

2015

## Lighting up learning: mathematics becoming less of a 'killer subject' in KwaZulu-Natal, South Africa

Marguerite Maher

University of Notre Dame Australia, [marguerite.maher@nd.edu.au](mailto:marguerite.maher@nd.edu.au)

Follow this and additional works at: [https://researchonline.nd.edu.au/edu\\_article](https://researchonline.nd.edu.au/edu_article)



Part of the Education Commons

This article was originally published as:

Maher, M. (2015). Lighting up learning: mathematics becoming less of a 'killer subject' in KwaZulu-Natal, South Africa. *International Journal for Mathematics Teaching and Learning, Online*.

Original article available here:

<http://www.cimt.plymouth.ac.uk/journal/maher.pdf>

This article is posted on ResearchOnline@ND at [https://researchonline.nd.edu.au/edu\\_article/172](https://researchonline.nd.edu.au/edu_article/172). For more information, please contact [researchonline@nd.edu.au](mailto:researchonline@nd.edu.au).



**This article was originally published:**

Maher, Marguerite. (2015) Lighting up learning: Mathematics becoming less of a 'killer subject' in KwaZulu-Natal, South Africa. *International Journal for Mathematics Teaching and Learning*, Online.

**Available at:** <http://www.cimt.plymouth.ac.uk/journal/maher.pdf>

# Lighting up Learning: Mathematics becoming less of a ‘Killer Subject’ in KwaZulu-Natal, South Africa

Marguerite Maher<sup>1</sup>

*School of Education, University Of Notre Dame Australia*

## Abstract

This paper reports the findings of an evaluative study of an initiative, in its sixth year of implementation, enhancing the learning and teaching of mathematics in 20 disadvantaged secondary schools in KwaZulu-Natal (KZN), South Africa, twenty years after democracy. Findings highlight the importance of initial and ongoing professional development for under-qualified teachers. Support and strategies that have enhanced the achievement in mathematics of learners in these still under-resourced schools, are described.

**Keywords:** *secondary mathematics, mathematics literacy, higher level mathematics curriculum, disadvantage, teacher professional development, peer tutors*

## Introduction

This paper first describes the context, including the transition to democracy, of the current study, the socio-historical moment in which it took place in KwaZulu-Natal, South Africa. It shines a light on the continuing disparity in educational provision still evident in 2014, a legacy of apartheid. Thereafter, changes to curriculum are considered with particular focus on the mathematics curriculum noting drivers for these changes and implications for learners.

The paper then provides a description of a mathematics initiative undertaken in a partnership between one advantaged school in Pietermaritzburg, KwaZulu, and 20 disadvantaged schools in the rural areas and those schools servicing learners who live in informal settlements surrounding the city. The research aims, the research design and methodology are provided, followed by a discussion of the findings.

## Context of the current study

*From past: education under colonialism and apartheid...*

For 342 years under colonialism and apartheid, before the advent of democracy in South Africa, the majority of the South African population experienced exclusion in political, economic and educational arenas. In the years following the election of the Nationalist Government in 1948, the divisions between the various population groups became set in the concrete of government legislation (Behr, 1988). During the apartheid era people were classified as either Black, Coloured (mixed race), Indian, or White. The use of these words does not denote any desire to perpetuate such divisions, but they are useful in the consideration of historical events, the legacy of apartheid, and progress towards a democratic, equitable, non-racial society.

Inequities in education abounded. The pre-democratic regime effected the systematic privileging of White learners in most educational areas. They were afforded more opportunities; physical resources were superior, as was the quality of curriculum content and teaching.

Funding for schools was racially based: in 1994, just before the first truly democratic elections, government per capita funding for Black college and school children was about R1600 (in South African rands) per year. In contrast, White learners received funding of R4772 per year. The consequence of this was that a far lower percentage of Black learners enjoyed academic success. Out of every 1000 Black learners who started Grade 1 in 1982, four hundred completed Grade 10, with

---

<sup>1</sup> Marguerite Maher is Professor and Dean of Education at the University Of Notre Dame Australia. Her research interests include cross-cultural education, inclusive education, and mathematics education.  
[marguerite.maher@nd.edu.au](mailto:marguerite.maher@nd.edu.au)

Grade 12 being the year learners sat the matriculation exit examination. By comparison, of 1000 White learners who started Grade 1 in 1982, all except 80 made it to Grade 10. (South African Institute of Race Relations, 1996). It should be remembered that not all Black learners started school if they were living in rural or remote schools.

In Black schools at the time of the advent of democracy, teacher beliefs linked to Fundamental Pedagogies (FP) which had been the dominant theoretical discourse in South African education. It had been pervasive in teacher education thus dominating the education of most Black teachers (Penny, 1988). FP, overcrowded classrooms, and insufficient resources coupled with the dominant oral tradition of African culture meant that in practice extensive use was made by teachers of chanting, referred to by them as the choral method. This is the practice where the teacher provides the information to be learnt in short sentences or phrases which are repeated by the whole class, chanting the words until they can be repeated verbatim. Berry (2006) points out that inquiry learning is unlikely “to occur in classrooms where recitations are the norm and where the teacher and classroom texts are considered to hold the key to knowledge” (p. 500). The choral method tended to lead to one type of learning only seated in a transmission theory of education.

