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"Masifunde Nosapho" ("Let us learn with our families")

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***Abstract*:** *Low levels of numeracy are pervasive throughout South Africa. Reports show that numeracy levels in the General Education and Training Band (GET) are around 30%. The intention of this paper is to tels the story of a project, Masifunde Nosapho (Learning with our children), which aims to develop young children's (Grade R and Grade 1) numeracy (and literacy) skills through the use of learning activities developed by caregivers; and to address opportunities to link children's informal mathematical knowledge to the formal requirements of schools.*

The intention of Masifunde Nosapho was to harness the local knowledge of caregivers and teachers through participatory 'open space technology' workshops to share stories, particularly iinstomi (traditional stories), games, songs and rhymes which could be used to support children's learning. Working groups were constituted to develop activities, based on the rich local knowledge, that could extend children's understanding of numeracy.

While many caregivers start developing their children's numeracy from an early age, there appears to be a gap between the rich learning contexts created within the home environment and the more formal requirements of the curriculum within schools. The paper describes how the 'Masifunde Nosapho' project could be used as a possible means of enabling caregivers and teachers, through the use of local knowledge forms, to extend their children's numeracy and to bridge the gap between children's informal understanding and the formal 'abstract' knowledge promoted in schools.

Introduction

The 'Masifunde Nosapho' is a project initiated by ITEC (Institute of Training and Education for Capacity-building), a not for profit organization focusing on 'capacity building' particularly within the field of education. This project has been funded through donor money designated to addressing numeracy and literacy in the Eastern Cape Province. 'Masifunde Nosapho' is currently at the piloting stage and it is hoped that the knowledge gained from this project will permeate to other areas of the province. Our interest in the project is rooted in our concern that mathematics is not a learning area of choice for the majority of students in the Eastern Cape Province, and our commitment to exploring ways in which we can support teachers in the province. Our focus in this project is to examine the prior knowledge that children bring to school by exploring the local activities that they engage in; to investigate opportunities for creating links between children's informal knowledge and the required formal knowledge prevalent in schools by working collaboratively with teachers and caregivers; and finding ways of supporting caregivers and teachers as they develop mathematical concepts with young children. This paper tells the story of our experiences and learnings in the 'Masifunde Nosapho' thus far.

Context

The population in the Eastern Cape is approximately 7 million with 63% of this population living in rural areas where there is little or no employment and where they find themselves dependent on welfare grants and small-scale sub-subsistence farming. This research is based in Mdantsane, an urban area, which is situated in the Eastern Cape Province and is part of the Buffalo City Metropole. In such urban areas, there is also evidence that rates of employment have decreased over the past 5 years as a result of the closure of factories in a number of sectors and that levels of poverty and desperation are increasing here as well. Poverty provides a crucial context for the understanding of the poor levels of education attainment because, by international standards, many children living in the Eastern Cape would be described as 'children-at-risk'. As a result of high levels of poverty and the need for parents to find employment, many children in rural and urban areas in the Eastern Cape live with relatives predominantly grandparents. Older people making up a significant portion of the poorest and the increased burden they carry compromises their ability to adequately care for young children. (HelpAge International,1999)

The impetus for the project was the low literacy and numeracy achievements amongst young learners in grade 3, and the subsequent limitations in living productive and self-sufficient lives. According to the Grade 3 Systemic Evaluation for 2001 Eastern Cape (2002), the "Eastern Cape learners obtained the lowest scores for Literacy and Numeracy tasks (mean of 34% for both)." The results from grade 3 and grade 6 studies conducted for the Province of the Eastern Cape Department of Education in 2004 and 2005 respectively consistently indicate that numeracy levels are low. The numeracy mean scores in the grade 3 study were 35%, and 18% in the grade 6 study. The pass rate for Mathematics in the Eastern Cape Province in 2004 at the end of Grade 12 was 51% compared with the national average which was 74% (Mail and Guardian 2005) We acknowledge the dilemmas in focusing on the results of such research projects as the emphasis is purely on mathematics ability defined within a very narrow discourse that ignores the situatedness of learning and frequently makes "unwarranted assumptions about mythical levels of ability" (Bishop, 2000, p.10). However, the statistics provide evidence that we, as teachers, academics and researchers are failing our young. The causes of low numeracy levels are varied and complex. This research focuses on one aspect which is the development of a positive collaboration between school, parents (or caregivers) and young children in an attempt to bridge the gap that has been identified between the rich local knowledge that children are exposed to from an early age at home, and the more formal requirements of the school environment, including the curriculum.

