displayed at the 2005 Expo, there were 187 Bronze, 148 Silver and 78 Gold medals awarded. There were also awards made by special interest groups, as well as a number of prestigious awards. A handful of the ESKOM Expo for Young Scientists Finalists is selected to participate in Science Fairs overseas.

In its 25<sup>th</sup> year, the organisers of the ESKOM Expo, place strong emphasis on the need for the exhibits to reflect “useful technological processes and development”. The ESKOM Expo clearly markets itself as a means of accommodating the technological aspirations of the learners who participate in it. In other words, it acts as a conduit through which the learners express their interest in science and technology.

## Sibusiso Nene and the other Hammarsdale learners

This article forms part of an ongoing National Research Foundation (NRF) – funded research project. The aim of the research is to explore how learners who have been identified as having a particular talent in science and technology through their own home-based projects, relate these activities to their experiences of science and technology at school and in the broader community. The research relates to the national plan, generally referred to in government and policy documents, to work towards a model for institutional capacity development at the various levels of the communities from which future young scientists and technologists should come.

I met Sibusiso Nene in late 2003 through his mother, Mrs Doris Nene, who, at the time, was working in the Faculty of Education (of the erstwhile University of Durban-Westville) as a cleaner. She had come to my office to raise funds for her son’s participation in the national ESKOM Expo in Pretoria. He had won a gold medal in the local KwaZulu-Natal Expo, but didn’t have the necessary funds to be able to make the

trip to Pretoria. Doris enthusiastically shared her son's interest in technology with me. Not being entirely convinced that the money was going to be used for the cause she said it was, I inquired if it would be possible for me to pay them a visit to see at first hand the models made by her son (see pictures below of my first encounter with Sibusiso Nene at his house in Hammarsdale).



Picture 1: *Busisiwe Alant and Sibusiso Nene, Hammarsdale, November 2003. Sibusiso enthusiastically demonstrates how his model truck works.*



Picture 2: *Busisiwe Alant and Sibusiso Nene, Hammarsdale, November 2003.*

Upon walking into the four-roomed house in Hammarsdale, it was clearly evident how the ESKOM Expo had invaded, not only this young boy's life, but indeed that of his entire family. His bedroom, which he shared with some of his siblings, was adorned with components of both finished and unfinished projects, as well as newspapers clippings and articles that covered a trip he had made to Grenoble in France in July 2001 in recognition of his achievements in the 2000 ESKOM Expo. The "cramped" lounge was full of certificates and medals he had won in past Expos.

Sibusiso's recollection of our first meeting was captured as follows by a local newspaper journalist:

*I: How did you meet Sis Busi?*

*Sbu: Through my mother, my mother told her about my projects. Sis Busi wanted to come and [see] what I was doing. She and her husband drove all the way to come to Hammarsdale. I showed her the project that I entered at the ESKOM Expo in 2003 - the car trapper. She really liked the project and asked me to bring the project to the university to show her colleagues.*

During my initial association with Sibusiso Nene, I was introduced to several of his peer acquaintances who had a similar inclination for the design and construction of working models of various types. Within this loose, but growing formation of "technologically promising young people", my own role gradually became that of a sister, warder, confidante, facilitator, participant-observer and action researcher. Thus drawn into the action network of these learners (Latour, 1992; Callon, 1993), I began to facilitate their participation, not only in various Expos at both provincial and national level (SAPPI, FFS and ESKOM Expositions for Young Scientists), but also at exhibitions, for example at the Natural Science Museum in Durban. Throughout all these activities, I shared in their anticipation and preparation for the events and in the ways the group experienced them. In fact, the title of this article, "We cross night", derives from

the expression the boys use amongst themselves to refer to their preparation for an exhibition, which in isiZulu is “kuze kwasa sibheke ngawayizolo<sup>3</sup>”.

The ESKOM Expo has a local committee that organises each regional Expo. If a school is interested in taking part, the local committee sends entry forms and relevant information to one of the teachers. Each participant completes an entry form and pays the registration fee which is R80 per entrant. If entrants win in the regional Expo, they proceed to the finals in Pretoria. The trip costs roughly R750. As mentioned earlier, I met Sibusiso’s mother when she was trying to raise this money for Sibusiso’s forthcoming trip to Pretoria.