In South Africa, under apartheid, to effect the implementation of its differentiated philosophy, there was a convoluted arrangement of 19 different departments of education which ran parallel to one another, divided on racial grounds and inequitably funded (Behr, 1988; Donald, 1993). The result was many drop-outs, push-outs, unschooled, illiterate, and unskilled youth (Csapo, 1996). While White education was free and of superior quality, Black education was worse than in many developing countries, and was not free. “Buildings were derelict, 30% had no electricity, 25% no water, 50% no sanitation and one third of the teachers were unqualified” (Sparks, 2003, p. 220). After the release of Mandela in 1990, when the initial faltering steps were being taken towards the first democratic elections in 1994, Hartshorne (1992) described the typical picture of neglect in many rural and township settings:

All over the country there are dilapidated buildings, crowded classrooms, rudimentary school furniture, broken windows, leaking roofs, a lack of adequate sanitation facilities, blackboards and cupboards—all of which contribute to both teachers and pupils feeling that what they are doing is not regarded as important. (p. 54)

With the advent of democracy the hope was that such descriptions would come to be of historical interest only, but in 2014 many rural, previously Black, schools were still in this state of disrepair. In 1994, student : teacher ratios in rural areas at times exceeded 100 : 1 often because of the shortage of classrooms. This has not changed in all instances. In many of the schools involved in the Khanyisa programme in 2014, the focus of the current study, the year Grade 8, 9 and 10 classes often had around 80 learners.

#### *To present: post-apartheid education*

The first free and fair elections in South Africa took place in 1994 with the ANC becoming the ruling party. Major reconstructing followed: schools were racially integrated by law, although many Black schools remained Black. The 19 different departments of Education were restructured to have nine provincial departments of education and one national department. The national education department saw its primary role as that of attempting to promote equity with the reprioritisation of resource allocation across and between provinces. Despite initial efforts, in 1997 it was reported that “more than half a million children in KZN of school-going age are not attending school” (Jessop, 1997, p. 5).

The reconstruction of education immediately provoked different anomalies, contradictions, and tensions. For example, the new Minister of Education, Sibusiso Benghu, in an attempt to overcome the problem of unskilled teachers in Black schools, implemented a scheme whereby skilled teachers were forced to transfer to schools in poorer regions or face retrenchment. Many preferred to take the retrenchment package and start another career. The result was that the chronic shortage of skilled teachers worsened (Sparks, 2003).

Many teachers found the paradigm shift to the post-apartheid Grade 1-9 curriculum very challenging (Nakabugo & Sieborger, 2001) as there was insufficient training to see it satisfactorily implemented. Despite pressure from an increasingly disenchanted population, the ANC was unable to provide free education for all as they had promised pre-election. Instead, in 1996, they promised a ten-year phase-in of free and compulsory education, with those learners starting school that year as the first to be exempt from fees (Pape, 1998).

Inequities in teacher quality persisted, with teachers in previously White schools having superior training and qualifications while many teachers at previously Black schools are still under-qualified. With specific reference to mathematics teachers, Parker noted in 2010 that one fifth of Grade 10-12 mathematics teachers are professionally unqualified and of the 80% that are qualified, only 21% have studied at university level. Quality, well-qualified, competent teachers play a pivotal role in enhancing outcomes for learners in their classes (Parker, 2010).

There were other challenges as well. The World Bank's *World Development Report 2006* highlights not only disparities related to race but to gender as well. The report contrasts, statistically, the outlook of two children born on the same day in the Cape Province in 2000.

Nthabiseng is black, born to a poor family in a rural area ... Her mother had no formal schooling. Pieter is white, born to a wealthy family in Cape Town. His mother completed college education at the nearby prestigious Stellenbosch University. (World Bank, 2006, p.1)

The report continues: “ ... Pieter can expect to complete 12 years of formal schooling, Nthabiseng less than 1 year” (World Bank, 2006, p.1). Skovsmose (2012) points out that each person's “foreground ... the possibilities, tendencies, propensities, obstructions, barriers, hindrances et cetera, which his or her context provides for a person” (p.1) is not necessarily a determinant of actual experience, as the actual experience will be determined as well by the person's interpretation of these possibilities and challenges. In the current study, this was at the forefront of the minds of those responsible for its conceptualisation and its development in practice. Teachers and learners would need to be empowered to rise above the obstructions, barriers and hindrances described by Skovsmose (2012).

In South Africa, as recently as 2012, statistics show that in relation to mathematics, “when race is intersected with gender, major differences are found” (Vithal, 2012b, p. 5) between Black females and other female candidates in the mathematics matriculation examination. There the pass rate for Black females was only 25% of the pass rate of their White counterparts (Vithal, 2012b). Gender was found to be a relevant and pervasive theme in the data gathered in the current study.

Another factor pertinent to the current study relates to violence. Ten years after democracy a study on the prevalence and impact of violence (Zulu, Urbani, van der Merwe, & van der Walt, 2004), utilised a random sample of 288 learners, drawn from a possible 14,400 in 15 high schools in the KwaMashu area of KZN. Some of the findings were that:

- “76% of respondents had witnessed a physical attack on a fellow learner
- 38% had witnessed such attacks on an educator
- 64% of learners bring weapons to school
- 60% of respondents' parents or guardians were unemployed” (Zulu et al., 2004, p. 172).

These authors contend that overcrowding and overage learners contribute to the culture of violence, as do poverty and the lack of parental support for academic endeavours. They maintain that a positive culture of teaching and learning, epitomised by “a spirit of dedication and commitment” to school which is achieved through cohesion in school management and teacher input, positive personal characteristics of learners, supportive factors in the family life of learners, “were, sadly, absent in the case of the 15 schools investigated in this project” (Zulu et al., 2004, p. 174). They conclude, therefore, that violence with its various causes, is a key impediment to a culture of learning and

teaching, leading to teachers losing control and feeling fearful. By 2012 there was a more optimistic view that South Africa could consider itself “a post-conflict society still healing from its apartheid wounds” (Vithal, 2012a, p. 1), however participants in the current study, undertaken in 2014, still mention violence and fear as important factors.