Mathematics learning and teaching in the Eastern Cape: Understanding the gap

The National Curriculum Statement for Mathematics (Department of Education 2002) is underpinned by the principles of the South African constitution, which promotes social, economic and political justice and equity. However, the content of the curriculum statement is based on western notions of formal mathematics and does not provide suggestions for affording equal educational opportunities for historically disadvantaged children. According to Reyes (2005) social justice advocates "believe that locally established informal learning activities by the local culture can provide content and strategies for formal learning in school. The claim is that 'foreign imports' of education from the West such as curriculum and teaching-learning methodologies have not really helped people in third world countries" (p.11). An overemphasis on 'imported learning content' ignores local knowledge and results in educational programmes that are culturally inappropriate and counter-productive. Likewise the present focus in many South African Higher Education Institutions on addressing the lack of content knowledge and mathematical understanding with teachers, while a serious issue, is often devoid of socio-cultural context and therefore, does not meet the philosophical framework of the curriculum.

Teaching and learning of mathematics in the classrooms that we have observed in Mdantsane are devoid of social-cultural relevance and the so-called benefits of a 'prototype mathematics classroom'. In many instances classrooms are completely under- resourced with insufficient desks, books and writing materials. The mathematical experiences that young children are exposed to are far different from the informal activities that occur outside the school domain. In schools learning is rigid in the sense that teachers follow a prescribed national curriculum (often ignoring local differences), use rote learning methodologies and encourage early use of symbolic mathematical representation as opposed to concrete or contextual representation. The spontaneity and freedom common in out-of-school learning activities is stifled in the formal, passive classroom environment.

Learning in schools in Mdantsane is far removed from the spontaneous, natural and authentic learning that occurs in out-of-school situations. It is crucial to understand what learning takes place outside the classroom, not only in terms of the knowledge and understandings that children bring to the classroom, but also in terms children's constructions of knowledge. While criticisms about prior learning include the development of 'inaccurate concepts' 'misconceptions "faulty reasoning', 'misinterpretation' of facts', these arguments are rooted in the discourse of mathematics as objective as opposed to acknowledging the

plurality of mathematics. An activity such as counting in an out-of-school situation is contextual and children find meaning in it as opposed to the "impersonal, mechanical, and tiresome" nature of school mathematics (Reyes, 2005, p.31; Matang, 2005; Bonotto, 2001). At the same time simply reciting the number names while counting does not constitute an understanding of counting as mathematical knowledge. Teachers need to use contexts that children are using at home to develop their formal mathematics. Without accessing and utilizing local knowledge and activities in the classroom teaching and learning "will remain just like a hollow vacuum, deterring instead of bringing out the potentials of the child's natural development process." (Reyes, 2005, p.13) As Wittgenstein argued (in Matang, 1996), mathematics is "social in nature, and inseparable from the social realm in which it is used" (p. 257).

Attempts at bridging the gap

This project is an attempt to bridge the gap between informal local knowledge and formal school knowledge by using local contexts for developing children's numeracy to "allow for an easier flow of scientific ideas with children, reducing the effects of cultural blocks" (D'Ambrosio, 1990, p. 369) and to avoid feelings of alienation often experienced by young children. Primary schools in Mdantsane were invited to participate in the project. As there was a great deal of interest in the project, schools had to justify their inclusion by ensuring that the Grade 0 and Grade 1 educators and caregivers were committed to the project. Six schools were selected to participate in the project and preliminary meetings were held at each school.

Two iimbizo (workshops) using 'open space technology' were held in two centers in Mdantsane where caregivers and teachers were required to explore local activities such as indigenous games, iintsomi, songs, rhymes, riddles and other visual art forms that children engage in that could be used to develop numeracy. There was a total of 165 participants at these iimbizo. The participants displayed high levels of enjoyment and enthusiasm and were eager to share and demonstrate their local knowledge throughout. The activities that the caregivers shared had enormous potential for developing mathematical concepts and motivating young children to mathematise familiar contexts. However, we realized at the iimbizo that the caregivers and teachers understanding of how to extrapolate the mathematics within the activities was limited. Although they were able to identify many activities that related to counting, naming numbers and one-to-one correspondence, it was evident many of the caregivers were not able to identify opportunities for concept development beyond those already mentioned, and many of them were not able to represent the numbers symbolically. We mentioned in the context that the schools in Mdantsane are under-resourced. While a lack of resources is problematic it can also provide opportunities for creativity as was evidenced within the caregivers use of recyclable materials for facilitating learning.