Whereas most of the learners who participate in the ESKOM Expo have a school workshop where the science teacher helps the learners with the conceptualisation and development of the project (with the full backup support of a well-resourced library), the learners from Hammarsdale have no such luxury. Whereas most learners participating in the ESKOM Expo go to retail shops (*Game, Toys r Us, Experi-lab*) to look for components for their projects, the Hammarsdale learners frequent the local scrap yards and workshops.

Mr Zulu (owner of the workshop where the boys weld their models) as well as Mr Paul Wartmann and Mr Grant McGee (owners of Cato Scraps) are reflected upon by the learners with great fondness. It is here that the learners have honed the negotiation skills that are crucial to their projects. These skills that determine the type of material they are able to obtain, as well as the quantity. A further skill much in evidence lies in their creative use of space. As can be seen from the photographs of my first visit to Hammarsdale, the “workshop” where Sibusiso demonstrates the workings of his car-trapper model is simply an open space behind the house. It is here, “in the dirt” as it were, that most of the learners conceptualise / design, construct and appraise their models. Dirt is creatively transformed into a workshop through the use of cardboard boxes that serve as workbenches. The important point to make is that all these practices - the phrase “we cross night”, the bartering for components, the use of all kinds of makeshift tools and settings, right up to the press cuttings in the living room - collectively make up ways of knowing, doing and behaving (Roth, 2001, 2002; Rambusch & Ziemke, 2005) that constitute a certain culture (Bourdieu, 1991) that has developed around the making of technological models.

## The two inclusionary/exclusionary institutional practices of the ESKOM Expo

### *a) Categories of participation.*

The ESKOM Expo for Young Scientists was established in 1980. An analysis of the Hall of Fame of the ESKOM Expo Special Awards and International Participation leaves one with many questions (see ESKOM Expo website). For example, if one considers the Meiring Naude Award for the period 1985-1995, one notices that only one black participant is included in the “Hall of Fame”, and then only as a partner in a collaborative project. For the period 1996-2005, there is again only one black participant. In other words, in a period of 20 years, only two black learners have managed to “earn their place”. Significantly, these black learners come from former Model C schools.

In the 25 years of the ESKOM Expo’s existence, I have counted approximately 35 categories of special awards and prestigious awards that have been recognized (excluding International Participation). As shown below, black learners feature in no more than 12 of the 35 categories:

- Category 1: Meiring Naude Award – two black learners over a period of 20 years
- Category 6: ESKOM - Best Rural Project – all black learners
- Category 8: ESKOM Best Development Project – all black learners
- Category 14: The Royal Aeronautical Society of South Africa – one black learner

<sup>3</sup> The closest English equivalent I can think of is “burning the midnight oil”.

- Category 15: Department of Science and Technology Service Community Award – two black learners
- Category 16: Jandri Barnard Award for Environmental Science – two black learners
- Category 22: – SA Radiological Protection Society Award - two black learners
- Category 24: – Grintek Best Development Project in Electronics – all black learners
- Category 25 – Intel Innovation in IT Prize -one black learner
- Category 27B: Water Institute of South Africa 2<sup>nd</sup> Prize – all black learners (first prize awarded to white learners)
- Category 30: Royal Society of Chemistry – a few black learners; in general there are more black learners in this category than in any other category
- Category 35 DST Best Female Physics Project – one black learner (new category, introduced in 2005)

My concern with the focus on the different categories is with the conceptualisation of three categories, namely categories 6, 8 and 24. It is in these categories that Sibusiso Nene and the other Hammarsdale learners have featured as recipients of special awards. Two of these categories focus on development, whilst the third focuses on “rurality” (Howley, 2001; Odora-Hoppers, 2004). Yet the models produced by Nene and the other members of the Hammarsdale group can hardly be described as “rural”, nor is there anything particularly “developmental” about them.



Picture 3: Sibusiso Nene, showing his awards from the ESKOM Expo Finals in Pretoria, Hammarsdale, 2004.



Picture 4: Sibusiso Nene's model of his 2010 state-of-the-art soccer stadium, Hammarsdale, 2004.



Picture 5: Sbongiseni Ndawonde with his models, a multifunction trolley and a snow remover; exhibited at the Natural Science Museum, Durban – 2004.



Picture 6: Bonga Mthalande with his model of the multifunction paver exhibited at the Natural Science Museum, Durban – 2004.