### *Curriculum changes*

A priority for the newly elected government in 1994, and it remains so today, was to maintain high standards in the previously advantaged schools and to bring the previously-disadvantaged up to that level. Every effort was made not to allow all education to level out at the lower levels experienced in previously disadvantaged Black schools.

Enormous changes were effected. The ideal with the implementation of Outcomes Based Education (OBE) in the form of *Curriculum 2005* (Department of Education, 1997) was that by 2005 there would be a curriculum in place that would emancipate the majority of learners who had not been well-served in the past. It was posited that by introducing OBE “doors of opportunity may be opened for people whose academic or career paths have (previously) been blocked” (Van Wyk & Mothata, 1998, p. 4). Soon after the implementation of OBE in 1997, however, problems became evident. Jansen (1998) noted that there were some perplexing contradictions in the documentation and “[t]he language of OBE and its associated structures [were] simply too complex and inaccessible for most teachers to give these policies meaning through their classroom practice” (Jansen, 1998, p. 323). Varying interpretations were prevalent for such crucial assessment terms as formative assessment, summative assessment, and continuous assessment in the Department of Education (1998) policy on assessment, causing further confusion for teachers.

In summary, OBE was not able to be successfully implemented (Chrisholm & Wildeman, 2013) and it was officially abandoned in 2010, replaced with the Curriculum Assessment Policy Statements (CAPS).

CAPS is not a new curriculum, but an amendment to the National Curriculum Statement (NCS) Grades R-12, so that the curriculum is more accessible to teachers. Every subject in each grade will have a single, comprehensive and concise Curriculum and Assessment Policy Statement (CAPS) that will provide details on what content teachers ought to teach and assess on a grade-by-grade and subject-by-subject basis (College of Education, 2012, e-newsletter).

It led further, to teachers feeling insecure and in overload because of the many curriculum changes (Fullan, 2003).

### *Mathematics curriculum within a democratising society*

Given that South Africa is a new democracy and not yet a consolidated democracy, with ongoing inequities as discussed above, it is imperative to acknowledge the extremely important role that mathematics education plays as related to “political, power and identity issues” (Aguilar & Zavaleta, 2012). There are two meanings at least associated with the term *mathematics education*: firstly, it comprises a field of research and, secondly, it refers to the practice of teaching leading to learning of mathematics (De Mattos & Batarce, 2010). It is contended that no longer should research focus solely on mathematical content and learner to teacher relationships as the field of research, which has dominated in the past (Paris & Valero, 2012); the wider implications of the role of mathematics education in empowerment and promotion of a liberal democracy are important too (Gutiérrez, 2010). Mathematics education can be a key means of fighting poverty (Lubisi, 2008), however, as noted by Vithal (2012a) achievement in mathematics is often the gateway

to jobs and further or higher education studies in a range of areas, from the natural and physical sciences to economics and technology ... but also functions as a gatekeeper for the many who fail to learn and perform at the requisite levels or are failed by the education system. (p.3)

As South Africa has moved from the exploitation of Blacks under apartheid towards being a liberal democracy where the rights of minority groups are protected, it is important that the new inclusive capitalist economy does not, through poor mathematics education, come to exclude those previously exploited (Bauman, 2004). This was a consistent theme among all participants in the current study who saw it as a motivation for the initiative and related to the outcomes for learner participants.

### *Mathematics curriculum in South Africa*

There are two main drivers influencing the mathematics curriculum in South Africa. The first relates to the previously discussed “post-apartheid challenge for greater equity and social justice, ... and to entrench and deepen democratic life” (Vithal, 2012b, p. 4). The second relates to the imperative for South Africa to be able to function effectively in a globalised economy (Vithal, 2012b). One significant change over and above the move from OBE to CAPS, was a change to the mathematics curriculum which saw the introduction in 2008 of *mathematics literacy* to meet the needs of learners entering secondary school with low levels of numeracy. Higher level mathematics, as opposed to mathematics literacy, leads to science, engineering and technology studies at tertiary level. The aims of the mathematics literacy curriculum are to promote the ability of learners to think quantitatively, to think spatially, and to use these skills in real life situations such as dealing with information in tables, graphs, diagrams and in text (Department of Education, 2003).

With the implementation of CAPS in 2010, the divide between mathematics and mathematics literacy became more entrenched, with the higher level mathematics curriculum including elements not previously found in the OBE curriculum such as Euclidian geometry and probability. Many of the under- or unqualified teachers in under-resourced schools had never studied these aspects during their own schooling nor during their teacher training. Following international trends, as depicted by Fowler and Poetter (2004), what occurred in South Africa was a mass migration of learners from mathematics to mathematics literacy. Of half a million learners sitting the matriculation each year, in 2008 there were 300,000 enrolled in the higher level mathematics; by 2011 this had decreased by 25 per cent (Department of Basic Education, 2011).

### **The Khanyisa initiative – lighting up learning**

With the background sketched, the paper now moves to a description of the Khanyisa (lighting up learning) initiative.