At the iimbizo a core group of caregivers and teachers were selected by the participants to form part of a working group. The role of the working group was to translate the local activities recommended at the iimbizo into text form. The purpose of having these activities in text form was to isolate the mathematical concepts embedded in the activities and, through the working group, to develop ways in which the mathematics within the activities can be used and furthered to relate informal learning to the formal mathematics of schools. Bishop (1991a) noted six "universal" practises necessary for developing mathematical knowledge that apply to all cultural groups. These are counting, locating, measuring, designing, playing and explaining. These are some of the practises that are currently being explored within the materials. For example, the local game 'ipuca' offers opportunities for developing children's numeracy. 'iPuca' is a game played by isiXhosa children using a circle drawn on the ground and a collection of small stones that are placed in the middle of the circle. The game is usually played in pairs with each child continuing until s/he drops the stone or removes the incorrect number of stones. The first child throws a stone up in the air and before s/he catches the stone has to move a collection of stones from the

centre of the circle, outside the circle. The stone is thrown into the air again and the child has to move all the stoned except for one back to the centre of the circle. The stone is thrown into the air each time as the child ensures that two stones, then three stones and so forth remain outside the circle. Once all the stones are outside of the circle, the challenge is to place the stones back in the circle still having to catch the stone that has been thrown up into the air each time. This game encourages counting, the use of number names, understanding the principle of cardinality, concepts such as more or less, early addition and subtraction, and spatial relationships.

A further task of the working group is to identify the mathematical concepts within each activity and to offer suggestions as to how caregivers and teachers can explore these concepts with their children as they engage with the various activities. The materials, which will be written in isiXhosa by the working group without the formalities of computer technology, will provide the focus for the next phase of the project. In this phase it is hoped that caregivers and educators will explore the materials together with their children and provide feedback with regards to the suitability and effectiveness of these materials in bridging the identified gap. For Bishop (1991a, p.33) the way in which cultures engage in these activities, "in a sustained and conscious manner" gives real meaning to mathematics. The strength of the project will depend on the ability and will of the participants to translate the local knowledge and activities related to these universal practises into the formal curriculum thus promoting "formal mathematical enculturation" (Bishop, 1991b, p. 89). Within the project, in order to bridge the gap, it will be crucial to maintain an equilibrium between local knowledge and the formal knowledge required by the curriculum.

As Bishop (1991b) expanded:

> To ignore the *[local knowledge]* would lead to indoctrination, while to ignore the *[formal knowledge of the curriculum]* would lead to anarchy. Mathematical enculturation needs to be conceptualised as a social interactive process carried out within a certain knowledge frame but with the goal of recreating and redefining that frame (p. 89).

In-school mathematical experiences are necessary to extend and formalise the informal mathematical knowledge that children develop out-of-school. The challenge is to encourage teachers, used to rigid and formal methodologies, to enable children to see the interconnectedness of different mathematical processes thereby encouraging them to become part of the mathematical community and to see themselves as mathematicians who are engaging with ideas.

> A cherished antinomy in teaching and learning mathematics is putting on one side of a deep gorge such noble ideas as insight, understanding, thinking [local meaningful learning], and on the other side such base things as rote, routine, drill, memorising, algorithms [associated with formal mathematics]. … However, it is not that simple, and it has never been so ... firstly because the question is not which side of the gorge to choose but rather to bridge it by the learning process that I called schematising and formalising (Freudenthal as quoted in Bonotto, 2001, p.82).

The way forward for 'Masifunde Nosapho'

We believe that in order for the learning and teaching of mathematics to remain embedded within socio-cultural contexts and simultaneously to reflect global ideas and practices it is necessary for teachers and children to be able to "interpret, even critically, the reality they live in, to understand its codes and messages so as not to remain excluded or be misled." (Bonotto, 2001, p.76) To do this in the context of learning in early childhood, we believe that teachers and caregivers need to collaboratively create opportunities to investigate the mathematics embedded in local activities. "In other words we want to encourage the children to recognize a large variety of situations as mathematical situations or more precisely as "mathematizable" situations" (Bonotto, 2001, p.77). As mentioned earlier in the paper the

National Curriculum Statement for Mathematics presents a western view of mathematics and so the onus is on the teachers, with assistance of caregivers, to utilize local knowledge and activities to make learning meaningful and real. In order to do this, teachers need to find opportunities and resources related to the socio-cultural environment of the children, and use these to initiate mathematical learning opportunities both inside and outside the classroom.

However, we realize that in order to develop a mathematics curriculum that addresses the transformation needs of our society; it is imperative that learning and teaching are not simply reliant on local knowledge and activities, but that learners start to critically investigate the social implications of different knowledge forms.

Conclusion

In an attempt to bridge the gap between informal out-of-school learning and formal in-school learning that is largely based on an imported mathematics curriculum that is not necessarily contextualised or relevant to the young children in our province, the 'Masifunde Nosapho' project, through collaboration with teachers and caregivers, explores opportunities for mathematising local activities. Historically caregivers have had little input on their children's education once they start school. ITEC believes strongly in forming partnerships between teachers and caregivers and this belief is central to the project. Our experiences thus far illustrate that caregivers are enthusiastic about sharing local knowledge and exploring opportunities with the teachers to develop their children's conceptual understanding of Mathematics. We hope that this enthusiasm will translate into the development of sustainable and committed efforts at bridging the gap by bringing everyday context-based learning activities into mathematics classrooms.

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