Their projects have been uniformly acknowledged and praised in the press, as well as in various other forums, for the way they engage with a highly industrialised, urban environment. For example, Sibusiso Nene’s state-of-the-art 2010 soccer stadium and Sihle Ngidi and Bonga Mthalande’s multifunctional paving machine not only saw them to the national finals in Pretoria, but saw them commended by the local newspapers as young designers on the road to a brighter future and success. Commenting on Sibusiso Nene’s design, the City of Durban’s architect, Sandy Naicker, was quoted as saying:

*‘This design is innovative, well thought out and exhibits an insight into mechanics. Sibusiso has done his research. It is one thing to have an understanding of IT and electronics, but Sibusiso has a good understanding of structure’ (The Mercury, 2004, 4).*

In the face of examples such as these, the inclusion of black participants - in particular the Hammarsdale group - in a “rural” or, for that matter, “developmental” category, would seem to have little justification other than the fact that the learners concerned are black. As such, the rural and development categories amount to exclusion on the basis of an institutional practice.

### b) Criteria of evaluation.

*“Rituals are the limiting case of situations of imposition, in which through the exercise of a technical competence which may be very imperfect, a social competence is exercised - namely, that of the legitimate speaker, authorised to speak and to speak with authority” (Bourdieu, 1991, 41)*

A variation on how the ESKOM Expo’s institutional practices come to exclude learners from disadvantaged backgrounds is seen in the system of adjudication of projects. In addition to the construction of the models, participants are expected to produce a poster, which forms the basis of an interview with the judges, during which learners are asked questions. Needless to say, both the poster and the interview have to be in English, which is the only working language of the ESKOM Expo (I am referring specifically to the KwaZulu-Natal and national Expos). Until today, the Expo organisers do not seem to have given any consideration to the fact that an English-only policy by definition advantages first language speakers over second (and, indeed, foreign) language speakers. As will be seen below, this omission has crucial implications.

The guidelines for poster presentation are based on the premise of conducting a scientific experiment. No clear guidelines are provided on the presentation of the technological models; participants either have to rely on previous experience, or, more likely, on the “cultural capital” (Bourdieu, 1991) that comes from some kind of privileged access to the world of science and technology: for example, a parent who is an engineer.

Within the context of such ill-defined parameters, the Hammarsdale learners have generally been able to merge their interpretation of the technological process involved in the construction of their models into their presentations. On the whole, this interpretation is the result of what can only be described as a “hands-on” / “minds-on” approach, which - seen from the perspective of the outside observer - fuses together a tacit knowledge of technological process with a series of practical “trouble-shooting” skills.

Some of the assessment criteria come to the fore in the comments of the judges:

*“Neat poster presentation”, “Confident presentation”, “Nicely constructed model with a well intentioned design”, “Present your project in a more scientific way and quote science laws applied”, “[The project] shows that you can think outside the box”.*

Frequently, however, such positive comments are followed by secondary comments purporting to the need to improve on “*presentation*”. Alas, there seems to be every likelihood that “presentation” in these cases is little more than a euphemism for “proficiency in English”. Not only “proficiency in English”, but, indeed, a whole range of cultural “niceties” appropriate to a particular class (Bourdieu, 1991). Particular ways of knowing, doing and behaving (“*thinking outside the box!*”) have enabled the Hammarsdale learners not only to make their models and to participate in the ESKOM Expos, but - through the recognition they receive in their communities as well as in the press - to become role models. Yet, these ways of knowing, doing and behaving count for little in the culture of the ESKOM Expo for Young Scientists.

## Conclusion

This article has attempted to adhere to Madison’s (2005) advice to consciously address my own positionality in the narration of the experiences of the learners involved in the research. I hope that through the use of my voice to explicate the hegemonic practices of the ESKOM Expo, I have been able to engage in “reflexive ethnography” (Davis 1999 in Madison, 2005, 7). This “turning back” on ourselves relates to the way in which I had to locate and position my “own research”, my own forever-changing “position of authority”, and my “own moral responsibility relative to representation and interpretation” (Madison, 2005, 7). It is hoped that this sharing of experiences of how the disadvantaged learners from Hammarsdale insert themselves into the organisational structures of the ESKOM Expo for Young Scientists and the challenges they encounter, will help to generate knowledge that can be provided to Expos to help them understand and, perhaps, to transform any taken-for-granted assumptions regarding the categories of participation, evaluation and award. Furthermore, as in the work of Barton (2001, 899), it is hoped that this transformation would help in “generating new ways of understanding, valuing, and genuinely incorporating into” the ESKOM Expo for Young Scientists practices the indigenous knowledge, “culture, language, beliefs, and experiences” that these learners from Hammarsdale bring to the ESKOM Expo.

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