Khanyisa started in 2009 when a White teacher at a well-resourced previously White, but now racially integrated, school, referred to henceforth as School X, who was also a leader in mathematics education in South Africa, secured funding to support the initial conceptualisation of the project. A motivator for her was the scale of continuing need in under-resourced schools in the area where she had been teaching for many years, waiting year on year for hoped-for improvements as envisaged with the demise of apartheid. This Khanyisa Project Co-ordinator knew the Superintendent-General of Education in KZN, who at one stage had been in her Mathematics Methods class at the University. He was very keen that she and her school should help teachers in the wider KZN context. They decided the most effective way for a single person to make an impact was to work with teachers for a protracted time providing in-service professional development over two years. The Superintendent-General oversaw the invitation of 20 mathematics teachers to join the initiative from 20 rural, under-resourced, previously Black schools that still have 100 per cent Black enrolment. These teachers are referred to henceforth as the Khanyisa teachers. School X worked on a nine-day timetable so the 20 Khanyisa teachers came once every nine days from their rural schools and spent the day undertaking professional development with the Project Coordinator at School X. In the intervening eight days, Khanyisa teachers went back to their home schools and implemented the pedagogy and content that had been the focus of the professional development day. On return to School X, nine days later, they could collaboratively discuss challenges they had experienced and devise strategies to overcome them before moving to the next content area.

By the end of the first year, Khanyisa teachers were showing enormous commitment to the programme but noted that the greatest challenge they had was the extremes in capacity amongst the

learners in their classes, which at times numbered over 80. They felt they were not providing sufficient support for learners with the greatest potential, their main focus being on increasing the pass rate of weaker learners. Khanyisa teachers pleaded for these stronger learners in their schools to be given the opportunity to come to School X on Saturday mornings for additional tuition with the Project Coordinator. She therefore secured further funding to pay for eight to ten learners from each Khanyisa school to travel to School X on Saturdays twice a term in 2010. They were all year 12 learners and were provided with taxi money, there being no public transport from the informal settlements where most of them lived. Also, they were provided with food as most of these learners live in poverty and it could not be assumed that they would have eaten. Those learners recorded improvements in their mathematics grades but the Project Coordinator realised that learners would show greater gains if they were to undertake the additional Saturday tuition over two years.

Having piloted this model in 2009 and 2010, there have been two further intakes of Khanyisa learners on Saturdays at School X; the intake each time since the first iteration has been Year 11 learners who have then attended Saturday tuition for two years – their Year 11 and Year 12 years. Two full cycles of the two-year model have been completed running in 2011 and 2012, and again in 2013 and 2014.

The project team deemed it timely to have external evaluation of the Khanyisa programme. The methodology and the findings are summarised in this paper.

## **Methodology**

The Project Coordinator commissioned an evaluation of the Khanyisa Programme in the second half of 2014, when the current enrolment of learners were just about to write their matriculation examination. The aims of the current study were two-fold. The first aim was to ascertain what aspects of the Khanyisa Programme were considered to be working well and should definitely not be changed. The second was to ascertain to what extent participants thought that improvements could be made and what these might look like.

The present research was a qualitative study in the paradigm of interpretivism “which takes the position that social and cultural phenomena emerge from the ways in which the actors in a setting construct meaning” (Schensul, 2012, p.75-76). Such research can uncover the implicit meaning, from one or more perspectives, in a particular circumstance. In the current study the “purpose [was] to understand the world or experience of another” (Ary, Jacobs, Sorensen, & Walker, 2014).

This was an evaluative study and evaluation embeds the notion of judgement, whether one is referring to the subjective assessments people make informally during the course of their everyday lives, or whether one is referring to formal evaluation, such as specific inquiry. Cohen, Manion and Morrison (2011) note key features of evaluation: “answering specific, given questions; gathering information; making judgements and taking decisions” (p.50). These authors note that educational evaluation is important in that it provides validation for improvements in educational policies and practices. In the current research, validation of practice and participants’ experience provided a platform for decision-making in the schools where the research took place and in the wider context as well.

### *Participants*

Overall there were 25 participants drawn from all stakeholder groups. These comprised Khanyisa learners ( $n = 18$ ) noted as KL1 to KL18 in transcripts, Khanyisa teachers ( $n = 2$ ) KT1 and KT2, peer tutors ( $n = 2$ ) PT1 and PT2, School X facilitator ( $n = 1$ ) KF1, Project Co-ordinator and facilitator ( $n = 1$ ) PC, and a past peer tutor ( $n = 1$ ) PPT.

### *Methods*

Data were gathered utilising four methods: group interviews, individual interviews, observation, and monitoring of the support offered via Facebook. Of the 25 participants, 18 Khanyisa learners and two peer tutors took part in group interviews. The five adults took part in individual interviews. Additionally, the researcher observed Khanyisa teaching sessions to get a sense of pedagogy and the role played by the peer tutors. The social media Khanyisa Facebook page was also monitored



## *Data analysis*

Twelve group and individual interviews were transcribed. A thematic analysis was then undertaken for each question from the interviews. The unit of text analysis was the sentence. Each sentence was written in full. Alongside it the analyst wrote their interpretation of what the text said followed by a categorisation of what the text was about. The final part of the analysis was the generation of a theme that captured the essence of the text. Five themes that emerged are reported next in the findings and discussion section of this paper.

## **Findings and discussion**

Findings are discussed in five themes that emerged from the data. These are a) empowerment through mathematics; b) ongoing inequities in under-resourced schools; c) gender issues and ongoing violence in KZN in 2014; d) outcomes of the Khanyisa initiative; and e) key elements leading to the successes in the Khanyisa initiative. Fairly extensive use is made of direct quotes, which are representative comments typical of those made by participants. This is deliberate as it fits with the underpinning principles of the current study which was to give voice to participants and to gain an understanding from their perspective of the Khanyisa programme. Additionally, it provides the reader with good insight into the level of English the Khanyisa learners have developed. For many of them English is their second, third or fourth language.

### *a) Empowerment through mathematics*

Having learners attend for the expanded timeframe of two years has seen their mathematics grades increase in some cases from around 30 per cent to over 80 per cent.

To get accurate statistical data on individual Khanyisa learners to compare pre- and post-intervention grades would, as explained by the Project Coordinator, “need expertise not currently available in the Education department. We have found that in their region, students get distinction in history and life orientation, but now these learners are starting to get distinctions in mathematics” (PC Transcript 10). It was interesting to get participants’ views on mathematics.

KL3: That first day. Eish! It was like I was feeling very honoured that I was coming to Khanyisa for free to attend the killer subject mathematics ... and to attend for free. (Transcript 1)

This reference to the *killer subject* was made several times by all participant groups, just the terminology differed somewhat. For the learners, the term *killer subject* captures well the difficulty they experience with mathematics as reflected in poor results, but also, poignantly, the end consequence if they do not do well in mathematics – a future killed off. The peer tutors referred to mathematics as the *problem subject* while facilitator and the Khanyisa teachers referred to it as the *gateway subject* as mathematics is indeed the gateway to further higher education study for all learners in South Africa as highlighted by Vithal (2012a, 2012b). It is in mathematics that many KZN high schools struggle to find qualified, dedicated, and expert teachers according to Parker (2010). This continues as shown in the current study.

Of the 150 Khanyisa learners in this third iteration of the Khanyisa programme, all were confident of achieving a good grade for mathematics, many expecting to achieve in the distinction range (80%+). Learners articulated how grateful they were that they had wider career options since their mathematics grades had improved. KL5, for example, had applied to study medicine or physiotherapy at the University of KwaZulu-Natal in 2015 and had just heard that she had won a scholarship to support her studies. She lives in an informal settlement on the outskirts of Pietermaritzburg where there is no power (electricity) or organised sanitation.

### *b) Ongoing inequities in under-resourced schools*

In under-resourced schools it was still common to have classes of 100 learners in one class as noted by Sparks (2003). It should be recognised that this is not following the move in some countries to utilise variable spaces to enhance pedagogy. In those instances four or so classes are placed together

at times but the space comprises the space of four classrooms and there are four teachers, planning together and team teaching in these large venues with break-out spaces. In KZN at the time of current study, a classroom built to accommodate 40 students would likely have 80 crammed in, so that it was impossible for the teacher to move about the room and work individually with learners, or ever to get to the back of the classroom to see what learners were doing. Resources taken for granted in advantaged schools were not available in the under-resourced schools as explained by KT2:

KT2: We still have the big classes. We have sometimes more than 80 kids. We do not have the whiteboard and the overhead projector. We do not have even the photocopying machine that works so that we cannot provide even the handouts for the learners. If the machine gets fixed, then we have no more ink. It is frustrating. So, then we are chained to the text book. Like now. Now we want to go through the old exam papers, the old trials papers. To do this we have to write it up on the chalkboard. This is such a waste of time. It is not possible even to do the graphs. It would take all lesson to get the graphs drawn up on the chalkboard. Teachers are tired at the end of the week.

This teacher went on to reinforce the findings of Fullan (2003) as she described the overload that teachers experienced when there are education changes brought into effect and if there is no buy-in from those at the grassroots level, it is fraught. She talked about the huge administrative load that OBE had required of teachers and that this was now gone, replaced with CAPS and who knows what next year.

Additionally, the disparity in qualifications was still prevalent as underscored in an interchange between the researcher and KT1:

R: How did you get involved in Khanyisa?

KT1: I was part of the first Khanyisa group of 20 teachers. I was selected. I don't know how we were selected. I was attending in 2009. I was appointed as a maths teacher at school.

R: When you were first appointed, had you been teaching maths before?

KT1: Eish! No. I had done, a little bit, the maths at training college, but my maths knowledge, aibo! (disparaging exclamation) it was not good.

R: How were you feeling about coming to the Khanyisa sessions?

KT1: Scared. But I was empty. Because with maths, I am telling you, I was scared even to go to the class because I could not understand some of the chapters. Ja. So then I was involved here. We came every nine days. So we were going according to the syllabus. If we say we are going to each THIS, then (Project Coordinator) is teaching us THIS so we can teach the children.

### *c) Gender and ongoing violence*

In the following exchange it should be noted that KL5 is a girl. In a group interview, discussion relating to the KZN context was enlightening:

KL5: In this project, so I was a little bit nervous. I had my expectations and I was wondered if it would help me and if I would be able to hear the teachers clearly, because at my school my teacher Mr .... I sometimes find it hard to hear what he is saying and I struggle to understand when I don't hear everything.

R: Why don't you hear everything?

KL5: There are some learners who do not want to do well and they just want to talk, and Mr ... he asks them to keep quiet but they do not listen.

R: And are you the only one who is bothered by the talking?

KL5: No, there are quite a few who, uh... wish they would keep quiet. We want to do well.

R: And can *you* tell the learners who are talking to keep quiet?

- KL5: No, it is the boys. I am frightened. Those boys, they are powerful. In my culture the females, we do not tell men what to do.
- R: What might those boys do?
- KL5: They can hit us, they can kill us.
- R: And can you hear the teachers when you come to Khanyisa?
- All: Yes (general laughter)/ here we all want to work and do well/ it is good. (Transcript 2)

This exchange reinforces the lack of control that teachers can experience if learners have little respect for them. Ten years later, this description echoes the findings of the Zulu et al. (2004) findings regarding violence, discussed earlier. Furthermore, this conversation highlights again the cultural differences and poignantly shines a light for those outside their reality on the fear that Zulu girls and women live with on a daily basis, their progress affected by growing up and living in a situation where violence is a reality and which is male dominated. These girls, the female Khanyisa learners, had avoided becoming a statistic as noted in the World Bank (2006) report. Their journey had not paralleled that of Nthabiseng (World Bank, 2006, p.1). Girls acknowledged that it was largely Khanyisa that had really broadened their horizons to the point where they were thinking beyond hoping to become a domestic worker, to being able to consider university study.

*d) Outcomes from the Khanyisa initiative*

There are number of significant successes of the Khanyisa initiative identified in the current study. These include: the improvement in learners' mathematics grades'; increased self-efficacy leading to improvements in other subjects as learners began to believe in their capacity and powered through when the going was tough in other subjects; improved English which assisted with their other subjects; and the ripple effect of Khanyisa learners and teachers assisting learners beyond those attending the revision sessions at School X. Some of these are captured in the following exchanges:

- KL18: At first I was scared because at my school we are taught by the Black teacher and at Khanyisa we are taught by the White teacher and I was afraid to be taught by the English White teacher. They would only speak English and my teachers at my school, they talk a lot in isiZulu.
- R: And how did you find it with all the teaching in English with a White teacher?
- KL18: I am now better at mathematics and I can even help the other learners at my school. And it is good that it is all in English, because my English was bad and that was in the way of my learning with the text books in English. And now, eish, now my English is much better also. Not just my mathematics (laughter, general agreement). (Transcript 6)

In another interview with learners the scale of assistance they offered to peers became apparent:

- KL7: I am enjoying maths, now I am getting 90%; before I was getting 30 and now 90.
- KL9: I was getting 40, 50 per cent, but now it is much better, it is much better to share. I am the highest in my class, in distinction (80%+), so I also am helping my friends at school.
- R: So you are teaching the other learners in your school what you have learned here at Khanyisa?
- KL9: Ja, so I will get a distinction, but I am helping the others also to do better.
- R: What has been the most beneficial aspect for you in regards to Khanyisa?

KL9: So, it is that I can learn, but teach too. Because I am teaching the other learners at my school, um, they can understand sometimes, but then some do not understand. So, then I must start again and think to find another way to say it. And I think it is the teaching that has made me to understand even better and I am so happy that I will do well, but it makes me more happy even that I can help some other people who did not come to Khanyisa. (Transcript 3)

The Khanyisa teachers are also providing assistance beyond to learners in their own classes, often on Saturdays which impacts on their ability to attend the ongoing Khanyisa sessions on Saturdays:

R: What has been most significant benefit to you?

KT1: Khanyisa has developed me ever more. Sometimes if they are clever, the kids go ahead in the textbook and I used to think, what will I do? They will ask me something that I do not know the answer. Now, ja, now I am relaxed because there is every part of the syllabus that I know. And this year I have two A learners, they will get an A (distinction of 80+%) I think. They got very good marks now with the trials (preliminary trial examination). And I can tell you it is not because of me. It is because of Khanyisa.

R: But it is because of you as well?

KT1: Yes, but it is because of Khanyisa, now I am very clear in maths. It was like I never learnt the maths. I could not make the change to OBE now to the CAPS. I did not know the new parts of the syllabus because I never learnt it. But now I know every bit of it. And I help other learners from other schools. I have a group of matric learners who come from ..... schools (other schools in the area) and I help them, because I am just proud now to be a maths teacher. I am very proud. (Transcript 7)

*e) Contributors to successes in the Khanyisa initiative*

The Khanyisa programme has led to the improvement in Khanyisa learners' mathematics results thereby broadening their scope for further study and employment. Three factors contributed to this improvement: firstly, the learners are provided with a number of teaching sessions over two years by some of the most successful School X teachers; secondly, they are offered one-on-one peer support from top academic Grade 11 and 12 learners from School X; and thirdly, teachers from the under-resourced schools also attend as professional development the teaching sessions on the same Saturdays so that when teachers and learners return to their home school from Monday to Friday, they are all covering the same content in the same way. These elements all played a role, although the teaching sessions were noted by all participant groups as the most significant factor.

The success of the Khanyisa programme, which is also its vulnerability, is in large part due to the unprecedented commitment of experienced teachers at School X who have the dedication to make a contribution beyond the boys in their school and to commit to the disadvantaged in KZN as well.

The unlooked-for advance has been the pupil-driven peer tutor scheme. Because of competing demands on their time, there were insufficient Khanyisa teachers attending the Saturday sessions to provide the one-on-one assistance that 150 or so learners needed. Originally, in the design of the programme, to augment the teaching provided by the Project Coordinator, Khanyisa teachers were to provide one-on-one assistance to learners but this did not eventuate. To meet this need, School X boys committed to fulfil this role as peer tutors. It appears that the benefit for these peer tutors is that they feel that they are making a small difference as expressed in this exchange:

R: What is your role in the Khanyisa programme?

PT2: I am the head peer tutor at Khanyisa. What I basically do is I have to make sure that we have a group of peer tutors who largely consist of Grade 12s at the moment because we take in a two-year group for Khanyisa and this year, the group that came in last year when they were doing Grade 11, is doing matric. So we need people who

can help them in matric work. So I facilitate that whole part there. We also help out on Facebook because we have a Facebook group. We can also help out people on that page there because um people come for the Saturday sessions and sometimes they might be doing revision when we are not there to help them with that. So we can help them through that Facebook group if they post their problem. So that is basically my role, as well as being a peer tutor on Saturdays.

R: That is a huge commitment on your part.

PT2: It is a huge commitment, but for me, it is something that I am really passionate about.

## **Conclusion**

The reasons for inequities in learning outcomes between learners from well-resourced and under-resourced schools in South Africa is well documented (Fowler & Poetter, 2004; Parker, 2010; Vithal, 2012a, 2012b; Zulu et al., 2004). The Khanyisa project is one example of the enormous commitment on the part of many in South Africa to play a positive role in addressing these inequities. The evaluative study discussed in this paper, found two vulnerabilities to the programme. These are:

- i. The funders have not made a long-term commitment to the programme. Strong relationships have been built between School X and the 20 Khanyisa schools. Participants and organisers of the Khanyisa Programme wait year on year for confirmation of funding and would feel more secure if the funders were to make a long-term commitment to the Khanyisa Programme to provide assurance of its continuation, development and expansion.
- ii. The organisers, facilitators and “behind the scenes” crew all fulfil their roles over and above a comprehensive teaching role at School X. It is therefore reliant on their goodwill and ongoing commitment.

This study found positives far outweighed the negatives of the Khanyisa Programme. Khanyisa teachers, the peer tutors and the Khanyisa learners all noted the benefits to them. Key elements leading to the success of the programme are as follows:

- i. The funders of the Khanyisa Programme have a clear vision and they place trust in the Khanyisa team. This has allowed the design of the programme to develop and respond to the drivers that have become apparent along the way, without burdensome bureaucracy getting in the way.
- ii. School X has supported the programme by providing the venue for the teaching sessions on Saturdays and for bearing concomitant expenses such as electricity.
- iii. The Project Coordinator is tireless as she heads up such a successful programme through a clear vision, inspirational leadership and being an example to all in her own commitment to the regular teaching sessions.
- iv. The Khanyisa facilitators are selfless in giving of their time to undertake the planning, organisation of resources and teaching of the Saturday sessions in addition to their comprehensive teaching loads as School X teachers.
- v. The Khanyisa team have such relationships with the students in School X such that they inspire young people to commit to the peer-tutor scheme that has been set up and run on the initiative of the School X boys.
- vi. The School X boys give selflessly of their time on Saturdays to fulfil the role of peer-tutor and be part of the programme, making a vital contribution to the success of the programme
- vii. The head peer-tutor, who ensures that there are sufficient tutors each Saturday, displays admirable leadership and dedication.

- viii. The “behind the scenes” team, made up of School X staff and boys, organise the food packs which all Khanyisa learners mentioned with gratitude.

Recommendations are as follows:

- i. The KwaZulu-Natal Education department should work in collaboration with initiatives such as the Khanyisa Programme and use it as a model for enhancing the mathematics outcomes of a greater number of learners in under-resourced schools.
- ii. Funders of Khanyisa should, if possible, make a longer term commitment to the programme such that it becomes sustainable and potentially expanded.
- iii. Further research should be undertaken to strengthen the findings of this initial evaluative study and elaborate on them. Examples of foci for further research could be aspects such as:
  - investigating the reasons why Khanyisa teachers are unable to attend Saturday sessions and perhaps consider ways of overcoming those obstacles;
  - investigating the perspective of the peer tutors on how they see tutoring as supporting their own learning, what gains they have made, and what positives they have experienced through their involvement in the Khanyisa programme; and
  - whether mobile technologies could be more explicitly utilised to further support Khanyisa learners.

It is fitting to conclude this paper with a quote from the Khanyisa Facebook page. It captures the huge impact the programme has had on past Khanyisa learners. It demonstrates the camaraderie that exists between past and current Khanyisa learners, and it shows the ripple effect that will potentially emanate as Khanyisa learners complete their university study, become leaders in their field and in turn support the next generation of Khanyisa learners.

Facebook posting:

Although I was enjoying getting those R30s and lunch sets in 2012 but I didn't forget about my books to make sure I get to varsity and study for the career of my dream. I have realised how important the khanyisa programme is, since it helped me to be where I am today as I am getting closer and closer to obtaining my BCom degree from UKZN. I would like encourage those sponsors to continue enriching lives of the disadvantaged matriculants, and it's a good investment to our own economy and it's making a huge difference in people's lives. I really do not know how I can thank khanyisa for the difference it made in my life but in the possible future I never doubt that I'll be amongst those experts who will be sponsoring that programme to continue making a difference. Most importantly I'd like to wish all the best to matric class of 2014 for their final examinations, and you guys are very fortunate to have that opportunity so make something out of it and be successful

Regards: [name provided]

## References

- Aguilar, M.S., & Zavaleta, J.G.M. (2012). On the links between mathematics education and democracy: A literature review. *Pythagoras*, 33(2), 1-15. doi: 10.4102/pythagoras.v33i2.164
- Ary, D., Jacobs, L. C., Sorensen, C., & Walker, D. A. (2014). *Introduction to research in education* (9th ed.). Wadsworth, CA: Congage Learning.
- Bauman, Z. (2004). *Identity: Conversations with Benedetto Vecchi*. Cambridge: Polity Press.
- Behr, A. L. (1988). *Education in South Africa. Origins, issues and trends: 1652-1988*. Pretoria, South Africa: Academica.

- Berry, R. A. W. (2006). Inclusion, power, and community: Teachers and students interpret the language of community in an inclusion classroom. *American Educational Research Journal*, 43(3), 489-529.
- Chrisholm, L., & Wildeman, R. (2013). The politics of testing in South Africa. *Journal of Curriculum Studies*, 4(1), 89-100.
- Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education* (7th ed.). New York: Routledge.
- College of Education. (2012). *The South African schools curriculum: from NCS to CAPS*. UNISA, South Africa. Retrieved from <http://www.unisa.ac.za/cedu/news/index.php/2012/06/the-south-african-schools-curriculum-from-ncs-to-caps/>
- Csapo, M. (1996). Education for all in South Africa. In P. Engelbrecht, S. M. Kriegler & M. I. Booysen (Eds.), *Perspectives on learning difficulties. International concerns and South African realities*. Pretoria, South Africa: Van Schaik.
- De Mattos, A.C., & Batarce, M.S. (2010). Mathematics education and democracy. *ZDM: The International Journal on Mathematics Education*, 42(3/4), 281-289.
- Department of Basic Education. (2011). *Report on the Senior Certificate Examination 2011. Technical Report*. Pretoria: DBE.
- Department of Education. (2003). *National curriculum statements. Grades 10-12 (General). Mathematics literacy*. Pretoria, South Africa, Department of Education.
- Department of Education. (1998). *Assessment policy in the general education and training bands, grades R to 9 and ABET*. Pretoria, South Africa: Department of Education.
- Department of Education. (1997). *Curriculum 2005*. Pretoria, South Africa: Department of Education.
- Donald, D. (1993). Re-conceptualising the nature and extent of special education need in South Africa. *Perspectives in Education*, 14(2), 139-156.
- Fowler, F. C., & Poetter, T. S. (2004). Framing French Success in Elementary Mathematics: Policy, Curriculum, and Pedagogy. *Curriculum Inquiry* 34(3), 283-314.
- Fullan, M. G. (2003). Implementing change at the building level. In W. Owings & L. Kaplan (Eds.), *Best practices, best thinking, and emerging issues for school leadership* (pp. 31-36). Thousand Oaks, CA: Sage.
- Gutiérrez, R. (2010). The sociopolitical turn in mathematics education. *Journal for Research in Mathematics Education*, 41, 4-32.
- Hartshorne, K. (1992). *Crisis and challenge: Black education 1910-1990*. Cape Town, South Africa: Oxford University Press.
- Jansen, J. D. (1998). Curriculum reform in South Africa: A critical analysis of outcomes-based education. *Cambridge Journal of Education*, 28(3), 321-331.
- Jessop, T. S. (1997). *Towards a grounded theory of teacher development: A study of the narratives of rural primary teachers in KwaZulu-Natal*. Unpublished PhD thesis from the University of Southampton, England.
- Lubisi, C. (2008, April). Mathematics education and the developmental state. Presentation at the symposium *Mathematics education, democracy and development: Challenges for the 21<sup>st</sup> Century* at the University of KwaZulu-Natal, Durban, South Africa.
- Nakabugo, M. G., & Sieborger, R. (2001). Curriculum reform and teaching in South Africa: Making a 'paradigm shift'? *International Journal of Educational Development*, 21(1), 53-60.

- Pape, J. (1998). Changing education for majority rule in Zimbabwe and South Africa. *Comparative Education Review*, 42(3), 253-266.
- Paris, A., & Valero, P. (2012). Researching research: Mathematics education in the political. *Education Studies in Mathematics*, 80(1/2), 9-24.
- Parker, D. (2010). Teachers and teacher quality: A critical issue in school mathematics and science. In D. Grayson (Ed.), *Proceeding of an Academy of Science of South Africa forum: Critical issues in school Mathematics and Science: Pathways to progress* (pp.47-59). Pretoria, South Africa: ASSAf.
- Penny, A. J. (1988). Afrikaner identity and educational policy in South Africa. In C. Tulasiewicz & C. Brock (Eds.), *Christianity and educational provision in international perspective* (pp. 345-374). London: Routledge.
- Schensul, J. J. (2012). Methodology, methods, and tools in qualitative research. In S. D. Lapan, M. T. Quartaroli, & F. J. Riemer (Eds.), *Qualitative research: An introduction to methods and design* (pp. 69-103). Retrieved from <http://www.ebib.com>
- Skovsmose, O. (2012). Students' foregrounds: Hope, despair, uncertainty. *Pythagoras*, 33(2), 1-8. doi: 10.4102/pythagoras.v33i2.162.
- South African Institute of Race Relations. (1996). Annual survey of race relations, 1995-1996. Johannesburg, South Africa: SAIRR.
- Sparks, A. (2003). *Beyond the miracle: Inside the new South Africa*. Jeppestown, South Africa: Jonathan Ball.
- Van Wyk, N., & Mothata, M. (1998). Developments in South African education since 1994. In F. Pretorius (Ed.), *Outcomes-based education in South Africa* (pp. 1-12). Johannesburg, South Africa: Hodder & Stoughton.
- Vithal, R. (2012a). Mathematics education, democracy and development: A view of the landscape. *Pythagoras*, 33(2), 1-3. doi: 10.4102/pythagoras.v33i2.207.
- Vithal, R. (2012b). Mathematics education, democracy and development: Exploring connections. *Pythagoras*, 33(2), 1-14. doi: 10.4102/pythagoras.v33i2.200.
- World Bank. (2006). *World development report 2006. Equity and development*. Washington and New York: A copublication of The World Bank and Oxford University Press.
- Zulu, B. M., Urbani, G., van der Merwe, A., & van der Walt, J. L. (2004). Violence as an impediment to a culture of teaching and learning in some South African schools. *South African Journal of Education*, 24(2), 170-175.